University Calendar For 1983-84

Winter Quarter, 1983

January 3-4 (Monday-Tuesday) Registration
January 5 (Wednesday) Classes Begin
January 31-February 4 (Monday-Friday) Advance Registration for Spring 1983
February 8 (Tuesday) Change of Registration Deadline
March 15 (Tuesday) Classes End
March 18 (Friday) Commencement

Spring Quarter, 1983

March 24-25 (Thursday-Friday) Registration
April 1-2 (Friday-Saturday) Classes Begin
April 29 (Friday) Easter (No Classes)
May 2-6 (Monday-Friday) Change of Registration Deadline
May 23-27 (Monday-Friday) Advance Registration for Summer 1983
June 6 (Monday) Classes End
June 9 (Thursday) Commencement

Summer Quarter, 1983

June 13-14 (Monday-Tuesday) Registration, First or Both Terms
June 16 (Wednesday) Classes Begin
July 4 (Monday) Independence Day (No Classes)
July 5 (Tuesday) Change of Registration Deadline, First Term
July 18-19 (Monday-Tuesday) Registration, Second Term
July 19 (Tuesday) Classes End
July 20 (Wednesday) Advance Registration for Fall 1983
July 25-29 (Monday-Friday) Change of Registration Deadline, Full Term
August 8 (Monday) Classes Begin
August 22 (Monday) Second Term
August 24 (Wednesday) Classes End

Fall Quarter, 1983

September 19-21 (Monday-Wednesday) Registration
September 22 (Thursday) Classes Begin
October 26 (Wednesday) Change of Registration Deadline
October 28 (Friday) East Tenn Educ Assoc (No Classes)
November 12 (Saturday) Classes End

Winter Quarter, 1984

January 3-4 (Tuesday-Wednesday) Registration
January 5 (Thursday) Classes Begin
February 6-10 (Monday-Friday) Advance Registration for Spring 1984
February 8 (Wednesday) Change of Registration Deadline
March 14 (Wednesday) Classes End
March 16 (Friday) Commencement

NOTE: Deadlines for degree requirements described on pp. 21-22.
The University of Tennessee, Knoxville does not discriminate on the basis of race, sex, color, religion, national origin, age, handicap, or veteran status in provision of educational opportunities or employment opportunities and benefits.

UTK does not discriminate on the basis of sex or handicap in the education programs and activities which it operates, pursuant to the requirements of Title IX of the Education Amendments of 1972, Pub. L. 92-318; and Section 504 of the Rehabilitation Act of 1973, Pub. L. 93-112; respectively. This policy extends to both employment by and admission to the University.

Inquiries concerning Title IX and Section 504 should be directed to the Office of the Vice Chancellor for Planning and Administration, 525 Andy Holt Tower, 974-4391. Charges of violation of the above policy should also be directed to the Office of the Vice Chancellor for Planning and Administration.

The University of Tennessee, Knoxville, does not discriminate on the basis of sex, color, religion, national origin, age, handicap, or veteran status in provision of educational opportunities or employment opportunities and benefits.
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Thomas L. Bell, B.A., M.A., Ph.D., Assistant Dean for Research
Diana C. Lopez, B.S., M.S., Director, Graduate Admissions and Records
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Kenneth E. Harwell, B.S., M.S., Ph.D., Dean, UT Space Institute
A. A. Mason, B.S., Ph.D., Associate Dean, UT Space Institute
Marvin Goodman, B.S., M.S., Director, Kingsport Graduate Program
David A. Johnson, B.A., M.C.P., Ph.D., Director, Graduate School of Planning
W. Edgar Barnett, B.S., M.S., Ph.D., Director, UT-Oak Ridge Graduate School of Biomedical Sciences
William F. Brandes, M.S., P.E., Director, Water Resources Research Center
Jerry D. Westbrook, B.E., M.S., Ph.D., Director, Nashville Graduate Engineering Program and Oak Ridge Resident Graduate Program
Ann E. Prentice, B.A., M.L.S., D.L.S., Director, Graduate School of Library and Information Science
Kenneth W. Heathington, B.S., M.S., Ph.D., Director, Transportation Center
Edward Lumsdaine, B.S., M.S., Ph.D., Director, Energy, Environment, and Resources Center

The Graduate Council
Membership January 1, 1982

| Ex Officio Members                                      | Appointment Date | Proxy
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<td>L. Evans Roth, Vice Chancellor</td>
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<td>Clarence W. Minkel, Dean</td>
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<tr>
<td>Thomas Hood, Chairperson for Research Council</td>
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<td>Mary P. Richards, Associate Dean</td>
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<td>Thomas H. Klindt, Assistant Dean</td>
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| Appointed Members                                      | Appointment Date | Proxy
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<td>Dr. W. Edgar Barnett</td>
<td>Dec. 31, 1982</td>
<td>Dr. Curtis Melton</td>
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<td>Dr. Kenneth Heathington</td>
<td>Dec. 31, 1982</td>
<td>Dr. Ronald E. Shriever</td>
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<td>Dr. David A. Johnson</td>
<td>Dec. 31, 1982</td>
<td>Dr. Norman E. Dittrich</td>
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<td>Dr. Richard J. Courtney</td>
<td>Dec. 31, 1982</td>
<td>Dr. Kent M. Sidel</td>
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| College or Unit                                       | Elected Members | Date of Expiration | Proxy
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<tr>
<td>Col. of Agriculture</td>
<td>Dr. Luther Wilhelm</td>
<td>Dec. 31, 1983</td>
<td>Dr. Donald J. Dickenson</td>
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<td>Col. of Bus. Admin.</td>
<td>Dr. David J. Barnaby</td>
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<td>Dr. Alan D. Fletcher</td>
<td>Dec. 31, 1982</td>
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<td>Col. of Education</td>
<td>Dr. Don B. Franks</td>
<td>Dec. 31, 1984</td>
<td>Dr. Charles F. Moore</td>
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<tr>
<td>Col. of Engineering</td>
<td>Dr. T. McN. Simpson</td>
<td>Dec. 31, 1982</td>
<td>Dr. Charles O. Jackson</td>
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<tr>
<td>Col. of Home Economics</td>
<td>Dr. Marcil Milligan</td>
<td>Dec. 31, 1983</td>
<td>Mr. George Daniel</td>
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<tr>
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<td>Dr. Imogene Ford</td>
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<td>Ms. Lindy Gilbert</td>
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<td>Dec. 31, 1982</td>
<td>Dr. John H. Fisher</td>
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<td>Dr. John H. Fisher</td>
<td>Dec. 31, 1982</td>
<td>Dr. T. McN. Simpson</td>
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<td>UT Space Institute</td>
<td>Dr. Roger M. Nooe</td>
<td>Dec. 31, 1982</td>
<td>Dr. Charles O. Jackson</td>
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<tr>
<td>Col. of Vet. Med.</td>
<td>Dr. Gideon Fryer</td>
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<td>Dr. Robert L. Young</td>
<td>Dec. 31, 1982</td>
<td>Ms. Lindy Gilbert</td>
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<td>Dr. J. B. Jones</td>
<td>Dec. 31, 1982</td>
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| Graduate Student Council                              | Mr. George Daniel | Apr. 30, 1983 | Dr. Mildred Fenske |
|                                                        | Ms. Lindy Gilbert | Apr. 30, 1983 | Dr. Robert Bonovich |
| Col. of Nursing                                       | Dr. Sylvia E. Hart | Dec. 31, 1983 | Dr. George W. Ayres |
| School of Social Work                                 | Dr. Roger M. Nooe | Dec. 31, 1984 | Dr. Maurice A. Wright |
| UT Space Institute                                    | Dr. Gideon Fryer  | Dec. 31, 1983 | Dr. J. B. Jones |
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Lookout Mountain
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Marcia A. Echols,
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TERM EXPIRES
June 1, 1984
June 1, 1986
June 1, 1988
June 1, 1987
June 1, 1991
June 1, 1990

From Anderson, Bedford, Coffee,
Franklin, Lincoln, Moore, and
Warren Counties
Charlotte Parish
TERM EXPIRES
June 1, 1988
June 1, 1984
June 1, 1987
June 1, 1989
June 1, 1989
June 1, 1990
June 1, 1990

From Weakley County
James F. Harrison
TERM EXPIRES
June 1, 1990

Student Member
Jan Petri

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Linda Logan, Assistant Secretary

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Elaine McReynolds
June 1, 1984
From Hamilton County
Paul J. Kinser
June 1, 1987
From Knox County
Ann Baker Furrow
June 1, 1989
James A. Haslam, III
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June 1, 1990
Jack Craddock
June 1, 1990

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C. Warren Neel, B.S., M.B.A., D.B.A., Dean of the College of Business Administration
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William H. Coffield, B.S., M.A., Ph.D., Dean of the College of Education
Robert E. Weaver, B.S., Ch.E., M.S., M.A., Ph.D., Dean of the College of Engineering
Nancy H. Belick, B.S., M.S., Ph.D., Dean of the College of Home Economics
Kenneth L. Penegar, A.B., J.D., LL.M., Dean of the College of Law
Robert G. Landen, A.B., A.M., Ph.D., Dean of the College of Liberal Arts
Sylvia E. Hart, B.S.N., M.S.N., Ph.D., Dean of the College of Nursing
Hyram Kitchen, M.S., D.V.M., Ph.D., Dean of the College of Veterinary Medicine
Joseph P. Goddard, B.S., M.S., Ed.D., Dean of the Division of Continuing Education
John J. McDow, B.S., M.S., Ph.D., Dean of Admissions (Undergraduate) and Records
### Majors and Degrees Available

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<th>MAJOR</th>
<th>DEGREE</th>
<th>ADMISSION TEST REQUIRED</th>
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<td>*Food Systems Administration</td>
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<td>*Home Economics</td>
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<td>X</td>
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<td>College of Engineering</td>
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<td>*Industrial and Organizational</td>
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<td>*Management Science</td>
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<td>or X</td>
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<td>*Art</td>
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<td>*Botany</td>
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<td>*English</td>
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<td>Geography</td>
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<td>*Music</td>
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<td>*Speech Pathology</td>
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<td>Speech and Theatre</td>
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<td>*Theatre</td>
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<td>(Knoxville, Memphis, Nashville)</td>
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</table>

*Non-degree and provisional students must obtain permission from the department/program head in order to register for courses in these fields.

1 American applicants only.
2 International applicants only.
3 EdS applicants only.
4 EdD applicants only.
5 PhD applicants only.
6 Department doctoral option offered under the major of home economics.
7 Interdisciplinary option offered in each department.
8 Offered at UT Space Institute.
9 G.S. Rating Form submitted to Graduate Office.
10 G.S. Rating Form submitted to Department.
11 Forms obtained from & returned to Department.
12 For Financial Assistance only.
The Graduate School

L. Evans Roth, Vice Chancellor for Graduate Studies and Research
Clarence W. Minkel, Dean for Graduate Studies
Maria P. Peterson, Dean for Research
Thomas L. Bell, Assistant Dean for Research
Mary P. Richards, Associate Dean for Graduate Studies
Thomas H. Klinck, Assistant Dean for Graduate Studies

The University of Tennessee, Knoxville is the official land-grant institution for the State of Tennessee. It is a comprehensive institution offering a wide range of graduate programs leading to the Master's and doctoral degrees. The University offers Master's programs in 118 fields of specialization and doctoral work in 52. Approximately 6,000 graduate students are enrolled both on and off campus. Administration of graduate student policies and procedures, and associated record keeping, is the responsibility of the Dean for Graduate Studies. Much of the day-to-day administration of graduate study is conducted by department heads or faculty advisors and committees responsible for particular programs. In addition to departmental units, numerous interdisciplinary programs, institutes and centers have been developed on campus and in locations around the state.

The Graduate School brings together faculty and graduate students as a community of scholars with a common interest in creative work and advanced study. Graduate programs are available to students desiring full-time work toward the Master's and doctoral degrees or professional certification, those interested in continuing education for updating and broadening knowledge, and those pursuing postdoctoral research. Traditionally, universities have provided graduate programs primarily for full-time, degree-oriented students. Serving the needs of students engaged full-time in intensive study and pursuit of a degree continues to be a major emphasis of UTK's graduate effort. At the same time, the University employs a variety of modes, traditional and non-traditional, in offering quality programs designed to serve students.

The policies of The Graduate School are made by the Graduate Council, a body composed of elected representatives from each college, the School of Social Work, the Space Institute, the Graduate Student Council, and five members appointed by the Vice Chancellor for Graduate Studies and Research. Ex-officio members include the Vice Chancellor, the Dean for Graduate Studies, the Associate Dean for Graduate Studies, the Assistant Dean for Graduate Studies, and the Chair of the Research Council. The Graduate Office develops procedures to carry out the policies made by the Council, and has primary responsibility for Graduate School admissions and records. A graduate student must assume full responsibility for knowledge of rules and regulations of The Graduate School and departmental requirements for the chosen degree program. Individual colleges and departments may have requirements beyond the minimum established by The Graduate School. The Graduate School News, published quarterly, includes a calendar of deadlines, new policies and procedures of The Graduate School, and changes in degree programs. The News contains the latest information on Graduate School matters, some of which may supersede this catalog. Copies of the News are available at the Graduate Office. The News contains information on Graduate School matters, some of which may supersede this catalog. Copies of the News are available at the Graduate Office.

Admission and Registration

Admission to The Graduate School requires a Bachelor's degree with a satisfactory grade point average from a college or university accredited by the appropriate regional accrediting agency. Admission to The Graduate School does not ensure acceptance into a specific degree program nor admission to candidacy for the degree desired. When a student is admitted to The Graduate School prior to having received the baccalaureate degree, that degree must be awarded prior to the date of first registration in The Graduate School. If a student does not enroll within one year after the requested admission, he/she must repeat the application process.

Types of Admissions

Admission to a Graduate Degree Program:
Admission to a degree program requires a minimum grade point average of 2.5 out of a possible 4.0, or a 3.0 during the senior year. However, many departments require a higher average. A minimum B average is required for international students.

In order to earn graduate credit, a student must be enrolled in one of the categories listed below. Course work taken in any other status is ineligible for graduate credit and cannot be changed to graduate credit.

In addition to meeting the minimum requirements for admission to The Graduate School, applicants at the doctoral level must have demonstrated a potential for superior academic performance. To be considered are such criteria as performance in prior undergraduate and/or graduate studies, achievement on admission tests for graduate studies, letters of recommendation from professors familiar with the applicant's capabilities, and similar evidences of scholarly achievement.

Refer to pages 8-9 and to description of programs for specific requirements for admission.

Non-Degree Admission: Applicants may apply for non-degree status who, for example:
1. do not desire to pursue a degree program;
2. have received an advanced degree;
3. need additional time to fulfill application requirements for a degree program.

There is no specific limit on the number of courses that a student may take in non-degree status. However, within 18 hours of graduate course work in this status, the student must either:
1. apply and be admitted to a specific degree program (see Change of Program, p. 15, for instructions); or
2. File a Plan of Study form with the Graduate Office for approval to continue taking courses in non-degree status. The plan of study must include a stated educational objective and a list of courses proposed to achieve that objective. Application for a maximum of 18 graduate hours taken before acceptance into a degree program may be applied toward a graduate degree, if approved by the student's committee. Courses applied toward any graduate degree must fall within the time limit specified for the degree.

The graduate application, $10 application fee, and two (2) official transcripts from each institution previously attended are required for consideration as a non-degree student. The minimum requirements are a Bachelor's degree with a 2.5 grade point average on a 4.0 scale (or a 3.0 the senior year) from a college or university accredited by the appropriate regional accrediting agency.

A major area need not be declared, but some departments do not permit provisional students to register for graduate courses. (See pages 8-9 for information on restricted programs.) Applicants should contact the Graduate Office or the department concerning registration for specific courses. Permission to register in courses allowed may be obtained from the department or from The Graduate School.

Admission to non-degree status does not assure admission to a degree program. The student who hopes to enter a degree program will be directed to the appropriate department. Students must maintain a 3.0 grade point average to continue enrollment in this status.

An international student on a non-immigrant visa may not enroll in the non-degree program. Provisional Admission: Applicants may be admitted as provisional students for one quarter (or, for one course in each of two quarters) who, for example:

1. Desire graduate credit for a limited number of courses;
2. Do not meet the minimum grade point average requirements;
3. Wish to take graduate courses while meeting any additional requirements for the non-degree admission.

The graduate application, $10 application fee, and proof of a Bachelor's degree from a regionally accredited institution are required. Copies of official proof are acceptable.

A major area need not be declared, but some departments do not permit provisional students to register for graduate courses. (See pages 8-9 for information on restricted programs.) Applicants should contact the Graduate Office or the department concerning registration for specific courses. Permission to register in courses allowed may be obtained from the department or from The Graduate School.

Eligibility of Seniors: Subject to approval by The Graduate School, a senior at UTK who needs fewer than 45 quarter hours to complete the requirements for a Bachelor's degree and who has at least a B average (3.0) may enroll in graduate courses for graduate credit. The student must meet all admission criteria, complete the requirements for a Bachelor's degree and has at least a B average (3.0) may continue enrollment in this status. The student who fails to complete the requirements for a Bachelor's degree within the period of registration as a student; and (3) certification of English proficiency. Every student whose native language is not English must either submit a score of at least 525 on the Test of English as a Foreign Language (TOEFL), taken within the past two years, or have taken a degree from a U.S. or Canadian institution, an exception may be made to enter the winter or spring quarters. Requests must be in writing by the student and endorsed by the Graduate Office to issue the 1-20 or IAP-66 needed to register for specific courses. Permission to register in courses allowed may be obtained from the department or from The Graduate School.

Necessary forms may be obtained from the Graduate Office.

Eligibility of Seniors: Subject to approval by The Graduate School, a senior at UTK who needs fewer than 45 quarter hours to complete the requirements for a Bachelor's degree and who has at least a B average (3.0) may enroll in graduate courses for graduate credit. The student must meet all admission criteria, complete the requirements for a Bachelor's degree and has at least a B average (3.0) may continue enrollment in this status. The student who fails to complete the requirements for a Bachelor's degree within the period of registration as a student; and (3) certification of English proficiency. Every student whose native language is not English must either submit a score of at least 525 on the Test of English as a Foreign Language (TOEFL), taken within the past two years, or have taken a degree from a U.S. or Canadian institution, an exception may be made to enter the winter or spring quarters. Requests must be in writing by the student and endorsed by the Graduate Office to issue the 1-20 or IAP-66 needed to register for specific courses. Permission to register in courses allowed may be obtained from the department or from The Graduate School.

Enrollment of Veterinary Medicine Students in Graduate Courses: A student in good standing at a college or university in the British systems. Other grading systems will be evaluated upon receipt of transcript. Admission of International Students: The Graduate School can accept only students who have outstanding records. An international student must have an equivalent 4-year Bachelor's degree with at least a B average on all course work and a B + on all previous graduate work. On varying grade scales, this would indicate:

a. 3.0 and 3.5 on a 4.0 scale;
b. 14 and 15 on 20 point scale;
c. 80.0 from Chinese institutions;
d. 1st Class or Division from Indian institutions;
e. Upper 2nd Class Honors on various British passing grades

Approval must be obtained each quarter for graduate credit, without being admitted to The Graduate School, under the following conditions:

1. The student's advisor must approve in advance the student's enrollment in course each course.
2. The student may take a maximum of 15 quarter hours of graduate courses during the D.V.M. program.
3. Approval must be obtained each quarter at registration through the Graduate Office. The student's progress is subject to review and approval each quarter by the Associate Dean, College of Veterinary Medicine.

Admission of Faculty Members: Faculty members of UTK or the Institute of Agriculture at the rank of assistant professor or above, and employees of the administrative staff at UTK, the UT Central Administration, and the Institute of Agriculture will not normally be admitted to candidacy for a doctoral degree at UTK. Exemptions may be granted on an individual basis. Further information is provided in the Faculty Handbook. Possible conflict of interest will be a major factor considered in the review of any request.

Admission Procedures

Any student admitted to the non-degree program must receive permission from The Graduate School to register for a second or succeeding quarter if admission to the non-degree program status has not been obtained. To be admitted to the non-degree or degree status, the student must earn at least a 3.0 grade average in all course work (graduate and undergraduate) taken in provisional status, to include at least six hours of graduate work. The Graduate Office will process the revision to non-degree status if all requirements are met. To apply for a specific degree program, the student must submit the Request for Revision of Graduate Program form to the Graduate Office. Provisional admission does not assure admission to the non-degree or degree program. A student who hopes to enter a degree program will be directed to the appropriate department.

The student who fails to complete the requirements for a Bachelor's degree or degree program within the period of registration as a student; and (3) certification of English proficiency. Every student whose native language is not English must either submit a score of at least 525 on the Test of English as a Foreign Language (TOEFL), taken within the past two years, or have taken a degree from a U.S. or Canadian institution, an exception may be made to enter the winter or spring quarters. Requests must be in writing by the student and endorsed by the Graduate Office to issue the 1-20 or IAP-66 needed to register for specific courses. Permission to register in courses allowed may be obtained from the department or from The Graduate School.

The application, $10 application fee, official translated copies of all previous college-level education, certification of English proficiency, and other documents required by the specific program (if any) must be submitted to the Graduate Office at least six months in advance of the quarter in which the student desires entrance. Admission must be granted and financial documentation must be received by August 1 for the fall quarter, and May 1 for the summer quarter, to enable the Graduate Office to issue the 1-20 or IAP-66 needed to obtain a visa for the University. The University will not enroll any student who has not been approved initially or for transfer by the Immigration and Naturalization Services (INS) to attend UTK. An international student may not enroll as a provisional or non-degree student.

All students whose native language is not English must take the English proficiency examination after arrival at UTK. Refer to section on English Proficiency, page 15.

Transient Graduate Students: A student who has been enrolled in a graduate degree program at another institution and who wishes to take courses for transfer to that institution may be admitted after submitting a completed Graduate Application for Admission, the $10 application fee, and a Transient Student Certification 10 days prior to registration. Only one quarter, or a maximum of 12 hours, of course work can be taken in transient status. Necessary forms may be obtained from the Graduate Office.

Approval must be obtained each quarter at registration through the Graduate Office. The student's progress is subject to review and approval each quarter by the Associate Dean, College of Veterinary Medicine.

Admission of Faculty Members: Faculty members of UTK or the Institute of Agriculture at the rank of assistant professor or above, and employees of the administrative staff at UTK, the UT Central Administration, and the Institute of Agriculture will not normally be admitted to candidacy for a doctoral degree at UTK. Exemptions may be granted on an individual basis. Further information is provided in the Faculty Handbook. Possible conflict of interest will be a major factor considered in the review of any request.
Failure to pay tuition and fees before the deadline listed each quarter in the Timetable of Classes will result in the assessment of a late registration fee. Retroactive registration is not permitted.

Family Educational Rights and Privacy Act

This act provides for confidentiality of student records; however, it also provides for basic identification of persons at UTK without the consent of the individual. Release of information to third parties includes directory information such as contained in the campus telephone book and sports brochures. Such information may include name, address, telephone number, date and place of birth, major, dates of attendance, degree and awards, the most recent previous educational agency or institution attended, participation in school activities and sports, and weight and height (for special activities).

Notice of the categories to be contained in a publication of directory information. A period of one week is provided during which a student may request that such information not be released.

Student Identification Number

UTK requires assignment of an individual student number for internal identification of each student’s record. The University began using the social security number as the student identification number prior to January 1, 1975; therefore, the federal law allows continued use of this number. However, if a student does not desire the social security number to be used, notification to the University must be made at the time of application for admission; a student identification number will be assigned instead. For prompt and accurate retrieval of records and for conducting business about their own records, students and alumni must give their student identification number. Student identification numbers, whether a social security number or an assigned number, are used administratively within the University only and are not given to third parties without expressed consent of the student.

Fees, Residency Classification, and Financial Aid

University Fees

University fees are determined by the Board of Trustees and are subject to change without notice. The general fees in effect for graduate students are as follows:

APPLICATION FEE: $10

Each graduate application for admission must be accompanied by a fee of $10 before it will be processed. (Fee not required if: (1) former UTK graduate student; or (2) previously paid to UTK Graduate School within past 12 months.)

If a student applies but does not enter graduate school within twelve months after date of requested admission it will be necessary to resubmit the $10 application fee and application. This fee is not refundable.

MAINTENANCE FEE (all students): PER QUARTER $303

TUITION (additional for out-of-state students): PER QUARTER $587

NOTE: In lieu of the above charge for tuition and/or maintenance fee, part-time students may elect to pay fees computed by the quarter hour credit (or audit) as follows:

- In-State:
  - $44 per quarter hour or fraction thereof; minimum charge $132.
  - Out-of-State:
    - $102 per quarter hour or fraction thereof; minimum charge $306.

UNIVERSITY PROGRAMS AND SERVICES FEE:

- The fee for the summer quarter is $35.
- Part-time students taking fewer than 9 quarter hours will be assessed at the rate of $3 per quarter hour or fraction thereof; minimum charge $9.
- Graduate and teaching assistants, as well as fellowship students who may have waiver of fees (tuition and/or maintenance), must pay the appropriate University Programs and Services Fee.

Knoxville campus students taking a course load of 6-8 hours may elect to pay the full programs and services fee.

Knoxville campus day students taking a course load of 3-8 hours may elect to pay the $13 student health fee plus the appropriate part-time programs and services fee. The student health fee is included in the full $46 programs and services fee.

This fee is not refundable.

LATE REGISTRATION FEE:

- All students are required to have a validated fee receipt to complete the registration procedure. This includes students whose fees are billed, prepaid, or waived. Students who do not complete registration on the regular dates scheduled for this purpose will be charged a late registration fee of $2 up to $55.
- See the University General Catalog for application of this fee. Doctoral students who must register retroactively for dissertation work may elect to pay the $13 student health fee plus the appropriate part-time programs and services fee. The payment of fees with a check which is not honored by the bank will incur a service charge of $10 to $45, depending on the date the check is redeemed.

MUSIC FEE:

- One-half-hour lesson per week, per quarter \( \ldots \) $20
- One-hour lesson per week, per quarter \( \ldots \) $40

Payable at registration by students receiving individual instruction in music.

GRADUATION FEE:

- Master's degree candidates \( \ldots \) $16
- Doctoral degree candidates \( \ldots \) $46

There is no additional charge for diploma, transcript, binding, or microfilming. The graduation fee is non-refundable and is valid for three quarters after the quarter in which it is paid.

DEFERRED PAYMENT SERVICE FEE: \( \ldots \) $5

This fee is applicable when the payment of
any part of a student's account is deferred, including accounts which must be billed to outside agencies, foundations, and institutions. This fee is also applicable when any additional charge (out-of-state tuition, music fee, room and board adjustment) is not paid within five regular business days after the date it was incurred. It is the student's responsibility to take the initiative to pay all University obligations promptly.

FEES FOR COURSES NOT TAKEN FOR CREDIT:
Fees for courses audited are the same as for courses taken for credit. For fee purposes, courses listed for 0 credit hours are considered as one-hour courses.

REFUND OF FEES FOR WITHDRAWAL:
Withdrawal from school for the quarter after receiving a schedule must be by official notification to the Withdrawal Office, Student Counseling Services Center, 900 Volunteer Boulevard, whether or not fees have been paid, classes have been attended, or the schedule is incomplete. Failure to attend class does not automatically withdraw or drop a student from school.

The effective date of withdrawal is the date the Withdrawal Office is notified by completion of the official withdrawal request form. The appropriate percentage of fees will be charged unless this is completed by the close of the last day designated for regular registration and before the first official day of classes for the quarter. Failure to notify the Withdrawal Office promptly when withdrawing could result in a subsequent audit and verification. Withdrawal does not cancel fees and charges already incurred. The drop/add procedure must not be used to withdraw from school for the quarter.

For a regular academic quarter, withdrawal within 7 calendar days beginning with the first day following regular registration permits a 90 percent fee refund. Withdrawal between 8 and 14 calendar days following regular registration permits a 70 percent fee refund. Withdrawal between 15 and 21 calendar days following regular registration permits a 50 percent fee refund. Withdrawal between 22 and 28 calendar days following regular registration permits a 30 percent fee refund. The above withdrawal refund policy does not apply to the off-campus Graduate Centers. Refunds, in accordance with the withdrawal refund policy, will be made after the drop deadline.

Part-time students may pay fees computed at the appropriate quarter-hour rate as indicated above. No charge is made for courses dropped during the first 5 calendar days following regular registration. A 40 percent charge is made for courses dropped between 6 and 21 calendar days following regular registration, and a 100 percent charge is made for courses dropped after 21 days. Students who drop courses are eligible for a refund only if the sum of the charges computed at the quarter-hour rate for the hours continued plus the percentage assessed for the hours dropped results in an amount less than that paid. A course on a student's schedule is officially dropped and becomes effective on the date that the charge of registration form is processed on a drop/add terminal from school of classes. A refund due for dropped courses will be made after the final audit at the end of the quarter.

Rental charges and adjustments will be determined by the Office of Residence Halls in accordance with the terms of the housing agreement contract.

SUMMER QUARTER FEES AND EXPENSES:
Fees and expenses for the summer quarter are the same as for the other quarters during the academic year with the exception of the University programs and services fee as noted above.

Although the summer quarter is divided into terms of varying lengths, tuition and fees are assessed at the regular quarter-hour rate up to the maximum charge for a complete regular quarter.

The refund policy covering withdrawals and dropped courses for the summer quarter is based on the length of the term for the course(s) dropped. No refund is applicable to term courses dropped later than 14 calendar days after the regular registration day for the course(s) involved.

WAIVER OF FEES:
Graduate assistants, teaching assistants, and others whose fees are billed, prepaid, or waived must file a formal request on a form available at the Bursar's Office, where they should have their fee receipts validated and supply necessary details concerning fee payment waiver.

NOTE: All fees are subject to change.

All charges and refunds will be made to the nearest even dollar. All charges are subject to subsequent audit and verification. The University reserves the right to correct any errors in fee or rental payments by appropriate additional charges or refund. Other information on fees, expenses, refunds, and adjustments is given in the Timetable (schedule of classes) for each quarter.

The University is authorized by statute to withhold diplomas, grades, transcripts, and registration privileges until student debts and obligations (other than Student Loan Fund notes) owed to the University are satisfied.

Residency Classification for Tuition Purposes

When a prospective student applies to The Graduate School, he/she is notified of residency classification (in-state or out-of-state) for tuition purposes.

Classification is based on information supplied in the Graduate Application for Admission. A student does not acquire in-state residency status while enrolled full-time at a higher educational institution in Tennessee. Proof of in-state residence is the responsibility of the individual.

A student who is classified out-of-state (1) resides in Tennessee, (2) works full-time in the state or at Fort Campbell, Kentucky, and (3) desires to attend school on a part-time basis (maximum 6 hours of course work per quarter), is eligible for a waiver of out-of-state tuition. The student must apply for the waiver prior to the date of registration each quarter. Forms are available from the Residency Clerk at the Graduate Office.

A student wishing to appeal a residency classification should contact the Residency Clerk at the Graduate Office, who will provide an application for reclassification and a copy of the State regulations. The application should be submitted on or before the last day of registration for a given quarter, if the student is to be considered for reclassification that quarter.

Academic Common Market

The Academic Common Market is an interstate agreement among Southern states for sharing unique programs. Participating states are able to make arrangements for their residents who qualify for admission to enroll in specific programs at UTK on an in-state tuition basis, where these programs are not available in the state of residence.

Cooperating states in the Academic Common Market are Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, South Carolina, Tennessee, Texas, Virginia and West Virginia. Twenty doctoral, one Specialist in Education, and sixteen Master's programs at UTK are approved by the Academic Common Market for residents of these various states to enroll at in-state tuition rates.

Residents of one of the member states who would like further information should contact the Residency Clerk at the Graduate Office or the Southern Regional Educational Board, 130 Sixth Street, N.W., Atlanta, GA 30313.

Financial Aid

UTK offers several types of financial assistance for which graduate students can apply.

Assistantships and Fellowships: Graduate assistantships, scholarships, and traineeships are offered through many departments. Information concerning these types of assistance can be obtained from the department in which the student plans to study.

The Hilton A. Smith Graduate Fellowships for full-time study at UTK are awarded on the basis of scholarly performance as evidenced by grades and faculty recommendations. Candidates from any field of study are invited to apply if they have a 3.4 grade point average or above in all previous academic work. The fellowships include tuition, fees, and maintenance fees. Application packets are available from the Graduate Office after November. Completed applications, including all supporting materials, must be submitted to the Assistant Director of Graduate Admissions by February 15. Offers of awards will be announced by March 15.

Employment: Three sources of student employment are coordinated by the Office of Scholarships and Financial Aid. (1) The federally-sponsored College Work-Study Program provides part-time jobs for students having demonstrated financial need by the Financial Aid Office's Statement. (2) Job Location and Development Office lists off-campus, part-time, and full-time job opportunities with agencies and companies throughout the Knoxville area. Job interviews and minimal processing are required. (3) On-campus, part-time job opportunities are listed by the Student Employment Service. This listing of part-time jobs is based upon requests from on-campus agencies. Referrals are made in accordance with a student's skills and interests regardless of financial need.

Students needing either part-time or...
full-time employment are urged to contact the Job Location and Development Office. The Office of Scholarships and Financial Aid will endeavor to obtain job opportunities for every interested student.

Loans: Three types of loans are administered by the Office of Scholarships and Financial Aid: (1) National Direct Student Loans; (2) The University of Tennessee Student Loans; (3) Guaranteed Student Loans, financed by certain cooperative credit unions. The student should allow for three months' total processing time when applying for a loan.

Students must apply through the Office of Scholarships and Financial Aid for all loan programs.

Financial aid programs, policies and procedures are subject to change. Students receiving financial aid are expected to maintain satisfactory financial aid progress standards. Information and applications can be obtained from the Office of Scholarships and Financial Aid.

Veterans' Benefits: Veterans, and widows or children of certain deceased or disabled veterans, who have been admitted to a degree program, can apply for benefits by contacting the Veterans Affairs Office. Maximum benefits are paid by the Veterans Administration for course loads of 9 or more graduate hours each quarter.

Grundke Regulations of The Graduate School

Advisor/Major Professor

Every graduate student must have an advisor from the major department. This professor advises the student about courses, supervises the student's research, and acts as a channel of communication within the major department, to other departments and to The Graduate School. The advisor must approve the student's program before each registration and also must approve any changes in it. Many departments assign a temporary assistant to direct the entering student's work during the period in which the student is becoming acquainted with the institution and determining the focus of research interests, and in which the department is forming a judgment concerning the candidate's promise as a scholar. As early as appropriate the student requests a professor in the major department to serve as the major professor. The major professor and student together select a graduate committee.

Prerequisites

Graduate work in any program must be preceded by sufficient undergraduate work in the major and related fields to satisfy the department that the student can do graduate work successfully in the chosen field. Individual undergraduate records are examined and evaluated by the appropriate department before admission to a degree program. Questions about program prerequisites should be addressed to the advisor.

Explanation of Course Listings

Each course listing in the Graduate Catalog contains information in an abbreviated form. The course number indicates the level at which the course is taught. All 5000-6000 level courses are graduate courses. The 3000-4000 level courses are undergraduate courses available for graduate credit if listed in the Graduate Catalog, unless noted otherwise. To receive graduate credit for these, a student must so indicate on the registration material.

The official course title appears in bold-faced type following the course number. Numbers in parentheses following the course title indicate the quarter hours credit. If the credit is variable, the minimum and maximum are shown (e.g. 2-3). The credit hours are followed by a course description indicating the content to be covered.

Prerequisite courses must be taken prior to the course in question. Corequisite courses may be taken prior to or concurrently with the specific course. Recommended prerequisites should be taken previously but are not mandatory.

Some courses may be repeated for a maximum number of hours allowable toward a degree program. This number is stated for each repeatable course with the exception of Thesis 5000 and Dissertation 6000. Courses may be cross-listed with two or more departments, an arrangement that is indicated by a parenthetical statement (e.g. Psychology 5432). The description is given only under the primary department.

"S/NC only" indicates that the course may be taken only for Satisfactory/No Credit grading. Refer to section on Grading System for the instructor's signature if the course is closed and/or after the first two weeks of classes. If the student withdraws from a course or from the University after the first 5 days of classes and before the change of registration deadline, the student will receive a grade of F on the permanent record.

Course registration may not be changed from credit to audit after the first five days of classes.

To change registration in any way after the deadline, a student must present the request, together with documentary evidence of extenuating circumstances, to the Graduate Office. In addition, he/she must complete a change of registration form and questionnaire signed by the instructor(s) and advisor as evidence of their knowledge of the request. If the request is approved, the Graduate Office will notify the Office of Admissions and Records to enter the change on the student's permanent record.

Grading System

An average of B (3.0) on course work taken at UTK is required to receive any graduate degree from the University. Grades in The Graduate School have the following meanings:

A (4 quality points per quarter hour), superior performance.

B+ (3.5 quality points per quarter hour), better than satisfactory performance.

B (3 quality points per quarter hour), satisfactory performance.

C (2.5 quality points per quarter hour), less than satisfactory performance.

C (2 quality points per quarter hour), performance well below the standard expected of graduate students.

D (1 quality point per quarter hour), clearly unsatisfactory performance and
cannot be used to satisfy degree requirements.
F (no quality points), extremely unsatisfactory performance and cannot be used to satisfy degree requirements.
I (no quality points), a temporary grade indicates that the student has performed satisfactorily in the course, but due to unforeseen circumstances, has been unable to finish all requirements. An I is not given to enable a student to do additional work to raise a deficient grade. All incompletes must be removed within two quarters, excluding the summer quarter. If a student withdraws from a course, a W (no credit or quality points) will appear on the permanent record. Students who withdraw from a course after the second quarter, the I will be changed to an F. The course will not be counted in the cumulative grade average until a final grade is assigned. No student may graduate with an I on the record.
S/NC (carries credit hours, but no quality points), S is equivalent to a grade of B or better, and NC means no credit earned. Courses where NC is received may be repeated for a grade of S. S/NC grading is allowed only where indicated in the course description in the Graduate Catalog. The number of S/NC courses in a student's program is limited to one-fourth of the total credit hours required.
NP (carries credit hours, but no quality points), P indicates progress toward completion of a thesis or dissertation. NP indicates no progress.
W (carries no credit hours or quality points) indicates a grade of W due to unforeseen circumstances, e.g. due to unforeseen circumstances, a student may transfer courses taken at other institutions. Incompletes must be removed within two quarters, excluding the summer quarter. If a student withdraws from a course, a W (no credit or quality points) will appear on the intermediate report. No record of audited coursework registered will appear on the permanent record.
Graduate courses are not available for graduate credit. A professor, at the department's option, may enroll non-degree seeking students in graduate courses. The graduate student must register for law courses during the registration period at the College of Law and request an S/NC grade. If the student earns a 2.0 or better, an S will be recorded on the transcript. Below 2.0, an NC will be recorded and the course cannot be used toward meeting degree requirements. Grades for law courses will not be reflected in the cumulative-grade-point average.

Proficiency Examinations
A proficiency examination may be given in academic courses offered for graduate credit. Applications for proficiency examinations are available in the Office of the Registrar, 209 Student Services Building. To be eligible, a student must be admitted to The Graduate School. The request for examination must be approved by the head of the department offering the course. Students applying for this privilege must present evidence to the department head that they have the knowledge and abilities expected of graduate students who have taken the same course. Upon passing such an examination with a minimum grade of B, the student will receive graduate credit. A maximum of one-fourth of the total credit hours in a Master's degree program may be earned by this method, subject to the approval of the student's graduate committee. A fee of $10 must be paid before each examination. Proficiency examinations may not be used to raise the grade or change the credit in a course previously completed, nor may such an examination be repeated. Proficiency examinations taken at other institutions are not transferable.

English Proficiency
Any student whose native language is not English must present a TOEFL score of at least 525 unless he/she has received a Bachelor's or Master's degree from an accredited institution in the United States. Some departments will require a higher minimum TOEFL score. The student must also pass an English proficiency examination given by the University prior to initial registration. Students whose performance on the examination indicates a need for additional English study must enroll immediately for English 1221—Written and Oral English for Foreign Students (or another course assigned by the English Department) for undergraduate credit and pass with a grade of C or better. A student may not take more than 6 additional hours of course work while enrolled in English 1221. Those students whose scores indicate that they are not prepared to enter English 1221 will be referred to a program of intensive English study prior to taking the course.

Law Courses
Law courses are not available for graduate credit. However, a graduate student may take up to 6 semester hours of law courses and apply them toward a degree, upon approval of the College of Law and the student's major professor. The graduate student must register for law courses during the registration period at the College of Law and request an S/NC grade. If the student earns a 2.0 or better, an S will be recorded on the transcript. Below 2.0, an NC will be recorded and the course cannot be used toward meeting degree requirements. Grades for law courses will not be reflected in the cumulative-grade-point average.

Transfer Credits
Official transcripts must be sent directly to the Graduate Office from all institutions previously attended before any transfer of credit will be considered.
To be transferred into a graduate program at UT, a course must:
1. be taken for graduate credit;
2. carry a grade of B or better;
3. be a part of a graduate program in which the student had a B average;
4. not have been used for a previous degree; and
5. be approved by the student's graduate committee and the Vice Chancellor for Graduate Studies and Research on the Admission to Candidacy form.
Courses transferred into any graduate program will not affect the minimum residence requirements for the program, nor will they be counted in determining the student's grade point average. Credits transferred cannot be used to meet the 5000- or 6000-level course work requirements. Credit for extension courses taken from other institutions is not transferable, nor is credit for any course taken at an unaccredited and/or foreign institution.

Master's degree: A maximum of 9 quarter hours (or 6 semester hours) from institutions outside the University of Tennessee system may be transferred into a student's Master's program. In addition, the student may transfer courses taken at other campuses of The University of Tennessee. The total transfer work accepted may not exceed one-half of the student's full program of course work. Transferred courses must have been completed within the six-year period prior to receipt of the graduate degree. They will be placed on the student's UTK transcript only after admission to candidacy.

Ed.S. degree: A maximum of 9 quarter hours of course work beyond the Master's degree must be transferred into an Ed. S. program. Transferred courses in the last 45 hours taken for the degree must have been completed within the six-year period prior to the receipt of the degree. They will be placed on the student's UTK transcript only after admission to candidacy.

Doctoral degree: The number of hours the student may transfer into a doctoral program will be determined by the student's doctoral committee. Although the courses transferred may be used as part of the requirements toward the degree, they will not be placed on the student's UTK transcript.

Change of Program
A student who wishes to change a major program of study must complete a Request for Change of Graduate Program form which can be obtained from the Graduate Office. The form requires the signature of the head of the department in which admission was previously granted. No signature is needed if a student requests to change from non-degree or provisional status to a degree program, or from one degree to another within the same department. Acceptance into a new degree program is contingent upon review and approval by that department. If the student is not accepted into the program requested, he/she remains in the former department/program. The results of each
request for program change are communicated to the student by mail.

Residence Requirements
Residence is defined as full-time registration for a given quarter on the campus where the program is located. The summer quarter is included in this period.

Master's degree: no general Graduate School residence requirement.

Ed.S. degree: one quarter of residence if the student has a Master's degree; two consecutive quarters of residence if the student lacks a Master's degree.

Departments and programs may have additional residence requirements.

Theses and Dissertations
All theses and dissertations are submitted to The Graduate School Thesis Consultant for examination. The Thesis Consultant will review the materials and assure that they are mechanically accurate and attractively presented, free of technical errors in format, suitable for binding, and reflect credit upon the University and The Graduate School. If the thesis or dissertation is not accepted, the student must make corrections and resubmit the materials.

The student and major professor together share the responsibility for the accuracy and professionalism of the final product of the student's research. The student should confer with the Thesis Consultant regarding problems and questions in advance of preparing the final copy. The UT Thesis and Dissertation Manual is the guide to correct format for the thesis or dissertation. A Thesis Workshop is held each fall and summer quarter for all students who will be writing theses and dissertations. The date for each Workshop is announced in the Graduate School News.

Academic Termination
Graduate education requires continuous evaluation of the student. This evaluation includes not only periodic objective evaluations such as the cumulative grade point average, performance on comprehensive examinations, and acceptance of the thesis or dissertation, but also the subjective appraisal by the faculty of the student's progress and potential. Continuation in a program is determined by the consideration of all these points by the faculty and the department head. Departments and programs may have requirements for continuation or graduation in addition to the minimum requirements set forth in this Catalog. It is the student's responsibility to be familiar with the special requirements of her/his department or program.

Appeals Procedure
The student handbook, Hill Topics, published and distributed annually, contains statements of UTK standards of conduct and of all disciplinary regulations and procedures. Normally grievances should be handled at the departmental level by the student's advisor or the department or program head.

Further appeal may be made to the Dean for Graduate Studies, the Vice Chancellor for Graduate Studies and Research, the Graduate Council, and the Chancellor. The By-Laws of the University (Article V, section 7) provides that the final appeal may ultimately be made to the Board of Trustees, through the President. A copy of the Appeals Procedure is available in the Graduate Office.

Facilities and Services

Housing
Single Men and Women: Single graduate students are provided accommodations in facilities conducive to academic achievement and personal development. Single graduate students have the same priority as other single students and may be assigned to any residence hall. Graduate students have the option to reside in Melrose Halls. Melrose Halls offers community living units with five or six students and personal responsibility emphasized. The Hotel Avenue Apartment Residence Hall accommodates students in groups of four. It is the responsibility of each resident to maintain the apartment to University standards. Further Information can be obtained from the Office of Residence Halls, 405 Student Services Building.

Married Students: The University provides excellent apartment facilities in several locations for married students. Information and application for these facilities may be secured from the Office of Rental Properties, Stadium Hall.

Off-Campus Housing: Information and assistance in locating off-campus housing are available in the Off-Campus Housing Office, 336 University Center.

Vehicle Operation And Parking

The University of Tennessee endeavors to provide adequate facilities for vehicles operated by students and staff. However, areas available for parking are necessarily limited. To reduce traffic congestion within the campus area, large student parking areas are located on the perimeter of the campus. Presently, FREE bus service is provided from the Main Campus to the Agricultural Campus.

Also, bus service is provided to students. Bus service is provided to students at a nominal fee. Each person who operates a motor vehicle in connection with attendance or employment at the University must register that vehicle with the traffic section of the Security Department. A University Traffic and Parking Authority determines the parking policy, traffic regulations, and fees. This information is published each year in the "University Traffic and Parking Regulations" and is available at registration, at the Security Building, 1115 UT Drive, and at the Campus Information Center at Circle Park.

Services to the Physically Disabled
Services for students with physical disabilities, whether permanent or temporary, are coordinated by the Office of the Dean of Admissions and Records, 305 Student Services Building. In conjunction with the Physical Plant Office, the Office of the Dean of Admissions and Records, and the Student Activities Office, and academic departments, the office seeks to ensure that attendance at UTK is as convenient as possible for students with physical disabilities. These services include assistance during registration (preregistration, collection of class schedules, payment of fees, drop and add); the securing of special parking permits, elevator keys, tickets for special events; and similar efforts to alleviate the special mobility problems of the students. The Physical Plant Office coordinates efforts to eliminate physical barriers to the extent possible, with priority being given to access and facilities for academic buildings.

The Office of the Dean of Admissions and Records assists students in the scheduling of special class sections in order to respond to the particular needs of the physically handicapped.

The Office of Handicapped Student Services, 900 Volunteer Boulevard (Ground Floor—Student Counseling Center Building) operates the Academic Support Center, which provides a wide range of services for students with disabilities, whether permanent or temporary, including assistance during registration, and academic advising. Further information can be obtained from the Office of Handicapped Student Services, 900 Volunteer Boulevard (Ground Floor—Student Counseling Center Building).

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The University Library

The University of Tennessee, Knoxville Library owns approximately 1,400,000 volumes, more than 2,000,000 manuscripts, 58,000 microfilm reels and 1,200,000 items of other microtext, plus recordings, tapes, United States and United Nations documents, and more than 20,000 periodicals and other serial titles, which are received annually. The library's membership in the Association of Research Libraries reflects the University's emphasis on research and graduate instruction at the doctoral level and the support of large, comprehensive collections of library materials on a permanent basis. Library holdings in Knoxville are housed in the James D. Hoskins (Main) Library and its three branches: Agriculture-Veterinary Medicine, Music, and the John C. Hodges Undergraduate Library.

The Special Collections section in the Main Library is a repository of regional and local materials, Tennessee, and other specialties, including legislative papers and mementoes of many Tennessee political.
figures. The Radiation Biology Archives comprises the files of a group of internationally renowned scientists. Special Collections materials are of particular interest to scholars in the fields of history, political science, social sciences, biological sciences, and the arts. Library research holdings for faculty and graduate students are augmented by the Reference Department and by Interlibrary Services. Reference provides access to bibliographic services by other institutions, such as computer-based data services and information retrieval, while Interlibrary Services borrows monographs and obtains copies of other material.

The Law Library on the Knoxville campus and the libraries located on the campuses in Chattanooga, Martin, Memphis, and Tullahoma are individually administered; each library of The University of Tennessee is accessible to all students and faculty in the system.

Computing Center

The University of Tennessee Computing Center (UTCC) provides computing facilities and services for the University's teaching, research, public service, and administrative activities. UTCC maintains close contact with the UT academic community by supporting research and instructional users with professional computer staff. UTCC is principally located in the Stokely Management Center and in Andy Holt Tower. From the Stokely location, UTCC supplies computing services to all campuses in the UT System through job entry facilities located on each campus. At UTK, UTCC maintains seven job entry stations for batch work and nine sites for interactive computer work. UTCC maintains a graphics center with ten Tektronix graphics terminals, five storage and five refresh, two digitizing tablets, and a graphics plotter. Another digitizing tablet, plotter, and storage terminal are available at SMCC M-1.

UTCC also provides data entry services with two Trintex 600/50 key-to-disk systems. UTCC's computers at Stokely Management Center which include two IBM 370/3031s, an IBM 4341/2, a DEC System-10 with four K10 processors, and a symmetrical multi-processor (SMP) configuration, and a DEC PDP 11/55 are used in research, instruction and administrative work. UTCC also has an IBM 360/40 used exclusively for administrative work. A Celcom 1051 plotter is used to produce graphics output from jobs run on the IBM and DEC computers at SMCC. Each IBM 370/3031 has six million bytes of memory, the IBM 4341/2 has eight million bytes of memory, and the DEC System-10 has 1024K words of memory. The DEC PDP 11/55 is used to support the WIDJET job submission and retrieval system.

The IBM 370/3031s run under SVS with HASP II. The DEC System-10 runs under TOPS-10. Time sharing features include VM/CMS and Coursewriter III on the 370/3031s, and APL, FORTRAN, BASIC, COBOL, MACRO, and other special purpose application programs including extensive graphics software support, on the DEC System-10.

UTCC publishes a User's Guide which describes the use of the IBM 370/3031s and the DEC System-10 User's Guide which describes the use of the DEC System-10. The guides are available at the UT Book and Supply Store. UTCC also publishes a monthly Newsletter which announces systems, equipment and procedural changes and contains other items of interest to users. Program writers and special user's guides are also available.

UTCC periodically offers intensive training seminars of several days duration in computer utilization on the IBM 370/3031s and the DEC System-10. These seminars are primarily for faculty, staff and graduate students who use or plan to use UTCC facilities. UTCC offers non-credit short courses each quarter in topics such as programming languages and special purpose programs. These courses are announced in the UTCC Newsletter, the "Campus Capsule" section of the UT Daily Beacon, and "this week on campus", a publication announcing campus events.

Computing services can be requested via the request for services form available from the receptionist; 200 Stokely Management Center. All users of UTCC facilities are assigned a consultant to provide user assistance.

Office of International Student Affairs

This office, located at 201 Alumni Hall, assists students from other countries with the many matters that are of particular concern during their stay at UT. International Student Affairs serves as the official University representative in all matters involving immigration authorities, international, educational organizations, and foreign governments.

The office maintains the student's official immigration records and handles questions regarding immigration regulations. It coordinates such projects as a community volunteer program for international students, a Friendship Family program, and activities for student spouses. To aid the international student's understanding of American life, the office staff serves as advisors on personal and related problems. Orientation programs are held at the beginning of each term, and international students are urged to attend them.

The International House is located near the campus, at 1801 West Clinic Avenue. Provided by UT and operated by the staff of the Office of International Student Affairs, the House is a social and recreational center where domestic and international students meet to relax and discuss matters of mutual interest. The small library at "I" House contains books and periodicals from all over the world. This University facility is open during vacation periods.

International students applying for admission should write to The Graduate School.

Ombudsman Office

Personnel of the Ombudsman Office in the University Center assist students in the resolution of problems encountered with any aspect of the University. The office is open during the regular working hours and students are welcome to drop in at their convenience. Problems are treated confidentially and are dealt with expeditiously. The office does not replace existing structures but helps to ensure their responsiveness to student needs.

Graduate Research Centers and Institutes

Energy, Environment, and Resources Center

Director: J. L. Finney, M.S.I.T., Tennessee
Assistant Directors: R. A. Bohm, Ph.D., Washington; L. A. Clindar, Ph.D., Tennessee.

The Energy, Environment, and Resources Center was created to encourage interdisciplinary studies at UTK, directed at solutions to problems related to energy and the environment. The Center provides assistance to faculty interested in developing research and public service projects, manages research and development projects that involve several disciplines, and assists Tennessee government and industry in specific problems related to energy and environment. It also participates in the Statewide Consumer Education Program, especially in developing materials for the program.

Current research includes environmental and human costs of coal production, utilization of solar energy, energy conservation in buildings and industry, regional solid waste management, resource recovery, and energy education and information.

Transportation Center

Director: K. W. Heathington, Ph.D., Northwestern, P.E.
Associate Directors: M. S. Broncz, Ph.D., Pennsylvania State, P.E.; D. P. Middendorf, Ph.D., Tennessee.
Assistant Director: D. H. Jones, M.S., Tennessee.

The Transportation Center, utilizing an interdisciplinary approach to transportation research, brings together both University faculty and students in a setting conducive to the solution of problems associated with the transportation of goods and people. The Center provides support for undergraduate and graduate students, as well as faculty, in projects associated with research in the field of transportation. Such support, while providing needed financial assistance to students, enables the Transportation Center to undertake research that ultimately leads to the solution of the nation's transportation problems.

The Center's contribution to the field and its success in meeting the challenges of contemporary transportation research is predicated on the philosophy that education
The academic institutions of the state, public and private, in pursuing water resources research programs needed by the state; (2) to provide information, dissemination and technology transfer services to state and local government bodies, academic institutions, professional groups, environmental organizations, and others, including the general public, who have an interest in water resources matters; (3) to promote educational efforts in fields relating to water resources and to encourage the entry of promising students into careers in these fields.

The University of Tennessee Space Institute

Kenneth E. Harwell, Dean, Ph.D. California Institute of Technology
A. A. Mason, Associate Dean, Ph.D. Tennessee

The Space Institute is an interdisciplinary institute of graduate study and research offering the research program leading to M.S. and Ph. D. degrees in selected areas of engineering and the aerospace and physical sciences. The Institute occupies a 365-acre lakeshore campus near Tullahoma, Tennessee, conducive to the concentrated effort needed in advanced studies. Graduate degree programs are available with majors in Aerospace Engineering, Aviation Systems, Computer Science, Mathematics, Mechanical Engineering, Metallurgical Engineering, and Physics. In addition to the fundamental studies characteristic of each discipline, research opportunities are available in many aspects of atmospheric and space flight such as aerodynamics, atmospheric engineering, propulsion, flight performance, materials and structures, gas diagnostics including spectroscopic and electro-optic techniques, thermal sciences, energy conversion, remote sensing, computational fluid dynamics, microprocessors, and computer graphics. The Institute was established in part to increase the research and engineering resources of Tennessee through education and practice in relevant scientific and technical areas and in part to interface University faculty and student research with the Air Force Arnold Engineering Development Center.

The faculty, research activities, and facilities of the Institute and those available at Arnold Center through appropriate contractual arrangements provide students an unusual opportunity for research and development in these areas. Students who enroll at UT Knoxville are admitted to the Graduate School, The University of Tennessee, Knoxville. Graduate research assistantships are available for qualified students. Further information may be obtained from the Dean, The University of Tennessee Space Institute, Tullahoma, Tennessee 37388.

Water Resources Research Center

W. F. Brandes, Director, M.S. Illinois, P.E.

The Water Resources Research Center is a federally-designated institute for the conduct of water research for the state. The purposes of the Center are: (1) to assist and support all

Research Centers

Off-campus Graduate Centers

Kingsport University Center: UTK offers graduate study programs in chemistry and engineering at both the Master's and doctoral levels. The program is operated within the policies set by the Graduate Council of UTK and is coordinated with the graduate and undergraduate offerings of East Tennessee State University.

Students who enroll in this program must be admitted to The Graduate School of UTK. Information and application forms may be obtained from Jerry Westbrook, Director, Information and appropriate forms may be obtained from Marvin K. Goodman, Director, Education and Research, Arnold Engineering. The program is supported under a subcontract with ORAU with principal support coming from the Union Carbide Nuclear Division. Students who enroll in this program must be admitted to The Graduate School of UTK. Information and appropriate forms may be obtained from Jerry Westbrook, Director, Information and appropriate forms may be obtained from Marvin K. Goodman, Director, Education and Research, Arnold Engineering. The program is supported under a subcontract with ORAU with principal support coming from the Union Carbide Nuclear Division.

Oak Ridge Resident Graduate Program: UTK offers graduate study programs at Oak Ridge, with Master's degrees in Business Administration, Chemical Engineering, Mechanical Engineering and Physics. The program is supported under a subcontract with ORAU with principal support coming from the Union Carbide Nuclear Division. UT is one of the forty-three colleges and universities which sponsor ORAU, a nonprofit educational and research management corporation.

Information and applications to the Graduate School may be obtained by writing to Director, UT-Oak Ridge Graduate School, Post Office Box 117, Oak Ridge, Tennessee 37830.

Nashville Graduate Engineering Program: Opportunities for graduate study leading to the degree of Master of Science in Industrial Engineering and other disciplines, as the need and resources permit, are offered by UTK. Students who enroll in these programs must be admitted to The Graduate School of UTK. Information and appropriate forms may be obtained from Jerry Westbrook, Director, Information and appropriate forms may be obtained from Marvin K. Goodman, Director, Education and Research, Arnold Engineering. The program is supported under a subcontract with ORAU with principal support coming from the Union Carbide Nuclear Division. UT is one of the forty-three colleges and universities which sponsor ORAU, a nonprofit educational and research management corporation.

Information and applications to the Graduate School may be obtained by writing to Director, UT-Oak Ridge Graduate School, Post Office Box 117, Oak Ridge, Tennessee 37830.

Nashville Graduate Engineering Program: Opportunities for graduate study leading to the degree of Master of Science in Industrial Engineering and other disciplines, as the need and resources permit, are offered by UTK. Students who enroll in these programs must be admitted to The Graduate School of UTK. Information and appropriate forms may be obtained from Jerry Westbrook, Director, Information and appropriate forms may be obtained from Marvin K. Goodman, Director, Education and Research, Arnold Engineering. The program is supported under a subcontract with ORAU with principal support coming from the Union Carbide Nuclear Division. UT is one of the forty-three colleges and universities which sponsor ORAU, a nonprofit educational and research management corporation.

Information and applications to the Graduate School may be obtained by writing to Director, UT-Oak Ridge Graduate School, Post Office Box 117, Oak Ridge, Tennessee 37830.

Chattanooga Graduate Education Program: UTK offers a graduate program in education leading to the Specialist in Education and the Doctor of Education degrees with a major in Educational Administration and Supervision. Students who enroll in this program must be admitted to The Graduate School of UTC.
Admission to Candidacy: Application for admission to candidacy for the Master's degree is made as soon as possible after the student has completed any required prerequisite courses and 15 hours of graduate course work with a B or better. All non-thesis students must submit the Admission to Candidacy form, with appropriate signatures, to the Graduate Office no later than commencement day of the quarter preceding the quarter in which he/she plans to graduate.

Thesis Registration: A student must be registered for course 5000 each quarter during work on the thesis, including a minimum of 3 hours taken during the quarter in which the thesis is accepted by The Graduate School. At least 9 hours of 5000 are required for the thesis option. After receiving the Master's degree, a student is no longer permitted to register for Thesi 5000.

Final Examination for Thesis Students: A candidate presenting a thesis must pass a final oral (or oral and written) examination on all work offered for the degree. The examination, which must be scheduled through the Graduate Office, shall be held at least three weeks before the final date for approval and acceptance of theses by The Graduate School. Final examinations not properly scheduled must be repeated. The final draft of the thesis must be distributed to all committee members at least two weeks prior to the date of the final examination. In case of failure, the candidate may not apply for reexamination until the following quarter. The result of the second examination is final.

Thesis: The thesis represents the culmination of an original research project completed by the student. It must be prepared according to the UT Thesis and Dissertation Manual. Two copies of the thesis must be approved and accepted by The Graduate School on or before the deadline specified each quarter in the Graduate School News. Each copy must include an approval sheet, signed by the members of the master's committee, certifying that they have examined the final copy of the thesis and judged it to be satisfactory.

Non-Thesis Students: All non-thesis students using University facilities or faculty time must be registered for course 5002 if not registered for other courses. This applies to students removing incompletes from their records.

Final Examination for Non-Thesis Students: A non-thesis student must pass a final written examination on all work offered for the degree. A department may require an additional oral examination. The examination is not merely a test over course work, but a measure of the student's ability to integrate material in the major and related fields. It must be scheduled through the Graduate Office in accordance with the deadlines specified in the Graduate School News and will be conducted by the Master's committee. Final examinations not properly scheduled must be repeated.

Specialist in Education Degree: The Specialist in Education (Ed.S.) degree is offered in Supervision and Instruction, Educational Administration and Supervision, Educational Psychology and Guidance, Safety Education and Service, and Vocational-Technical Education. Admission to the Ed.S. program requires acceptance by The Graduate School, and review and acceptance by the department or area in which the student is majoring. It is recommended that students who apply for the Ed.S. have at least one year of related work experience. Additional information on admission requirements can be obtained from the Graduate School on or before the deadline each quarter for application.


Final Examination: A candidate presenting a thesis, or problems in lieu of thesis, must pass an oral examination of the student's committee. The examination is not merely a test over course work, but a demonstration of the candidate's ability to integrate materials in the major and related fields. Each examination must be scheduled through the Graduate Office before the deadline and will be conducted by the student's committee. Final examinations not properly scheduled must be repeated. In case of failure, the candidate may not be reexamined until the following quarter. The result of the second examination is final.

Time Limit: Candidates have six calendar years from the time of entry into the last 45 hours of their degree programs to complete the Ed.S. degree.

Doctoral Degrees: There are three doctoral degrees available: Doctor of Philosophy (Ph.D.), Doctor of Education (Ed.D.), and Doctor of Business Administration (DBA). Programs are listed under "Majors and Degrees Available," pages 8-9. For specific degree requirements, consult individual program descriptions listed by college and department in this Catalog. See also the chart, page 22, for the summary of procedures for doctoral degrees.

Doctoral programs include a major field or area of specialization and, frequently, one or more collateral fields. These are defined as a minimum of 9 quarter hours of graduate course work in a given area outside the student's major field.

Course Requirements: Each doctoral student must take an appropriate number of 6000-level courses, usually a minimum of 9 quarter hours, at UTK. Normally a doctoral program includes a minimum of 36 hours of graduate course work beyond the Master's degree, graded A-F, plus the minimum 36 hours of dissertation work in course 6000. Additional work taken for S/N grading may comprise up to one-fourth of the student's total graduate hours.
Doctoral Committee: The student and the major professor identify a doctoral committee composed of at least four faculty members, three of whom, including the chair, must be approved by the Graduate Council to direct doctoral research. At least one member must be from a department other than that of the student's major field. This committee must be nominated by the department head and approved by the Graduate School. The committee must be formed during the student's first year of doctoral study. Subject to Graduate Council policies and individual program requirements, the committee must approve all course work applied toward the degree, certify the student's mastery of the major field and any collateral fields, direct the research, and recommend the dissertation for approval and acceptance by the Graduate School.

Continuous Registration: The student must register continuously for course 6000 (minimum of 3 hours) from the time that the doctoral research proposal is approved, admission to candidacy is accepted, or registration for course 6000 is begun, whichever comes first, including all summer quarters and the quarter in which the dissertation is approved and accepted by the Graduate School. A minimum total of 36 hours of course 6000 is required before the dissertation will be accepted. A student who will not be using faculty services and/or university facilities for a period of time may request leaves of absence from dissertation research up to a maximum of three quarters. The request will be considered by the Graduate School upon recommendation of the department head.

Doctoral Examinations: Departments may, at their discretion, require written and/or oral examinations in the early stages of the student's doctoral program. Successful completion of a comprehensive examination and a final examination is required for all doctoral degrees.

1. Diagnostic or placement examinations, which can be written and/or oral, may be given to students on admission to the doctoral program to the student's level of preparation, areas of strengths and weaknesses, and general background. Since courses bearing the same title may vary in content from institution to institution, the diagnostic or placement examinations are designed to aid in the selection of courses and to determine the student's preparation to continue doctoral studies at UTK. If a student near the end of their first year in the doctoral program, qualifying examinations are designed to test the student's progress, current knowledge of fundamentals of the field, and fitness to continue with the more specialized aspects of the doctoral program. The comprehensive examination must be passed prior to admission to candidacy.

2. Qualifying examinations, which may be written and/or oral, may be given to students near the end of their first year in the doctoral program. Qualifying examinations are designed to determine the student's progress, general knowledge of fundamentals of the field, and fitness to continue with the more specialized aspects of the doctoral program. When the student has completed or nearly completed all prescribed courses, the successful completion indicates that, in the judgment of the faculty, the doctoral student can think analytically and creatively, has a comprehensive knowledge of the field and the specialty, knows how to use academic resources, and is deemed capable of writing the dissertation. The comprehensive examination must be passed prior to admission to candidacy.

3. The comprehensive examination (or the final part of this examination, when parts are given at different times) is normally taken when the student has completed or nearly completed all prescribed courses. Thus, its successful completion indicates that, in the judgment of the faculty, the doctoral student can think analytically and creatively, has a comprehensive knowledge of the field and the specialty, knows how to use academic resources, and is deemed capable of writing the dissertation. The comprehensive examination must be passed prior to admission to candidacy.

4. A final examination (oral, or oral and written) on the student's dissertation, major field, and such other fields as the student's doctoral committee may specify, will be administered by all members of the doctoral committee after completion of the dissertation and all course requirements. This examination must be passed at least three weeks before the date of acceptance and approval of the dissertation by the Graduate School. The examination must be scheduled through the Graduate Office. Final examinations not properly scheduled must be repeated. The dissertation, in the form approved by the major professor, must be distributed to the committee at least two weeks before the examination. The examination is announced publicly and is open to all faculty members.

Language Requirements: Candidates for the Ph.D. degree may be required to demonstrate a reading knowledge of at least one foreign language in which there exists a significant body of literature relevant to their major field of study. Refer to the descriptions of individual programs. The doctoral committee will determine the specific language (or languages) required. Language requirements must be met at UTK and cannot be transferred from another institution. When the student is prepared to take a language examination, he/she should complete an Application for Doctoral Language Examination at the Graduate Office in accordance with the dates and times for the examinations printed in the Graduate School News. The student must pass the examination with a grade of B or better. Two copies of the dissertation (prepared and approved) of a 3030 course in a language department may be substituted for a language examination. This course cannot be repeated to satisfy the language requirement.

Admission to Candidacy: A student may be admitted to candidacy for the doctoral degree after passing the comprehensive examination, fulfilling any language requirements (for Ph.D.), and maintaining at least a B average in all graduate course work. Admission to candidacy must be applied for and approved at least two full quarters prior to the date the degree is to be conferred. Each student is responsible for filing the admission to candidacy, which must be signed by the doctoral committee and approved by the Vice Chancellor for Graduate Studies and Research.

Dissertation: The dissertation represents the culmination of an original major research project completed by the student. The organization, method of presentation, and subject matter of the dissertation are important in conveying to others the results of such research. A student should be registered for the number of dissertation hours representing the fraction of effort devoted to this phase of the candidate's program. Thus, a student working full-time on the dissertation should register for 12 hours of 6000 per quarter.

Two copies of the dissertation prepared according to the regulations in the UT Thesis and Dissertation Manual must be submitted to and accepted by the Graduate School. Each copy must include an approval sheet signed by all members of the doctoral committee, which certifies to the Vice Chancellor for Graduate Studies and Research that they have examined the final copy and found that its form and content demonstrate scholarly excellence. Doctoral forms and a thesis card are also submitted at this time. The student should check with the department head concerning additional required copies of the dissertation.

Time Limit: Comprehensive examinations must be taken within five years, and all requirements must be completed within eight years, from the time of a student's first enrollment in a doctoral degree program.
# Summary of Procedures for Master’s and Specialist in Education Degrees

<table>
<thead>
<tr>
<th>PROCEDURES</th>
<th>UNDER DIRECTION OF</th>
<th>DATE</th>
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</thead>
<tbody>
<tr>
<td>Admission as a potential degree candidate</td>
<td>Graduate Office and Major department</td>
<td>Prior to completing 18 hours of graduate courses</td>
</tr>
<tr>
<td>Formation of Master's/Ed.S. committee</td>
<td>Advisor/Major professor</td>
<td>Prior to application for admission to candidacy</td>
</tr>
<tr>
<td>Submission of application for admission to candidacy</td>
<td>Master’s/Ed.S. committee</td>
<td>At least one quarter prior to graduation*</td>
</tr>
<tr>
<td>Approval of admission to candidacy</td>
<td>Vice Chancellor for Graduate Studies and Research</td>
<td>Prior to graduation</td>
</tr>
</tbody>
</table>

**GRADUATION REQUIREMENTS FOR NON-THESIS OPTION**

| Placement of name on graduation list           | Student                                                   | Indicate on registration materials       |
| Application for diploma                        | Graduate Office                                           | Deadline available at registration*      |
| Scheduling of final examination               | Graduate Office                                           | Not later than one week prior to final examination* |
| Final examination(s)                          | Master’s/Ed.S. committee                                  | Not later than three weeks prior to Commencement* |
| Removal of incomplete(s)                      | Instructor of course                                      | Not later than one week prior to Commencement* |

**GRADUATION REQUIREMENTS FOR THESIS/PROBLEMS OPTION**

| Placement of name on graduation list           | Student                                                   | Indicate on registration materials       |
| Application for diploma                        | Graduate Office                                           | Deadline available at registration*      |
| Submission of thesis/problems to Master’s/Ed.S. committee | Student                                               | At least two weeks prior to final examination |
| Scheduling of final examination               | Graduate Office                                           | Not later than one week prior to final examination* |
| Final examination(s)                          | Master’s/Ed.S. committee                                  | Not later than three weeks prior to thesis deadline* |
| Approval and acceptance of final copy of thesis and thesis card | Master’s/Ed.S. committee and The Graduate School   | After final examination and not later than two weeks prior to Commencement* |
| Removal of incomplete(s)                      | Instructor of course                                      | Not later than one week prior to Commencement* |

*Deadlines are printed in the Graduate School News quarterly.*
## Summary of Procedures for Doctoral Degrees

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<td>*Appointment of doctoral committee</td>
<td>Assistant Dean for Graduate Studies on</td>
<td>Preferably during the first year of graduate study but, at the latest, prior to admission to candidacy</td>
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<td>recommendation of department head</td>
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<tr>
<td>*Comprehensive examination</td>
<td>Major department</td>
<td>Prior to admission to candidacy</td>
</tr>
<tr>
<td><em>Foreign language examination(s)</em>*</td>
<td>Graduate Office</td>
<td>Prior to admission to candidacy</td>
</tr>
<tr>
<td>Submission and approval of application for admission to candidacy</td>
<td>Doctoral committee and Vice Chancellor for</td>
<td>At least three quarters prior to graduation***</td>
</tr>
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<td></td>
<td>Graduate Studies and Research</td>
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<td></td>
<td>(Forms at Graduate Office)</td>
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**GRADUATION REQUIREMENTS**

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*The order of these items varies with individual programs.  
**Not required in some programs.  
***Deadlines are printed in the Graduate School News quarterly.
Institute of Agriculture

W. W. Armistead, Vice President
Bobby H. Pentecost, Assistant Vice President

The Institute of Agriculture traces its history to 1869 when the University was designated as Tennessee's Federal Land-Grant Institution. Under terms of the Federal Land-Grant Act, the University was enabled to offer instruction in agriculture and the mechanic arts for the first time. Since 1869, agricultural programs at the University have been expanded to include research for the development of new knowledge and extension for dissemination of such knowledge to rural people. Thus the Institute of Agriculture has come to include the work of three main divisions: Agricultural Experiment Station, Agricultural Extension Service, and College of Agriculture.

In 1974 the College of Veterinary Medicine was established within the Institute. The college is developing research and graduate programs in veterinary medical sciences in addition to the professional curriculum leading to the degree, Doctor of Veterinary Medicine.

Agricultural Experiment Station

D. M. Gossett, Dean
T. J. Whatley, Associate Dean
J. I. Sewell, Assistant Dean

The Agricultural Experiment Station was established by the University's Board of Trustees on June 8, 1882, five years before the passage of the Hatch Experiment Station Act by the U.S. Congress. The University was one of the first five institutions in the U.S. to establish an Agricultural Experiment Station. Since its beginning the Station has given first attention to investigations of concern to the agriculture of Tennessee. The investigations of the Station follow a systematic method of gaining and applying knowledge efficiently to the biological, physical, and economic phases of producing, processing, and distributing farm and forest products; to the social and economic aspects of rural living; and to conservation and nutrition. Both farm and urban populations gain from the accomplishments of the Agricultural Experiment Station. Examples of some of these accomplishments are new and improved varieties of crops, new and better methods of controlling and livestock pests, more efficient production of crops and pasture through improved fertilization and mechanization, and more efficient feeding and management of livestock.

The program is designed and administered through sixteen subject matter departments located at Knoxville. A number of the staff have teaching responsibilities in addition to their research. To assist in the research program the Station supports a large number of graduate students. To serve Tennessee's diverse agriculture, branch stations are operated at Jackson, Milan, Grand Junction, Spring Hill, Springfield, Lewisburg, Crossville, Greeneville, Martin and a forestry branch station at Oak Ridge. Professional and technical staff are in residence at these locations.

Agricultural Extension Service

M. L. Downen, Dean
T. W. Hinton, Associate Dean
M. F. Clarke, Assistant Dean
B. G. Hicks, Assistant Dean

The Agricultural Extension Service was established in 1914. Its purpose is to extend through various educational means agricultural and home economics information to farm families and others in the state who do not have the opportunity to enroll in resident courses of instruction at colleges.

The educational program is carried on through offices in each of the ninety-five counties of the state. Educational emphasis includes work in four major program areas: agriculture and natural resources, community resource development, home economics, and education of young people through 4-H Clubs.

County Extension staff members working directly with local people are supported in the various information fields by a specialist staff, members of which are stationed either in Knoxville, Nashville, or Jackson.

The Agricultural Extension Service operates administratively as one of four units of the Institute of Agriculture. For administration the state is divided into five districts with supervisors located in their respective districts. District headquarters are maintained in Knoxville, Chattanooga, Cookeville, Nashville, and Jackson.

The Agricultural Extension Service operates as a three-way partnership among county, state, and federal governments. The University of Tennessee represents state and federal government and a County Agricultural Extension Committee represents county government in this partnership.

College of Agriculture

O. Glen Hall, Dean

Graduate programs of the College of Agriculture are designed to prepare men and women for positions of leadership in industry, state and federal government, teaching, research, and extension. The graduate student is expected to demonstrate a thorough knowledge of the subject matter in his/her specialized field of study and its relationship to the sociological, economic, and environmental impact on society. The student must demonstrate the ability to plan, conduct, analyze, and report original research. More importantly, emphasis is given to intellectual growth and to the development of scholarly habits of study, reasoning and analysis to the end that the graduate will continue to grow and develop professionally throughout his/her career.

Masters of Science Programs

Programs of graduate study leading to the Master of Science degree are offered through all departments in the College of Agriculture. The general rules of The Graduate School apply to all graduate work in the college. The graduate program may be entirely in one major subject or may include subject matter areas related to the major.

Both majors and minors are available in Agricultural Economics, Agricultural Engineering, Agricultural Extension, Agricultural Mechanization, Animal Science, Entomology and Plant Pathology, Food Technology and Science, Ornamental Horticulture and Landscape Design, and Plant and Soil Science. Majors only are available in...
Forestry and Wildlife and Fisheries Science, and minors are available in General Agriculture and Rural Sociology. The minor in General Agriculture requires 18 hours of course work. A complete listing of majors is shown on pages 8-9.

For admission to a graduate degree program, the student must have a satisfactory academic average and have completed the substantial requirements for an undergraduate major in his/her field of study or have completed sufficient undergraduate work in related areas to satisfy the department that he/she can successfully pursue graduate study in the chosen field. Prerequisite courses may be required when the student’s preparation is deemed to be inadequate.

A complete listing of majors is Agriculture and Rural Sociology. The minor in Agriculture and Rural Sociology is as follows:

1. Minimum of 108 quarter hours credit of which 34 hours must be at the 5000 and 6000 level, exclusive of Doctoral Research and Dissertation. At least 9 of the 36 hours must be in 6000-level courses.

Supporting studies are required in related biological and physical sciences fundamental to the training of the candidate.

**Additional Course Requirements:**
1. A minimum of 24 quarter hours credit must be completed in related fields outside of animal science.
2. At least 36 quarter hours credit in courses at the 5000 and 6000 level, exclusive of Doctoral Research and Dissertation.

**Food Technology and Science**

**Concentrations:**
1. Food products
2. Food chemistry
3. Food microbiology

Supporting studies will be required to provide fundamental training in sciences related to the student’s specialized area. Various commodity interests can be emphasized in all three areas by judicious selection of courses and dissertation topics.

**Additional Course Requirements:**
1. At least 36 quarter hours credit in courses at the 5000 and 6000 level, exclusive of Doctoral Research and Dissertation.
2. A minimum of 9 hours of courses for graduate credit outside of the Department of Food Technology and Science.

**Plant and Soil Science**

**Concentrations:**
1. Soils
2. Plant breeding and genetics
3. Crop physiology and ecology

Supporting studies are required in related sciences fundamental to the training of the candidate.

**Departments of Instruction**

**Agricultural Economics and Rural Sociology**

**Major Area of Concentration**

1. Agricultural policy
2. Agricultural marketing and price analysis
3. Farm management and production economics
4. Natural resource economics
5. Rural development
6. The economics of forestry
7. Agricultural economics
8. Economic theory
9. Mathematical and quantitative methods in agricultural economics

**Additional Course Requirements:**

At least 30 hours of course work shall be in agricultural economics and 15 hours in economics. Excluding the dissertation, at least 21 hours in agricultural economics and 36 hours in agricultural economics and economics combined must be in courses numbered 5000 and above.

**Agricultural Engineering**

**Concentrations:**

1. Agricultural power and machinery
2. Soil and water conservation engineering
3. Agricultural structures
4. Electric power and processing

Supporting studies are required in related biological, physical, and engineering sciences and mathematics fundamental to the training of the candidate.

**Additional Course Requirements:**

The program of each candidate shall consist of a major and supporting studies in one or more additional areas. The major shall consist of a minimum of 24 quarter hours exclusive of research and dissertation. A minimum of 24 quarter hours shall be taken in departments outside of the Department of Agricultural Engineering.

**Animal Science**

**Concentrations:**

1. Animal nutrition
2. Animal breeding
3. Animal physiology

Supporting studies are required in related biological and physical sciences fundamental to the training of the candidate.

**Additional Course Requirements:**

1. A minimum of 24 quarter hours credit must be completed in related fields outside of animal science.
2. At least 36 quarter hours credit in courses at the 5000 and 6000 level, exclusive of Doctoral Research and Dissertation.

**Food Technology and Science**

**Concentrations:**

1. Food products
2. Food chemistry
3. Food microbiology

Supporting studies will be required to provide fundamental training in sciences related to the student’s specialized area. Various commodity interests can be emphasized in all three areas by judicious selection of courses and dissertation topics.

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1. Soils
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Supporting studies are required in related sciences fundamental to the training of the candidate.

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**Additional Course Requirements:**

The program of each candidate shall consist of a major and supporting studies in one or more additional areas. The major shall consist of a minimum of 24 quarter hours exclusive of research and dissertation. A minimum of 24 quarter hours shall be taken in departments outside of the Department of Agricultural Engineering.

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**Concentrations:**

1. Animal nutrition
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Supporting studies are required in related biological and physical sciences fundamental to the training of the candidate.

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**Concentrations:**

1. Food products
2. Food chemistry
3. Food microbiology

Supporting studies will be required to provide fundamental training in sciences related to the student’s specialized area. Various commodity interests can be emphasized in all three areas by judicious selection of courses and dissertation topics.

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**Plant and Soil Science**

**Concentrations:**

1. Soils
2. Plant breeding and genetics
3. Crop physiology and ecology

Supporting studies are required in related sciences fundamental to the training of the candidate.
Agricultural Economics

4120 Farm Management (3) Principles of farm organization and operation; nature of managerial processes; economic aspects of crop, livestock, labor and machinery planning; use of budgeting techniques; field trials arranged. Prereq: Agriculture 1110 and Economics 2120. 2 hrs and 1 lab. F, W.

4140 Agricultural Production Economics I (3) Application of microeconomic theory to problems of resource allocation, product selection, scale of operation of agricultural firms; economic interpretation of technical agricultural production relationships. Prereq: Agriculture 1110 and Economics 2120. W.

4240 World Agriculture and Trade (3) Economic bases of world agricultural production and trade; resource location, land tenure systems, international trade and commercial policy. Prereq: Agriculture 1110 and Economics 2120, or consent of instructor. F.

4250 Agricultural and Rural Planning (3) Decision-making concepts applied to design and implementation of local action programs. Case examples from the U.S. and other countries. Prereq: Agriculture 1110 and Economics 2120, or consent of instructor. Su.

4310 Agricultural Finance (3) Nature and source of capital; credit problems of farmers; kinds and sources of farm credit; Agricultural insurance and taxation. Prereq: Agriculture 1110 and Economics 2120.

4320 Agricultural Policy (3) Meaning of agricultural policy in democratic society; relationship of farm groups to political problems giving rise to policy; agricultural policy and appraisal of results; policy problems. Prereq: Agriculture 1110 and Economics 2120. Sp.

4330 Land Economics (3) Problems and policies of land use, conservation, development, taxation, and tenure; population growth and demand for land; principles and theories of rent, property, value, and income. Prereq: Agriculture 1110 and Economics 2120. F.

4610 Management of Farm Supply and Marketing Firms (3) Organization of firms selling farm supplies and merchandising agricultural products; Emphasis on accounting data and economic theories of decision making. Prereq: Agriculture 1110 and Economics 2120. F.

4630 Advanced Agricultural Marketing (3) Economics of market location and pricing; perfect market model; spatial equilibrium analysis; production and marketing of agricultural commodities; processes and storage costs; maximizing returns, institutions and market flows; measuring efficiency. Prereq: 3120 or 3520 or consent of instructor. W.

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

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

5011 Special Problems in Lieu of Thesis (3) S/NC only. E.

5130 Agricultural Production Economics II (3) Theoretical and empirical concepts of agricultural allocation problems under various knowledge situations with emphasis on uncertainty. Aggregate external effects of decisions made by individual agricultural entities; development of field trials for agricultural production. Prereq: 4140 or equivalent. Sp.


5220 Research Methodology (3) Nature of scientific method, logic, philosophy, assumptions, potential and limitations of science, methodological prerequisite of the agricultural profession. Prereq: Consent of instructor. W.

5230 Seminar: Adjustments to Industrialization (3) F.

5310 Research (3) Special research problems in agricultural economics and rural sociology. Gathering, tabulating and interpreting data and report writing. May be repeated S/NC only. E.

5410 Agricultural Marketing Analysis (3) Analysis of structure, conduct, and performance of agricultural marketing system; application of price theory concepts and decision-making models used to examine industry conduct and performance. Prereq: Economics 3110 or consent of instructor. Sp.

5420 Advanced Land and Natural Resource Economics (3) Economic efficiency in natural resource allocation; issues in project and policy evaluation. Prereq: 4330 and Economics 5110, or consent of instructor. F.

5440 Economics of Agricultural Development (3) Role of agriculture in overall economic development; impacts of world food situation on people, environment, development; natural and human resources for food production; technology and change; national and international food policy. Prereq: 4240 or consent of instructor. W.

5610 Quantitative Methods in Agricultural Economics (3) Analytical techniques useful in estimation of functions—supply, demand and production—and prediction of economic variables. Emphasis on application of multiple regression model; specification, estimation technique using computer and interpretation of results. Prereq: Statistics 4310 or Economics 5510 or consent of instructor. W.

5710 Linear Programming (3) Techniques with empirical applications to problems of firm and region; maximizing firm profit, minimizing firm costs, transportation, risk, location in space and time. Prereq: Consent of instructor. F.

5820 Agricultural Price Analysis (3) Application of various research methods to analysis of price structures; specification and estimation of price determination models and interpretation of results. Prereq: 3120 and 5610 or Statistics 4310 or consent of instructor. Sp.

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

6120-30 Seminars in Agricultural Economics (3,3) Topics selected from the areas of economics of production, consumption or distribution in agriculture and related industries and public policies concerned with agriculture and related industries. F, Sp.

6210 Agricultural and Rural Transformation Problems (3) Systematic evaluation of policy and development proposals related to agricultural modernization, food supply and rural living. Decision making process and useful roles of social scientists. Analysis of current issues in U.S. and developing nations. Prereq: 4240 or consent of instructor. F.

6410 Agricultural Supply Analysis (3) Estimating agricultural supply relationships using aggregate time series regression, production functions, linear programming, simulation and farm growth models with emphasis on correspondence between theoretical concepts and model attributes. Prereq: 5130 or consent of instructor. F.

6420 Marketing and Resource Use (3) Institutional settings for research and policy formulation; analytical tools to measure efficiencies of marketing and resource use; emerging problems in marketing and resource use. Prereq: 5410 or consent of instructor. W.

6910 Rural Sociology (3) Nature of rural society; social system concept; rural-urban differences; nature of social relations; population characteristics and movement; problems of rural people; tenancy, farm labor, health, services, educational facilities, churches, local government; impact of industrialization. F, W, Sp.

4450 Diffusion of Agricultural Technology (3) Analysis of diffusion process for new technology; explanatory model developed by diffusion theory is designed to explain the process of technological adoption. Prereq: 4330. F.

5340 Special Problems (3) Special topics in rural sociology. Prereq: 3420 or consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. E.

5430 Seminar in Rural Sociology (3) Current rural sociological literature and research; relevance of general sociological theory and methodological techniques. Prereq: 3420 or equivalent. F.

5459 Advanced Rural Sociology (3) Application of sociological concepts to analyze changing structure and function of rural life; rural social values, attitudes, and norms as they influence the family, formal and informal groups, population shifts and changing farm technology. Prereq: 3420 or equivalent. W.

4470 Research Problems in Rural Communities (3) Emphasis on problems that arise in survey research in rural areas. Sampling procedures, questionnaire construction, interviewer selection, training, control, and legitimation needs. Prereq: Undergraduate course in statistics. Sp.

5480 Rural Population Analysis (3) Analysis of U.S. and world population changes and determinants of fertility, mortality, and migration with emphasis upon changes in rural sector. Prereq: Sociology 4110 or equivalent. W.

Agricultural Engineering

5230 Selected Topics in Agricultural Engineering (3) Develop new topics as required by current trends and problems in agricultural engineering.

5610 Design of Water Control and Waste Utilization Systems (3) Earth dams, irrigation, drainage, leat, lifting, hydraulic, hydroelectric, and informal groups, population shifts and changing farm technology. Prereq: 3420 or equivalent. W.

5620 Design of Structures for Production, Processing and Environmental Control (3) Functional planning and structural design of agricultural buildings; emphasis on complete design of structure or system, functional, structural and environmental aspects. Prereq: 3620. 1 hr and 2 labs. Sp.

5650 Design of Processing and Materials Handling Systems (3) Development of systems and components for integrated agricultural processing considering mass and energy balances, product characteristics, equipment specifications, storage, handling and economic merit. Prereq: 3630. 1 hr and 2 labs. F.

4640 Design of Agricultural Machinery (3) Functional requirements of agricultural machinery. Elements of machine component design; synthesis of mechanisms; mechanical and hydraulic drives. Team effort in completing machine design project. Prereq: 3640 or consent of instructor. 1 hr and 2 labs. Sp.

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

5240 Environmental Control in Agricultural Structures (3) Engineering and design of environmental control systems for confined housing of animals, controlled environ-
Agriculture

5120 Teaching Internship in Agriculture (1) Supervised experience in teaching, test preparation, and evaluation of agriculture students. May be repeated. Maximum 3 hrs for M.S. students; 6 hrs for Ph.D. students.

Animal Science

MAJOR

DEGREES

Animal Science

Professors:
D. O. Richardson, (Head), Ph.D. Ohio State; J. W. Holloway, Ph.D. Oklahoma State; J. K. Slater (Emeritus), Ph.D. Ohio State; W. T. Butts, (Adjunct), Ph.D. Tennessee; C. C. Chamberlin (Emeritus), Ph.D. Iowa State; G. W. Hair (Emeritus), Ph.D. Iowa State; S. L. Hansard (Emeritus), Ph.D. Florida; R. E. Livings, M.S. Tennessee; J. B. McLaren, Ph.D. Auburn; G. M. Manns (Emeritus), D.V.M. Michigan State; M. J. Montgomery, Ph.D. Wisconsin; R. M. S. Olson, Ph.D. Wisconsin; C. E. Carter, Jr., Ph.D. Ohio State; L. H. Brown, Ph.D. Ed. D. and 1 lab. Sp, A.

Associate Professors:

Assistant Professors:
R. C. Sellen, Ph.D. Minnesota; R. N. Hellmann, Ph.D. Maine; H. E. Katseh, Ph.D. Virginia Polytechnic Institute; T. W. Schultz, Ph.D. Tennessee; J. D. Smaling, Ph.D. Texas A & M.

3210 Anatomy and Physiology of Farm Animals (4) Skeleton and joints, skeletal muscles, blood and microcirculation, and the nervous, circulatory, respiratory, digestive, renal and endocrine systems; demonstrations of physiochemical phenomena. Prereq: Biology 1210 or Agricultural 1130. 3 hrs and 1 lab. F, W, Sp.

3220 Physiology of Reproduction (3) Comparative anatomy and physiology of reproductive systems of higher vertebrates; gametogenesis, fertilization, implantation, prenatal growth, parturition and initiation of lactation; endocrine regulation of reproductive phenomena. Prereq: 3210 or consent of instructor. (Same as Zoology 3220.) 3 hrs and 1 lab. F, W, Sp.


3330 Feeds and Ration Formulation (4) Feedstuffs, additives, feeding standards, nutrient requirements and ration formulation for beef and dairy cattle, sheep, horses, swine, poultry and laboratory animals. Prereq: 3320. 2 hrs and 2 als. W, Sp.

3410 Heredity in Animals (3) Basic chromosomal mechanisms of heredity. Prereq: 3420 on Mendelian principles and exceptions such as linkage and cytoplasmic inheritance. Introductions to the biochemical basis of heredity and to quantitative inheritance. Illustrations of principles related to species familiar to agriculture students. Prereq: Agriculture 1130. 2 hrs and 1 lab. F, W, Sp.

3420 Principles of Animal Breeding (3) Genetic principles in the breeding of economic species. Genetic basis of variation. Partitioning of variation according to various kinds of causative factors such as those in genetic, environmental and selective and its consequences. Mating systems and their effects on populations. Planning breeding programs. Prereq: 3410 or equivalent, 2 hrs and 1 lab. F, Sp.
5000 Thesis (1-15) P/NP only. E
5010 Research Methods and Instrumentation in Plant Pathology and Entomology (3) Techniques for cultivation, field, and greenhouse research in plant pathology and entomology. 1 hr and 2 labs. F
5110 Plant Disease Diagnosis (3) Diagnosis of plant diseases, disease symptoms, causal agents and control measures. Prereq: 3130.
5120 Insect Diagnostic Clinic (3) Identification of insects and insect damage to crops, livestock and residences. Obtaining of insects and damaged specimens; diagnostic characteristics and control measures. Prereq: 3210 or Zoology 3110.
5210 Plant Parasitic Nematodes (4) Morphology, physiology, taxonomy, and ecology of plant parasitic nematodes with emphasis on host-parasite relationships. Prereq: 8 hrs biological science or consent of instructor. 3130.
5220 Plant Disease Control (3) Basic problems and principles involved in controlling plant diseases. Prereq: 3130. W, A
5230 Field Crop and Vegetable Insects (3) Taxonomy, biology, and control of insects affecting field and vegetable crops. Prereq: 3210 or equivalent course in applied entomology. 2 hrs and 1 lab. F, A
5240 Plant Virology (4) Symptoms, morphology and epidemiology of virus infection; structure, replication, transmission, purification, characterization, and classification of plant viruses; serology; plant pathogenic viroids, mycoplasmas and spiroplasmas. Prereq: 3130 or consent of instructor. 2 hrs and 2 labs. W, A
5250 Medical and Veterinary Entomology (4) Morphology, taxonomy, biology and control of arthropod parasites and vectors of pathogens of humans and animals. Ecology and behavior of vectors in relation to pathogen transmission and control. Prereq: 3215, general entomology, or consent of instructor. 3 hrs and 1 lab. Sp, A
5260 Insect Pest Management (4) Principles and applications of biological, cultural, genetic, behavioral, and chemical methods of control to maintain pest populations below economic threshold levels. Prereq: 3210, Zoology 3110, or consent of instructor. 3 hrs and 1 lab. W, A
5310 Special Problems in Entomology (1-6) Comprehensive individual study of current problems. May be repeated. Maximum 9 hrs. E
5320 Special Problems in Plant Pathology (1-6) Comprehensive individual study of current problems. May be repeated. Maximum 9 hrs. E
5330 Special Problems in Nematology (1-6) Comprehensive individual study of current problems. May be repeated. Maximum 9 hrs. E
5410 Seminar (1) Review of literature and current research in plant and animal study of cosmic entomology. May be repeated. Maximum 3 hrs. F, W, Sp

Food Technology and Science

MAJOR DEGREES
Food Technology and Science M.S., Ph.D.

Professors:

J. T. Miles (Head), Ph.D. Wisconsin; J. L. Collins, Ph.D. Maryland; H. O. Jaynes, Ph.D. Illinois; C. C. Melton, Ph.D. Kansas State; W. W. Overcast (Emeritus), Ph.D. Kansas State.

Associate Professors:

B. J. DaMott, Ph.D. Michigan State; S. L. Melton, Ph.D. Tennessee; M. J. Rieman, Ph.D. Kansas State.

Assistant Professors:


5200 Food Processing I (4) Procurement, processing and distribution of fluid milk. Manufacture of frozen and condensed dairy products. 3 hrs and 1 lab. W
5340 Meat Science (3) Processing methods, carcass characteristics of meat animals; slaughter, cutting, seasoning, freezing and storage. 2 hrs and 1 lab. W, Sp
5410 Food Technology and Science Seminar (1-3) Review of literature and written reports. May be repeated. Maximum 3 hrs. F, W, Sp
5430 Dairy Products II (4) Principles in the manufacture of butter, cheese and special dairy products. Prereq: 3020. 3 hrs and 1 lab. Sp, A
5130 Food Chemistry I (3) Minerals, fats, oils and vitamins in food as affected by processing and storage. Prereq: Nutrition 3320 or equivalent. 2 hrs and 1 lab. Sp
5140 Food Chemistry II (3) Reactions of proteins, carbohydrates and natural food colorants in food materials. Structure, food protein, enzymology and processing. Effects of storage and processing on proteins and carbohydrates with emphasis on nutritional value and functionality. Prereq: Nutrition 3320 or equivalent. 2 hrs and 1 lab. F
4200 Food Processing II (4) Prevention of deterioration and spoilage of foods. Methods of preservation and packaging. Prereq: 2200 and Agricultural Mechanization 3510. 3 hrs and 1 lab. F
4210 Food Additives (3) Substances used in food manufacturing with emphasis on properties and functions. Prereq: Nutrition 3320 or equivalent. S
4300 Food Processing III (2) Water, sanitation and waste control in food industry. Prereq: Agriculture 1150 and Microbiology 2910-19 or equivalent. W
4410 Food Crop Products (3) Foods from crops with emphasis on types, manufacturing systems, quality attributes, and utility. F, A
4420 Bakery Products (3) Baking ingredients and their interactions during production and storage of bakery products. Prereq: 4130 and Chemistry 2230 or equivalents. 2 hrs and 1 lab. Sp, A
4810 Microbiology In Food Manufacturing (3) Relationships of growth of common food microorganisms in fermentative and enzymatic changes occurring during processing and manufacturing of foods. Prereq: Microbiology 2910-19 or equivalent. 1 hr and 2 labs. F
4830 Fermented Foods (3) Role of microorganisms in preparation of foods with emphasis on development of certain desirable characteristics. Flavor, aroma, texture, and keeping quality. Prereq: Microbiology 3810. 2 hrs and 1 lab. Sp, A
4840 Meat Products Manufacturing (3) Prepared meat products with emphasis on sausage making and information relating to cost controls, inspection, and meat science. Prereq: 3640 or consent of instructor. 1 hr and 2 labs. W
4920 Analysis of Physical Properties of Foods (4) Physical states of food materials, water, viscosity, colloids, gels, foams, crystals, color. Quantitation and chemical environment and metabolism of microorganisms and to rate of loss of food quality. Prereq: 4810 and Microbiology 3810. 2 hrs and 1 lab. Sp
5540 Microbial Cultures in Foods (3) Physical and chemical environment and metabolism of microorganisms as related to cultured food products. Prereq: 4810 and Microbiology 3810. 2 hrs and 1 lab. Sp, A
6000 Doctoral Research and Dissertation (3-15) P/NP only. E
6010 Advanced Food Technology and Science (1) Selected readings, discussions and presentations of current topics; topics to be announced in advance. May be repeated. Maximum 6 hours. S/NC only. F, W, Sp
6410 Advanced Food Processing (3) Role of processing treatments in modification of food properties; texture, color, and flavor characteristics. Prereq: 5120, 5140, and Food Science 5510 or consent of instructor. Sp

Forestry, Wildlife and Fisheries

MAJORS DEGREES
Forestry, Wildlife and Fisheries M.S.

Professors:


Associate Professors:

B. L. Dearden, Ph.D. Colorado State; W. E. Hammit, Ph.D. Michigan; R. L. Hay, Ph.D. Duke; D. W. Johnson (Adjunct), Ph.D. Washington;
4020 Forest Watershed Management (3) Water as a forest resource; role of forests in the hydrologic cycle; control of water quantity, quality, and regimen; watershed protection and management; approval consent of instructor. Two overnight field trips. W

4210 Forestry Organization and Administration (3) Planning, organizing, and leadership concepts and cases; problem analysis and decision making in forest resource management. Prereq: Consent of instructor. 2 hrs and 1 lab. F

4220 Forest-Resource Management (4) The forest as integration of resource uses; review of traditional timber-management concepts; the multiple-use concept; valuation of forest resources for decision making; and planning; taxation of forest firm. Prereq: 4210 W

4230 Forest-Resource Management Plans (4) Field problems and case studies in forest-resource management; the forest as a system; management of forest enterprises as a producer of timber, recreational services, watershed services, and wildlife; producing multiple services; preparation of a complete plan based on optimizing forest uses. Prereq: 4210 Sp

4240 Interpreting Forest Resources (3) Principles and techniques of interpreting forest resources; importance of environmental interpretation to management of forest resources; development and administration of interpretive services. Possible overnight field trips required. Prereq: 3240 or equivalent. 2 hrs and 1 lab Sp

4330 Forest Policy (3) History of forestry in the United States with emphasis on development of forest resource policies; current policies influencing development and management of forest resources; a brief survey of policy implications of forest resource organizations in public and private sectors. Prereq: 4004 W

4340 Aerial Photography in Forest-Resource Management (3) Use of conventional aerial photographs in forest-resource management; interpretation of detail, aerial inventories, preparation of cover-type maps, uses of other remotely sensed imagery. Prereq: 3110 or equivalent. 1 hr and 2 labs. Sp

4420 Forest Tree Improvement (3) Forest tree improvement related to silviculture; nature and purposes of tree improvement and forest genetics; principles of tree cytology and population genetics; importance of seed source; selection of superior phenotypes and development of seed orchards; hybridization; seed production and seed certification. Prereq: 4006 or consent of instructor. 2 hrs and 1 lab Sp

4440 Forest Recreation (3) Forest lands as a recreation resource; the interrelationships of forest recreation and other management activities; development and management of forest recreation areas; socio-economic and political determinants of recreation development and management. Prereq: 6 hrs sociology and/or economics. 2 hrs and 1 lab Sp

4450 Recreational Behavior in Forest Environments (3) Review of sociological and psychological theories relevant to forest recreation planning, management, and evaluation; application of behavioral concepts to forest recreation problems, review of methodologies for assessing recreational behavior. Prereq: 3240 and 6 hrs in behavioral psychology and/or sociology, or consent of instructor. W


Mathematics 1851, Physics 1220, or consent of instructor.

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

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

5011 Problem Analysis in Forest Resources (3) Problem identification, analysis and solution in forest resources management. Prereq: 4230 or equivalent. "Prepare written report on a problem. Topic and report must have approval of all committee members. Formal presentation to faculty and students. Available only to students in the non-thesis option for the M.S. in Forestry.

5110 Special Problems in Forestry (1-8) May be repeated. Maximum 9 hrs. E

5220 Seminar in Forest Tree Biology (3) Growth, reproduction, and genes of commercial trees. Prereq: Plant and Soil Science 3610 and Computer Science 1410 or equivalent. Th Quarter. May be repeated. Maximum 9 hrs. E

5230 Seminar in Forest Management (3) Newly developed systems in forest organization and regulation; financial and operational planning in forest management. Prereq: 4230 or equivalent. W, A

5240 Seminar in Forest Genetics (3) Population genetics and speciation, variation patterns and heritability in forest tree improvement; identification, manipulation and techniques of interpreting forest resources. Prereq: 4420, Biology 3110, and consent of instructor. A

5250 Recreation Planning for Forests and Associated Lands (3) Planning process for recreation development on forests and associated lands; analysis and critique of specific contemporary plans. Overnight field trips may be required. 2 hrs and 1 lab. F

5260 Industrial Forestry (3) Study and analysis of wood-using firms and industries. Forest taxation, land tenure and wood procurement alternatives. Development and application of forestry planning models. Prereq: 4230 or consent of instructor. W

5270 Topics in Forest Industries Management (3) Current problems in forest industries. Exclusively for public and private business sector (concerned with forest industry) conduct classes in selected topics. Prereq: 4230 or consent of instructor. F

5280 Seminar in Forest Biometry (3) Theory and application of forest measurements and sampling; tree, log and lumber quality; volume estimation techniques; growth and yield prediction. Prereq: 4003 or consent of instructor. W, A

5310 Seminar (1) Current developments in forestry. Required of each graduate student in residence Winter Quarter. May be repeated. Maximum 2 hrs. S/NC only. W

Wildlife and Fisheries Science

3230 Wildlife Management (3) Lives and ecological relationships of wild animals; biological, social and economic aspects of their management. 2 hrs and 1 lab F

4450 Game Mammals (4) Classification, identification, distribution, natural history, and management principles of game mammals in North America. Prereq: 3230 or yr of zoology. 2 hrs and 2 labs. F

4460 Game Birds (4) Classification, identification, distribution, and management of game birds in North America. Prereq: 3230 or yr of zoology. 3 hrs and 1 lab plus one weekend field trip. W

4510 Fish Populations (4) Principles and methods of fish population estimation; sampling techniques and population dynamics; age and growth. Prereq: Biology 3130, 8 hrs mathematics, or "Graduate credit for non-forestry and non-wildlife sciences majors only.

Institute of Agriculture/Forestry 29
3620 Intermediate Landscape Design (4) Application of skills developed in design of landscape projects. Refinement of graphic skills. History of landscape design related to contemporary applications. Technical aspects of design and implementation. Use of plant materials in the design of small and moderate scale landscape situations. Prereq: 3610 or 3610-equivalent. 1 hr and 2.9 hrs. F, W

3630 Landscape Construction and Contracting (4) Construction methods, materials and practices of landscape installation and contracting. Site layout procedures, artwork and drainage, landscape construction materials; application through detailed design drawings and cost estimation procedures. Landscape contracts, specifications and bidding procedures. Prereq: 3310; 3610; Agricultural Mechanization 2130 recommended. 1 hr and 2.9 hrs. Sp

4150 Nursery Production (4) Modern methods of producing liners, field and container grown woody ornamental plants. History and evolution of nursery industry and modern production recommendations for woody ornamental plants. Prereq: 3030, 3810 and Plant and Soil Science 2130. 2 hrs and 2 labs. F, Sp

4160 Nursery Management (3) Modern management methods for wholesale and retail nurseries, garden centers, and landscape contractors. Prereq: 3310. 2 hrs and 1 lab. W

1800 Park Design (4) Design criteria for parks and outdoors recreation systems. Park site selection, analysis, planning and management as related to landscape needs and natural and economic resources. Evaluation of aesthetic and functional quality of parks and their impact on environmental quality of rural and suburban communities. Prereq: 3620. 2 hrs and 2 labs. Sp

4190 Advanced Landscape Design (4) Comprehensive application of landscape design skills and knowledge through development of major project. Analysis, programming, planting design, construction detailing, estimating, specifications, contracts and bidding. Prereq: 3510; 3620, 3620, 1 hr and 2.3 hrs. Sp

4220 Advanced Turfgrass Management (4) Principles and scientific basis of turfgrass culture: adaptations, ecology, physiology, soil fertility and grass nutrition; climatic influences on grass culture; physiology of clipping and water management; traffic effects and compaction; and the physiological influences of pest infestations and control measures. Prereq: 3210. 3 hrs and 1 lab. W

4320 Specialty Floriculture (3) Specific practices in production, distribution and marketing of flowers and plants. Production methods for wholesale and retail nurseries, container and field grown ornamentals. Prereq: 4220 and consent of instructor. 2 hrs and 2 labs. Sp

4460 or consent of instructor. May be repeated. Maximum 6 hrs. Sp, A

5410 Histological Microtechnique (4) Preparation of plant tissue for microscopic examination, paraffin and plastic embedding, microtomy and mounting of sections, dyes and staining schedules and photograpy. Prereq: General biology or botany, general and organic chemistry; and consent of instructor. 2 hrs and 2 labs. W

5500 Seminar (1) Current literature and developments in ornamental horticulture and landscape design. May be repeated. Maximum 3 hrs. F, Sp

5510 Advanced Nursery Production (4) Preparation and use of growing media for woody ornamental plants; nutrition of ornamental plants including di- agnoses, prevention and control of mineral deficiencies; development of fertilization programs for containers and field grown ornamentals. Prereq: 4150; Plant and Soil Science 3110; Botany 3210 or Plant and Soil Science 3040. 3 hrs and 1 lab.

Plant and Soil Science

MAJOR Plant and Soil Science

DEGREES M.S., Ph.D.

Professors:
L. F. Staat (Head), Ph.D. North Carolina State; F. F. Bell (Emeritus), Ph.D. Iowa State; D. L. Cofley, Ph.D. Purdue; L. W. Harmist, Ph.D. Purdue; H. D. Jeffery, Ph.D. North Dakota State; L. M. Josephson (Emeritus), Ph.D. Washington State; J. E. Purdy, Ph.D. Purdue; J. H. Reynolds, Ph.D. Wisconsin; L. A. Short, Ph.D. Kansas State; M. E. Springer (Emeritus), Ph.D. California (Berkeley); H. D. Swingler (Emeritus), Ph.D. Michigan State.

 Associate Professors:

Assistant Professors:
P. E. Dykman, Ph.D. North Carolina State; R. J. Miles, Ph.D. Texas A & M; M. D. R. West, Ph.D. Nebraska; J. D. Woldt, Ph.D. Auburn.

3020 Crop Ecology (3) Crops and environment, geographic location; site, heat, light, water and interplant relationships as a basis for judgment of cultural practices used to modify environmental factors. Prereq: 8 hrs biological science. 2 hrs and 1 lab.

3040 Crop Physiology (3) Physiology of crop plants; growth phenomena related to crop production; use of general theories of physiology; effects of environment; growth regulators, temperature, light, heat, air, minerals, and water. Prereq: 8 hrs biological science. 2 hrs and 1 lab. W

3110 Soil Fertility and Fertilizers (4) Properties of soils in relation to fertility and related availability and uptake. Methods of soil fertility evaluation and principles of fertilizer use; manufacture and properties of fertilizers. Prereq: 2130. 3 hrs and 1 lab. W

3120 Grain and Oil Crops (3) Distribution, improvement, morphology, culture, harvesting, and utilization of corn, small grains, grain sorghum, soybeans and related crops. Prereq: 2130, 3 hrs biological science. 2 hrs and 1 lab. W

3140 Forage Crops (4) Characteristics, adaptation, improvement, management, and utilization of grasses and legumes for pastures, hay, and silage. Prereq: 2130, 8 hrs biological science. 3 hrs and 1 lab. F, Sp

3160 Cotton and Tobacco (4) Characteristics, adaptation, improvement, culture, harvesting, and marketing of cotton and tobacco. Prereq: 2130, 6 hrs biological science. 3 hrs and 1 lab. F

3180 Fruit Crops Management (4) Soils, planting, cultivation, development of fruit crops plantations; pest control, harvesting, packing, storage, and prun ing. Prereq: and Plant Pathology 3130 and 3210. 3 hrs and 1 lab. W

*Clyde B. Austin Distinguished Professor
Experimental design and procedures; effect of the variable. Prereq: 2130. 3 hrs and 1 lab. W, A

3510 Commercial Production of Cool Season Vegetables (3) Characteristics, economic importance, adaptability, and production for fresh and processing markets; emphasis on greens, salad, cole, root, bulb crops, perennials, and Irish potatoes. Prereq: 8 hrs biological science. 2 hrs and 1 lab. Sp

3520 Commercial Production of Warm Season Vegetables (3) Characteristics, economic importance, adaptability, and production for fresh and processing markets; emphasis on okra. Need not have 3510 as prereq. Prereq: 8 hrs of biological science. 3 hrs and 1 lab. Sp

3610 Interpretation of Agricultural Research (3) Statistics as applied to agriculture. Statistical methods in interpretation of research results. Prereq: Math 1550, F, W

3710 Principles of Weed Science (4) Basic principles of weeds, taxonomy, ecology, economic importance, methods of control, types of herbicides, and specific recommendations for various crop and non-crop situations. Prereq: 3 hrs of agricultural science and 3 hrs organic chemistry. 3 hrs and 1 lab. Sp

4110 Soil Chemistry (4) Colloidal systems; properties and behavior of colloidal soil materials; relation of chemical processes to plant nutrient availability. Prereq: 2130 and Physics 1210. 3 hrs and 1 lab. F

4120 Principles of Crop Breeding (4) Genetic principles and techniques used in crop improvement. Prereq: 3 hrs of biologic science or consent of instructor. 3 hrs and 1 lab. W

4250 Agricultural Chemicals and the Environment (4) Characteristics, use of mode of action, degradation, and environmental impact of chemicals used in agriculture, forestry, and related areas with emphasis on agricultural pesticides; environmental safeguards imposed by federal and state regulations on chemical development and use. Prereq: 1 yr biological science and 1 yr chemistry. 3 hrs and 1 lab. F

4320 Soil Formation, Morphology, and Classification (4) Soil formation; properties, distribution, and classification of soils; interpretation of morphology; use of soil surveys. Prereq: 2130. 3 hrs and 1 lab. Sp

4400 Problems in Plant and Soil Science (1-6) May be repeated. Maximum 9 hrs. E

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

5100 Special Problems in Plant and Soil Science (1-6) May be repeated. Maximum 9 hrs. E

5200 Soil Crop Relationships (3-6) May be repeated. Maximum 6 hrs. Su

5240 Soil Productivity and Management (3) Concepts of soil productivity and management, quantitative evaluation of factors and their interaction affecting soil management decisions, cropping systems, water control and management, tillage and fertility management. Planning and evaluation of specific soil management programs. Prereq: 4220 and 4110 or consent of instructor. Sp, A

5250 Pedology (4) Factors and processes of formation as related to physical, chemical, and mineralogic properties of soils; soil in an ecosystem; classification of soils. Prereq: 4320 or consent of instructor. 3 hrs and 1 lab. W, A

5310 Design and Interpretation of Experiments (4) Experimental design and procedures; effect of different variables on precision of experiments; problems dealing with the analysis of data. Prereq: 3610 or equivalent. 3 hrs lec, 1 hr rec, and 1 hr disc. W

5340 Soil Physics (3) Chemical and physical relationships among soil, liquid, and gaseous phases of soil management. Prereq: 4110. 2 hrs and 1 lab. W, A

5370 Advanced Soil Fertility (3) Fundamental concepts and soil chemistry as they relate to nutrient absorption by plant roots; interaction of these concepts in soil fertility and management. Prereq: 4110. W, A

5390 Soil Physical Chemistry (3) Structural properties of soil minerals determining physicochemical reactions, ion exchange, Donnan Equilibrium, double layer theory. Prereq: 4110; Chemistry 4110 or concurrent registration. Sp, A

5600 Seminar (1) May be repeated. Maximum 3 hrs. E

5710 Advanced Plant Genetics (3) Mutation systems: controlling elements, induced mutations, genome organization, polytomic, tetrasomic inheritance, extrachromosomal inheritance, apospory, incompatibility systems, and genetic engineering of higher plants. Prereq: Basic genetics or consent of instructor. F, A

5720 Quantitative Genetics (3) Genetic constitution of populations; quantitative characteristics; recombination and measurement of continuous variation; estimation of variable components and genetic advancement using different breeding procedures. Prereq: Basic genetics or consent of instructor. W, A

5750 Advanced Plant Breeding (4) Historical development of plant breeding concepts and methods, effects of heterosis, inbreeding, hybridization and selection. Improvement of self- and cross-pollinated crops. Prereq: 5710. 3 hrs and 1 lab. W, A

5810 Crop Climatology (4) Meteorological factors affecting crop plants; crop distribution and centers of origin; general and specific climatic regions and vegetative systems; microclimatic influences on plant growth. Prereq: 3020, 3040; or Botany 3210, 4310 or consent of instructor. 3 hrs and 1 lab. F, A

5820 Advanced Crop Physiology and Ecology (4) Historical development of research in crop physiology and ecology. Interrelationships between physiological processes and environmental factors. Crop adaptation to specific environmental conditions. Prereq: 3020, 3040; or Botany 3210, 4310 or consent of instructor. 3 hrs and 1 lab. W, A

5850 Mechanisms of Herbicide Action (3) Principles of the uptake, translocation, mode of action and basis of selectivity of herbicides. Effects of herbicides on plant morphology, metabolic systems and enzymatic activities. Prereq: Botany 3210 and Biochemistry 4110 or consent of instructor. Sp, A

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

6100 Special Topics In Soil Science (3) May be repeated. Maximum 9 hrs. E

6200 Special Topics In Plant Breeding (3) May be repeated. Maximum 9 hrs. E

6300 Special Topics In Crop Physiology and Ecology (3) May be repeated. Maximum 9 hrs. E

6410 Experimental Designs (3) Principles of experimental designs used in agricultural research. Complete and incomplete block, randomized complete block and latin square designs; factorial experiment and confounding; lattice designs; and covariance. Prereq: 5310, F, A

6510 Growth Control with Chemicals (3) Character, theories of action and use of auxins, gibberellins, cytokinins and inhibitors. Range of effects on growth. Prereq: Botany 3210 or equivalent. 2 hrs and 1 lab. W, A

6600 Seminar (1) May be repeated. Maximum 3 hrs. E

College of Veterinary Medicine

H. Kitchen, Dean
C. F. Reed, Associate Dean
W. H. Grau, Jr., Associate Dean

The College of Veterinary Medicine, established in 1974, is organized into six academic departments: Animal Science (jointly with the College of Agriculture), Environmental Microbiology, Microbiology (jointly with the College of Liberal Arts), Pathobiology, Rural Practice, and Urban Practice. The College administers a professional curriculum leading to the degree of Doctor of Veterinary Medicine (see the General Catalog) and a graduate program involving all departments leading to the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees.

Department of Instruction

Environmental Practice

Professors:

Assistant Professors:

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

5100 Special Topics In Environmental Medicine (1-3) Aspects of aberrant metabolism, pharmaco-kinetic studies, toxicokinetic studies, epimutations, and environmental factors in molecular biology: atomic absorption, gas chromatography, ultra centrifugation, extractive techniques and radiomunocassay. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5200 Experimental Animal Surgery (4) Competence in performing humane surgical modifications of experimental animals. Techniques of anesthesia. Drug administration and postoperative care. Prereq: Zoology 4050, 4110, 4082, and/or consent of instructor.

Institute of Agriculture/Veterinary Medicine 31
5611-12 Pharmacology (1,2) Theories of transport across membranes. Introduction to principles of drug action and distribution. Receptor theory, adverse drug reactions; correlated with Animal Science 8240-50. Prereq: Consent of instructor.

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

6010 Advanced Topics in Environmental Medicine (1-3) Current and future research methodology, laboratory situation, recent advances in instrumentation involved in analytical techniques for environmental medicine. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

Pathobiology

Professors:
R. L. Michel (Head); V.M.D., Ph.D. Michigan;
M. D. McGavin, M.V.Sc., Ph.D. Michigan;
L. N. D. Potgieter, B.V.Sc., Ph.D., Iowa.

Associate Professors:
M. D. McCracken, D.V.M., Ph.D. Purdue;

Assistant Professors:

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

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

6010 Special Topics in Pathology (1-3)

6020 Special Problems in Pathobiology (1-5) Projects of varying nature in necropsy, histopathology, clinical pathology, clinical parasitology, clinical immunology, clinical bacteriology and mycology, and clinical virology. May be repeated. Maximum 20 hrs.

6052 Pathogenesis and Diagnosis of Virus Diseases in Domestic Animals (5) Biology of viruses and pathology of virus infection in domestic animals. Prereq: Biochemistry 4110-20, 4119; Microbiology 4430, 4439; consent of instructor.

Rural Practice

Professor:
H. T. Barron (Head), D.V.M. Texas A & M.

Associate Professors:
D. O. Goble, D.V.M. Kansas; F. M. Hopkins, D.V.M. Georgia.

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

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

Urban Practice

Professors:
D. J. Krahwinkel (Acting Head), D.V.M. Auburn.

Associate Professors:

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

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

Animal Science/Veterinary Medicine

Professors:
D. O. Richardson (Head), Ph.D. Ohio State.

Associate Professors:

Veterinary Medicine

5343 Patterns of Disease (5) Host-agent relationship in disease of animals. Pathogenesis, laboratory diagnosis, control, and public health significance. Principles of epidemiology and application in study of diseases in animal populations. Prereq: Consent of instructor and Director, Comparative and Experimental Medicine Graduate Program.

5362 Veterinary Toxicology (3) Pharmacologic basis and pathologic features of diseases of animals caused by common toxic chemicals: clinical manifestations, diagnosis, and treatment. Prereq: Consent of instructor and Director, Comparative and Experimental Medicine Graduate Program.

5363 Public Health (2) Public health aspects of veterinary medicine and nature of related laws, ordinances and regulations. Veterinarian's role in protection of environment, ecology, and quality of food. Prereq: Consent of instructor and Director, Comparative and Experimental Medicine Graduate Program.

5372 Comparative Medicine (4) Diagnosis, prevention, and treatment of diseases of laboratory animals, avian species, and marine mammals, seen most commonly by practicing veterinarians. Prereq: Consent of instructor and Director, Comparative and Experimental Medicine Graduate Program.

5375 Principles of Medicine (4) Physiological and pathological principles underlying mechanisms of disease. Selected examples of human and animal diseases: recent advances in principles of veterinary medicine. Prereq: Consent of instructor and Director, Comparative and Experimental Medicine Graduate Program.

Microbiology

Professors:
A. Brown (Head), Ph.D. Chicago; R. W. Beck, Ph.D. Wisconsin; B. T. Rouse, Ph.D. Guelph.

Associate Professor:

For specific course listings please see College of Agriculture, Department of Animal Science, and College of Liberal Arts, Department of Microbiology.
Science offers an intercollegiate program and Doctor of Philosophy degrees. (See page 33.) The Department of Psychology in the College of Business Administration, the Doctor of Philosophy with a major in Psychology leading to the Master of Science degree. (See information under "Exemption from Core Courses" on page 34.)

Graduate Programs

The College of Business Administration offers programs leading to six advanced degrees: the Doctor of Business Administration, the Doctor of Philosophy with majors in Economics and in Management Science, the Master of Arts with a major in Economics, the Master of Science with a major in Statistics, the Master of Accountancy, and the Master of Business Administration. The Department of Management and the Department of Psychology in the College of Liberal Arts jointly offer an intercollegiate program in Industrial and Organizational Psychology leading to the Master of Science and Doctor of Philosophy degrees. (See page 94.) Also, the Department of Management Science offers an intercollegiate program leading to the Master of Science degree. (See page 95).

The two College-wide programs, the MBA and the DBA, are described below.

Descriptions of other degree programs will be found under the appropriate departmental or program headings.

Academic Common Market. An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UTK on an in-state tuition basis. Programs in the College of Business Administration available to residents of the states indicated include: DBA (all concentration areas)—West Virginia; MBA (Transportation and Logistics)—Virginia and West Virginia; Industrial and Organizational Psychology (M.S. and Ph.D.)—Alabama, South Carolina, and Virginia. Additional information may be obtained from the Graduate Programs office of this college.

The MBA Program

The MBA program is designed for students with undergraduate degrees in the social and natural sciences, the humanities, and professional fields such as engineering, business, agriculture, and architecture. A full-time student can complete the program in six academic quarters. Those with degrees in business earned at an institution accredited by the American Assembly of Collegiate Schools of Business (AACSB) should be able to complete the program in five quarters.

Full-time students are expected to successfully complete 12 hours per quarter and part-time students 6 hours per quarter. Scheduling and sequencing of courses are done with this assumption in mind. The complete MBA program with a concentration in management is offered by the regular graduate faculty of the College for part-time students on the Knoxville campus and at Oak Ridge.

The program consists of the MBA core (twelve to nineteen courses depending upon exemptions based on prior studies and/or proficiency examinations) and a concentration/electives block of eight courses. Each course is 3 credit hours. The total program may consist of from 60 to 81 quarter hours.

Prerequisites. Upon matriculation, the student must have received a bachelor's degree from a regionally accredited institution.

College level mathematics through at least one course in calculus is the only prerequisite requirement for entry into the program. Those electing the management science or statistics concentration must have completed two years of college level calculus. Those admitted to the accounting concentration should plan on up to two additional quarters for undergraduate prerequisite courses that are taken during the first year of the program. Although not required, completion of undergraduate courses in "core areas" may qualify the student for exemption from some core courses. (See information under "Exemption from Core Courses" on page 34.)

MBA Core. The following courses are required in each student's program unless an exemption from one or more courses is granted as provided below under the heading "Exemption from Core Courses." All courses are 3 credit hours. The core courses are: Accounting 5010, 5020, 5030; Business Administration 5310; Business Law 5010; Economics 5010, 5020, 5030; Finance 5010, 5020; Management 5010, 5020; Management Science 5010; Marketing 5010, 5020; Mathematics 5052; Office Administration 5050; Statistics 5010, 5020.

Concentration and Electives. A concentration area(s) may be indicated on the MBA Program Application or this declaration may be deferred until after matriculation. In any event, selection must be made no later than completion of 27 hours of MBA program course work. In some cases selection of an area(s) early in the program is encouraged to facilitate proper course sequencing. Requests for changes in concentration area(s) must be submitted to the Graduate Business Programs office for approval.

1Accounting 5020 and 5030 are waived for students who complete the concentration in accounting.
2See notation under the heading "MBA Concentration" in the Management Science Program section (page 91).
3See notation under the heading "MBA Concentration" in the Statistics Department section (page 43).
Among the 8 courses in the concentration/electives block, at least 4 but not more than 6 must be in one of the following concentration areas (for specific courses required in some concentration areas, see departmental sections on following pages):

Accounting
Economics
Finance
Forest Industries Management
Governmental Financial Administration
Management
Management Science
Marketing
Real Estate and Urban Development
Statistics
Transportation and Logistics

The remaining elective courses (2 to 4) must be in fields outside the concentration area, normally selected from MBA courses offered in other departments of the College, and may comprise a second concentration area of 4 courses. Up to 2 courses (6 hours) in this block may be taken outside the College of Business Administration. No more than 3 courses numbered below 5000 may be included in this 8-course block. Courses numbered below 4000 normally are not approved for the MBA program. Before beginning the concentration/electives part of the curriculum, the student must have his/her program approved by the Office of the Graduate Business Dean.

Exemption from Core Courses. A student may be exempted from certain core courses on the basis of having recently completed equivalent undergraduate courses in these subjects with grades of C or higher at a regionally accredited institution. "Recently completed" means, for mathematics, completion of the last course or regular use of math tools within three to four years of matriculation, and for other areas within five to six years of matriculation. Courses in this category (and the approximate undergraduate equivalent work) are:

Accounting 5010 (6 quarter hours, fundamentals of financial accounting)
Business Law 5010 (6 quarter hours, legal and economic environment of business)
Economics 5010 (9 quarter hours, principles of economics—macro and micro)
Mathematics 5052 (12 quarter hours, including college algebra and calculus. See topics included in Mathematics 5051 and 5052)
Office Administration 5050 (3 quarter hours, introductory course in computer science with programming)

In addition to the above, a graduate of an AACSB accredited undergraduate business program may request exemption from one or both of the core courses in the area of his/her undergraduate major field, provided at least 30 quarter hours (20 semester hours) of course work were completed in the major area no more than five years prior to matriculation, and a grade average of 3.0 or higher (on a 4.0 scale) was earned for all courses in the major. Students requesting such an exemption must petition the appropriate department head. The department may require the student to pass a proficiency examination over any course for which exemption is requested. (See page 15)

A minimum of 60 quarter hours of graduate credits is required to earn the degree. If a student qualifies for exemption from a course in addition to those provided for in the two categories described above, whether by proficiency examination or otherwise, an additional course approved by the Graduate Business Dean will be included in the student's curriculum for each such exempted course so as to meet the 60-hour minimum requirement.

Students holding degrees from foreign institutions normally may not be exempted from taking core courses.

Transfer Credits. Graduate level courses taken at other AACSB accredited institutions that otherwise conform to University policy (page 15) may be credited toward MBA degree requirements within the following limits:

MBA Core: 6 hours
Concentration Area: 3 hours (provided at least 12 hours of course work at this institution are included in each concentration area)
Elective Area: 3 hours

The maximum number of hours that may be transferred is 9 quarter hours.

Other Requirements. The Application for Admission to Candidacy (see page 19) must be approved by two faculty members in the student's area of interest and the Associate Dean for Graduate Programs in the College of Business Administration, signed by the department head, and submitted to the Graduate Business Dean.

To qualify for the degree, the student must achieve a B average (3.0) or above in MBA core courses required in his/her program, a B average or higher in courses comprising the concentration area(s) and a B average or higher in the overall program. In lieu of passing a written comprehensive examination the student must satisfactorily demonstrate his/her ability to analyze and solve multi-functional problems of the administrative processes and policy determination and to integrate the concepts of the various disciplines embodied in the curriculum of the program. The student is tested in these areas in the courses of the MBA core, particularly in the capstone course, Business Administration 5310 — Business Policy, as well as in work required in the concentration areas.

Application and Admission. Applications are accepted to begin the full-time program in the summer quarter for those who have an undergraduate degree in an area other than business and in the fall for students who hold an undergraduate business degree.

There are no admissions for spring or winter quarters. To be considered at admission sessions, the applicant's file must be complete. A completed file includes The Graduate School application, transcripts of prior college work, the MBA program application, supporting recommendations and the GMAT score report. The first two items should reach The Graduate School 10 days before the MBA application deadline to allow for internal processing, the items should reach the Office of the Graduate Business Dean by the deadline date.

For admission to the MBA program, consideration is given to (1) applicant's academic record with particular attention to the last two years of undergraduate work and previous graduate studies, (2) scores on the GMAT and the Test of English as a Foreign Language (TOEFL) for those whose native language is not English, (3) work experience and other activities which demonstrate potential for leadership, and (4) recommendations from professors and work supervisors.

The admission decision is based on all factors which make up the total application; therefore, there is no automatic cut-off for either grade point averages or GMAT scores.

Dual J.D.-MBA Program

The College of Business Administration and the College of Law offer a coordinated dual program leading to the conferral of both Doctor of Jurisprudence and Master of Business Administration degrees.

Admissions. Applicants for the J.D.-MBA program must make separate application to, and be competitively and independently accepted by, the College of Law for the J.D. degree and the Graduate School and College of Business Administration for the MBA degree, and by the Dual Degree Committee.

Students who have been accepted by both colleges may apply for approval to pursue the dual program anytime prior to, or after, matriculation in either or both colleges. Such approval will be granted, provided that dual program study is completed at the College of Business Administration before the 28th week of the last 28 semester hours required for the J.D. degree and the last 24 quarter hours required for the MBA degree.

Curriculum. A dual program candidate must satisfy the admission requirements of each college. Students withdrawing from the dual program before completion of both degrees will not receive credit toward graduation from either college for courses in the other college, except as such courses qualify for credit without regard to the dual program.

The College of Law will award up to 8 semester hours for the J.D. degree for acceptable performance in a maximum of 12 quarter hours of approved graduate level courses offered by the College of Business Administration. Three of the 12 quarter hours must be earned in Accounting 5030 or a more advanced accounting course. If College of Law credit is given for such an accounting course, the student may not receive credit for College of Law course 8990 — Legal Accounting.

The College of Business Administration will award up to 12 quarter hours of credit toward the MBA degree for acceptable performance...
prerequisites include at least one year of college mathematics to include a course in calculus, a course in statistics, knowledge of computer programming, and intermediate economic theory (micro and macro). See page 33 for MBA degree requirements. Entering students deficient in any of these areas may enroll in courses designed to meet these requirements.

Course Requirements for the DBA Program. Each student must demonstrate, by passing appropriate graduate level courses and/or by examination, an understanding of the business functional areas, the basic disciplines underlying the study of business administration, the student’s concentration area and a supporting area. Following are the requirements for each area:

A. Business Functional Areas. One graduate level course in each of the following areas must be completed: managerial accounting, financial management, marketing management, organization theory and behavior, and business policy. Students who have earned a B or higher at an accredited institution probably will have met these requirements. Others may include appropriate courses in their programs as approved by their academic committees.

B. Basic Disciplines. Each student must demonstrate proficiency in the following areas by completing course work indicated or by passing appropriate examinations:

- Quantitative Science: 12 quarter hours in one or a combination of two of the following areas: mathematics, econometrics, or computer science. Approval of student’s committee is required.

C. Concentration Area. This is the focal point of the program and the area in which the student expects to do his/her research and dissertation. A minimum of 24 quarter hours of course work is required, including 9 hours of doctoral seminars taken at this University. A study of research methodology of the discipline is required and work in the field taken at other institutions is considered by the student’s committee in determining additional course work required. Available concentration areas are:

- Accounting
- Finance
- Management
- Marketing
- Transportation and Logistics

D. Supporting Area. A minimum of 12 quarter hours of graduate course work is required in an area outside, but complementary to, the concentration area. The student may choose the supporting area from one of the following: one of the business functional areas, additional work in one of the basic disciplines or a related area in another school or college of the University. The program of studies should be arranged with an advisor in the discipline chosen and must be approved by the student’s committee.

Comprehensive Examinations. Comprehensive written examinations over the concentration and supporting areas are required of each person seeking candidacy for the DBA degree. The concentration area examination is administered in two sessions of approximately four hours each and the supporting area examination in one session of approximately four hours. The examining committee may, if it deems advisable, supplement the written examinations with oral examinations and may accept the results of only an oral examination for a supporting area in the College of Law. Scheduling of comprehensive examinations will be determined by the examining committee in each of the five concentration areas in coordination with the Associate Dean for Graduate Programs. The committee must designate two periods during the calendar year and announce the dates at least 90 days in advance. A student may sit for examinations in both areas at one examining period or take them in two consecutive periods. A student who fails an examination on the first attempt must repeat the examination over that area at the next examining period, the results of which shall be final.

Admission to Candidacy. A student may apply for admission to candidacy for the DBA degree after maintenance of at least a B average in course work, successful completion of comprehensive examinations and acceptance of a research proposal for the dissertation by his/her faculty committee. Admission to candidacy must be approved at least three quarters prior to the date the degree is conferred. (Admission in the fall quarter permits graduation in the following spring quarter.) See sections headed “Doctoral Committee” and “Admission to Candidacy,” page 20.

Application for Admission to Candidacy must include a listing of all courses taken in each of the fields required for the degree (business functional areas, basic disciplines, concentration area and supporting area). Graduate courses accepted from other institutions must be determined by the examining committee in determining additional course work required. Available concentration areas are:

- Accounting
- Finance
- Management
- Marketing
- Transportation and Logistics

Foundation Requirements. Although the program is designed for students who have completed an accredited MBA (or equivalent) degree program, those with outstanding undergraduate records in any area may be admitted directly to the DBA program and may, if they desire, earn the MBA degree in a coordinated program of study. Program
Minimum Academic Performance Standards

A graduate student in the College of Business Administration whose grade point average at any point after 12 hours is below 3.0 shall be placed on probation. A student on probation shall be dropped from the program unless his/hers graduate grade point average is 3.0 or higher at the end of the probationary period. The probationary period is defined as the next 12 quarter hours of course work attempted which is specified in the student's degree program. Exceptions to this policy may be made only with the approval of the Associate Dean for Graduate Programs of the College of Business Administration upon recommendation of the student's faculty committee.

Admission Requirements

General admission requirements for The Graduate School are stated on pages 10-11. M.Acc., MBA, and DBA applicants are required to take the Graduate Management Admission Test (GMAT). Applicants for programs in economics, management science, and statistics may submit results of either the GMAT or the Graduate Record Examination (GRE) aptitude portion. Applicants for management science and statistics programs must have completed at least two years of college level calculus and be proficient in a computer language. Applicants whose native language is other than English must submit results of the Test of English as a Foreign Language (TOEFL). Scheduled dates and locations for taking these examinations may be obtained from Educational Testing Service, P. O. Box 966, Princeton, New Jersey 08540, and from most colleges and universities.

In addition to procedures required for admission to The Graduate School (pages 10-11), M.Acc., MBA and DBA applicants must submit additional information on forms provided by the College of Business Administration for all programs and supporting materials should be submitted at least three months prior to desired entry date.

The College of Business Administration is fully accredited by the American Assembly of Collegiate Schools of Business and is associated with other leading graduate schools of business as a member of the Graduate Management Admission Council.

Fellowships and Assistantships

Fellowships. Information concerning nonservice fellowships administered by The Graduate School as well as application blanks may be obtained from the Graduate Office. Information on College-administered fellowships is available from the Office of the Graduate Business Dean in the College of Business Administration.

Assistantships. A limited number of teaching assistantships and assistantships that require from 10 to 20 hours of service per week are available through the departments of the College. Remuneration includes payment of fees and out-of-state tuition as well as monthly stipend. Assistantships are generally made on the basis of scholarship and performance on the admission test. Application forms may be obtained in any of the departments or from the office of the Associate Dean for Graduate Programs. Applications must be received by March 1 for consideration of assistantships and fellowships to be awarded for the following fall term.

Center for Business and Economic Research

The staff of the Center for Business and Economic Research engage in studies of the business and economic environment in Tennessee, the Southeast, and the nation. The Center serves the business community, state government, individuals, and the University through dissemination of various kinds of economic and socioeconomic information and supports the faculty of the College in seeking funding for research projects. Staff members conduct research in regional economics, public finance, and areas related to socioeconomic problems in the region. The Center publishes the results of its own research and that of others in monograph form so that significant developments in the various business disciplines and economics can achieve widespread exposure. In addition, the Center staff does contract research on business and economic problems for governmental organizations and private industry. The Center publishes periodically the Tennessee Statistical Abstract and quarterly the Survey of Business. The Center is a member of the Association for University Business and Economic Research.

Management Development Programs

The Management Development Programs Department offers a wide variety of programs ranging from two- to three-day public seminars and customized "in-plant" programs to the four-week Tennessee Executive Development Program.

The Tennessee Executive Development Program (TEDP) is designed to provide extensive continuing educational opportunities for executives from firms and organizations in Tennessee, the South, and the nation. The major objective of the program is to prepare and develop executives for increasingly higher levels of management responsibility and to sharpen existing executive skills needed for comprehensive decision making and leadership. Other major aims of the TEDP are to teach the fundamentals of analytical thinking and the use of the decision tools, and to examine the economic, political, technological and other environmental factors affecting the firm's operations.

The TEDP limits enrollment to forty participants who live on campus for a total of four weeks spread over a three-month period. This arrangement provides executives with extensive opportunities to exchange ideas and operational concepts with contemporaries in other business areas and with TEDP faculty as well.

The faculty for the TEDP consists of senior professors who teach business-related subjects in the University's graduate programs and nationally recognized professors of other institutions. Each participating faculty member has extensive experience in either consultative work or actual operation in business and industry. The TEDP faculty is augmented by outstanding practitioners in their fields of business and industry.

Departments of Instruction

Accounting and Business Law

J. E. Kiger (Head), Ph.D. Missouri, C.P.A.

Accounting

MAJOR

DEGREE

Accounting

M. Acc.

Professors:


Associate Professors:


Assistant Professors:


Distinguished Lecturer:

S. B. Wolfe, B.S. Virginia Polytechnic Institute.

THE MASTER OF ACCOUNTANCY PROGRAM

The objective of the Master of Accountancy (M.Acc.) program is to provide persons having an undergraduate accounting background and a high level of motivation with the depth and understanding of accounting which will enhance their probability of success in a career in professional accounting. Moreover, the student's educational experience should develop perspective toward the discipline of accounting in a manner that will enable the student to spearhead innovation and change in response to needs in public accounting, business, and government organizations.

Foundation Requirements. Although the program is designed for students who have completed an accredited baccalaureate degree program with a major in Accounting, those with outstanding undergraduate records in any area may earn the M.Acc. degree by completing prerequisites in accounting and by including courses in other business and related disciplines to supplement the applicant's undergraduate background.

Course Requirements for the M.Acc. Program. A student's program encompasses a minimum of 45 quarter hours of graduate course work. Specifically, the student must...
complete courses in selected business disciplines and in the area of accounting as indicated below. Each course is 3 quarter hours of graduate credit.

Business Core (21 quarter hours)1:
- Economics 5030, Finance 5420, Mathematics 50522 and 4 additional courses from the following areas, subject to approval of the program advisor (no more than one course may be taken in any one area): Business Policy, Business Law, Computer Science, Economics, Management, Management Science, Marketing, Finance, Statistics, and Transportation.

Accounting Electives (select 12 quarter hours): Accounting 5130, 5140, 5160, 5220, 5420, 5440, 5510, 5640, 5990.

Other Requirements. To qualify for the degree, the student must achieve a B average (3.0) in the business core courses and also a B average in the accounting courses. Each student must pass a final written examination during the final quarter of study for the degree.

MBA Concentration: Accounting

Core Course Requirements for MBA Concentration: Accounting 5110, 5120, 5210, 5420, and two of the following: 5320, 5330, 5340.

All Master of Business Administration students who elect an accounting specialization other than Accounting are required to take a minimum of 6 quarter hours of graduate level accounting in addition to Accounting 5010 or its equivalent. In those instances where Accounting 5020 and/or for the student would result in substantial duplication of accounting work previously taken, the student shall not be permitted to earn credit in those courses, but must select an equivalent number of graduate accounting hours in lieu thereof. Recommended courses include Accounting 5110, 5120, 5210, 5220, 5420, 5510, and 5640.

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

5101 Financial Accounting (3) Introduction to accounting principles, theory, and accounting information system. Not available to students with credit for 2110-20 or equivalent. F, Su

5200 Corporate Reporting Problems (3) Analysis of uses and limitations of accounting model of firm. Emphasis on internal and external uses of general purpose financial reports. Prereq: 5010 or equivalent. F, W

5300 Managerial Accounting (3) Analysis of accounting model of firm as vehicle for planning and controlling activities. Attention to development of cost data appropriate to managerial decision models. Prereq: 5020; Economics 5010. W, Sp

1Prior course work will be considered in determining the Business Core courses.
2An exemption may be granted for Mathematics 5052 if student has recently completed undergraduate core work of equivalent content with grades of C or higher at a regionally accredited institution. "Recently completed" means completion of the last course or regular use of math tools within the last five years.
3Selected courses from other disciplines may be substituted for accounting electives upon approval of the M.Acc. program advisor.

5110 Seminar in Accounting Theory (3) Evolution of accounting theory, concepts underlying financial reporting models, and authoritative accounting literature and measurement of performance and financial position. Prereq: Consent of department head. May not be taken by students with credit for 4140 or equivalent.

5120 Seminar in Advanced Auditing (3) Theory and concepts underlying the philosophy of auditing as related to current auditing issues. Prereq: 4120 or equivalent.

5130 Selected Topics—Current Accounting Practice (3) Critical in-depth consideration of selected financial reporting topics of particular relevance to current accounting practice. Prereq: 5110.

5140 Selected Topics—Current Accounting Theory (3) Full-time resident professional employment for one academic quarter involving qualified job experience, written report of responsibilities, and evaluation of student performance. Prereq: Consent of instructor.

5210 Seminar in Advanced Managerial Cost Accounting (3) Analysis of conceptual and current issues impacting on development and practice of managerial cost accounting. Cost allocation, planning and control, conditions of uncertainty, and responsibility accounting concepts. Prereq: 3230 or consent of instructor.

5220 Budgetary Planning and Control Systems (3) Alternative approaches to organizing and planning for management of the organization's needs and objectives. Control systems and corporate structure, discretionary expense centers, profit centers, investment centers, transfer pricing, and control in not-for-profit organizations. Prereq: 3220 or 5030.

5310 Auditing Concepts (3) Concepts and theory of auditing, environment of internal and external auditing, nature of evidence, internal control evaluation, and reporting. Not intended for persons who have credit for auditing course. Prereq: 3130. Prereq or coreq: Statistics 4415 or equivalent.

5320 Advanced Auditing (3) Case-oriented, including audit of specific asset, liability, revenue and expense accounts. Emphasis on reporting, data processing, statistical sampling, and statistical auditing. Prereq: 4110 with C or better. Available only to MBA students who do not have credit for 4120.

5330 Advanced Income Tax (3) Federal income taxation, income tax planning and research. Prereq: 3120 with C or higher; 3430 with C or higher. Available only to MBA students who do not have credit for 4430.

5340 Consolidations and Business Combinations (3) Analysis of accounting for interrelated business entities—domestic and foreign. Not intended for persons who have credit for a course with the same title. Prereq: 3130.

5420 Tax Research (3) Development of expertise in tax research utilizing tax service, tax periodicals, legal and other available sources. Prereq: 5430. (Available only to MBA students who do not have credit for 4430.)

5430 Tax Planning (3) Advanced study of income tax planning emphasizing tax planning alternatives in modern tax. Prereq: 5420 or equivalent.

5440 Taxation of Estates and Gifts (3) Transfers at death, intestate transfers, federal succession laws, and gift tax returns. Prereq: 5430. (Available only to students with credit for 4440.)

5450 Taxation of Partnerships and Partners (3) Formation, operation, termination, and liquidation and other special problems of partnerships. Prereq: 5420.

5460 Taxation of Corporations and Shareholders (3) Organization and structure, distributions, liquidations, reorganizations and special problems includ-
Mathematical and quantitative methods: Economics 5180, 5190, and 5510. The 5510 requirement may be waived for students completing Economics 6170, 6180 and 6190. Students must achieve a grade average of B or higher for all courses offered to fulfill requirements of subparagraphs b, c and d, or as an alternative, may petition to satisfy any one or all of these three fields by other means such as comprehensive examination.

2. Students will be required to demonstrate their competence through comprehensive examination in three fields with the approval of the department, at least two of which must be selected from the following: economic development; economics of centrally planned economies; economics of labor and human resources; industrial organization; international economics; regional and urban economics; a field, as agreed to by the department, combining two or three of the above.

Exceptions to the foregoing are discouraged but may be petitioned by writing directly to the department head who will decide with the advice of an ad hoc committee of three tenure members of the faculty. This petition is to be submitted at least nine months before the student takes the comprehensive exam in question.

Course Requirements. Candidates for the Ph.D. degree in Economics will be required to complete a minimum of 72 quarter hours of course work beyond the Bachelor's degree, plus the dissertation which carries 36 quarter hours of credit. At least 54 hours shall be in economics.

MBA Concentration: Economics. Minimum Course Requirements for MBA Concentration: As approved by the area MBA faculty advisor.

4000 Special Topics (3) Student generated course offered at convenience of department upon student initiative. Subject matter and credits determined by student and instructor with approval of the department.

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

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

5011-12 Problems in Lieu of Thesis (3, 3) S/NC only.

5090 Workshop in Economics (3-9) Special topics in economic education. Not available for credit in any College of Business Administration degree program. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5910-20-30 Economics Seminar (1, 1, 1) Research in progress and discussion of selected topics. May be repeated. S/NC only. E

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

ECONOMIC THEORY

4110 Managerial Economics (3) Application of economic theory to business decision making; emphasis on profit objectives, measurement and forecasting demand and costs, and capital budgeting. Prereq: 2100-20-30. E

4120 Business Cycles (3) Fluctuations in income, employment, prices, and output in the economics system; subjects discussed are the historical facts and economic theory of employment and prices for economy as a whole. Implications of aggregate fluctuations for individual firm. Role of forecasting techniques and stabilization policies. Prereq or coreq: 5111 or equivalent. F, W

4170-40 Introduction to Mathematical Economics (3) Application of mathematical methods to micro and macroeconomic phenomena. Designed for beginning graduate students who have limited training in analytic geometry and calculus. Must be taken in sequence. Prereq: 1 yr of principles of economics and consent of instructor. F

4170-40 Introduction to Mathematical Economics (3) Application of mathematical methods to micro and macroeconomic phenomena. Designed for beginning graduate students who have limited training in analytic geometry and calculus. Must be taken in sequence. Prereq: 1 yr of principles of economics and consent of instructor. F

5010 Introduction to Economic Analysis (3) Analytical tools of micro- and macroeconomics for students without prior training in economics. Price determination, national income measurement and determinants of money and banking system. Not available to students with credit for 2110-20-30 or equivalent. F

5020 Managerial Economics (3) Application of economic concepts to business decision making. Analysis and forecasting of demand, cost analysis, pricing behavior, and optimizing techniques. Prereq: 5010 or equivalent. Prereq or coreq: Statistics 5202 or equivalent. F, W

5030 Economic Fluctuations, Forecasting, and Stabilization (3) Macroeconomic environment of the firm. Determination of level of output, employment and prices for economists as a whole; implications of aggregate fluctuations for individual firm. Role of forecasting techniques and stabilization policies. Prereq or coreq: 5010 or equivalent. F, W

5110 Fundamentals of Microeconomics (3) Verbal arguments and geometric and algebraic techniques. Theory of consumer behavior and demand; theory of production and cost; long and short run theories of profit maximizing firm in both perfectly competitive and monopolistic environments; theory of derived demand. For students whose major is other than economics. Not available for students with credit for 5111. Prereq: 3110 or equivalent. F

5111-12 Microeconomic Theory I, II (3, 3) Theory of consumer choice and demand; theory of the firm; theory of production and cost; market structures; derived demand and factor pricing; introduction to welfare economics, capital theory. Should be taken in consecutive quarters. Prereq: 3110 or equivalent. F

5120 Fundamentals of Macroeconomics (3) Determination of levels of employment and prices for economy as a whole; relationships between interest rates, price expectations, productivity, and quantity of money; inflation and deflation, national and international; price level, and liquidity preference. For students whose major is other than economics. Not available for students with credit for 5121. Prereq: 3110 or equivalent. F

5121-22 Macroeconomic Theory I, II (3, 3) Monetarist and income-expenditure approaches to questions of income and price level determination; applications to contemporary macroeconomic problems. Should be taken in consecutive quarters. Prereq: 3120 or equivalent. W, Sp

5150 History of Economic Thought (3) Development of economic ideas from mercantilists through Alfred Marshall; emphasis given to classical and neoclassical tradition.

5180-90 Mathematical Methods in Economics (3, 3) Applications of basic concepts in differential and integral calculus, differential equations, linear algebra and stochastic models to topics in theory of firm, growth models, game theory, linear programming and decision-making under uncertainty. Prereq: 1 yr of calculus. Sp, F

5510 Quantitative Methods in Economic Research (3) Methods of estimation and testing of economic relationships with use of time series and cross section data with application to economic problems. Prereq: Introductory statistics or Statistics 5211 or equivalent. W

5520 Introduction to Econometrics (3) Statistical data analysis, production and cost analysis, distribution of income and wealth, models of growth and
cycles, macroeconomic applications. Should not be taken by students who contemplate taking Econom 6170-80-90. Sp
5810 Financial Markets and Intermediaries (3) (Same as Finance 5610.) W
5830 Commercial Bank Management (3) (Same as Finance 6930.) F, Sp
6111 Advanced Microeconomic Theory (3) Consent of instructor, exchange in partial and general equilibrium settings. Prereq: 4710, 4780, 5112, or equivalent. F, W.
6121 Advanced Macroeconomic Theory (3) Topics in macroeconomic theory and policy. Prereq: 5122 or equivalent. W
6150-60 History of Economic Doctrines (3, 3) Important ideas of economic thinkers from Middle Ages to present. W, Sp

ECONOMICS OF CENTRALLY PLANNED ECONOMIES
5310 Economic Systems (3) Study and appraisal of underlying theories and operation of capitalism, socialism, communism, and other economic systems. W
5331 Theory and Practice of Economic Planning (3) Leading issues in imperative and indicative planning. Consent of instructor. May be repeated with consent of department. F

ECONOMICS OF LABOR AND HUMAN RESOURCES
4420 Economics of Human Resources (3) Analysis of current problems in human resource development and examination of policies aimed at their solution. Problems include unemployment, education and training, poverty and income redistribution, discrimination based on sex or ethnicity, or others. Pre-req: 3420 or consent of instructor.
4670 Public Policy in the Labor Field (4) Governmental regulation of wages, hours, and other aspects of industrial relations. Public policy in areas of labor relations, employment, and unemployment, economic discrimination, and impact of unionism. Prereq: 3110 and 3120, or equivalent.
4690 Public Policy in the Labor Field (4) Governmental regulation of wages, hours, and other aspects of industrial relations. Public policy in areas of labor relations, employment, and unemployment, economic discrimination, and impact of unionism. Prereq: 3110 and 3120, or equivalent.

INTERNATIONAL TRADE AND ECONOMIC DEVELOPMENT
4230 Problems in International Trade and Economic Development (3) Problems or problem areas of current importance in fields both of international economic literature. Prereq: 3210 or 3220.
4231 The Political Economy of Latin America (3) Description, analysis, and comparison of major economic problems and policies of various Latin American countries. Sp
4232 The Political Economy of Asian Development (3) Description, analysis, and comparison of major economic problems and policies of India, China, and other East Asian countries. Sp
4250 Economics of Resources and Environmental Policy (3) Economic analysis of environmental policy and allocation of resources. Benefits and costs of development of natural resources and impact of growth on environment. Prereq: 2130. W
5250 Economic History of Europe (3) Nature and functioning of economic systems and policies in history of western civilization; examination of some major issues of method and interpretation. F
5260 Economic History of the U.S. (3) Interpretation of American economic structure and policies from colonial times. W
5610 Location and Regional Development Theory (3) Theory of industrial, agricultural, and residential location; location in the relative location of regions and central places; examination of regional inequalities and national assistance for regional economic development. W, Sp
5620 Methods of Regional Analysis (3) Theory of regional structure and growth. Examination of regional models for impact analysis and economic forecasting. Methods of analysis include regional descriptive statistics, gravity and potential concepts, regional income and product accounts, shift and share analyses, economic base studies, and regional input-output, linear programming, and econometric models. W
6211 International Economics: Trade (4) Pure theory of classical, neoclassical, and modern international trade theory. Comparative advantage, free trade and welfare, and technological change, growth and migration, tariffs and subsidies, and customs unions. Prereq: 5112 or consent of instructor.
6213 International Monetary Economics (4) Theories of exchange rate determination, and approaches to balance of payments theory, balance of payments adjustment under alternative exchange rate regimes, economic policy in open economy, international capital movements. Prereq: 5121, 5030, 5120 or consent of instructor.
6231 Economic Development: Theories (4) Study of principal theories explaining economic behavior in less developed countries. Prereq: 21 hrs of undergraduate economics or consent of instructor.
6232 Economic Development: Policies (4) Policies, strategies, and planning techniques used to promote modernization in less developed countries. Prereq: 6231 or consent of instructor.
6241 Economic Development: Western Impact on Asia and Africa (4) Studies of consequences of contact between developed world and third world countries of Asia and Africa. Prereq: 21 hrs of upper division undergraduate social science or consent of instructor.
6242 Seminar in Economic Development (4) Topics vary with interests of students. Prereq: 6241 or consent of instructor.
6250 Seminar in European Economic History (3) Selected topics in European economic history. Prereq: Consent of instructor. May be repeated with consent of department. W

LOST SEMINAR IN AMERICAN ECONOMIC HISTORY (3) Selected topics in modern and less developed economic history. Prereq: Consent of instructor. May be repeated with consent of department. Sp
6270 Seminar in Economic History of the Third World (3) Selected topics in economic history of societies other than those of Western Europe and English-speaking North America. Prereq: Consent of instructor. May be repeated with consent of department. F, A
6510 Seminar in Regional Analysis (3) Selected topics in regional economic theory and analysis. May be repeated. Maximum 6 hrs. Sp, A.
6520 Regional Economics Workshop (3) Selected topics in applied regional research. Emphasis on student participation in model design and estimation, forecasting, simulation, and mathematical and computer programming. May be repeated. Maximum 6 hrs. Sp, A.
6550 Seminar in Environment and Resource Economics (3) Topics in environmental quality, natural resource allocation by private markets, and issues in formulating public policy towards environmental problems. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. Sp, A.

INDUSTRIAL ORGANIZATION
4350 Industrial Organization Analysis (3) Monopolies and competition in the United States economy; market structure, behavior, and economic performance and interrelationships. Prereq: 9 hrs of introductory economics. Prereq: 5112 or consent of instructor.

MONETARY ECONOMICS
5820 Monetary Theory and Policy (3) Relationship of money, credit and liquidity as related to income, interest rates, employment and prices as well as examination of effect of monetary policy on economic activity. Prereq: 5020 or equivalent.
5810-20 Seminar: Monetary Theory (3, 3) Study of money, credit and liquidity as related to income, interest rates, employment, output, and prices. Prereq: 5112 and 5122.

PUBLIC FINANCE
5710 Public Finance: Revenues (3) Allocative, distributive, and stabilization effects of alternative revenue systems. Prereq or coreq: 5020 or equivalent.
5720 Public Finance: Expenditures (3) Functions and growth of public sector, public goods, and beneficost analysis. Prereq or coreq: 5020 or equivalent.
5730 Finance Administration of Government (3) Determinants of public revenues and expenditures. Prereq: 5020 or consent of instructor. Sp
5740 Seminar in Public Finance (3) Selected topics: public choice, pricing government services, fiscal policy, and fiscal dynamics. Prereq: 5710 or consent of instructor.

PUBLIC FINANCE: ADVANCED TOPICS

FINANCE

Professors:
A. L. Auxier, Ph.D. (Iowa); W. C. Butcher, Sr. Professor of Banking and Finance.

Associate Professors:
A. L. Auxier, Ph.D. (Iowa); G. C. Philappatos, Ph.D. (New York); C. P. White, Ph.D. (California (Los Angeles)); C. P. White, Ph.D. (Emeritus), Ph.D. (Pennsylvania).
Assistant Professors: T. P. Boyer, Ph.D., Washington (St. Louis); D. Choi, Ph.D., Pennsylvania State; W. P. Lau, Ph.D., Wisconsin; H. A. Weir, Ph.D. North Carolina.

MBA Concentrations: Finance, Governmental Financial Administration, Real Estate and Urban Development.

DBA Concentration: Finance

Minimum Course Requirements for MBA Concentrations: Finance—For the Financial Management Concentration: 5130; 5140; for the Banking and Financial Institutions area: 5420, 5430, 5440; for the Real Estate and Financial Administration—5710, 5720, 5730, 5740.

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

5990 Research in Finance (3) Directed research on topics of mutual interest to the student and staff member. Prereq: 5020. May be repeated. Maximum 6 hrs.

5410-20 Seminar in Theory of Finance (3, 3) Theory of financial decision making under conditions of certainty and uncertainty. Application of economic theory of choice to allocation of resources over time and under uncertainty with reference to investment and financing decisions. F, W

5819 Seminar in Financial Management (3) Employment of quantitative techniques in formulation and solution of financial management problems. W


MONETARY POLICY AND FINANCIAL INSTITUTIONS

5810 Financial Markets and Intermediaries (3) Capital formation and allocation of capital in U.S. problems and abroad. Process of saving, partial institutionalization of these savings, investments of financial intermediaries, efficiency of allocation process and effect on economy, and impact of financial institutions on financial markets. (Same as Economics 5810.) W

5830 Commercial Bank Management (3) Bank management decision-making analysis of changes in banking environment and structure, acquisition and management of funds; current banking problems. Prereq: Consent of instructor. (Same as Economics 5830.) F

5810 Financial Institutions and Markets (3) Theory of financial markets, role of financial institutions, and analysis of market efficiency.

INSURANCE

5110 Theory of Risk Management (3) (For students with no background in risk and insurance.) Risk management and manageable risks facing individual and firm. Analysis of risk management techniques with emphasis on insurance as a tool. W

REAL ESTATE AND URBAN DEVELOPMENT

5110 Urban Economic Analysis (3) Urban economics. Land value and use. Analysis of current urban problems in United States. Prereq: Economics 5010 or consent of instructor. F

5120 Real Estate Analysis (3) Analysis of real property investment, real estate finance and appraisal theory. Prereq: Finance 5010 or Planning 5465 or consent of instructor. W

5130 Housing and Urban Land Markets (3) Analysis of housing demand, supply and location. Segregation and housing discrimination. Impact of urban renewal and public housing programs. Prereq: 5110 or consent of instructor. Sp

5140 Real Estate Investment and Taxation Analysis (3) Analysis of economic factors and institutions which underlie real estate investment decision making. Case method utilized. Prereq: 5120 or consent of instructor. Sp

Management

Professors: H. D. Dewhurst (Head), Ph.D., Texas; R. W. Doling, Ph.D., Stanford; M. Gordon, Ph.D., California; H. W. Henry, Ph.D., Michigan; A. H. Kealy, Ph.D., Pennsylvania; J. M. Lachen, Ph.D., Purdue; S. K. Reed, Ph.D., Edinburgh; S. C. Vande' (Emeritus), Ph.D., Pennsylvania; H. T. Whitlock2 (Emeritus), Ph.D., Tennessee; M. B. Wortman, Jr., Ph.D., Minnesota.

Associate Professors: F. A. Chamblin, (Emeritus), MBA Indiana; O. S. Fawler, Ph.D., Georgia; R. C. Madzor, Ph.D., Texas; C. W. Neel, Ph.D., Alabama; M. C. Rush, Ph.D. Akron.

1William B. Stolkey Professor of Strategic Management.
2Alumni Distinguished Service Professor.

Assistant Professors: K. C. Gilbert, Ph.D., Tennessee; R. T. Ladd, Ph.D., Georgia; G. B. Roberts, Ph.D., Georgia State; J. E. A. Russell, Ph.D. Akron.

MBA Concentrations: Management, Forest Indemnities Management.

DBA Concentration: Management

Minimum Course Requirements for MBA Concentrations: Management—As approved by the area faculty advisor. Forest Industries Management—5110, 5130; Forestry 5260, 5270.

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

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

5100 Organization Theory and Behavior (3) Basic concepts of organization theory, organizational behavior and management processes.

5200 Operations Management (3) Management processes of planning, operating and control of production systems. Management concepts and quantitative techniques. Application of systems approach to operating problems. Prereq: 5010; Management Science 5010; Statistics 5020. F, Sp, Su

5110 Organization Theory (3) Analysis and design of organization structure.

5130 Managerial Planning and Control (3) Processes of planning and controlling with emphasis on corporate strategic planning. Sp


5170-80-90 Prossemial In Industrial and Organizational Psychology (3, 3, 3) Introduction to basic concepts and ideas required for graduate study in industrial and organizational psychology. May be taken in sequence during the student's first year. (Same as Psychology 5170-80-90.) F; W; Sp

5210 Personnel Management (3) Analysis and appraisal of the personal function. F

5220 Wage and Salary Administration (3) Analysis of problems, programs, and practices. W

5230 Human Problems in Administration (3) Review of the social, economic and intellectual human relations. (Same as Psychology 5450.)

5250-60 Industrial and Organizational Psychology (1, 1-3) Readings in industrial and organizational psychology. Any two of these courses may be taken by a student with supervising faculty member. May be repeated. Maximum 6 hrs. S/NC or letter grade. E

5280 Independent Study, Project or Research in Management (1-3) Topic of mutual interest to student and faculty member. Available only by prerogation with supervising faculty member. May be repeated. Maximum 6 hrs. S/NC or letter grade. E

5320 Management Problems in Industrial Research (3) Classroom discussion and group exercises in management of industrial research projects. Prereq: Management 5240 or equivalent. F

5410-20-30 Production Management (3, 3, 3) Quantitative approach to solution of production management problems. Prereq: 5620 or consent of instructor. F

5610-20 Organizational Behavior (3, 3) Behavioral methodology and perspective, including review of empirical behavioral research in organizations. Must be taken in sequence. F

5630 Research Methods in Management (3) Methodological issues in management research. Review of experimental design, measurement problems, data sources and collection, and application of statistical methods, followed by critique of student
research proposals. Prereq: DBA student status or consent of instructor. S/NC only. Sp

5710 International Business Management (3) Analysis of environment of international business firms and impact of internal and external factors on managerial decisions. Sp

5810 Energy Management: Theory and Practice (3) Managerial and operational issues in operating systems; decision criteria, trade-offs, system analysis; energy audits, technical parameters, conservation and pollution control, energy supply and demand, new energy technologies.

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

6110 History of Management Thought (3) Significant historical ideas leading to present state of art of management.

6120 Advanced Organizational Theory (3) Analysis of functioning of complex organizations: structure, culture, and adaptation.

6130 Seminar in Contemporary Management Issues (3) Contemporary management policy issues. May be repeated.

6250-60-70 Seminar in Industrial and Organizational Psychology (3, 3, 3) Advanced problems in organizational psychology. Areas include performance, motivation, development, group process, and morale. (Same as Psychology 6250-60-70.)

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

6900 Field Work in Industrial and Organizational Psychology (1-18) Supervised practice. One credit for each 30 hours of such practice. Maximum 15 credits. (Same as Psychology 6900.) E

Management Science

MAJOR

DEGREE

Management Science

Ph.D.

Professor: R. S. Garlinkel (Chairperson), Ph.D. John Hopkins.

Associate Professors: J. K. Ho, Ph.D. Stanford; R. E. Rosenthal, Ph.D. Georgia Institute of Technology.

Management Science Committee: Members of the Management Science faculty and in addition: R. W. Boiling, Management; J. S. Bradley, Marketing; E. Glustoff Economics; W. J. Morse, Accounting; R. E. Shريفes, Finance; C. C. Thigpen, Statistics; H. J. R. Mathews, Computer Science; K. C. Gilbert, Management.

MBA CONCENTRATIONS

For students whose MBA concentration area is Management Science, the MBA Core is revised as follows: substitute Management Science 5310 for 5010, and with approval of student’s advisor, substitute Statistics 5120 for 5020. The concentration area must include Management Science 5330 and 5340.

MASTER OF SCIENCE PROGRAM

See page 95 for details of the Master of Science program in Management Science.

THE DOCTORAL PROGRAM

The Ph.D. program in Management Science is designed to prepare students for management positions, research, and teaching related to the application of mathematical tools in the administration of complex organizations. Three primary objectives of the program are:

1) to provide advanced management science coursework, a thorough knowledge of common Management Science/Operations Research mathematical models and their uses;

2) to provide sufficient advanced study in a supporting area to qualify the graduate for a joint faculty position in the supporting area and management science. The candidate may choose from the business functional areas (accounting, finance, marketing, production management, and transportation and logistics) or other disciplines, (e.g., computer science, statistics, forestry, ecology, and public administration);

3) to develop in the student, through course work in mathematics, statistics, and computer science, a high degree of mathematical maturity which will serve the graduate well throughout a life-long career, whether in management, research, or teaching.

Degree Requirements: Normal prerequisite requirements for the doctoral degree are stated on page 19.

Course work. A minimum of 72 quarter hours of course work taken for graduate credit (exclusive of thesis or dissertation) is required. The candidate must complete a minimum of 36 quarter hours at The University of Tennessee, Knoxville, at least 9 of which must be at the 6000 level. Entering students who have completed graduate study in applicable fields will be granted course credits for work which is equivalent to required courses in the program.

The program consists of approximately 24 to 30 quarter hours of course work in the applied concentration area.

Qualifying Examinations. The student must demonstrate mastery of probability theory and statistical inference (Statistics 5110-20-30) by passing a written qualifying examination. Mastery of 18 to 21 quarter hours in mathematics course work must be demonstrated by passing a written qualifying examination. For the mathematical portion of the examination, topics include numerical analysis (either Mathematics 4225, 4245, 4060 and 5655, or Mathematics 5655-65-75) and real analysis (Mathematics 4510-20-30). Other options may be approved. In exceptional circumstances the faculty will consider waiving the mathematics and/or statistics qualifying examinations.

There is no foreign language requirement.

The student must complete 36 quarter hours of course work, normally completed by the end of the first year of the program.

Comprehensive Examination. Prior to admission to candidacy for the degree, and normally after completion of the second year of the program, the student must pass a written comprehensive examination covering the theory of deterministic and stochastic management science models. Topics included in this examination are determined on an individual basis. Students will be expected to demonstrate an integrative ability that goes beyond simple mastery of course content.

Research and Dissertation. The student must complete at least 72 quarter hours of Management Science 6000, Doctoral Research and Dissertation, through which he/she is expected to make a significant contribution to the field of management science. Each final oral examination is conducted over the dissertation and such other segments of the program that the faculty committee deems appropriate. This effort, which is beyond the minimum 72 hours of coursework, is normally completed in the third year of the program.

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

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

5002 Non-Thesis Graduation Completion (3-16) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E


5110-20-30 Management Science Methods (3, 3, 3) SI01—Linear programming procedures and sensitivity analysis; transportation problem and introduction to network analysis. Prereq: Fundamentals of matrix algebra and differential calculus; proficiency in a computer language, 5320—Dynamic, integer, and mixed linear programming; 5360—Simulation techniques. Markov analysis, and queuing models. Prereq: Statistics 5110 or Mathematics 4750-60 or Mathematics 4650: proficiency in a computer language. F; W; Sp

5335 Mathematical Programming Computational Systems (2) Practical aspects of using state-of-the-art mathematical programming systems. Students will write computer programs general and report writing software for specific applications. Sp

5340 Application of Management Science Methods (3) Application of methods from 5310-20-30 to large scale management problems. 5330 may be taken concurrently. Su

5810 Special Topics in Management Science (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5810 Management Science Problems (1-4) Directed study on subject of mutual interest to student and staff member. E

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

6110-20-30 Models for Production Systems (3, 3, 3) Seminar providing research experience to enhance professional development and to improve student interest in investigation of existing mathematical models for production processes and opportunities for original research.

6210-20 Network Flows (3, 3) In-depth treatment of widely applied network optimization algorithms including transportation and transshipment; primaldual and primal basis-tree methods; multimmodity, multiterminal and dynamic flows; flow with gains; and other advanced topics. Prereq: 5310 or equivalent. A

6310 Integer Programming (3) Theoretical and computational aspects of linear programming with integer variables, branch and bound, cutting plane, and group theoretic algorithms. Prereq: 5310 or equivalent. A

6410 Large Scale Mathematical Programming (3) Development of solution strategies for linear programming problems that have many constraints, many variables or extremely sparse constraint matrices. Prereq: 5310 or equivalent. A

6510 Nonlinear Optimization (3) Solution of constrained and unconstrained nonlinear optimization problems focusing on algorithms that have performed well in recent practice. Prereq: 5310 or equivalent. A

6610 Markovian Decision Models (3) Formulation and analysis of Markov Chain models; Markov Chain models which incorporate decisions—their formulation, application and some results. A final oral examination on stochastic dynamic programming models in continuous time. Prereq: 5390. F
Marketing and Transportation

G. N. Dicer (Head), DBA Indiana.

Marketing

Professors: D. J. Barnaby, Ph.D.; Purdue; F. W. Davis, Jr., Ph.D.; Michigan State; G. N. Dicer, DBA Indiana; E. D. Dille (Emeritus), Ph.D.; Ohio State; E. E. Garrison (Emeritus), MBA Ohio State; J. A. Langley, Jr., Ph.D.; Pennsylvania State; R. A. Mundy, Ph.D.; Pennsylvania State; R. B. Woodruff, DBA Indiana.

Associate Professors: R. C. Reizenstein, Ph.D.; Cornell; G. N. Diller, Ph.D.; Indiana.

Assistant Professor: R. D. Duff, Ph.D.; Purdue.

DBA Concentration: Marketing: DBA Concentration, Marketing.

Minimum Course Requirements for MBA Concentration: 5300, 5350, 5400, 5410.

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. Maximum 9 hrs.

5910 Advanced Law and Regulation (3) Prereq: Consent of instructor. A

5920 Research in Marketing (3) Directed research on subject of mutual interest to student and staff member. Prereq: 5020 and 5300. May be repeated. Maximum 6 hrs.

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

6050 Macro/Theoretical Foundations of Marketing (3) Fundamental nature and history of marketing processes. Role of marketing theory in developing marketing discipline and in research process. Environmental/ political and regulatory processes of marketing. Prereq: Consent of instructor. A

6100 Design and Measurement in Marketing Research (3) Advanced design and measurement issues. Theoretical scaling considerations, applications of multidimensional scaling, conjoint analysis. Prereq: Consent of instructor. A

6150 Marketing Research Applications (3) Application of multivariate research tools to functional areas of marketing. Prereq: Knowledge of multivariate analysis and consent of instructor. A

6200 Buyer Behavior (3) Behavioral processes of individuals and groups in roles as buyers of goods and services. Prereq: Consent of instructor. A

6250 Selected Problems in Consumer Behavior (3) Information search processes, attitude models, media use, and consumer satisfaction. Prereq: Consent of instructor. A

6300 Marketing Decision Models (3) Prereq: Consent of instructor. A

6350 Current Topics in Marketing (3) Specific topics will vary with each course offering, but could include: nonbusiness marketing applications, macro-environmental issues, market segmentation, children's television advertising, international marketing issues, marketing channels, and related issues. Prereq: Consent of instructor.

6500 Urban Transportation Policy (3) Movement of people, goods and information in urbanized areas with special emphasis on formulation of national, state and local policy. Prereq: passing of previous course. E

6810 Special Topics (3) Prereq: 5310-20-30 and consent of instructor. May be repeated. Maximum 9 hrs.

6910-20-30 Management Science Seminar (1-3, 1-3, 1-3) Subjects selected from current management science literature. F; W; Sp.
Office Administration

J. Stalling, Program Director

Professors:
E. W. Davis (Emeritus), M.S. New York; D. Reese, Ph.D. Iowa; E. R. Smith, Ph.D. Ohio State; J. Stalling, Ph.D. Ohio State; G. A. Wagener (Emeritus), M.S. Indiana.

Associate Professor:

Assistant Professors:
P. G. Campbell, M.S. Austin Peay; H. Petree, M.S. Tennessee.

Assistant Professor:
P. G. Campbell, M.S. Austin Peay; H. Petree, M.S. Tennessee.

Courses numbered below 5000 are not available for credit in the MBA program.

4310 Business Letter Writing (3)

Practices, principles, and mechanics of effective business letters and memos; principles applied by solving communication cases; emphasis placed on letters and memos as initial sources of ideas in communications system of the business firm. E

4320 Business Report Writing (3)

Basic principles and procedures of originating and disseminating business reports, both formal and informal in style; writing techniques for short and long reports; graphic presentation and interpretation; use of primary and secondary data for reports. E

4420 Advanced Transcription (3)

Improvement of ability to transcribe mailable copy from dictation of a wide variety of correspondence; emphasis on competencies needed to meet occupational standards. Prereq: 4410. F

4510 Office Management (3)

Strategic and operational planning of office objectives; relating tasks and human resources to objectives; recruiting, selection, training, and development of office staff; directing of office staff through leadership, motivation, communications; measurement of office performance, comparison to standards, and corrective actions; and applications of decision making to the office. Sp

4520 Office Systems (3) Synthesis of systems and subsystems applicable to centralized and decentralized office functions. Emphasis placed on cost analysis in contemporary office environment, technology, and research analysis. Sp

4810-20-30 Problems in Office Administration (1-3, 1-3, 1-3) Subject and title vary each quarter. May be repeated. Maximum 3 hrs for each course.

5011 Problems in Lieu of Thesis (3) S/NC only.

5050 Data Processing in Business (3)

Fundamentals of computer programming and applications, systems design. (Available only as stated on page 33.) E

Statistics

MAJOR

DEGREE

Statistics

M.S.

Professors:
C. C. Tegnon (Head), Ph.D. Virginia Polytechnic Institute; D. S. Chambers (Emeritus), M.B.A. Texas; R. A. McLean, Ph.D. Purdue; J. W. Phillpot, Ph.D. Virginia Polytechnic Institute.

Associate Professor:
H. A. Lasater, Ph.D. Rutgers; R. D. Sanders, Ph.D. Texas; D. J. Wheeler, Ph.D. Southern Methodist; M. S. Younger, Ph.D. Virginia Polytechnic Institute.

Assistant Professors:

THE MASTER'S PROGRAM

The M.S. program in Statistics is designed to provide students a basic foundation in theoretical and applied statistics for meaningful careers as consulting and practicing statisticians. A candidate should possess an undergraduate degree with a strong background in calculus, but no restrictions are imposed regarding the undergraduate major. The typical Master of Science degree program in Statistics is as follows:

- **Statistics Major Area**
  - **Quarter Hours**
    - **Probability theory**
    - **Theory of statistical inference**
    - Additional coursework in statistics as approved by the student's committee.
    - Additional coursework as approved by the student's committee.
  - **Minor Area**
    - Selected with the approval of both the Department of Statistics and the department in which the work is to be taken.
  - **Total minimum hours**

5010 Probability and Statistical Inference (3) Fundamentals of probability, discrete and continuous probability models, mathematical expectation, and inference concerning means. Prereq: Mathematics 5052 or equivalent and a computer programming course. May not be taken for credit by students who receive credit for 5110. F, W

5020 Statistical Methods (3) Regression and correlation models, basic time series analysis and forecasting; inferences about one or more proportions, and tests for independence. Prereq: 5010. W, Sp


5110 Introduction to Probability Theory (3) Classical probability and distribution theory. Prereq: Elementary linear algebra and calculus of several variables. F

5120-30 Theory of Statistical Inference (3, 3) Introductory theory underlying common statistical procedures of hypothesis testing and estimation. Prereq: 5110. W, Sp


5211 Elementary Statistics I (3) Introductory statistics for graduate students. Probability, sampling distributions, estimation, and hypothesis testing. Emphasis on interpretation and decision making. Not available for credit in any College of Business Administration degree program. F, Su


5510 Special Topics in Statistics (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6060 Applied Multivariate Analysis (3) Canonical correlation; discriminant analysis for several groups, and for equal and unequal covariance matrices; principal component analysis; Hotelling's T\(^2\) multivariate analysis of variance and covariance. Prereq: 1 yr applied statistics including analysis of variance and multiple regression analysis. W

6070 Factor Analysis (3) Principal component analysis and principal factor analysis; estimates of communalities; methods of rotation; interpretation of factors; cluster analysis. Prereq: 6060. Sp

6210 Stochastic Processes II (3) Special analysis, time series, linear and nonlinear systems. Prereq: 5210.
College of Communications

Donald G. Hileman, Dean
Paul G. Ashdown, Assistant Dean for
Undergraduate Studies
Herbert H. Howard, Assistant Dean for
Graduate Studies and Research

The College of Communications offers two graduate degrees with a major in Communications, the Master of Science (M.S.) degree and the Doctor of Philosophy (Ph.D.) degree.

In addition, Communications is available as a minor for students majoring in other departments. Required course work will be selected after discussion with the major advisor and an advisor from the College of Communications.

The M.S. program (professional track) is accredited by the American Council on Education for Journalism. The College is a member of the American Association of Schools and Departments of Journalism and the Broadcast Education Association.

The doctoral program in Communications is listed in the Academic Market of the Southern Regional Education Board. Students residing in Alabama, Georgia, Kentucky, South Carolina, Virginia, and West Virginia can normally qualify for in-state fee status by applying to the Academic Market coordinators in their state capitals.

MASTER OF SCIENCE

The Master of Science degree with a major in Communications is offered for students who primarily desire (1) advanced preparation in effective communication for mass media and other fields of applied communications, or (2) a deeper understanding of the communication process and the social role of the mass media.

The prospective student who is interested only in acquiring basic skills in journalism, advertising, or broadcasting is advised to consider a second baccalaureate rather than an advanced degree. (Note: There is no M.S. in Journalism or Advertising or Broadcasting at this institution. Students desiring a major in one of these fields must take the B.S. program.)

Applicants must meet admission requirements of The Graduate School. In addition they must complete the Graduate Record Examination, the California Psychological Inventory, and application forms as required by the College of Communications. All application materials will be screened by an admissions committee authorized by the Graduate Studies Committee of the College of Communications.

New students may be admitted to the program at any time; however, core courses begin only in the fall quarter. Unless necessary materials are received at least six weeks before registration, applications may not be processed in time for admission to full potential candidate status in the first quarter. In these cases, the student may still qualify for non-degree or provisional status.

The student may choose either of two tracks, both leading to the M.S. in Communications and both requiring a thesis:

The academic track is designed for the student who wishes to emphasize advanced study of the theory and effects of communications. A minimum of 45 hours of approved graduate work is required:

-12 hours of core courses:
  Communications 5100, 5120, 5140 and 6140, the first three of which must be taken during the first two quarters of the student's program, except with written approval of the Assistant Dean for Graduate Studies for the College. In addition, students who earned their Bachelor's degrees outside the field of Communications will normally be required to add Communications 5190 to their core;
-24 hours of selected courses within the College, including at least 9 hours at the 5000 level;
-9 hours of thesis work (Communications 5000), including 3 hours of thesis seminar.

This track is assumed to be the logical choice for students interested in subsequent entry into a doctoral program. Advising of students in this track is supervised by the Assistant Dean for Graduate Studies for the College.

The professional track is designed for the student who desires the graduate degree but wishes to emphasize a particular professional area, such as advertising, broadcasting, journalism, or public relations. A minimum of 45 hours of approved graduate course work is required:

-9 hours of core courses:
  Communications 5100, 5120 and 5140, which must be taken during the first two quarters of the student's program, except with written approval of the Assistant Dean for Graduate Studies for the College;
-15 hours in a major area within the College, including at least 6 hours at the 5000 level;
-9 hours of thesis work (Communications 5000); including at least 3 hours of thesis seminar;
-at least 12 hours in a minor area approved by the major advisor, of which at least 6 hours must be at the 5000 level.

In addition, students with Bachelor's degrees in other cognate areas will be required to complete prerequisites as designated by their advisors. Advising for the professional track will be supervised by the chairperson of the appropriate department of the College. Students who have had no courses in their major areas of concentration may expect to spend six or more full-time quarters in the program.

After the formal program of courses and research in either track is completed, the student must pass an oral examination conducted by his/her graduate committee.

Communications majors in the M.S. program must demonstrate ability to use a typewriter proficiently within their first quarter in residence.

DOCTOR OF PHILOSOPHY

The Ph.D. degree with a major in Communications is intended to prepare scholars for teaching, research, administration, and service in the field of human communications.

The program is interdisciplinary, consisting of a required core curriculum and recommended emphasis outside the College in the related social and behavioral sciences. The program is flexible and will accommodate a wide variety of career goals in communications. New students may be admitted to the program at any time; however, core courses begin only in the fall quarter.
The Master’s degree is not required for entry into or completion of the doctoral program. Program planning, however, will permit the Master’s degree to be earned if desired. Students lacking academic or professional experience in communications will be required to take prerequisite courses. In general, however, the program may be completed within three academic years of full-time study beyond the Bachelor’s degree. Those holding Master’s degrees should anticipate the completion of full-time study for completion of the Ph.D. degree.

The following are normally minimal requirements for admission to full potential candidate status; (a) a 3.0 (4.0 system) grade point average in undergraduate studies, or 3.5 for graduate work if applicant holds a Master’s degree; (b) above the fiftieth percentile in verbal and quantitative aptitude on the Graduate Record Examination; (c) completion of the California Psychological Inventory; (d) endorsement by at least three former teachers or professional colleagues chosen by the Ph.D. Admissions Committee; and (e) a statement of the applicant’s goals and reasons for pursuing the doctoral degree with members of the Ph.D. Admissions Committee may be required. Professional experience in some field of communications is a highly desirable criterion for admission.

The course requirements for the Ph.D. are:

1. Core
   - Communications 5120, 5121, 5140, 5200, 5410, 5420, 5470, 6100, 6140, 6141, 6200; one of the following: 6300, 6310, 6320, 6330, plus 6 additional hours of advanced research courses; Statistics 5050 and 5060; 6 graduate hours of education; 3 graduate hours of organizational behavior; Computer Science 4380

2. Primary Concentration
   - Advertising, broadcasting, journalism, public relations, or speech communication
   - Communications Research Methods (3)
   - Survey methods applied to opinion and message pretesting applications. Prereq: 5120

3. Secondary Concentration
   - Outside the College of Communications
   - Communications History (3)
   - Major trends in media history; development of major broadcasting, and principles of advertising. W
   - Communications Education (3)
   - Maximum 6 hrs.
   - University facilities and/or faculty time before registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

4. Dissertation
   - Communications 6300, 6310, 6320, 6330
   - Seminar in Historical Research Methods in Communications (3)
   - Seminar in Research Literature of Mass Communications (3)

5. 5970 Independent Study (3)
   - Reading, research, or project, may be repeated.

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

7. 5100 Introduction to Doctoral Studies (1) Doctoral degree and dissertation requirements. Committee formation and program planning. Overview of research methods and informational sources. S/NC only.

8. 5140 Mass Communication Theory II (3) Application of theory to contemporary mass communication problems. Topical approach; literature reviews and analytical papers. Prereq: 5120, 5140, 6100

9. 5141 Mass Communication Theory III (3) Continuation of 5140, detailed analysis of selected topics in theory and research. Tutorials, readings, reviews, reports, and papers in fields of interest. Prereq: 6140

10. 5200 Seminar in Communication Topics (3) Identification, presentation, and analysis of special issues of problems in communication. Organization and strategy in writing research proposals. Prereq: 5110, 5120. Recommended prerequisite: 6100 or consent of instructor.

11. 5300 Survey Research Methods in Communications (3) Survey methods applied to opinion and communications media research problems. Planning, sampling, questionnaire construction, data gathering (personal, mail, and telephone), data processing and interpretation. Attitude measurement and message pretesting applications. Prereq: 5120 or consent of instructor.

12. 5310 Experimental Research Methods in Communications (3) Experimental methods applied to communications research problems. Causal inferences from various research designs. Control, single-factor, and multifactor experimental designs. Laboratory and field experimental situations. Prereq: 5120 or consent of instructor. Prereq or coreq: Basic statistics.


14. 5330 Content Analysis (3) Content analysis as mass media research technique, conceptual foundations. Research design, categorization, sampling procedures, data gathering, and analysis.
Advertising

Professors: R. Joel (Head), M.A. Wisconsin; A. D. Fletcher, Ph.D. III.; D. C. Hileman, Ph.D. Illinois.


3850 Advertising Copy and Layout (4) Ideas and their translation into persuasive words and pictures. Principles and techniques of copy and layout. Lectures and labs. Prereq: 3630 with grade of "C" or better or consent of instructor. F, W, Sp

4000 Advanced Advertising Copy and Layout (4) Creative strategy and execution of advertisements for mass media. Problems in idea creation for advertisers. Lectures and labs. Prereq: 3630 with grade of "C" or better or consent of instructor. F, W, Sp

4360 Advertising Media (3) Media, markets, and audiences. Evaluation of media in relationship to communication needs of advertisers. Prereq: 3000 with grade of "C" or better or consent of instructor. E

4460 Cases and Problems (3) The case approach to the study of advertising problems. Analysis of campaigns and ads. Prereq: 3630, 3650 and 4360 with grade of "C" or better or consent of instructor. F, W, Sp

4470 Advertising Campaigns (4) Application of advertising principles to execution of campaigns. Market and consumer research; development and allocation of budgets. Choice of appeals and approaches to media; media selection; preparation of advertisements. Prereq: 3650, 4000 and 4360 with grade of "C" or better or consent of instructor. F, W, Sp

5310 Current Issues in Advertising (3) Current socioeconomic, legal, ethical, and cultural issues in advertising and communication to determine advertising's role in and responsibility toward society. Emphasis on both marketing and behavioral science aspects of advertising. Consideration of creativity, media, management, and research. Extensive individual reading; preparation and delivery of papers. Prereq: Consent of instructor.

5340 Advertising Management (3) Agency-client relations, media strategy, creative strategy, research, and relationship between advertising and marketing function. Prereq: 4360 and 3630 or consent of instructor.

5510 Advanced Advertising Research (3) Nature, scope, and application of research including measurement of advertising, media audiences, and evaluation of messages. Prereq: 4460 or consent of instructor.

5510 Creative Projects (3) Creative or problem solving interests related to advertising. Designed for the advanced student who wishes to apply theory and skills. Prereq: 4360 and 4460 or consent of instructor. May be repeated.

5970 Independent Study (3) E

Broadcasting

Professors: D. W. Hicks (Head), Ph.D. Northwestern; H. H. Howard, Ph.D. Ohio.

Associate Professor: P. G. Ashdown, Ph.D. Bowling Green; I. G. Simpson, M.S. Syracuse; M. W. Singletary, Ph.D. Southern Illinois.

Assistant Professors: B. A. Moore, Ph.D. Ohio; R. A. Shirley, M.A. Tennessee.


3360 Televison and Radio Advertising (3) Principles of successful radio-televised advertising; evaluation of messages, sales, promotion; radio, television, public relations, creative; television commercials. W, Sp

3850 Radio-Television Writing (3) Theory and technique of writing broadcasting scripts except news and dramas. Special events, interviews, musical scripts, radio talks, documentaries, and promotion material. F, W, Sp

4010 Speech for Broadcasting (5) Fundamental broadcasting conditions affecting the announcer; pronunciation and oral interpretation of general American speech; Spanish, Italian, German, and French pronunciation. Prereq: Consent of instructor. E

4020 Radio Production (3) Study of radio productions, past and present. Familiarization with production tools and techniques. Group and individual production activities. Prereq: 3750 or consent of instructor. Cannot be taken for graduate credit by communications majors. E

4030 Television Production (3) Overview of elements of television production: cameras, sound, lighting, film, videotape recording, optics, and studio control centers. Presented with the layperson and professional broadcast student in mind. Prereq: 4020 or consent of instructor. Cannot be taken for graduate credit by communications majors. E

4040 Advanced Television Production (3) A seminar in production origination, producing, directing and performing with orientation to the professional broadcast student. Prereq: 4030 or consent of instructor. F

4610 Broadcast News Operation (3) Theory and practice in covering local news and public affairs events for radio and television. Gathers and produces news broadcasts. Prereq: 3610 and 3670 or consent of instructor. F

4670 Radio-Television Management (3) Business policies and practices of networks and stations. Departmental functions, cost and income figures, sales techniques, promotion, personnel utilization, sources of program materials, network relationships, media strategy, creative strategy, research. Prereq: 2230, 3310 or consent of instructor. F

5140 Educational Broadcasting (3) Summary, writing and editing techniques, editorial principles and practices, pages. Writing of editorials and columns. Prereq: 2230 and 3310 or consent of instructor. F

5150 Creative Projects (3) For students having special advanced broadcasting interests or those who wish extensive direction in creative writing or production projects. May be repeated. E

5610 Public Affairs Broadcasting (3) News and public affairs functions in broadcasting stations and networks, including management, economics, personnel utilization, sources of program materials, legal and ethical aspects. Public affairs program development, particularly press conferences, interviews, and news specials. Prereq: 3610 or consent of instructor. W

5620 Broadcast Law and Regulations (3) Sociopolitical control of broadcasting; effect of laws, regulations, and public pressures upon station policies. Emphasis on unique situation of broadcasting among media in terms of regulation. Prereq: Journalism 4410 or 5210 or consent of instructor. F

5630 Broadcast Documentary Writing (3) Role of documentary in radio and television. Research, writing, and critique of documentary programs. Sp

5650 Radio-Television Program Development (3) Planning, station, network, and commercial program development for radio-television stations. Historical trends in programming and current programming practices as related to audience requirements, governmental policy, and competitive conditions. Individual studies of program development on both local station and network levels. Prereq: 3750 or consent of instructor. Su, F

5970 Independent Study (3) E

School of Journalism

Professors: J. A. Crook (Director), Ph.D. Iowa State; J. H. Haskins, Ph.D. Minnesota; B. K. Leiter, Ph.D. Southern Illinois; D. D. Nimmo, Ph.D. Vanderbilt.


Assistant Professors: M. L. Kern, Ph.D. Wisconsin; D. L. Smith, M.A. San Francisco State.

3120 Writing Feature Articles (3) Selection of topics and practice in writing feature articles for newspapers, magazines, and company publications. Prereq: 2220 or consent of instructor. E

3410 Communications Law (3) Statutory law and judicial precedents affecting mass communications media. Libel, contempt of court, invasion of privacy, copyright, broadcasting, advertising and postal regulations. E

3710 Public Relations (3) Theories and principles of public relations. Overview of PR as a management tool of business, government, institutions, and organizations. Cannot be taken for graduate credit by communications majors. E

3720 Advanced Public Relations (3) Preparation of communications materials to gain support from various publics; planning public relations programs. Prereq: 3710. F, Sp

3810 Specialized Publications (3) Editorial and design considerations for company publications and small magazines. Prereq: 2230 and 3310 or consent of instructor. W, Sp

3900 Journalism Research Methods (3) Use of social science research methods in journalism with emphasis on survey techniques. Interpretation and communication of research findings to public. W, Sp

4130 Editorial Writing (3) Analysis of editorial policies, practices, pages, writing of editorials and columns, with emphasis on study and use of rhetorical devices and logic. Sp

4150 Issues in Journalism (3) Topics vary. May be repeated. Maximum 6 hrs.

4310 Reporting Public Affairs (3) Reporting news of courts, politics, and government. State and county coverage. Prereq: 2330 and senior standing. W, Sp

4410 Mass Media and Society (3) Roles and responsibilities of mass media in society. Critique of mass media performance. Media codes and controls on the media. E

4420 Newspaper Management (3) Daily and weekly business operations. Developments in newspaper management. Sp

4560 Investigative Reporting (3) Investigative and interpretive reporting of complex or specialized subjects to place news in perspective or to clarify situations. Emphasis on writing for publication. Prereq: 2230. W

4710 Public Relations Cases (3) Case studies and applications of public relations principles to problems in business and industry, government, institutions, trades and professions, solving problems in public relations situations. Prereq: 3720. F, Sp

4810 Journalism in the High School (3) Functions and methods of high school publications. Staff organization, writing and editing techniques, editorial problems, and business management. Su

4910 News and Feature Photography (3) Advanced principles and methods in black-and-white and color photography. Emphasis on news and feature photography, and picture stories. Prereq: 3910 or consent of instructor.

4950 International Communications (3) Communication of news and opinion among nations and regions.
under varying types of political and economic systems, world news organizations; the press as a factor in international affairs; barriers to the flow of information; comparison of world press systems.

4970 Independent Study (3) May be repeated. Maximum 6 hrs.

5210 Government and the Press (3) Historic and current problems in the relations of executive, judicial, legislative, and regulatory segments of governmental and press. Prereq: 3110 or consent of instructor. W

5250 Public Opinion and Mass Media (3) Nature of public opinion with emphasis on role of press in its formation and how the press in turn is influenced by public opinion. Prereq: 4410 or consent of instructor. F

5510-20-30 Writing and Editing Projects (3, 3, 3) Specialized writing or editing interests, such as agriculture, politics, labor, finance, science, for technical as well as general publications. Prereq: 2220 or 2230.

5560 Magazine Article Writing (3) Techniques of writing in-depth articles for mass circulation magazines. Organizing and presenting material. Problems in specialized areas, such as business, science, agriculture, the humanities. Prereq: 3120 or consent of instructor. Sp

5710 Studies In Public Relations Communications (3) Problems of communication between institutions and organizations and their publics. Case histories and evaluations of programs. Prereq: 3710 or consent of instructor.

5810 Magazine Editing and Production (3) Analysis of editorial and production problems of general, regional, and specialized publications. Reader interest evaluation. Individual editorial projects. Prereq: Consent of instructor. F

5950 Communications and International Development (3) Seminar emphasizing mass media in national and international development. Communications and change in developing countries. Problems in international and cross-cultural communications. Prereq: 4950 or consent of instructor.

5970 Independent Study (3)
The College of Education offers programs of advanced study leading to the Doctor of Education degree in the major areas listed on page 8, and to the Doctor of Philosophy degree in Health Education.

The Ph.D. program with a major in Education provides five options for study in the departments of Curriculum and Instruction, Educational Administration and Supervision, Educational and Counseling Psychology, Physical Education, and Vocational-Technical Education. The program requirements and the options and emphases are:

**The Program**

- **Research Area**
  - Hours: 21
- **Foreign or Computer Language**
  - Hours: 0-9
- **General Core Requirements**
  - Hours: 6
- **Courses in Learning Theory, Curriculum Theory, and Administrative Theory**
  - Hours: 9
- **Trans-college seminar—four consecutive quarters**
  - Hours: 4
- **Specialization**
  - Hours: 24

**Options and Emphases**

**Option I. Administrative Theory and Practice**

1. **Principles and Models for Instructional Improvement**
2. **Subject Areas of Instruction and Practice: i.e., Science, Social Studies, etc.**
3. **Elementary and Early Childhood Instruction and Practice**

**Option II. Theories of Curriculum Development and Foundations of Education**

1. **Anthropological, Historical, Philosophical, and Sociological Bases of Educational Planning and Curriculum**
2. **Principles and Models for Planning, Developing, and Evaluating Educational Programs**
3. **Research Design for Educational Programs**

**Option III. Instructional Theory and Practice**

1. **Behavioral Interventions**
2. **Assessment (Educational, Vocational, Physical Education Instruction and Practice)**
3. **Adapted Physical Education**
4. **Physical Education Instruction and Practice**
5. **Vocational-Technical Fields of Instruction and Practice**

**Option IV. Theories and Practice of Educational and Personal Adjustment**

- Assessment (Educational, Vocational, Personality)
Career Development
Cognitive and Motor Learning
Consultation for the Helping Professions
Counseling Psychology
Diagnosis and Remediation of Cognitive and
Motor Learning and Behavioral Problems
Educational Measurement and Research
Design
Ethnic and Sex Fairness in Counseling
Group Processes
Human Development
Learning Theory and Application
Psychological Interventions in School and
Community Settings
Student Personnel Work
Training and Supervision of Counselors
Option V. Foundations of Human Movement
Factors Influencing the Learning of Motor
Skills
Philosophical and Sociological Foundations of
Sport and Physical Education
Physiological Factors Related to Fitness and
Performance

Bureau of Educational Research and Service

Four major types of activities—research, development, educational services, and
publications—are channeled through the Bureau of Educational Research and Service
(BERS), located in Claxton Education Building. The research activities relate to the
development of research proposals, conducting research, and assisting others in
development of research proposals in the College of Education. Developmental
activities relate to change efforts in curricular content and instrumental methodology.
Educational services include a wide list of activities such as in-service educational
programs, consultant services, and administrative training programs. Official
publications of the College of Education are developed through the Bureau. A limited
number of graduate student assistantships are available.

Departments of Instruction

Art and Music Education

C. H. Ball, Head

Art Education

MAJOR
Art Education

DEGREE
M.S.

Professor:

Associate Professors:

Assistant Professor:
J. P. Watkins, M.S. Tennessee.

The Master of Science degree in Art
Education is offered for art teachers, supervisors, and art-trained persons holding
the baccalaureate degree. The program provides both thesis and non-thesis options.
Moreover, it is possible to achieve Tennessee Certification in art while pursuing the Master’s
degree progra m.

The thesis option requires 45 quarter hours as follows:

<table>
<thead>
<tr>
<th>Quarter hours</th>
<th>1. Art Education 5310, 5320 and electives</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>--------------</td>
<td>2. Curriculum and Instruction 5800, and electives</td>
<td>9</td>
</tr>
<tr>
<td>--------------</td>
<td>3. Minor (selected with committee)</td>
<td>9</td>
</tr>
<tr>
<td>--------------</td>
<td>4. Electives</td>
<td>6</td>
</tr>
</tbody>
</table>

The non-thesis option requires 45 quarter hours as follows:

| Quarter hours | 1. Art Education 5210, 5230, and electives | 21 |
|--------------| 2. Curriculum and Instruction 5800, and electives | 9 |
|--------------| 3. Minor (selected with committee) | 9 |
|--------------| 4. Electives | 6 |

The thesis option requires satisfactory completion of a final written comprehensive examination. Both
the oral and written exams are conducted by the student’s professor.

Not all courses in art education are offered regularly each quarter, so the student should plan his or her program carefully with a faculty advisor.

4350-60-70 Problems in Art Teaching (3, 3, 3)
Prereq: Consent of Instructor. E
5000 Thesis (1-15) P/NP only. E
5002 Non-Thesis Graduation Completion (3-15)
Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
5210 Organization, Administration, and Supervision of Art in the School Program (3) W
5310 Art in Education (3) Historical background, current philosophy, theory, and trends; nature and function of aesthetic behavior in visual arts; relationships to psychology, sociology, and anthropology. F
5320 Program Development in Art Education (3) Objectives, organization, content selection, facilities, and equipment; supervision; evaluation; professional- goals; leadership and community relationships; art for special student. Sp
5880-60-70 Problems in Art Education (3, 3, 3)
Prereq: Consent of Instructor. E

Music Education

MAJOR
Music Education

DEGREE
M.S.

Professors:

Associate Professors:

Thesis and non-thesis programs lead to the Master of Science degree in music education.

Prerequisite preparation: undergraduate degree or equivalent in music education.

All graduate students in music education must pass proficiency examinations in music theory and applied music.

Requirements for thesis program:

<table>
<thead>
<tr>
<th>Quarter hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Music Education 5210, 5220, 5230 and electives</td>
</tr>
<tr>
<td>Music electives</td>
</tr>
<tr>
<td>Professional education courses including Curriculum and Instruction 5710</td>
</tr>
<tr>
<td>Music Education 5000</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Requirements for non-thesis option:

<table>
<thead>
<tr>
<th>Quarter hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Course requirements: a. Music Education 5210, 5240, 5250, 5710, one seminar, and electives numbered 5000 and above</td>
</tr>
<tr>
<td>b. Music electives at 3000, 4000, and 5000 levels (not to include required undergraduate curricula courses)</td>
</tr>
<tr>
<td>c. Professional education electives including Curriculum and Instruction 5610, Educational Counseling and Psychology 4760, and Educational Counseling and Psychology 5050, 5320, or other appropriate course</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

2. Evaluation (in addition to routine examinations in courses):

a. Written comprehensive examination in major and minor fields.

b. The student shall elect one of the evaluation procedures below (with approval of advisor and committee):

   (1) Oral examinations in major and minor fields.

   (2) A public recital in principal instrument, piano, or voice.

   (3) The presentation in public performance of an original musical composition(s) accepted by the committee as music suitable for school music performing groups.

   (4) Plan, rehearse and conduct a full public performance of music by junior or senior high school music groups. This shall be worked out as a long-term project under the supervision of the student’s professor.

   3. Student’s Committee: A minimum of three faculty members—the advisor from music education, one member from music, one member from education.

4441-42-43 Teaching Class Piano (1, 1, 1) For majors in music, music education, or elementary education. Prereq: Consent of Instructor. F, W, Sp
4450 Music In Special Education (3) Techniques and materials for exceptional children. Prereq: 3110-20.
4480 Marching Band Techniques (3) Functions, organization, and direction of a school marching band. Prereq: Consent of instructor. Coreq: 3511. F, Su
5000 Thesis (1-15) P/NP only. E
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

5283 Programs and Materials in Teaching Elementary Science (3) Analysis of new and innovative science program materials; methods of discovering relationships between approaches and materials for teaching science, elementary school teachers. Prereq: Consent of instructor. 3720 or equivalent, or consent of instructor.

5284 Seminar in Teaching Elementary Science (3) Analysis of curricular issues. Prereq: 5282 or 5283; at least one year teaching experience; or consent of instructor.

5290 Teaching of Mathematics in the Elementary School (3) Trends in methods, materials, and content. Not available for credit to persons completing recent elementary mathematics course. Prereq: Consent of instructor. F, Su

5291 Programs and Materials in Elementary School Language Arts (3) Programs and special instructional materials used in language arts. Prereq: 3260 or equivalent, or consent of instructor.

5292 Seminar in Research and Theory in Teaching Mathematics in the Elementary School (3) Systematic approach to planning and development of instructional materials in reading program, distinguishing between reading comprehension skills, concepts, and attitudes for creative or productive and critical (or evaluative) reading. Prereq: Consent of instructor.

5301 Developmental Reading in the Elementary and Middle School (3) Methods and materials, basic approaches, examination of reading skills, development of functional relationships with other curricular areas. Not available for credit to persons with recent course in reading education. Prereq: Consent of instructor.

5302 Psychology of Reading (3) The reading act, related to motivation, learning theory and reading role of reading in child's overall intellectual development. Prereq: Undergraduate reading course or consent of instructor.

5303 Methods and Materials for Teaching Critical Reading (3) Instructional techniques, methods, and materials for development of higher level comprehension skills, concepts, and attitudes for creative (or productive) and critical (or evaluative) reading. Prereq: Course in reading education or consent of instructor.

5304 Programs and Materials for Reading Instruction (3) Selection and use of materials in reading program, distinguishing between approaches and materials for teaching reading. Prereq: Course in reading education or consent of instructor.

5305 Trends and Issues in Teaching Reading (3) Differentiation of issues and trends through analysis of past, present, and future programs, materials, and developments. Prereq: Graduate course in reading education or consent of instructor.

5306 Teaching Reading to the Linguistically Different Learner (3) Language characteristics and special reading problems pertaining to linguistically different learner. Prereq: Course in reading education or consent of instructor.

5307 Assessment and Correction of Classroom Language Arts Difficulties (3) Classroom approaches to assessing and correcting language arts (other than reading) difficulties. Prereq: One graduate level course in elementary school language arts or consent of instructor.

5350 Curriculum Development and Evaluation (3) Examination of alternative approaches to improve current practice. Prereq: 5580 or consent of instructor.

5356 Curriculum Development at the Local Level (3-9) Systematic approach to planning and development of curriculum at local school or system level. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. S/NC only.

5385 Mathematics Laboratories in Elementary Mathematics Education (6) For elementary school teachers dealing with activity-oriented mathematics laboratory materials and pedagogical strategies. Theoretical and practical applications of specific diagnostic teaching methods and materials. A student who has completed 4280 may not enroll without consent of instructor. Prereq: Course in diagnosis and correction of reading problems or consent of instructor. May be repeated. Maximum 6 hrs.

5387 Mathematics in Elementary Schools (3) Mathematics laboratory materials and pedagogical strategies. Theoretical and practical applications of specific diagnostic teaching methods and materials. A student who has completed 4280 may not enroll without consent of instructor. Prereq: Course in diagnosis and correction of reading problems or consent of instructor. May be repeated. Maximum 6 hrs.

5393 Practicum in Diagnosis of Reading Problems (3) Application of principles of learning and teaching methodology in working with elementary and/or secondary school students. Prereq: Course study reports, and conducting parent conferences. Prereq: Course in diagnosis and correction of reading problems or consent of instructor. May be repeated. Maximum 6 hrs.

5394 Practicum in Remediation of Reading Problems (3) Application of principles of learning and teaching methodology in working with elementary and/or secondary school students on one-to-one or small group basis. Prereq: Course in diagnosis and correction of reading problems or consent of instructor. May be repeated. Maximum 6 hrs.

5395 Practicum in Developmental Reading Practicum (3) Diagnosis and correction of reading needs. Prereq: Course in diagnosis and correction of reading problems or consent of instructor. May be repeated. Maximum 6 hrs.

5396 Practicum in Reading Instruction (3) Special conferences, workshops, and in-service programs. Prereq: Minimum 9 hrs. S/NC only.

5410 The High School Curriculum (3) Identification of problems associated with curriculum study, emphasis on Tennessee curriculum framework, assessment of trends in programs of local, regional, and national significance. E

5510 Education in Cultural Perspective (3) Contribution of anthropological concepts (primarily concepts of culture) to understanding of education processes, problems, and insights in our society and others. (Same as Anthropology 5510).

5511 Non-Western Education: Anthropological Approaches (3) (Same as Anthropology 5511.)

5570 The Junior High and Middle School Curriculum (3) Curriculum designs and appropriate patterns of instruction to middle grade students. Prereq: 5580 or 5580-5270 or consent of instructor.

5610 Educational Statistics (3)

5620 Direction and Supervision of Student Teaching (3) Roles and responsibilities of cooperating teachers and student teachers; objectives and policies of student teaching programs; elements of clinical supervision; overview of research.

5630 Individualization of Instruction (3) Practical experience in designing individualized activities and materials. Prereq: 5580 and 5500 or consent of instructor.

5640 Newer Trends in Elementary Education (3) Trends in classroom procedures, equipment, and materials of instruction; problems involving improvement of instruction. W, Su

5650 Curriculum Laboratory for Elementary Schools (3-6) Workshops and in-service programs to improve instruction of teachers. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

5670 Curriculum for Early Childhood (K-3) (3) Prereq: 5600 or equivalent.

5680 Teacher-Parent-Community Relations (3) Development of techniques for effective relations between parents and teachers. Roles and expectations of parents and teachers, parent involvement, and influence of community on educational process. W

5690 Design of Instructional Media (3) Design and application of instructional development model to arrive at solutions to instructional problems, development of design of an instructional sequence or module, using appropriate media in actual learning setting. Prereq: 4750 or consent of instructor.

5691 Advanced Production of Audiovisual Software (3) Lettering, overhead projectuals, mounting, preserving, synctaping, photocopying, nonphotographic slides, and videotaping for producing classroom audiovisual software. Prereq: 5680 or consent of instructor, Library and Information Science 4750 or equivalent. (Same as Library and Information Science 5691.)

5692 Evaluation of Instructional Media (3) Evaluating and recycling media prototypes to meet needs and objectives of learners. Prereq: 5691 or consent of instructor.

5693 Administering Instructional Media Programs (3) Duties, functions, and responsibilities of media professionals developing and administering media program in various organizational and learning settings. Prereq: 5691, 5692, or consent of instructor.

5694 Utilization of Educational Television and Radio (3) Use of noncommercial educational TV and radio in schools and colleges. Prereq: Consent of instructor.

5695 Research in Instructional Media (3) Media research and its application toward improvement of instruction and learning. Prereq: Consent of instructor.

5696 Practicum Experience in Instructional Media (3) Practicum experience in professional media role as identified by student in various organizational and learning settings. Prereq: Consent of instructor.

5697 Application of Instructional Media (3) Media theory and research, newer media and technology, application of media in instructional settings. Prereq: Consent of instructor.

5710 Techniques of Research in Education (3) Study and application.

5720 Observation and Analysis of Instruction (3) Classroom observation and analysis procedures; development of objective observation and analysis skills, examination of existing observation systems.

5790 Career Development: Workshop (1-3) (Same as Educational Psychology 5790.)

5800 Seminar in Cooperative Curriculum Research (3) Action research procedures and their application to programs. E

5810 Introduction to Data Processing in Education (3) Analysis of current activities in field of educational data processing. Emphasis on curricular, administrative, and research opportunities in education, using modern electronic data processing methods and machines. Prereq: Consent of instructor.

5820 Seminar in the Teaching of Mathematics (3) Current methods and materials for grades 7-12 for experienced teachers. Prereq: 1 year teaching experience (mathematics grades 7-12) or consent of instructor. Sp

5825 Teaching Mathematics in the Middle and Junior High School (3) Problems related to teaching mathematics in middle and junior high schools. Understanding structure of mathematical concepts, strategies, and materials for teaching. Materials suitable for individualized instruction, mathematical laboratories, and independent study. Opportunities for individual projects. Prereq: 3350 or 3751-52 or equivalent. Su

5830 Seminar in Mathematics Education (3) Current curricular issues. Emphasis on individual student projects and investigations. W
5835 Teaching Mathematics in the Senior High School and Community/Junior College (3) Curriculum and teaching problems. Methods of teaching "analyses" courses such as Algebra II, trigonometry, analytic geometry and calculus. Prereq: 3751-52 or equivalent. F, Su.

5841 Trends and Issues in Early Childhood (3) Historical background; trends, and issues as basis for evaluating current programs; materials and techniques. Prereq: Consent of instructor. F, S, Su.

5842 Applications of Theory in Early Childhood Education (K-3) (3) Principles and practices from several theoretical orientations for young children (K-3). Teacher strategies, materials and evaluation methods. Prereq: Course in child development or child psychology at senior or graduate level.

5843 Seminar in Early Childhood Education (3) Analysis of research in early childhood education (K-3) with emphasis on application to programs and methods of instruction. Prereq: 4450 or equivalent, or consent of instructor. May be repeated. Maximum 6 hrs. W.

5844 Mathematics in Early Childhood Education (K-3) (3) Behavioral characteristics of children in regard to mathematics, content materials and function of instructional settings, and teaching strategies for development of mathematical ideas. Prereq: 3350 or equivalent. Su.

5845 Social Studies and Science in Early Childhood Education (K-3) (3) Integrative approaches to social studies and science content areas of schools and science for early childhood years. Emphasis on selection of appropriate social studies and science content and approaches for the young child. Prereq: 3270 and 3720 or equivalent. F, Su.

5846 Language Arts in Early Childhood Educacion (K-3) (3) Language development of young learner with emphasis on teaching methods, procedures, program and materials in early childhood language arts program. Prereq: 3260 or equivalent or consent of instructor.

5899 Field Experience (1-6) Application of curricular and instructional principles, methods, and materials in schools. Program prerequisites must be met, and consent of instructor required. May be repeated. Maximum 12 hrs. S/NC only.


5901 Linguistics and the Teacher of English (3) Analysis and application of linguistics in the classroom. Prereq: Consent of instructor.

5902 Teaching Composition in the High School (3) Techniques for teaching rhetoric. W.

5903 Teaching Fiction in the Secondary School (3) Reading, study, and analysis of literary selections. F.


5905 Teaching English in the Community/Junior College (3) Emphasis on thorough understanding of communication needs of community/junior college students and objectives, strategies, and materials for meeting these needs. Su.

5906 Teaching Poetry in Grades 7-12 (3) Materials and strategies for teaching poetry. F.

5907 Teaching Drama in Grades 7-12 (3) Strategies and materials for teaching drama. W.

5908 Developing Speaking and Listening Skills in Grades 7-12 (3) Strategies and materials for teaching skills of speaking and listening. Sp.

5909 Instructional Theory and Design (3) Instructional process and relationship to curriculum and learning. Prereq: Consent of instructor.

5910-20-30 Problems in Lieu of Thesis (3, 3, 3) S/NC only.

5911 Directing the Forensic Program (4) (Same as Speech 5911.)

5912 Play Production in Secondary Schools (4) (Same as Theatre 5912.)

5950 The Function of the Thinking Process in Education (3) Analysis of thinking process for purpose of tracing its implications for education theory and practice.

5960 The Teaching of Natural Science (3) Strategies, laboratory techniques, testing and evaluation, professional guidelines for middle, junior and senior high schools, community colleges. Prereq: Consent of instructor.

5961 Seminar in Science and Environmental Education (3) Recent developments in science education. Interrelationships of major environmental factors on science education for middle, junior and senior high schools, community colleges. Prereq: Consent of instructor. W.

5962 Studies in Energy Education (3) Major and alternative energy sources with applications for development of energy educational programs and materials; special emphasis on science taught in schools including community colleges. Prereq: 5961 or consent of instructor.

5970 The Teaching of the Social Studies (3) Su.

5980 Projects, Programs, and Materials in Social Studies (3) A selection of projects and teaching materials associated with each social science discipline. W.

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

6102 Studies in English Education (3) Reading and study in various areas of teaching of English: composition, language, and literature. Su.

6200 Seminar in Teaching the Social Studies (3) Problems associated with classroom instruction in junior and senior high schools. Su.

6300 Research and Theory in Teaching Reading (3) Research and theory in application to teaching of reading; research design as it applies to reading investigations. Prereq: Two 5000-level courses in reading. W.

6301 Seminar in Reading and Language Arts (3) Topics new to reading and language arts chosen by need and instructor(s). Prereq: 5000-level course in reading education and in language arts or consent of instructor. Su.

6302 Organization and Administration of Reading Programs (3) Synthesizing instructional and learning components of reading into classroom, school, and system programs. Prereq: 2 5000-level courses (minimum 1.5 credits) in reading education or consent of instructor.

6400 Seminar in Curriculum and Instruction (1) Required three quarters. S/NC only. E.

6500 Advanced Studies in Elementary School Language Arts (3) Critical research analysis of selected issues in elementary school language arts. Prereq: 2 graduate level courses in elementary school language arts or consent of instructor. F.

6610-20-30 Seminar in Dissertation Proposal Writing (3, 3, 3) Preparation of dissertation and proposal of teacher for American elementary and secondary schools; current and historical trends and issues; innovation and directions for future. W.

6650 Supervised Readings (1-6) Topics to be assigned. May be repeated. May be offered for letter grade or S/NC. E.

6710 Advanced Educational Statistics (3)

6720 Reading of Data (3) Types of data in research materials in education, principles of sound interpretation.

6730 Evaluation in Curriculum Planning: Theory and Application (3) Trends, issues, and theoretical frameworks; implications for conducting evaluation studies in specific educational settings. Prereq: 5580 and 5350, or equivalent.

6731 Advanced Studies in Curriculum (3) Analysis of influential curriculum theories and approaches, structural and developmental. Prereq: 5580 and 5350 or equivalent.

6830 Studies in Mathematics Education (3) Reading and study related to historical trends and issues in mathematics education in United States providing broad perspective on current curriculum problems and future trends. Prereq: 5830 or consent of instructor.

6850 Principles of Educational Leadership (3) Concepts and practices, with application to major problems in instruction, supervision, and administration.

*May not be used toward meeting 6000 requirements.*
6899 Internship (1-6) Advanced level experiences in application of principles and practices of curricular development and instructional improvement. Program prerequisites must be met and consent of instructor required. May be repeated. Maximum 12 hrs. S/NC only.

6960 Advanced Studies in Secondary Science and Environmental Education (3) Programs, materials, and recent research for middle, junior and senior high schools, community colleges. Prereq: 5960 or equivalent, consent of instructor.

Education

MAJOR Degree Education Ph.D.

6001 Trans-College Seminar (1) Minimum of four consecutive quarters required of all Ph.D. students. Prereq: Admission to Ph.D. program. May be repeated. May not be used to meet 6000 requirement. S/NC only.

Educational Administration and Supervision

MAJOR DEGREES Educational Administration: M.S., Ed.S., and Supervision: Ed.D. and Ph.D.


Programs are planned for (1) students preparing for administrative positions normally found in the educational structure of the state; (2) students preparing for the position of supervisor of education; (3) administrators and supervisors in service who wish to improve their professional competence; (4) students and teachers preparing for teaching positions involving administrative responsibilities; and (5) students preparing for teaching educational administration or for administrative positions in higher education. In addition to M.S. and Ed.D. degrees, a special two-year graduate program is offered which leads to the Ed.S. (Specialist in Education) degree and which provides advanced preparation for applicants judged to be potentially competent school administrators.

The Doctor of Philosophy degree with a major in Education includes options and emphases as listed on page 48.

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

5022 Non-Thesis Graduate Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

5100 Internship in Educational Administration (3) May be repeated without consent of department. Maximum 8 hrs. E

5130 Introduction to Educational Administration (3) Tasks, functions, and processes of educational administration; organization and structure of educational programs and institutions. E

5180-90-200 Educational Specialist Research and Thesis (3, 3, 3) P/NP only. E

5220 Philosophy and Theory in Educational Administration (3) Philosophical and theoretical foundations of educational administration, programs, and institutions, within the framework of American culture. F, Sp, Su

5230 Seminar in the Behavioral Sciences in Educational Administration (3) Key behavioral science concepts and theories in educational administration. F, Sp, Su

5290 The Politics of Education (3) Special emphasis on leadership structures, operational beliefs, and communication of ideas with regard to community decisions concerning education. F, Sp, Su

5310 School Administration and Civil Rights Issues (3) To help school administrators meet responsibilities and solve problems stemming from civil rights legislation pertaining to race, sex, and the handicapped. A

5420 District Level Administration (3) Role of central administrative team, and relationships, behaviors, and competencies to develop an effective school organization. F

5430 Building Level Administration (2) For beginning school principals and administrators, and for those operating in rural elementary, secondary, or consolidated schools. W, Su

5440 Introduction to Law, Finance, and Business Management (3) Orientation for beginning principals for basic foundations of the American legal system; how case law affects daily building level operations; building level methods of fiscal and logistical support measures. Sp, Su

5450 Organization of the School Program (3) For principals and supervisors; conceptual and technical skills in organizing school program including curriculum, instruction, student grouping, staff, schedules, and space. F, Su

5460 Personnel Administration: Local School (3) Planning personnel needs; job analysis; recruitment; selection; placement; orientation of new staff; fair employment and dismissal; and contract administration for both professional and supporting staff. Sp, Su

5470 Introduction to School Facility Planning (3) For school administrators; facility planning; skills in building planning, use and evaluation. F, Su

5480 Instructional Supervision—Local School (3) Developing a concept of supervision; instructional help, support, and service for teachers; supervision of curriculum; staff development; and staff evaluation. F, Sp, Su

5530 Introduction to Educational Planning (3) Processes for improving decision-making function through both quantitative and qualitative planning techniques. Relating educational policy analysis to educational planning. W, Su


5550 Research for Educational Administrators (3) Descriptive, experimental, and quasi-experimental designs to help student without quantitative back- ground to read and understand technical literature. Primarily for nonthesis option students. Should be taken early in M.S. or Ed.S. program. W, Su

5580 Seminar in Communication Skills for Educational Administrators (3) Identification, development and improvement of both oral and group related communication skills. F, Sp, Su

5711 Problems in Educational Administration and Supervision: School Operation (3) May be re- peated. E

5712 Problems in Educational Administration and Supervision: Higher Education (3) May be re- peated. E

5713 Problems in Educational Administration and Supervision: State School Administration (3) May be repeated. E

5714 Problems in Educational Administration and Supervision: Preparation Programs (3) May be repeated. E

5715 Problems in Educational Administration and Supervision: Community Education (3) Inde- pendent study of administrative problems. May be repeated. E

5751 Problems in Educational Administration and Supervision: Theory (3) May be repeated. E

5752 Problems in Educational Administration and Supervision: Finance (3) May be repeated. E

5753 Problems in Educational Administration and Supervision: Transportation (3) May be re- peated. E

5754 Problems in Educational Administration and Supervision: Business Management (3) may be repeated. E

5755 Problems in Educational Administration and Supervision: Personnel (3) may be repeated. E

5756 Problems in Educational Administration and Supervision: School Plant (3) May be re- peated. E

5757 Problems in Educational Administration and Supervision: Organization and Structure (3) may be repeated. E

5758 Problems in Educational Administration and Supervision: School Law (3) May be repeated. E

5759 Problems in Educational Administration and Supervision: Supervision (3) May be repeated. E

5770 Maintenance of School Plants (3) Skills in operating school custodial and maintenance pro- grams. W

5810 Survey Research Methods (3) Overview of descriptive studies, data collection, analysis, and interpretation for survey studies and school surveys; strategies for descriptive research in education. F, Su

5850-60-70 Independent Study in Educational Administration (3, 3, 3) Prereq: Consent of instruc- tor. E

5890 Decision Making and Decision Theory in Educational Organizations (3) Theoretical con- structs underlying executive decision theory prob- lem-solving activities for preservice and practicing administrator. Executive decision making at several administrative levels in complex educational organi- zation. S/NC only. A

5900 Special Topics (3) May be repeated. E

5910-20-30 Problems in lieu of Thesis (3, 3, 3) S/NC only. E

5950 Elementary Administrators Seminar (3) For in-service training of elementary school administra- tors. Development, problems, programs, and trends of elementary schools and management skills of elementary school administrators. Prereq: Presently an elementary school administrator or consent of instructor. May be repeated. S/NC only. F

5960 Middle School Administrators Seminar (3) For in-service training of middle school administra- tors. Development, problems, programs, and trends of middle schools and management skills of middle school administrators. Prereq: Presently a middle school administrator or consent of instructor. May be repeated. S/NC only. F

5970 Secondary Administrators Seminar (3) For
in-service training of secondary school administrators, development of problems, programs, and trends of secondary schools and management skills of secondary school administrators. Prereq: Presently a secondary school administrator or consent of instructor. May be repeated. S/NC only. F

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

6040 Seminar in Educational Administration and Supervision (1) Required three consecutive quarters. S/NC only. E

6100 Internship in Educational Administration (3) May be repeated at discretion of student's commit- ttee. Opportunity for doctoral students and advanced graduate students to gain experience in performance of critical tasks of educational administration under supervision of practitioner and University repre- sentative. E

6110 Administrator Update (3) Current topics of concern to practicing school administrators, selected each quarter and presented by a specialist. Prereq: Presently a school supervisor or administrator, or consent of instructor. May be repeated. S/NC only. E

6190 Administration in Higher Education (3) De- veloping conceptual understanding of administrative theory and practice in higher education. F, Su

6220 Programs for the Professional Preparation of Educational Administrators and Supervisors (3) A

6340 Current Trends in School Law (3) Logical arrangement of case and statutory material for public school administration; in-depth examination of problems relevant to public education. W, Su

6380 Instructional Supervision—School District (3) Definition and analysis of instructional supervi- sion at the school district level. Supervisory opera- tions including goal development; curriculum de- velopment; instructional support, help, and service for teachers and administrators; personnel de- velopment; program evaluation. W, Su

6420 School Board-Superintendency Rela- tionship (3) The local unit of school administration, school district and its governing body, board of education or school board. Sp

6440 School Business Management (3) Empha-sizes superintendent's role concept; planning, proc- urement and utilization of fiscal resources. F, Su

6450 Grant and Contract Proposal Preparation (3) Grants and contracts processes in education. F

6460 School Personnel Administration (3) Per- sonnel administration functions for professional and supporting staff in educational organizations. Recruit- ment, selection, placement, personnel policies and employee wage and salary administration, fringe ben- efits, collective negotiations, human relations, staff development, and staff evaluation. Sp, Su

6480 Special Topics In School Personnel Admin- istration (3) Human problems in school personnel administration; staff planning, record systems, per- sonnel policy development; collective bargaining in education; and staff evaluation. May be repeated. Maximum 12 hrs. F, W, Sp

6530 Futuristic Educational Planning Methods (3) Methods for describing alternative futures. A

6540 Contemporary Economics and Educational Finance (3) Contemporary educational finance poli- cies and their influence on educational service and program, national economy, welfare of individuals, and welfare of the nation. F, Su

6550 State-Federal Relations in Education (3) Purposes and functions of federal/regional/state/local educational agencies, organizational control and political variables. Major education laws, rule and regulation-making process, grants and contracts as inter-level policy instruments. F, Su

6560 Legal Foundations of Public Education (3) Legal framework and theoretical concepts that im- pinge on operation of schools within present legal structure of the United States. A

6580 Seminar in Managing Conflict (3) Learning about and experiencing various forms of conflict. W, Su

6750-60-70 Independent Studies in Educational Administration and Supervision (3, 3, 3) Prereq: Consent of instructor. May be repeated. E

8800 Administration of Complex Educational Organizations (3) Concepts and theoretical for- mulations to understand, analyze, evaluate, and change complex educational organizations. W, Su

6870 Advanced Study in School Facility Planning (3) Includes an in-depth development of educa- tional specifications and techniques of leadership in creation of quality educational facilities. W

6900 Special Topics (3) May be repeated. E

6981 Specialized Seminar: School Operation (3) E

6982 Specialized Seminar: Higher Education (3) Current policy development, organizational re- lationships, and administrative issues in higher educa- tion. Sp

6983 Specialized Seminar: State School Adminis- tration (3) E

6984 Specialized Seminar: Preparation Programs (3) E

6990 Specialized Doctoral Seminar in Politics of Education (3) Purposes and functions of political theories and practices as they affect operation of public school system. Appropriately interdisciplinary discussions based on literature and research from education, sociology, and political science. One field inquiry. Prereq: 5250, 5610 or equivalent or consent of instructor. W

6991 Specialized Seminar: Theory (3) E

6992 Specialized Seminar: Finance (3) E

6994 Specialized Seminar: Business Manage- ment (3) E

6995 Specialized Seminar: Personnel (3) E

6996 Specialized Seminar: School Plant (3) Theory and practice in planning and operating educa- tional facilities; related research in education and other disciplines; implications for further research; application of existing knowledge to known school facility settings. Prereq: Consent of instructor. A

6997 Specialized Seminar in Organization and Structure (3) Organizational theories in education including systematic review of status of organization- al and leadership research in education and related disciplines; implications for further research; applica- tion of existing theory and research in known educa- tional settings. Prereq: Consent of instructor. A

6998 Specialized Seminar: School Law (3) E

6999 Specialized Seminar: Supervision (3) Sp

Educational and Counseling Psychology

MAJORS

DEGREES

Guidance

M.S.

M.S., Ed.D.

Psychology

Ed.S.

Education

Ph.D.

Ph.D.

M. A. Hector, Ph.D., Michigan State; L. M. Kindall, Ed.D., Tennesse; A. McIntyre2, Ph.D., Yale; N. M. Meara, Ph.D., Ohio State; M. P. Pate of1, Ph.D. Ohio State; R. S. Saudargas2, Ph.D. Florida; K. K. Swander, Ph.D., Florida.

Assistant Professors:


Graduate programs (thesis or non-thesis option) lead to the Master of Science degree with a major in Educational Psychology with concentration in educational psychology, in school psychology, and in community agency counseling; the M.S. degree in Guidance has concentrations in elementary or secondary guidance; the Specialist in Education and the Doctor of Education degrees in educational psychology, school psychology, and counselor education. Professional emphases within the above programs are offered in applied behavioral analysis, positive mental health. Application of mental health criteria to a study of one's self based on a battery of personality assessment instruments.

Appropriate interpersonal, and social skills, and group therapy techniques. Prereq: Introductory course in psychology or consent of instructor. Letter grade or S/NC.

4350-60-70 Special Topics and Problems (1-6, 1-6, 1-6) May be repeated. S/NC or letter grade.

4440 General Education Procedures for Public Schools (3) Prereq: 2430 or equivalent. E

4640 Standardized Testing (3) Use and interpreta- tion of standardized group instruments in assess- ment of intelligence, aptitude, achievement, voca- tional interests, and personality adjustment. E

4650 The Construction of Classroom Tests (3) Concerned with teacher-made classroom tests: in- structional objectives, principles of test construction, item analysis, evaluation of a test's reliability and valid- ity, interpretation of test scores, relationship between testing and grading. W, Su

4760 Advanced Child Study (3) Prereq: 2430 or 3610 or consent of instructor. W, Su

4900 Psychology of the Disadvantaged Child (3) Significant behavioral differences and causes appropriate intervention approaches. F

Part-time.

Adjunct.
4810 Psychosocial Aspects of Appalachian People (3) Exploration of psychosocial factors affecting people of Appalachian region through examination of history, culture, and role of education. W, Su


4890 Differential Psychology (3) Nature and sources of individual differences in behavioral characteristics, differences between racial, ethnic, socioeconomic, sex, and other groups.

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

5022 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

5040 Guidance and Pupil Personnel Services in Education (3) For students not conducting research. Prereq: 3810 or equivalent.

5050 Children and Adolescents (3) Mental, social, physical, and emotional growth, development, and learning of children and adolescents; prevention, identification, and remediation of learning problems. W, Su

5060 Group Approaches with Students (3) Knowledge and skills appropriate to functioning with groups in school counseling, psychological and parent education. F, W, Su

5070 Seminar in Elementary School Guidance (3) Trends, role, function, and administration of guidance in elementary school. Sp

5099 Field Work (1-6) Practical experience in departmentally-approved field experiences. Supervision by field and University personnel. Program prerequisites to field work must be met. May be repeated. Maximum 6 hrs. S/NC only.

5100 Developmental Psychology (3) (Same as Psychology 5100) F, W, Su

5101 Advanced Psychology of Adolescence (3) Theory and research on principles and problems of adolescent development; application to individual and group counseling and classroom management. W

5110 Psychology of Women (3) Past and current educational and psychological theory and practice with special attention to assumptions and practice in regard to women; social context in which various theories were developed and current theories and research focusing on women and/or sex differences. Prereq: 4130 or basic course in personality theory. E

5111 Seminar in Current Issues in School Psychology (3) (Same as Psychology 5111) S/NC only.

5120 Seminar in Bias-Free Counseling (3) Feminist psychology, bias-free education, and counseling. Prereq: 4110 and 5110 or consent of instructor. F, W, Su

5140-50-60 Psychodiagnostics and/or Counseling Assessment (3, 3, 3) (Same as Psychology 5140-50-60.) S/NC only.

5149-59-69 Practicum in School Psychology (2, 2, 2) (Same as Psychology 5149-59-69.) S/NC only.

5180-90-200 Educational Specialist Research and Thesis (3, 3, 3) P/NP only. E

5210 Interpreting Published Articles: Statistics (3) Descriptive and experimental research in educational psychology, guidance and counseling, and college student personnel. Prereq: Non-thesis option students only or consent of instructor. F, W, Su

5220 Interpreting Published Articles: Research Design (3) For students not conducting research projects; interpret and evaluate statistical tables and statistical tests as reported in journals. Prereq: 5210 or consent of instructor. W, Sp, Su

5310 Diagnostic and Corrective Teaching (3) Application of psychology of learning to instruction and problem-solving situations that student encounters in classroom. Prereq: Course in general psychology. May be taken for undergraduate credit by undergraduates admitted to teacher education or consent of instructor. E

5319 Field Work in School Psychology: Level I (3) (Same as Psychology 5319.) S/NC only.

5320 Advanced Classroom Behavior Modification (3) Current research in psychology and its application to educational problems. E

5330 Theory and Research in Human Learning (3) Contemporary learning theory; current research and its influence upon school practice. F

5331 Current Developments in Human Learning (3) Sp

5340 Group Dynamics (3) Principles of group dynamics as they apply to a variety of group settings. Prereq: 5331 or equivalent. Maximum 6 hrs. E

5350 Educational Applications of Cognitive Theories (3) Developmental theory of Jean Piaget and implications for education. Related theories such as Bruner and Ausubel. F

5356 The College Student (3) Nature, characteristics, and needs.

5720 Evaluation in Education (3) Techniques and instruments for identifying and appraising social values, the thinking processes, social adjustment, emotional and educational development, and potential leadership skills. (Same as Psychology 5340.) E

5750 Career Development: Theory and Research (3) F, Su

5755 Career Development: Program Development, Implementation and Evaluation (3) Career development and pre-vocational programs and projects, K-adult with emphasis on development, implementation, and evaluation. Prereq: 5780 or equivalent, or consent of instructor. Sp

5790 Career Development: Workshop (1-6) Designed for in-service training of school personnel. Developments, problems, and programs and trends related to career development. May be repeated. Maximum 6 hrs. (Same as Counseling and Instruction 5780 and Special Education 5780.) W

5840 Student Appraisal (3) Gathering, interpreting, and using data for development of guidance programs and individual counseling. Prereq: Educational Psychology or Psychology 4640 or equivalent in standardized testing. (Same as Psychology 5840.) W

5850-60-70 Special Topics and Problems (1-6, 1-6, 1-6) Not to be taken to fulfill regular 6000-level course requirements. Prereq: Consent of instructor. Maximum 12 hrs. May be taken for letter grade or S/NC. E

5880 Career Development: Occupational and Educational Resources (3) Gathering, interpreting, and using occupational, social, occupational, and community information in the guidance program; sources, types of materials, and occupational filing plans. For use both in group and individual guidance programs. W, Su

5885 Career Development: Field Experience (1-3) Application of career development principles and practices in school, community, business, and/or industry. May be taken concurrently or separately: 5780, 5785, 5790, 5880, or consent of instructor. May be repeated. Maximum 6 hrs. E

5890 Counseling Theories and Techniques (3) Presentation, demonstration, and application of the technical procedures to students interested in counseling process. (Same as Psychology 5890.) F, W, Su

5897 Practicum (3) Didactic experiences and counseling simulations in learning laboratory. Coreq: 5890. E

5910-20-30 Problems in Lieu of Thesis (3, 3, 3) S/NC only.

5940 Counseling Practicum (3) Supervised practice in counseling in elementary or secondary school guidance and/or student personnel work. Prereq: 4640, 5060 or 5340, 5890, 5897 or consent of instructor. E

5950-60 Theory and Practice of Consultation (3, 3) (Same as Psychology 5950-60.)

5959-69 Practicum in Consultation (2, 2) (Same as Psychology 5959-69.) S/NC only.

5980 Organization and Administration of Pupil Personnel Programs (3) Basic principles, procedures, and policies. Prereq: 5460 or 5620, or consent of instructor. Sp, Su

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

6040 Seminar (1) Required in fall quarter. Maximum 3 hrs. S/NC only. F

6099 Internship (1-6) Supervised employment at departmentally-approved internship sites. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.

6110 Application of Research Design (3) Research design and statistical analysis unique to educational psychology, counseling, and college student personnel. Prereq: 6110 or equivalent. May be repeated. Maximum 6 hrs. E

6120 Application of Experimental Research Design (3) Experimental designs used by researchers in educational psychology, counseling, and college student personnel. Prereq: 6110 or equivalent. W

6319 Field Work in School Psychology: Level II (2) (Same as Psychology 6319.) S/NC only.

6550-60-70 Seminar in College Student Personnel (2, 2, 2) Issues in college student personnel, college counseling, student development, etc. Prereq: Consent of instructor, admission to the doctoral program. S/NC only.

6610-20-30 Seminar in Dissertation Proposal Writing (2, 2, 2) Preparation and evaluation of dissertation proposal. Prereq: 2 consecutive statistics courses or consent of instructor. F, W, Sp

6750-60-70 Special Topics and Problems (1-6, 1-6, 1-6) Not to be taken to fulfill regular 6000-level course requirements. Prereq: Consent of instructor. Maximum 12 hrs. May be taken for letter grade or S/NC. E

6810 Seminar in Counseling (3) Selected counseling theory, topics, issues. Prereq: 5890 or consent of instructor. May be repeated. F, W, Sp

6840-50-60 Seminar in Professional Issues (1, 1, 1) Job selection, convention participation, publishing, writing, grant proposals, consulting, etc. For final year doctoral students only. S/NC only. F, W, Sp

6910 Special Topics Seminar (3) Exploration of special research topics and interests for students who have necessary background. Topic will vary from quarter to quarter, depending upon instructor. Prereq: Advanced standing as doctoral student. May be repeated. S/NC only. W, Sp

6931-32-33 Practicum in Counseling Psychology (3, 3, 3) Practicum supervised. Minimum: 90 clock hours each quarter. Prereq: Advancement to counseling psychology program and consent of instructor.

6940 Group Counseling Practicum (3) Supervised practicum with children and/or adults. Prereq: 5340, 5890, 5897, and 5940 and consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

6941-42-43 Practicum in Guidance, Counseling, and Personnel Services (3, 3, 3) Supervised practicum designed to develop skills and techniques. Minimum: 90 clock hours each quarter. Prereq: 5890 and consent of instructor. E

6944-45-46 Teaching Practicum (3, 3, 3) Prereq: Admission to doctoral program and consent of instructor. May be repeated. Maximum 6 hrs for each course. E

6950 Counseling Supervision (3) May be repeated with consent of advisor. Prereq: 5890, 5940, 6810, 6941. S/NC only. E
Special Education and Rehabilitation

MAJORS

Vocational Education

DEGREES

M.S.

Vocational Rehabilitation Counseling

M.S.

Professors:


Associate Professors:


Assistant Professors:


Instructors:


Lecturers:

R. D. Avans, M.S. Tennessee; Z. H. Brody, M.A. Tennessee; B. M. Byrdd, Jr., M.S. Tennessee; O. E. Reese, B.S. Memphis State.

The Department of Special Education and Rehabilitation provides competency-based programs and experiences to prepare regular, special education certification personnel to work with exceptional persons: children and adults. Specialized courses may be distributed over the several areas of exceptionality with emphasis in an area of special interests or need. Facilities are available for continuous observation and participation in direct relationships with handicapped children and adults who are hospitalized, homebound, or in residential schools, special classes, or regular classes.

Course sequences may be planned in specialized areas to include (1) hearing impaired; (2) gifted; (3) learning disabilities; (4) mentally retarded; (5) multiple disabilities; (6) socially or emotionally maladjusted; (7) rehabilitation counselor education; (8) disability evaluation education; (9) general special education and rehabilitation.

Programs lead to the Master of Science degree in Special Education with an emphasis in one of the specialized areas.

Under the sponsorship of the Office of Special Education and Rehabilitation Services (R.S.A.), a specialized institute for the preparation of professionals to adapt their skills toward services to hearing impaired and deaf people is provided.

Further information write the department head.

EDUCATION OF THE HEARING IMPAIRED

4000 Rehabilitation Practicum (3) Evaluation of client data practicing rehabilitation prognosis. Pre-req: 4230. F, Sp

4190 Speech Development of Hearing Impaired (3) Anatomy and physiology of speech system. Relations of hearing to speech development. Theories and techniques of speech development and improvement of hearing impaired children. Prereq: 4190 consent of instructor. (Same as Audiology and Speech Pathology 4200.) W, Sp

4210 Language Development of Hearing Impaired I (3) Systems by which formal language is presented. (Same as Audiology and Speech Pathology 4210.) F, Sp

4220 Language Development of Hearing Impaired II (3) Techniques; various systems by which formal language is presented. (Same as Audiology and Speech Pathology 4220.) W, Sp

4230 Communication Processes for the Hearing Impaired I (3) Various communicative skills required by hearing impaired person; speech and language development; auditory training, speech reading, manual language and its relation to other forms of communication. Observations and practicum. (Student must acquire a degree of proficiency in use of manual language.) Prereq: Consent of instructor. E

4231 Communication Processes for Hearing Impaired II (3) Intermediate course in manual communications skills and techniques with emphasis on vocabulary development with receptive and expressive fluency. Prereq: 4230 or consent of instructor. A

4240 Nature of Hearing Impairments (3) Basic principles of audiology; anatomy and physiology of hearing; nature and causes of hearing loss; methods and instrumentation for assessment of hearing level; interpretation of audiograms; selection and use of hearing aids; relation of audiologic services to medical and other rehabilitation disciplines. Observations and practicum. W, Sp

4250 Introduction to the Psychology and Education of the Hearing Impaired (3) For those planning to enter field of teaching deaf and hard-of-hearing. Review of history of education of deaf. Research studies relating to psychology, social adjustment, and learning of deaf. Survey of professional literature in area of deaf child and adult. (Same as Audiology and Speech Pathology 4250.) E

4280 Curriculum Development in Elementary and Secondary Schools for Hearing Impaired (3) Adaptation of curriculum development and methods in public school education to meet needs of deaf and hard-of-hearing students in residential and integrated settings. W, Su

4290 The Teaching of Reading to Hearing Impaired Children (3) Readiness activities, developmental approaches, theories, and specialized materials for curricula in teaching reading. W, Su

4870 Student Teaching with Hearing Impaired Children (3) Supervised practicum with preschool, day school, and residential pupils. S/NC only. F, W, Sp

4871 Practicum with Hearing Impaired Children (3) S/NC only. F, W, Sp

5200 Linguistics in the Education of the Hearing Impaired (3) Recent research and developments in linguistics related to hearing impaired. F, Su

5240 Seminar in Language Remediation for the Hearing Impaired (3) Current and recent developments in educational methodologies and methods pertaining to teaching language to hearing impaired. Research and materials current in use of various sign language systems and adaptions. Emphasis on approaches which accommodate and assist integration of hearing impaired children in regular classrooms. W, Su

5280 Seminar on Educational Implications of Language Deficiency (3) Readings, discussion, and projects on impact of language deficiency on educational programming for children with language deviations. W

5310O-20-30 Manual Communication (2, 2, 2) Basic and advanced skills in fingerspelled and signed forms of communication. Emphasis on ability to express and receive the formal manual forms. Prereq: Consent of instructor. Must be in sequence. F, W, Su; F

5440 Educational and Vocational Guidance of the Deaf and the Hard of Hearing (3) Evaluation; test techniques for diagnosis and guidance; social and personality adjustment; occupational opportunities. F, Sp

5620 Curriculum Development Applied to Programs for the Hearing Impaired (3) Current curriculum trends adapted for hearing impaired individuals. New curriculum options in education of these children. Current education theories for programs for hearing-impaired children. Prereq: Curriculum and Instruction 5580 or equivalent and consent of instructor. Sp

EDUCATION OF THE MENTALLY RETARDED

4110 The Nature and Concept of Mental Retardation (3) Identification, description, and study, E

4120 Education of the Mentally Retarded Child (3) Philosophy and rationale underlying teaching and guidance of mentally retarded; methods and materials in special and regular classes. Prereq or coreq: 4110. E

4490 High School Program for the Mentally Retarded (3) Trends, ideas, and research relating to core and work study programs. E

4810 Student Teaching Mental Retardation (3) Prereq: Major in education of mental retardation. S/NC only. F, W, Sp

4811 Student Teaching Mental Retardation (9) Prereq: Major in education of mental retardation. S/NC only. F, W, Sp

4922 Student Teaching of the Edubably Retarded (3) Observation and supervised practicum. S/NC only. E

5111 Psychology of Mental Retardation (3) Intellectual functioning, psychological theories and learning interrelations and theoretical and educational implications emphasized. Prereq: 4110. F, Su

5112 Psychology of the Severely Mentally Retarded (3) Program and curriculum development for training/education of severely retarded in public schools, institutions and privately operated schools and workshops. S

5230 Advanced Curriculum for the Mentally Retarded (3) Educational models, methodologies, and curriculum in education of mentally retarded children and adults. Prereq: Varied curriculum alternatives and coreq: 5225 or consent of instructor. Sp, Su

5240 Educational Problems of the Cerebral Palsied Child (3) Nature of brain-injured child; skills for indentifying educational, physical, and emotional characteristics; special educational techniques. E

5480 Educational Problems of the Cerebral Palsied Child (3) Nature of brain-injured child; skills for indentifying educational, physical, and emotional characteristics; special educational techniques. E

4921 Student Teaching in Crippling and Special Health Conditions (3-15) Observation and supervised practicum in home, hospital, and classroom. S/NC only. E

EDUCATION OF THE EMOTIONALLY DISTURBED

4610 Nature and Characteristics of Learning and Behavior Disorders (3) Forms of academic and socially disturbing behavior, degrees of severity, possible causes, and relationships to each other. Relationships with respect to personality characteristics and development factors interpreted through behavioral and psychodynamic theories as well as practical situations in which learning and behavior disorders may occur. E

College of Education/Special Education 57
4620 Education of the Emotionally Disturbed Child (3) Managing behaviors, models for instruction, teaching techniques and materials, and teacher-student-family interpersonal relationships as basis for academic achievement for the pupil. Prereq: 4610. W, Su

4630 Practicum in Residential Settings Serving Children with Disturbing Behavior (3) Practicum in scientific observation, recording and interpreting disturbing behaviors. Initiating behavior changes regarding academic and social behaviors. To perform in a residential setting, within a residential classroom, and to take part in discussion and evaluation of relevant academic and reinforcement schedules. Prereq: 4610 and 4620 or consent of instructor. A

4640 Practicum in Public School Systems Serving Children with Learning and Behavior Problems (9) Academic tutoring in a teacher/leader capacity within regular classrooms. Particular emphasis and practice in individualizing instruction for learning and behavior problems. Classroom observations. Discussion and evaluation of relevant methods and materials unique to each teaching situation. Prereq: 4610 and 4620 or consent of instructor. A

4924 Student Teaching of the Emotionally Disturbed (3-9) Tutoring and classroom observation and teaching of the emotionally disturbed individual. Prereq for coreq: Curriculum and Instruction 4720 or 4820. S/NC only. A

REHABILITATION COUNSELOR EDUCATION

5100 Orientation to Rehabilitation (3) History, philosophy, and legal bases for rehabilitation movement; case finding, intake, diagnosis, physical restoration, community training, placement, follow-up; relation to programs of allied agencies, rehabilitation teams, facilities and programs in hospitals, institutions, community agencies, and service groups. Attention to specialization in disability categories such as mental illness, mentally retarded, and blind. F

5115 Caseeload Management in Rehabilitation (3) Techniques and procedures involved in management of caseloads in state rehabilitation agencies and public/private rehabilitation facilities; analyses of appropriate industrial management models related to rehabilitation programs; and simulated experience in work planning, decision making, and case selection. W

5120 Psychosocial Aspects of Disability (3) Medical aspects and psychological impact of major disabilities, including implications of family and community. Sp

5121 Job Development and Placement in Rehabilitation (3) Identifying work for handicapped persons; utilization of occupational resource materials and techniques including field experiences for analyzing jobs; procedures necessary for helping a handicapped individual successfully adjust to a work environment and assessment of future trends within labor market. Su

5130-40 Seminar in Rehabilitation (3, 3)

5141 Diagnostic Vocational Evaluation in Rehabilitation (3) Process, principles, and techniques used to diagnose vocational assets and liabilities of handicapped persons; utilizing and interpreting findings from biographical data and use of evaluation interview. W

5142 Prognostic Vocational Evaluation in Rehabilitation (3) Process, principles and techniques used to determine potential work behavior and vocational potential. Includes rationale underlying selection and use of occupational exploration programs; techniques, situational tasks, simulated work experiences, and job tryouts in vocational evaluation. Prereq: 5141 Sp

5143 Interpretation of Vocational Evaluation Data in Rehabilitation (3) Procedures, principles, and techniques used in interpretation of vocational evaluation data to handicapped adults, to referral agency, or to facility staff. Interpretation of data through the formal staff conference, vocational counseling report writing, and follow-up. Prereq: 5141 and 5142. Su

5144 Development and Supervision of Client Evaluation Programs (3) Procedures involved in establishment and maintenance of effective vocational evaluation programs. Determining and planning amount of floor space, type of equipment, type and number of staff, and lines of communication essential to maintenance of vocational evaluation programs. Effective supervisory, referral, recording, budgeting, and staff development practices. Prereq: 5141, or consent of instructor. W

5145-46-47 Practicum in Rehabilitation (3, 3, 3) Supervised experience in area of rehabilitation with emphasis on application of concepts, principles, and skills acquired in previous or concurrent course work. Prereq: Consent of instructor. W; Sp; Su

5150-60 Internship in Rehabilitation (9, 9) Pracical counseling procedures in rehabilitation. Prereq: Admission to program in rehabilitation counseling. W, Su

5170 Systematic Human Relations Training (3) Active listening, observing verbal and nonverbal behavior, empathetic understanding, and communicating with handicapped individuals. F

5180 Approaches to Rehabilitation Counseling (3) Approaches and techniques in individual counseling of handicapped adults to further develop student's counseling skills. Problem-solving techniques and utilization of alternative modes of counseling procedures in rehabilitation. Prereq: 5170 or consent of instructor. W

DIABILITY EVALUATION EDUCATION

5700 Evaluation and Mobilization of Community Resources (3) Determining and mobilizing community resources relating to community resources and service integration with emphasis on social and rehabilitation agencies and facilities. Assessment utilization and mobilization of community resources to facilitate development of innovative service programs for handicapped. W

5710 Medical Aspects of Disability I (3) Etiology, clinical signs, symptoms and diagnostic procedures related to musculoskeletal, neurological, circulatory, and respiratory diseases/disorders. Effect on structure and function of human body. Restorative measures to eliminate or minimize resulting handicaps; skills necessary to communicate effectively with lay persons and medical community on evaluation of impairments and administration of appropriate rehabilitation services. W

5720 Medical Aspects of Disability II (3) Etiology, clinical signs, symptoms and diagnostic procedures related to neoplastic, skin, digestive, genito-urinary, endocrine, mental, visual and hearing disorders. Effect on structure and function of the human body; Restorative measures to eliminate or minimize resulting handicaps; skills necessary to communicate effectively with lay persons and medical community on evaluation of impairments and administration of appropriate rehabilitation services. Sp

5730 Vocational Assessment in Disability Evaluation (3) Vocational assessment resource materials; criteria for vocational assessment of disability insurance claims under Social Security; on-site job analysis and case file vocational assessment experiences. Prereq: Admission to program in disability evaluation or consent of instructor. Sp

5740 Disability and Work in Society (3) Relationship of work to physical, social, psychological, and economic development of disabled individual. Process and techniques of vocational evaluation, work adjustment services in rehabilitation. F

5750 Principles and Problems of Disability Evaluation (3) Individual identification and analysis of principles and problems of disability evaluation process or structures; emphasis on problems of disability evaluation process or structures, and exploration of alternatives, and sharing experience within group. Prereq: 5700 or consent of instructor. W

5760 Seminar: Functional Capacity Assessment (3) Criteria for residual functional capacity assessment in disability insurance claims evaluation; problems in achievement or acquisition of residual functional capacity assessments. Prereq: 5710-20 or consent of instructor. Su

5770-71 Current Problems in Disability Claims Evaluation (1-3, 1-3) Current problems in process, content, or administration of disability claims evaluation, with emphasis on application and propriety of alternative solutions. May be repeated with consent of instructor. S/NC only. A

SCHOOL SPEECH AND HEARING THERAPY

4300 Professional Aspects of Speech-Language Hearing Programs in Schools (3) Organization and administration of school programs. Other settings, hospitals, institutions, private practice, professional certification levels, legislation, careers.

4304 Apaval of Speech and Language Disorders (4) (Same as Audiology and Speech Pathology 4304.)

4310 Stuttering (3) (Same as Audiology and Speech Pathology 4310.)

4320 Introduction to Clinical Practice in Speech Pathology (3) (Same as Audiology and Speech Pathology 4320.) S/NC only.

4330 Clinical Practice in Speech Pathology (1-6) (Same as Audiology and Speech Pathology 4330.) S/NC only.

4340 Clinical Practice in Speech Pathology (1-6) (Same as Audiology and Speech Pathology 4340.) S/NC only.

4341 Clinical Practice in Communication Disorders in Schools (3) Prereq: 4300, 4350-50-40 and consent of instructor. S/NC only. F, W, Sp

4342 Seminar in Communication Disorders in Schools (3) Prereq: 4300, 4350-50-40 and consent of instructor, F, W, Sp

4400 Voice Disorders (4) (Same as Audiology and Speech Pathology 4400.)

4720 Audiology II (4) (Same as Audiology and Speech Pathology 4720.)

4930 Aural Rehabilitation: Speechreading and Auditory Training (3) (Same as Audiology and Speech Pathology 4930.)

4940 Introduction to the Verbo-Tonal System (4) (Same as Audiology and Speech Pathology 4940.)

5040 Advanced Clinical Practice in Audiology Study and Practice (1-6) (Same as Audiology and Speech Pathology 5040.)

5300 Cerebral Palsy (3) (Same as Audiology and Speech Pathology 5300.)

5390 Cleft Palate (3) (Same as Audiology and Speech Pathology 5390.)

5540 Seminar in Language Pathology (3) (Same as Audiology and Speech Pathology 5540.)

EDUCATION OF THE VISUALLY HANDICAPPED

4160 Education of Partially Sighted Children (3) Curricular adjustments and materials; home visits for parents' cooperation in medical care and special needs. A

4850 Eye Problems Encountered by the Teacher (3) Eye anatomy and hygiene; common diseases and defects; testing and treatment; educational adjustments for specific eye conditions; related service resources. A

4923 Student Teaching of the Partially Seeing (3) Observation and supervised practicum in special and regular classrooms only. A

GENERAL COURSES

3333 Education of the Exceptional Child (3) Principles, characteristics, and special needs; local and state programs for diagnosis and care; educational programs for remediation of handicaps. A

5790 Career Development: Workshop (1-6) (Same as Educational Psychology 5790): A

5830 Seminar: Issues and Theories in the Education of the Exceptional Child (3) Current trends in education of exceptional child. Application of philosophical approaches to education; analysis of current theories of integration as applied to exceptional child. Current research concerning education and/or rehabilitation of exceptional persons. Prereq: Curriculum and Instruction 5800 or Educational Psychology 5210 and consent of instructor. A

5910-20-30 Problems in Lieu of Thesis (3, 3, 3) S/NC only. E

5970 Juvenile Delinquency and the School (3) Responsibilities of school in dealing with problems of antimorality. Emphasis on planning and producing programs for children's welfare; curriculum adjustments; directed study of socially maladjusted children, environment, and programs for meeting needs. A

Vocational-Technical Education

MAJORS

Agricultural Education

Business Education

Distributive Education

Industrial Education

Vocational-Technical Education

DEGREES

M.S., M.A. (Coordinated), Ph.D.

M.S.

M.S.

M.S., Ed.D., Ed.D.

M.S., Ed.S., Ed.D.

Education

Education

Education

Ph.D.

Education

Education

Professors:


Associate Professors:


Assistant Professors:


THE MASTER'S PROGRAM

The M.S. degree with a major in Vocational-Technical Education is available with concentrations in agriculture, business, and office education, and general vocational-technical education. Concentrations in agricultural education, business education, and general vocational-technical education. Requirements are:

Concentration

18 hrs

Research

6 hrs

Electives

12 hrs

Thesis Option

9 hrs

Problems in Lieu of Thesis Option

9 hrs

Course Option

15 hrs

Total 45-51 hrs

All course work must be approved by the student's committee.

Each vocational service area (agricultural education, business education, and vocational-technical education) offers similar programs leading to the Master's degree. Both thesis and non-thesis options are available. Details regarding the Master's programs of each of the service areas may be obtained from the coordinators of the service areas.

The MACT is available in the business education area.

THE SPECIALIST PROGRAM

The Ed.D. degree program, which is a thesis or non-thesis program, is a cooperative undertaking involving all vocational service areas. Options are available in agricultural, business, distributive, home economics, and industrial education, and in general vocational-technical education.

THE DOCTORAL PROGRAM

The comprehensive Ed.D. program in Vocational-Technical Education is designed to provide for achieving professional objectives, developing needed competencies, and gaining desirable experiences and understanding of vocational-technical areas.

The Vocational-Technical Education doctoral curriculum consists of the following: professional education core, 9 hours; service areas, 18 hours; vocational-technical education, 18-27 hours; cognate fields, 9-18 hours; research techniques, 15 hours (consult advisor for details); and dissertation, 36 hours. A minimum of 120 hours above the baccalaureate is required.

The Doctor of Philosophy degree with a major in Education includes options and emphases as listed on page 48.

General

4010 Development and Utilization of Advisory Committees (3) Craft advisory committees, selection, organization, implementation, and utilization.

4750 Utilization of Instructional Media (3) (Same as Curriculum and Instruction 4750 and Library and Information Science 4750.)

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

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

5005 Problems in Lieu of Thesis (3) May be repeated. S/NC only.

5100 History and Organization of Vocational-Technical Education (3) Vocational and technical education in public schools through analysis of social forces, legislation, and organization models.

1 Student must meet the service area entrance requirements for the concentration selected. General vocational-technical education requires 6 hrs Vocational-Technical Education 5015 and 5016.

2 6 hrs course work approved by graduate committee in area of emphasis outside of area of concentration.
5020 Placement, Follow-up and Evaluation Procedures in Occupational Education (3) Methods and procedures in establishing placement programs, curriculum revision.
5030 Organization and Operation of Area Vocational-Technical Schools (3) Area vocational-technical school concept; administration and supervision of vocational and technical education programs in area schools.
5040 Guidance and Pupil Personnel Services in Education (3) (Same as Educational Psychology 5040).
5050 Supervision of Vocational-Technical Education (3) Program planning, coordination, instruction, roles and functions of supervisors.
5055 Vocational School Administration and Management (3)
5070 Competency Based Vocational Education (3) Introductory, comparative, and practical approaches.
5080 Continuing Education in Vocational-Technical Education (3) Importance, objectives, historical development, psychological and sociological formulations, methods and techniques, required.
5100 Occupational Program Development for Disadvantaged Persons (3) Academic, socioeconomic, cultural and/or other handicaps that prevent individuals from enrolling in regular vocational education programs.
5110 Principles and Objectives of Vocational-Technical Education (3) Fundamental principles and approaches to vocational education.
5130-31-32 Problems in Vocational-Technical Education (1-6, 1-6, 1-6) May be repeated. Maximum 9 hrs.
5140 Individual Study in Vocational-Technical Education (1-3) Must be approved by supervisory instructor and service area coordinator or department head. Approval form must be filed in office of department head. May be repeated. Maximum 12 hrs.
5150 Microcomputer Operations and Educational Applications (3) Operating procedures and program planning techniques. Hands-on experience in operating microcomputers, writing, debugging, and running education programs.
5155 Software Design for Microcomputers in Education (3) Advanced BASIC software design: operating System-CIP/M, TRSDOS and DSI, sequential and random I/O, analysis and operation of commercial educational programs, and teacher-designed programs.
5180-90-200 Educational Specialist Research and Thesis (3, 3, 3) Selection, analysis, and completion of problem necessitating original investigation, beneficial to investigator and vocational-technical field. P/NP only.
6000 Doctoral Research and Dissertation (3-15) P/NP only. E
6010 Curriculum Planning in Vocational-Technical Education (3) Prereq: Curriculum and Instruction 5410 or equivalent.
6020 Program Planning and Development in Vocational-Technical Education (3) Planning vocational-technical and work force state, local, and institutional educational programs; research in planning, advisory committees, planned change, administrative structures, and evaluation procedures.
6030 Evaluation of Vocational-Technical Education Programs (3)
6040 Seminar in Vocational-Technical Education (1) 3 consecutive quarters during residency. S/NC only.
6050 Administration of Vocational-Technical Education (3) Administrative principles and relationship to vocational and technical training.
6111-12-13 Internship in Vocational and Technical Education (3, 3, 3) Field experiences in selected areas of vocational and technical education. S/NC only.
Agricultural Education
4230-31-32 Problems in Agribusiness Education (1-5, 1-5, 1-5) May be repeated. Maximum 9 hrs.
4240-41-42 Seminar in Agricultural Education (1, 1, 1) Prereq: 4350 or consent of department head.
5120 Supervision of Student Teaching in Agricultural Education (3)
5220 Teaching Agricultural Mechanization in Vocational Agriculture (3) Prereq: 4350.
5230-31-32 Special Problems in Agricultural Education (3, 3, 3) May be repeated. Maximum 18 hrs.
5240 Current Literature in Agricultural Education (1-3) May be repeated. Maximum 6 hrs.
5250-51 Agricultural Education in Off-Farm Agricultural Occupations (3, 3) Developing occupational experience programs; course planning, teaching procedures. Prereq: 4350.
5260 Agricultural Education for First-Year Teachers (3) Adjustment to situation in which employed; group meetings in selected centers, and visits by instructor. Prereq: 4350.
5270 Adult Education in Agriculture (3)
5280 Supervised Occupational Experience in Agriculture (3) Prereq: 4350.
Business Education
5305 Methods and Materials for VOE Programs (3) Development of instructional aids, recent developments and research, individualized instruction, occupational clusters.
5306 Organization and Management of VOE Programs (3) Developing office occupations, guidelines, using cooperative, laboratory, and model office programs. Physical facilities, instructional aids, related instructional activities (clubs), enrollment, instructor and advisory committees.
5307 Measurement in Business Education (3) Evaluative methods and tools for all courses in business education and related areas of study in secondary and postsecondary business education.
5309 Evaluation of Research in Business Education (3) Prereq: Curriculum and Instruction 5610 or equivalent.
5310 Graduate Seminar in Business Education (3) Review of techniques for research and preparation of proposal for thesis or problem/project.
5311-12 Special Topics in Business Education (1, 1)
5313-14-15 Practicum in Business Education (2, 2, 2)
5320 Improvement of Instruction in Basic Business Courses (3) Issues, research findings, methods, and materials for improved instruction at both secondary and postsecondary levels.
5330 Improvement of Instruction in Typewriting and Clerical Programs (3) Research, principles of learning, issues and materials.
5340 Improvement of Instruction in Shorthand/Secretarial Programs (3) Principles of learning, issues, research findings, and materials on secondary and postsecondary levels.
5350 Improvement of Instruction in Accounting and Data Processing Programs (3)
5360 Improvement of Instruction in Business Communications and Word Processing (3) Basics of and strategies for teaching written communications. Word processing and oral communications.
5390 Problems in Business Education (1-9) Variable topics. May be repeated. Maximum 9 hrs.
6300-10-20 Current Issues in Business Education (3, 3, 3)
6330-40-50 Advanced Studies in Business Education (3, 3, 3)
6360 Higher Education for Business (3)

Distributive Education
4430-31-32 Problems in Distributive Education (1-3, 1-3, 1-3) Research problems in teaching and coordinating distributive education programs. May be repeated.
4440 Supervised Distributive Experience (3) Minimum 200 hours experience for each 3 credit hours in approved distributive business; concurrent analytical project. May be repeated. Maximum 9 hrs.
4450 Areas of Distribution (3) Marketing, product or service technology, social skills, basic skills, and distribution as they affect distributive education curriculum in secondary and postsecondary programs.
4460 Organization and Operation of Distributive Education Programs (3) Background and development needs, federal and state legislation; curriculum implications; establishing, evaluating, reporting, and improving programs.
4470 Methods and Materials in Distributive Education (3) Prereq: 4460 or consent of instructor.
4480 Coordination Techniques in Distributive Education (3) Selecting training agencies; job analysis; selecting and briefing training supervisors; advisory committees; adult and other community services. Prereq: 4460, 4470.
5410 Administration and Supervision of Distributive Education (3) Operation of distributive education program and work of city or county supervisor. Understanding and appreciating problems from high school principal’s and department head’s point of view. Trends in distributive education; community surveys, state plans, teacher-coordinator qualifications, changing curriculum.
5416-26-36 Problems in Distributive Education: Retailing (3, 3, 3)
5420 Organizing and Teaching Adult Distributive Education (3) Planning, organizing, promoting, teaching, and evaluating continuing education programs in distributive education; utilizing trade associations, employment agencies, business groups, and advisory committees in implementation.
5430-31-32 Special Problems in Distributive Education (3, 3, 3) Individual research, conferences, and/or workshops in teaching and supervising high school, postsecondary, and adult programs.

Home Economics Education
5510 Organization of the Homemaking Curriculum in Secondary Schools (3) Recent advances in home economics education. Development of teaching material in relation to total homemaking program in secondary school—day school, adults, home experience, and Future Homemakers of America.
5515 Evaluation in Home Economics Education (3) Purpose of evaluation in development of home economics programs; techniques employed in evaluation. Techniques for determining progress of students; individual problems of evaluation.
5530-31-32 Problems in Home Economics Education
tion (1-3, 1-3, 1-3) May be repeated. Maximum 3 hrs per course.

5540 Curriculum Development and Implementation in Family Relationships Instruction (3) Content for teaching family relationships. Selected materials and methods are appropriate for reaching curriculum objectives in family relationships.

5545 Wage Earning Programs in Home Economics (3) Planning, establishing, and implementing wage earning programs in home economics.

5550 Advanced Methods of Teaching Homemaking Classes for Adults (3)

5555 Supervision of Home Economics in the Public Schools (3) For teachers with successful experience in vocational home economics preparing for supervisory positions in vocational education. Program planning, organization, and administration. Field contacts with urban and rural programs.

5570-75 Seminar in Home Economics Education (3, 3) Research literature and techniques. Prereq: Consent of instructor.

5580 Teaching Home Economics in College (3) Methods, organization, and evaluation.

5581 The Problem Method of Teaching Home Economics (3) Underlying philosophy; skills and techniques. Observation and discussion.

5582 Furthering Good Human Relationships in the Classroom (3) Relationships between problems in human relations, basic needs of individuals, techniques of interpersonal relations and social values in developing more effective teacher education programs.

Industrial Education

3830 History and Philosophy of Industrial Education (3)

3840-41-42 Part-Time Programs in Cooperative Industrial Training (3, 3, 3) Principles of organization, methods, and materials.

3850 Shop Organization and Management (3)

3860-61 Materials and Methods for Teachers of Shop and Related Subjects (3, 3)

3870 School Shop Safety (3)

4620 Special Topics in Drafting (3) Industrial practices in specialized areas of drafting selected for the individual student. Prereq: 6 hrs drafting.


4670 Manufacturing Processes (3) The manufacturing processes of industry and their relationship to careers. Prereq: 2620, 2641, 2660, 3651, or consent of instructor.

4671 Materials and Processes (3) Organic and inorganic materials and processes used to produce finished products. Content, curriculum and techniques of laboratory operation. Prereq: Consent of instructor.

4682 Power and Energy (3) Development, control, transmission, conversion, interrelationship of power sources; content, curriculum, and techniques of laboratory operation. Prereq: Consent of instructor.

4820 Foresmanship Training by the Conference Method (3)

4830-31 Job Analysis (3, 3) Principles, practice, instructional methods.

4850-51 Curriculum Building in Trade and Industrial Subjects (3, 3) Course material in trade subjects; results of job analysis, checking sheets and individual job sheets in both trade and related subjects. Prereq or coreq: 4830.

4880-81-82 Seminar in Industrial Education (3, 3, 3) Educational innovations, current events, problems, and mechanics associated with the field of industrial education.

4885 Organization and Development of Vocation- al Industrial Clubs of America (VICA) (3) To give industrial education teacher experiences and understanding of organization and operation of VICA. Prereq: Undergraduate degree and 3 yrs teaching experience when taken for graduate credit.

4890-91-95 New Developments in Industrial Education (3, 3, 3) Developments, pressing problems, and recent trends in field of industrial education as presented by a coordinating instructor in conjunction with knowledgeable resource personnel.

5110-11-12 Administration and Supervision of Industrial Education (3, 3, 3) Principles of vocational education; relationships with general education and trade and labor organizations; administering and supervising schools and classes under federal vocational education acts.

5830-31-32 Special Problems in Industrial Education (3, 3, 3)

5840 Methods of Research in Industrial Education (3)

5850 Improving Teachers in Service (3) Problems of coordination in part-time and apprentice training programs.

5860 Advisory Committees and Apprentice Training (3)

5880 Advanced Methods of Teaching Skills and Technical Information (3) Proper selection and effective application of contemporary methods and techniques in teaching of specialized skills and technical related information.


5895 New Developments in Industrial Technical Education (3) Prereq: B.S. in Industrial Education and teaching experience.

School of Health, Physical Education, and Recreation

Madge M. Phillips, Director

Graduate programs are available to students preparing for (1) teaching and research positions in colleges, high schools and elementary schools; (2) administrative and supervisory work in athletics, health education, physical education, and recreation; (3) recreation specialist positions in various public, voluntary, private, and commercial agencies and institutions; and (4) public health positions in community health education, health planning and administration, and environmental health.

THE MASTER'S PROGRAM

Four programs leading to the Master of Science degree are available: Physical Education, Recreation, Safety Education and Service, and School Health Education.

Forth-five quarter hours are required for the M.S. Approximately 30 quarters hours of work selected from courses numbered 5000 and above are included in the M.S. requirement.

Course selection shall be made according to each student's professional interests in health, physical education, safety, or recreation with the approval of the major professor. Non-thesis options are available in all M.S. degree programs. A 3 quarter-hour course in research techniques and/or statistics and/or a seminar in research will be required. Each non-thesis degree candidate will take a final comprehensive examination.

Programs leading to the Master of Public Health are also available in community health education, health planning/administration, and occupational/environmental health and safety. Fifty-four quarter hours are required for the M.P.H. degree. One full quarter of field practice is required. During field practice, no student shall hold a full-time job except by special permission of the division chairperson. Students may be placed in all parts of this country.

DOCTORAL PROGRAM

The Doctor of Education and the Doctor of Philosophy degrees in Health Education and the Doctor of Education in Physical Education. See further description under Health Education and Physical Education.

The basic requirements for admission are:

a. A minimum of 40 (physical education) or 50 (health education) quarter hours.

b. Submission of satisfactory scores on the aptitude section of the Graduate Record Examination is required for all doctoral and specialist programs.

c. A superior grade point average.

d. Submission of satisfactory references relating to training, employment, and character.

e. Evidence of successful teaching or potential for success in the major area of study.

The Doctor of Philosophy degree with a major in Education includes options and emphases as listed on page 48.

Graduate Assistantships. A variety of graduate assistantships are offered in health education, physical education and safety education, and recreation to qualified women and men who are graduates of accredited colleges or universities. These assistantships are open to students in the Master's and doctoral programs.

Assistantships are made available by local schools, agencies and the School of Health, Physical Education, and Recreation in return for part-time services rendered. The services may consist of teaching physical education classes, teaching health classes, teaching safety classes and recreation classes, leading recreational activities, supervising recreation field work students, and/or directing or helping to manage extracurricular programs. Students interested in these opportunities should file their applications before February 1. Letters should be addressed to: The School of Health, Physical Education, and Recreation, The University of Tennessee, Knoxville, Tennessee 37996-2700.

Departments of Instruction

Division of Health and Safety

MAJORS

Health Education

Safety Education and Service

School Health Education

DEGREES

Ed.D., Ph.D.

M.S., Ed.S.

M.S.
The Health and Safety Division offers the following degree programs:

Master of Science degree with a major in School Health Education or Safety Education and Service (thesis and non-thesis options)

Non-thesis option requires 45 quarter hours of course work.

Educational Specialist degree in Safety Education and Service.

Doctor of Education degree in Health Education.

Doctor of Philosophy degree in Health Education.

Safety

3520 Principles of General Safety (3) Deals with principles, practices, and procedures in general safety. Coverage of safety problems in school, traffic, recreation, industry, home, and other public areas.


4410 Driver and Traffic Safety Education (5) Preparation and teaching of driver education in schools and colleges. Students are required to teach at least one nondriver. Valid driver’s license required. 3 hrs and 2 labs. E

4420 Advanced Driver and Traffic Safety Education (5) Development of competence in teaching of driver education through use of simulation, multimedia, and multiple-car driving range. Emphasis placed on teaching skills and supervision. Prereq: 4410. E

4430 Sports Safety (5) Accident prevention and injury control in sports activities; philosophy of sports safety; human environmental factors and interrelations in sports injury and control; risk-taking and decision solution strategies; and contributions of sports medicine to safety. 3 hrs and 2 labs. Su

4720 Workshop in Safety (3-5) Deals with special safety education problems. For advanced undergraduate students, graduate students, teachers, supervisors, and administrators. May be repeated. Su

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

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

5810-20-30 Problems In School Health Education (1-1, 1) E

6010-20-30 Internship and Research in Safety (3, 3, 3) Allows the student opportunities for engaging in field experience so that a significant problem in that experience will be identified, researched, and reported on in acceptable form.

School Health

3000 Foundation of Health Science (3) Personal health and contemporary health problems, i.e., mood-modifying products, consumer health, international health, personal health practices, reciprocal relationships involving humans, disease, and environment.

3210 First Aid and Emergency Care (4) Theory and practice, medical self-help. Leads to Red Cross Certification in Advanced First Aid and Emergency Care. Applicant must be at least 18 years of age for certification.

3410 School Health Instruction (3) Selection of health content in the school curriculum.

3420 School Health Services (3) Development, maintenance, and protection of health of students, including examination, screening, special services, communicable disease control, emergency care, and school health records. F, W, Sp

3510 The School in Community Health (3) Role of teacher in community health education; school’s responsibility in promoting healthful living and the place of existing media and agencies in program. Not open to health and physical education majors.

3610 Methods in Elementary Health Instruction (3) Preparation and presentation of health topics. Teaching method emphasized and student participation stressed. Required for elementary teachers. Prereq: 3510 or Public Health 1110 or Nutrition 1230. E

3820 The Teaching of Sex Education (3) Trends, content, methods, and materials in sex education. F, W, Sp

3850 Methods in Secondary Health Instruction (3) Preparation and presentation of health topics. Teaching method emphasized and student participation stressed.

4120 Alcoholism and Alcohol Education (3) Emphasis on factors which make alcoholism serious health and safety problem. Instructional/educational and intervention programs.

4130 Suicide and Suicide Intervention (3) Emphasis on factors which make suicide a serious health problem. Instructional/educational and intervention programs.

4140 Death, Dying, and Bereavement (3) Theories of death and dying and other programs to mitigate trauma of death and dying.

4410 Consumer Health and Safety Education (3) Major consumer health and safety problems; selecting, purchasing, and financing of safety and medical services. (Same as Public Health 4410.)

4411 Instructor’s Advanced First Aid and Emergency Care (3) Satisfactory completion qualifies one for American National Red Cross Certification as Advanced First Aid for Emergency Care Instructor. Applicant must be at least 21 years of age for certification. Prereq: 3210 or valid Advanced First Aid and Emergency Care Certificate.

4412 Cardiopulmonary Resuscitation (2) Theory and skills to implement basic cardiac life support following cardiac arrest due to heart attack, drowning, electrocution, suffocation, poisoning, drug intoxication, vehicular and other accidents. Educational and preventive aspects of controlling cardiovascular disease.

4420 Drug Abuse Education (3) Problems and susceptibility in drugs and other chemicals on society and methods of drug abuse education.

4430 Women’s Health (3) Factors influencing women’s health and women as consumers of national health service delivery systems.

4500-10-20 Field Practice in Health Education (3, 3, 3, 3-6) Off-campus health education internship or field practice in educational or other agency with qualified professional.

4710 Workshop in School Health Education (3-6) For advanced students, teachers, school administrators, nurses and other paramedical school personnel. Lectures, demonstrations, films, field trips, and supervised research in special health problems. May be repeated. Su

5810-20-30 Problems in School Health Education (1, 1, 1) Individual identification and study of current problems in school health education. Extensive reading of literature.

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

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

5010 Problems and Practices in School Health (3) Comprehensive study and analysis of the principles, problems, systems, and trends of and in school health, F

5020 Teaching of Sex Education and Human Sexuality (3) Analysis and explanation of theory, methods and materials for planning, organizing and teaching sex education and human sexuality in schools and other community settings.

5100 Problems and Practices in School Health (3) Comprehensive study and analysis of the principles, problems, systems, and trends of and in school health, F

5530 School Health Program Surveys (3) Techniques and standards used in surveying total school health program; collection and presentation of health instruction, health services, and healthful environment as each contributes to well being of individual students. Survey of existing school health programs. Planning and construction of health curricula to meet needs, interests, and abilities of pupils.

5520 Evaluation in School Health Instruction (3) Principles of objective tests construction; place of behavioral and attitudinal scales, check lists, questionnaires, surveys, and inventories in evaluation of health instruction. Includes criticism of some commercial prepared tests and construction and standardization of test.

5530 School Health Program Surveys (3) Techniques and standards used in surveying total school health program; collection and presentation of health instruction, health services, and healthful environment as each contributes to well being of individual students. Survey of existing school health programs.

5620 School Health Administration and Supervision (3) Analysis of various types of administrative control; budgetary problems; education-public health dilemma; responsibilities of school health personnel. Resource materials include case studies of on-going school health personnel. Resource materials include case studies of on-going school health programs.

5630-40 Workshop in School Health Education (3, 3) Designed for graduate students, inservice teachers, and other health professionals. Emphasis in any workshop to be placed on one critical health issue. Su

5720-30-40 Graduate Workshop in Health Education (3, 3, 3, 3-6) Deals with specific health problems. Designed especially to explore special health problems in a concentrated period of time.

5810-20-30 Problems in School Health Education (1-3, 1-3, 1-3) Individual identification and study of
Division of Physical Education

MAJOR

Physical Education

M.S., Ed.D.

Ph.D.

PROFESSORS:

J. E. Acker, M.D.

Tennessee, G. F. Brady (Ermetius), Ph.D.

Louis, A. J. Kozar, Ph.D.

Michigan; N. E. Lay, Ph.D.

Florida State;

W. P. Lienohm, Ph.D.

Ohio; M. Phillips, Ph.D.

D. Michigan;

H. G. Welch, Ph.D.

Florida.

ASSOCIATE PROFESSORS:

P. A. Bellet, Ed.D.

North Carolina (Greensboro);

R. Crossley, M.F.A.

Southern Methodist; R. E. Jones (Chairperson), Ph.D.

Toledo; B. J. Mead, Ph.D.

Michigan; C. W. Swager, Ph.D.

Michigan.

ASSISTANT PROFESSORS:

P. A. Borovik, M.S.

Tennessee, C. Fox, M.F.A.

Southern Methodist; J. L. Lewis, Ed.D.

Tennessee;

M. G. McCluskey, Ed.D.

North Carolina (Greensboro);

B. L. Morganeng, Ed.D.

Teacher's College, Columbia;

G. A. Ulrich, M.A.

North Carolina.

The Physical Education Division offers the following degree programs:

- Master of Science degree in Physical Education (thesis and non-thesis programs).
- Doctor of Education degree in Physical Education with concentrations in exercise physiology, motor behavior, adapted physical education, and philosophical and sociological foundations.

The Doctor of Philosophy degree with a major in Education includes options and emphases as listed on page 48.

3000- and 4000-level courses require a different level of performance of those registered for graduate credit.

3420 Adaptive Physical Education Laboratory (1)

Practical work, including student teaching, supplementing 4110.

4005 Advanced Ballet Technique (2)

Styles and principles. Prereq.: 3030. May be repeated.

4050 Advanced Composition (4)

Application of these skills to physical education and related areas.

5220 Readings in Physical Education (3)

Comprehensive review of literature in physical education and related areas.

5230 Supervisory Problems in Physical Education (3)

For students interested in supervision of physical education teachers.

5310 Analysis of Basic Motor Skills (3)

Mechanical analysis of basic motor skills, emphasizing application of these skills to physical education and athletics.

5320 Seminar in Research Techniques in Physical Education (3)

Evaluation of appropriate research techniques in physical education.

5330 Psychology of Sport (3)

Human behavior in sport context.

5340 Motor Behavior and Skill Acquisition (3)

Application of research on human movement behavior to sport education.

5400 or equivalent. W

5410-20-30 Specialization Study in a Selected Physical Education Area (1-3, 1-3, 1-3)

Advanced comprehensive study in selected specialized area within general fields of physical education.

Prereq.: Consent of instructor. E

5500 Advanced Kinesiology (3)

Action of muscles involved in fundamental movements, calisthenics, sports, and gymnastics.

Prereq.: 3230 or equivalent, Sp

5510 Selected Topics in Anatomy (3)

Intensive study of various systems of human body.

Prereq.: 5500 or equivalent. May be repeated with consent of instructor. S/N only. Su

5550 Advanced Adapted Physical Education (3)

Laws and regulations, theoretical bases for remediation or adaptation, programming implications.

Prereq.: 4110 or equivalent. W

5560 Physical Activity and Health (5)

Relationship of physical exercise to longevity, weight control, cardiovascular diseases, low back pain and other disorders, mental health, growth, and aging. Applications for maintenance of health.

Prereq.: Course in physiology of exercise or consent of instructor. 5 lectures per week. (Same as Physical Health 5580.) Sp

5600 Applied Physiology (3)

Principles of physiologic with special emphasis on application of physiologic findings to practical problems related to human function.

Prereq.: 1 yr general chemistry, or consent of instructor.

5610 Advanced Exercise Physiology (4)

Principles of energy transfer in humans with special emphasis on integration of organ systems in adapting to requirements of muscular exercise.

Prereq.: Zoology 4940 or equivalent. Recommended: 1 yr chemistry, physics, and mathematics. 3 hrs and 1 lab. W

5640 Experimental Techniques in Applied Physiology Laboratory (1)

Laboratory techniques in experiments methodology and instrumentation. Respiratory and blood gas analysis, human calorimetry, blood chemistry, and pulmonary function tests.

May be repeated with consent of instructor. S/N only.

5650 Social-Psychological Dimensions of Physical Activity (3)

Examination of social-psychological factors which influence performance in physical activity with emphasis on research. Prereq.: Psychology 3120 or equivalent. F

5810-20-30 Seminar in Physical Education (1, 1, 1)

Current issues and problems in physical education with emphasis on observations on studies in research. In field. E

5900 Graduate Seminar in Public Health (1-2)

(Same as Public Health 5900, Nursing 5900, Nutrition and Food Science 5910, and Social Work 5900.) S/N only.

5910-20-30 Problems and Projects in Physical Education (1-3, 1-3, 1-3)

Problems of professional interest and value to the individual student, selected by the student and approved by the major professor. S/N only.

6000 Doctoral Research and Dissertation (3-5)

Prereq.: 4110 or equivalent. F

6010 Seminar in Physical Education (1) Research
topics in literature related to physical education. May be repeated with consent of instructor. S/NC only. E

6220 Independent Research (3) Selection of topic, development of procedure, and conduct of study including independent research paper. S/NC only. E

6330 Advanced Motor Behavior (3) Theoretical issues of contemporary significance in human motor behavior. Prereq: 5340 or consent of instructor. Sp

6410 Practicum in Kinesiology (3) Electromyography laboratory and film analysis of sports skills. Prereq: 5340 or consent of instructor. F

6510-20 Issues and Problems in Physical Education (3, 3) Critical examination and evaluation of current issues and problems in physical education. W

6510 Seminar in Applied Physiology (2) Prereq: 5610. May be repeated with consent of instructor. S/NC only. F, Sp

6640 Research Participation in Applied Physiology (1-6) Advanced research techniques under supervision of faculty member whose research area coincides with interests of student. Prereq: Consent of instructor. May be repeated with consent of instructor. S/NC only. F

6810-20 Practicum (2, 2) Intern experience in areas of major interest. S/NC only. E

Division of Public Health

MAJOR

DEGREE M.P.H.

Professor: W. B. Hope, Jr. (Chairperson), MPH, Sc.D., Johns Hopkins; B. D. Franta, Ph.D., Illinois; B. C. Wallace, Ed.D., Colorado State.

Associate Professors: C. H. Hamilton, Dr.P.H. Oklahoma; R. J. Purrey, Ph.D., Indiana.

Assistant Professor: J. Eisson, Ed.D. Tennessee.

Lecturer: M. Dully, M.D. Pennsylvania.

Master of Public Health degree with a major in Public Health. Option in community health education is accredited by the American Public Health Association. Options with specialization in health planning/administration or occupational/environmental health and safety are also available.

Public Health

3310 Communicable and Noncommunicable Diseases (3) Modern concepts of diseases, etiology of common communicable and chronic disease problems including prevention and control. Prereq: 1 yr of biological science and 1 course in bacteriology. F, W, Sp

3320 Sanitation (3) History of sanitary awakening; disease-producing relationships and controls of water, sewage, refuse, milk, and other foods, air, insects, and soil; sanitation of homes, swimming pools, industrial plants, markets, restaurants, camps, and public bathing places. Healthful school living as affected by buildings and grounds, lighting, acoustics, thermal control, and safety provisions. Prereq: 1 yr biological science, 1 course in microbiology. 2 hrs and 1 lab. E

4210 Urban and Industrial Health (3) Health problems created by a burgeoning population and the megalopolis; industrial health problems of concern to management, supervisor, and industrial worker; control of occupational diseases, poisons, accidents, and other conditions incidental to industry. Sp

4220 Communications for Better Health (3) Selective study of communications in health enterprise. Consideration in logical progression of the problems of transmitting current and new information to practitioners; communications among members of the modern health teams, among health agencies, and the use of mass media for transmitting health information. W, Sp

4410 Consumer Health and Safety Education (3) (Same as School Health 4410). W

4700-10 Field Practice in Public Health (3, 3) Field practice in public health under supervision of public health professionals. Prereq: 10-20 Field Practice in Public Health (3, 3) Field practice in public health under supervision of public health profession. S/NC only. E

4730 Workshop in Public Health Education (3-6) For teachers, nurses, case workers, sanitarians, and other voluntary and public health agency personnel; emphasizes the problem-solving approach through small group interaction, case method, and critical incident technique. May be repeated. Su

4840-50-60 Problems in Public Health Education (1, 1, 1) Individual identification and study of current problems in public health education. Extensive reading of literature required. E

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

5010-20-30 Workshop in Public Health (3-4, 3-6, 3-8) Designed to deal with specific public health problems in short or extended period of time. Sp

5070-90-90 Field Practice and Seminar in Public Health (3-3, 3-5, 3-5) Internship or field experience under professional supervision in public health. S/NC only. E

5110 Environmental Health (3-5) Varied environmental factors within general framework of air, food, water, shelter, transportation as they affect human life's prevention, disease of performance, and enjoyment. Lecture, demonstrations, laboratory, and field practice. Prereq: Consent of instructor. Su


5150 Industrial Toxicology (3) Elements of industrial toxicology as they relate to the improvement of occupational safety and health. Prereq: Consent of instructor. Sp

5220 Health and Sickness (3) Formulation of models of positive health within life cycle and within community, types of sickness afflicting individuals and groups. Su

5410 Epidemiology (3) Incidence and prevalence of disease in man. W, Su

5420 Administration of Public Health (3) Administrative considerations of public health agencies including governmental aspects, legal bases, organizational principles, personnel factors, fiscal management, and public relations. F, W, Sp

5430 Vital and Medical Statistics (4) Application of basic statistical principles to living things. F, W, Sp

5440 Methods and Materials in Public Health Education (4) Theory and practice in use of communication techniques and materials in community health education. 3 hrs and 2 labs. W

5540 Factors in Problem Solving for Community Health (5) Tests in communications and group process en route to problem identification, objective setting, problem solving and planning for health education. 4 hrs and 2 labs. W

5550 The Public Health Educator in Community Organization and Development (4) Overview of health organizations and agencies in the community, prefaces exploration of conflicting theories and divergent styles of practice in community organization and development. Laboratory to delineate a community near campus and to practice. 2 hrs and 4 labs. F

5560 Functions and Roles of the Public Health Educator (3) Professional science is examined with special attention to roles and functions. Consideration of philosophy and motivation and differences between health education service and health education programs for community learning levels. 1-2 hr lecture-seminar session per week. F

5580 Physical Activity and Health (5) (Same as Physical Education 5580). W

5705-10-15 Advanced Professional Health Education: Health Planning I, II, Ill (3-5, 3-5, 3-5) Theory and practice in selected areas. F, W, Sp

5730 Dental Health Education (3-5)

5735 Emergency Medical Services (3-5) Sp

5745 Family Health Unit (3-5)

5750 Health and Medical Care Legislation and Law (3-5) Su

5755 Health Facilities Administration (3-5) W

5760 Health Services Administration (3-5) F

5785 Occupational Health Unit (3-5) Sp

5790 Self-Care Unit (3-5) Sp

5795 The Training of Paramedical Personnel (3-5)


5900 Graduate Seminar in Public Health (1-2) Scope of public health as discipline and interdisciplinary to other academic and professional disciplines. Speakers include both internal and external to UTK. Prereq: Baccalaureate degree in health-related field or consent of instructor. May be repeated. Maximum 6 hrs. (Same as Nursing 5900, Nutrition and Food Science 5910, Physical Education 5900, and Social Work 5950.) S/NC only.

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

6210 Health Aspects of Gerontology (3) (Same as School Health 6210.)

6220 Seminar on the Nation's Health (3) (Same as School Health 6220.)

6230 International Health (3) (Same as School Health 6230.)

Division of Recreation

MAJOR

DEGREE Recreation

M.S.

Professor: M. L. Peters (Chairperson), Ph.D., Illinois.

Assistant Professors: M. D. Blanton, Re.D., Indiana; K. L. Krick, Re.D., Indiana.

The Recreation Division offers the following degree program:

Master of Science degree in Recreation (thesis and non-thesis programs) with concentrations in general recreation, recreation administration, and therapeutic recreation.

4130 Recreation Administration (3) Introduction to recreation administration including planning, personnel, areas and facilities, program services, finances, and public relations. Prereq: 3140, 3200, 3800, or consent of instructor. F

4200 Survey of Recreation for Special Populations (3) Responsibility of recreation professionals to minority groups whose leisure opportunities and needs may require special servicing. Prereq: 3140, 3200, 3800, or consent of instructor. F
4310 Camp Administration (3) Program planning and organization, personnel management, camp site development and maintenance, camp operation for administrators and supervisors. W

4500 Specialized Study in a Selected Area of Recreation (1-6) Comprehensive study in a selected specialized area within the broad field of recreation. For recreation students only. Prereq: Consent of instructor. May be repeated with consent of division. Maximum 9 hrs. E

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

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

5130 Interpretations of Leisure (3) Concepts of leisure including social, psychological, cultural, and philosophical; recreative uses of leisure. Prereq: 3140 or consent of instructor. F

5140 Leisure Service Delivery Systems (3) Various systems—public, private, and commercial—involving in provision of leisure services for community at large. Prereq: Consent of instructor. F

5150 Current Issues in Recreation (3) Identification and consideration of broad issues—social, environmental, ethical—which currently have greatest impact on use of leisure, and implications for recreation administrator. Prereq: Consent of instructor. Sp

5420 Therapeutic Recreation (3) Role of recreation in lives and treatment of persons with disabilities—mental, physical and medical. Possibilities for helping ill and disabled realize their fullest potential. Prereq: Consent of instructor. W

5260 Leisure and Mental Health (3) Relationship between leisure activity and mental health, with emphasis on its use in therapeutic recreation. Prereq: Psychology 3650 or equivalent, and consent of instructor. W

5300 Seminar in Recreation (1) Presentation and general discussion of students' research studies, projects, and thesis in recreation. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. S/NC only. F, W, Sp

5340 Administration of Recreation Funds (3) Development and management of budgets for recreation agencies with special emphasis on obtaining federal funds appropriated specifically for recreation, management of revenue received, and exploration of funding alternatives. Prereq: 4130. Sp

5350 Organizational Policies for Recreation (3) Advanced study in the analysis of organizational policies and functions of management in recreation. Prereq: 4130. W

5360 Management and Operation of Recreation Facilities (3) Management process as it pertains to operation of recreation facilities. F

5440 Problems and Projects in Recreation (1-6) Individual research on problem of special significance to student. Research projects of limited nature undertaken in lieu of thesis. May be repeated. Maximum 9 hrs. New problem must be undertaken for each repetition. E

5450 Specialized Study in Recreation (1-6) Advanced comprehensive study in selected specialized area within leisure and recreation field. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E
College of Engineering

R. E. C. Weaver, Dean
W. K. Stair, Associate Dean
W. A. Miller, Associate Dean
A. W. Spickard, Assistant Dean

Graduate degree programs of the College of Engineering provide opportunities for advanced study leading to the Master of Science degree, the Master of Engineering degree, and the Doctor of Philosophy degree. For a listing, consult majors and degrees available on page 8.

OFF-CAMPUS GRADUATE INSTRUCTION BY VIDEOTAPE

Since 1966, the College of Engineering has made use of electronic communication techniques to reach students beyond the confines of Knoxville classrooms. These remotely-taught classes make the specialized talents of engineering college faculty available to students at off-campus centers and industrial sites. This effort makes use of videotapes prepared from a regular on-campus class in specially-equipped classrooms. The tapes contain a visual and audible record of a professor's lecture and questions. Occasional visits by the professor are made to each remote class and students visit the Knoxville campus at selected times.

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Graduate courses have been offered to students at other campuses and established centers of the UT System (Chattanooga, Kingsport, Martin, Nashville, and Tullahoma). Graduate courses have also been made available to engineers in industrial plants. Such courses are offered to students using classroom facilities at Jackson State and Columbia State Community Colleges.

The remotely-taught courses offered by UTK carry full graduate credit toward the Master's degree under authorization of the regional accrediting agency, the Southern Association of Colleges and Schools.

YEAR-IN-JAPAN M.S. PROGRAM

This is a unique program allowing American engineering students to develop some understanding, both scientific and cultural, of Japan. It allows an M.S. candidate to obtain a degree from UTK while carrying out research at a Japanese university. The program requires approximately two years, one year being spent in Japan and the remaining period being spent at UTK to fulfill the course requirements and to write the thesis or project report, as appropriate to the particular department. The program is administered in the framework of each department's regular graduate program except that the research is done in Japan.

Although the language of communication in Japan would be English, cultural understanding is one of the important objectives of the program and as such a participant would be asked to begin Japanese language study. At the option of the department, up to 6 hours of graduate credit may be allowed for language study, either at UTK or in Japan.

Financial support for living expenses in Japan and for the roundtrip transportation can usually be arranged through fellowships from the Japanese Ministry of Education.

Engineering Experiment Station

W. K. Stair, Director

The Station is organized to conduct investigations in fundamental engineering science and to aid in the development of the state's resources and industries as far as funds available will permit.

The Station may also make special arrangements with any person or company to study any technical question within the capacity of its resources, and to report the results to the company requesting the study. In such case, the whole expense will be carried by the parties requesting the investigation.

Departments of Instruction

Chemical, Metallurgical and Polymer Engineering

MAJORS

Chemical Engineering
Metallurgical Engineering
Polymer Engineering

DEGREES

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

Professors:
H. C. Johnson (Head), Ph.D. Yale; J. C. Bogue, Ph.D. Delaware; J. L. White, Ph.D. Arizona State; J. S. Watson, Ph.D. Tennessee;

Associate Professors:

Assistant Professors:

Lecturers:

Graduate programs lead to the degrees of Master of Science and Doctor of Philosophy in Chemical Engineering with concentrations in chemical engineering, chemical bioengineering, advanced control systems, and polymer science and engineering, in Metallurgical Engineering, and in Polymer Engineering.

*Alumni Distinguished Service Professor. *Space Institute, Tullahoma.
metallurgical engineering faculty concerning development of individual special programs compatible with their backgrounds. Areas of specialization within the program may be physical metallurgy of structure-property relations, corrosion, welding metallurgy and materials joining, solidification, microscopy (electron and optical), chemical process metallurgy, failure analysis, mechanical behavior of materials and structure analysis.

UK-TOKYO COOPERATIVE PROGRAM IN POLYMERIC ENGINEERING

The UK-Tokyo Program provides a means for Japanese research professors to teach part-time in the graduate program, and provides a joint Japanese-UK program for the admission of Japanese students into the polymer engineering graduate program. A committee of faculty from Japanese universities makes recommendations for students and a UK committee acts on them.

PROGRAM OPTIONS IN POLYMERIC SCIENCE AND ENGINEERING

M.S. and Ph.D. degrees with specialization in polymer science and engineering are possible through two routes—one in the department (through chemical or metallurgical engineering) with an engineering emphasis, and a second in a joint program with the Chemistry Department having a chemical emphasis.

The specialization program in the department requires, for the M.S. degree, a thesis in the field, completion of Polymer Engineering 4910, 5110, 5130, 5410, and either 5230 or 5210 plus active participation in the Polymer Seminar. The Ph.D. candidate must meet the above requirements, pass a special written examination in polymer science and engineering, and complete an additional academic program to be specified by the student's committee.

M.S. and Ph.D. degrees in the joint specialization program with the chemistry department require a thesis or dissertation in the field. Chemical and metallurgical engineering departmental requirements include completion of Polymer Engineering 4910 and 4920, Chemistry 5331 and 5140, plus active participation in the Polymer Seminar. Ph.D. students must also pass a special written examination as well as complete the above requirements.

Chemical Engineering

3410 Flow of Fluids (4) Differential and overall momentum balances, mechanical energy balances; flow in tubes, piping systems, and packed beds; metering devices, pumps. Prereq: Chemical and Metallurgical Engineering 2020, Mathematics 2850. 3 hrs and 1 lab.

3420 Heat Transfer (4) Differential and overall energy balances; steady and unsteady state, heat conduction in simple geometries; heat transfer in tubes and heat exchanger condensation and boiling; radiation. Prereq: 3410. 3 hrs and 1 lab.

3440 Stage-Wise Operations (3) Analytical and graphical methods applied to stage-wise separatory operations.

3450 Diffusional Operations (3) Diffusion, simultaneous heat and mass transfer, applications including humidification, gas absorption, extraction. Prereq: 3420. Chemical Engineering 3040.

3610 Introduction to Process Dynamics and Control (3) Introduction to concepts of process dynamics and control. Steady-state analysis of chemical process control systems. Unsteady state nature of chemical processes. LaPlace transform techniques, block diagram algebra, transfer functions, theoretical chemical models for several processes are developed and analyzed in detail. Prereq: Mathematics 2840.

3620 Chemical Process Control (3) Basic control theory applied to chemical processes; feed-back control, feed-forward control, recirculation, cascade control, disturbance analysis, frequency response. Survey of modern control of typical industrial unit operations. Prereq: 3160.

4110 Chemical Engineering Data Analysis (3) Analytical and experimental identification of system characteristics; statistical properties of samples and source systems; empirical modeling of processes; statistical process control. Prereq: 3420 and Mathematics 3150.


4130 Introduction to Optimization (3) Principles and applications of optimization techniques to chemical process design; unconstrained optimization, equality constrained optimization, inequality constrained optimization, and dynamic programming. Prereq: Mathematics 3240.


4420 Process Design and Economic Analysis (3) Development of basic information on a process into an integrated plant design considering mass and energy balances, product specifications, equipment characteristics, capital investment, operating costs and economic merit. Prereq: 4410, 4530.

4430 Special Problems in Design and Economics (3) Extension of 4420 for student participation in the American Institute of Chemical Engineering annual contest problem; other advanced design projects. Prereq: 4420.

4450 Hydrocarbon Processing (3) Study of specialized characterization of physical properties of fossil fuel raw materials and products, and of processes for conversion of fossil fuel raw materials into products needed in heavy industrial, industrial raw material and consumer markets. Prereq: 3440.

4470 Sulfur Removal from Coal and Associated Problems (3) Chemical and physical properties of the chemical or physical methods used for sulfur removal from both physical and chemical methods; fluidized bed combustion with both physical and synthetic SOX sorbents; stack gas SOX scrubbing. Prereq: Consent of instructor.

4480 Coal Processing to Liquid Fuels (3) Characterization of various methods; modeling of process concepts and estimation of maximum yields; water and oxygen requirements; pyrolysis; catalytic hydrogenation; reactor design considerations; review and critique of selected articles from both the literature and patents. Prereq: Consent of instructor.

4530 Chemical Engineering Reaction Kinetics (3) Chemical reaction rates in closed and flow systems; interpretation of laboratory and pilot plant data; reactor design. Prereq: 3420, Chemistry 3430.

4540 Fluid-Solid Operations (3) Heat and mass transport in fixed and fluidized beds; applications include absorption, ion exchange crystallization. Prereq: 3440-50.

4620 Process Modeling, Simulation, and Control of Chemical Processes (3) Development of process models, experimental process identification, process computer simulation, conventional and non-conventional feedback control, advanced control concepts. Prereq: graduate background in basic control theory and differential equations.

4730 Mass and Energy Flow in Biological Systems (3) Basic physical and biological principles applicable to biological systems. Deriva-
tions of general equations of biomass and energy transfer. Thermodynamics of transport and equilibrium in biological systems. Discussion of Volterra’s equation and biological clocks. Prereq: Consent of instructor.

4740 Introduction to Transport Phenomena in Biological Systems (3) Application of principles of transport phenomena to biological systems. Transfer of chemical energy and various cellular active transports; structure and rheology of physiological fluids, membrane and interfacial phenomena; analysis and design of artificial organs. Prereq: 3440, 3450 or consent of instructor.

4750 Microbiological Process Engineering (3) Application of chemical engineering principles and design concepts to microbiological processes; continued study of chemical process design and costing and pharmaceutical processes. Prereq: 3440, 3450, or consent of instructor.

4760 Principles of Biochemical Separation (3) Fundamental aspects and similarities of modern biochemical separation methods; classroom demonstrations, design of production and analytical systems. Prereq: Consent of instructor.

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

5010 Graduates Seminar (1) Prereq: Admission to graduate program. May be repeated. E

5050 Engineering Analysis (3) Analytical formulation of mass, momentum, and energy balances; phenomenological and physical theories of energy and mass transfer; design of equipment for energy and mass transfer operations. Prereq: 5060 and Polymer Engineering 5050.

5120 Heat Convection (3) Analysis of heat convection in fluids under viscous and turbulent flow conditions, emphasizing analytical approach; similarities of diffusion of momentum and heat. Prereq: 5050.

5130 Methods of Optimization (3) Principles and applications of various mathematical programming techniques to chemical process design and costing. Prereq: 3440 or consent of instructor.

5210 Process Dynamics (3) Analysis of recycle operations, steady state simulation and optimization of typical processes.

5250 Chemical Process Industry Economics (3) Analysis of economic components of chemical processes, internal economics of chemical enterprise, design of artificial organs, with special emphasis on topics of interest to engineering and bioengineering students. Prereq: 5310.


6240 Stability Phenomena in Chemical Engineering: Continuous Systems (3) Instabilities and instabilities in fluids based upon interaction of fluid dynamic phenomena with heat transfer, diffusion and chemical reactions. Emphasis on formulation of problems and methods of solution. Stability of jets and formation of emulsions; Benard instability, Maragoni turbulence. Prereq: 5810 and 5620 or equivalent.

6510 Applied Chemical Reaction Kinetics (3) Chemical reactions in gas and liquid phases, heterogeneous catalysis, catalyst effectiveness and role of transport in kinetics. Emphasis on development of phenomenological description although mechanistic models are discussed. Prereq: 5510.


6710 Process Dynamics (3) Development of dynamic models and methods of analysis and control of reacting systems, emphasizing analytical approach; similarities of diffusion of momentum and heat. Prereq: Consent of instructor.

6900 Advanced Topics of Chemical Engineering (3) Advanced topics of current interest to chemical engineers. May be repeated. Maximum 9 hrs.

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

6130 Process Optimization (3) Optimization of chemical process equipment and systems by various techniques; static and dynamic systems. Prereq: 5130.

5210 Advanced Diffusional Operations (3) Fixed and fluidized packed tower and bubble contacting devices; nonideal diffusional mass transfer bed concepts. Prereq: Consent of instructor.

6250 Venture Analysis in the Process Industries (3) Interactions among line functions of typical chemical company in application of modern decision theory and mathematical models to achieve optimum product investment decision in face of external competition. Prereq: 5250.

6310 Thermodynamics of Irreversible Processes (3) Thermodynamic treatment of irreversible chemical processes, transport processes, coupling phenomena, with special emphasis on topics of interest to engineering and bioengineering students. Prereq: 5310.


6510 Applied Chemical Reaction Kinetics (3) Chemical reactions in gas and liquid phases, heterogeneous catalysis, catalyst effectiveness and role of transport in kinetics. Emphasis on development of phenomenological description although mechanistic models are discussed. Prereq: 5510.


6710 Process Dynamics (3) Development of dynamic models and methods of analysis and control of reacting systems, emphasizing analytical approach; similarities of diffusion of momentum and heat. Prereq: Consent of instructor.

6900 Advanced Topics of Chemical Engineering (3) Advanced topics of current interest to chemical engineers. May be repeated. Maximum 9 hrs.

3130 Engineering Materials III (3) Extension of 2110 or 3110 with emphasis on control of electrical and magnetic properties of materials by specification of composition, thermal, and mechanical treatment; consideration of resultant properties with service performance. Suggested for electrical engineering students.

3140 Engineering Materials IV (3) Extension of 2110 or 3110 with emphasis on materials processing, specification and evaluation. Suggested for mechanical and industrial engineering students.

3150 Engineering Materials V (3) Extension of 3110 with emphasis on the mechanisms and control of reactions of engineering materials with aqueous, nonaqueous, and gaseous environment. Prereq: 3110 or equivalent.

3160 Engineering Materials VI (3) Extension of 2110 or 3110 with emphasis on materials of significant in nuclear engineering, nuclear reactor construction materials, nuclear fuel materials, and interaction of radiation with solids to produce changes in engineering properties. Suggested for nuclear and mechanical engineers.

3210 Plastic Deformation (4) Phenomena and theory of plasticity of single and polycrystalline materials. Applicable to metallic and ceramic materials. Prereq: Consent of instructor.

3220 Diffusion and Annealing (3) Introduction to solid state kinetics; point defects, solid solutions, diffusion equations and mechanisms, annealing of cold worked structures. Prereq: 3210. Mathematics 2840.

3310 Biomedical Applications of Materials for Life Scientists (4) Biochemical considerations in design of chemical processing equipment. Prereq: Chemical and Metallurgical Engineering 2030 or equivalent: 3150; and Chemical Engineering 2420. (Same as Engineering Science and Mechanics 3520.)

3710 Metallurgical Applications in Manufacturing Technology (3) Fabrication methods and principles of mechanical/thermal processing for finished and seminished articles; casting, powder metallurgy, plastic forming, joining, heat treatment. Prereq: 2110 or equivalent.

4240 Engineering Materials Design (3) Property control through choice of materials and design of components; fatigue and fracture in ferrous alloys. Plain carbon steels, alloy steels, and tool steel processing for property selection and design requirements. Prereq: 3200 or consent of instructor.

4250 Design and Analysis (3) Design and laboratory sessions on analysis of materials, requirements and performance in engineering structures and components. Prereq: Senior standing.

4510 X-Ray Diffraction and Its Application (4) Basic principles and application of x-ray diffraction from materials. Theory, powder technique, precision lattice constants, chemical, analysis and phase identification, preferred orientation. 3 hrs and 1 lab.

4540 Fracture-Safe Design (3) (Same as Engineering Science and Mechanics 4540.)

4730 Mechanical Metallurgy I (4) Elastic behavior; description of stress, strain, and stress-strain relationship; prediction of plane strain loading; failure by yielding; stress concentration and notch sensitivity; ductile fracture; brittle fracture due to geometry and rate of loading. Prereq: First course in Materials Science and Engineering Science and Mechanics 3511. Also suggested for mechanical engineering and industrial engineering students.

4740 Mechanical Metallurgy II (4) Brittle fracture due to metallurgical and environmental factors; fatigue, residual stresses; creep and stress rupture; effect of metallography; finite plastic strain and...
plastic stress-strain relations; fabrication by forging, rolling, drawing, forming, and hot working; effects of heat treatment; associated stresses. Prereq: 4730 or Mechanical Engineering 3650 and first course in Materials Science, or consent of instructor.

4760 Casting and Welding (3) Principles and processes of casting and welding; heat transfer, solidification segregation, gas-metal and slag-metal interactions, thermal treatments, associated stresses. Prereq: 3120 or 3230. 3 hrs or 2 hrs and 1 lab.

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

5010 Graduate Seminar (1) Prereq: Admission to graduate program. May be repeated: E

5050 Engineering Analysis (3) (Same as Chemical Engineering 5050.)

5110 Dislocations (3) Theoretical and experimental analysis of line defects and their interactions in solids. Prereq: 4730 or consent of instructor.

5120 Plastic Deformation (3) Geometry and mechanisms of plastic deformation of single crystals; slip and twinning; work hardening; effects of temperature and alloying on short-term loading. Prereq: 5110.

5130 Plastic Deformation II (3) Plastic deformation of polycrystalline materials; theoretical and experimental analysis of texture formation resulting from deformation and annealing. Prereq: 5120.

5140 Diffusion in Solids (3) Analysis of models and experimental observations relating to phenomenological and mechanistic description of diffusion and annealing of point defects.


5210-20-30 Welding Metallurgy (3, 3, 3) Welding processes and physical metallurgy of welding, including power supplies, heat flow, residual stresses, solidification, and solid state reactions, for both simple and complex alloys. Current theories of cold cracking, hot cracking and porosity formation are developed. Prereq: Physical metallurgy.

5310 Solidification and Crystal Growth I (3) Solute redistribution, thermodynamic considerations, kinet- ic, convection and fluid flow effects on the solid to liquid transition. Prereq: Mathematics 4550.

540-50 Electron Microscopy I and II (3, 3) Kinetical and statistical thermodynamic analysis of stability of solid solutions, compounds and ordered phases. Prereq: 5910-20-30 or consent of instructor.


6900 Special Topics in Metallurgical Engineering (3) Developments in the science and technology of metals and alloys. May be repeated. Maximum 9 hrs.

Polymer Engineering

4910 Applied Polymer Science (3) First course in the fundamentals of polymer science including structure, crystalline and glass transitions, physical properties of amorphous and crystalline polymers, crystallization kinetics and mechanical properties are discussed. Not for credit for Polymer Engineering majors.

4920 Polymer Processing (3) Rheological properties of polymer melts and solutions, viscometry, unit operations of fiber, plastics and rubber industries; dimensional analysis and scale-up, flow through dies and pipelines, screw extrusion, spinning of fibers, injection molding. Not for credit for Polymer Engineering majors.

4930 Principles of Fiber and Textile Engineering (3) Chemical and crystalline structure of important fibers; mechanisms of polymerization; spinning; drawing and texturing; preparation of yarn; dyeing, weaving and knitting. Emphasis on quantitative aspects.

4940 Plastics Fabrication Operations (3) Lecture and laboratory course treating unit operations of the plastics industry. Types and mechanisms of operation of machinery used and the structure and properties of fabricated parts. Operations to include extrusion, coextrusion, injection molding including structural foam, thermoforming, blow molding, rotomolding.

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

5010 Graduate Seminar (1) Prereq: Admission to graduate program. May be repeated. E

5050 Engineering Analysis (3) (Same as Chemical Engineering 5050.)

5110 Structural Characterization of Polymers with Electromagnetic Radiation (3) Theory of scattering and diffraction of electromagnetic waves by matter, special application to experimental techniques applied to polymers. Wide angle x-ray scattering (WAXS), small angle x-ray scattering (SAXS), small angle light scattering (SALS). Interpretation in terms of polymer chain conformation, crystal structure, morphology and superstructure.

5120 Characterization of Orientation in Polymer Systems (3) Representation of orientation in macromolecules characterization using electromagnetic radiation orientation factors. Experimental methods of measurement and solid solutions, and to alloy systems.

5210 Mechanics of Polymer Fluids and Solids (3) Evaluation of mechanical properties and application to rubber and glassy and crystalline polymer solids. Non-Newtonian fluid mechanics including viscometric flows, fabrication by forging, rolling, drawing, forming, and hot working; effects of heat treatment; associated stresses. Prereq: 5110 or consent of instructor.

5510 Polymer Solution Properties and Characterization (3) Molecular weight determination, chromatography, solution thermodynamics, phase separation; application to synthetic and naturally occurring macromolecules. Prereq: Undergraduate physical chemistry.

5410 Rheology and Polymer Processing (3) Methods for determining the rheological properties of polymer melts, solutions and suspensions; linear viscoelasticity, simple shear, capillary rheometry, dynamic properties, and solid solutions, and to alloy systems.

5450 Principles of Injection and Blow Molding Operations (3) Theory of injection molding, structure of molded parts; principles of structural foam and sandwich molding; principles of injection molding, core molding, application to polymer characterization, x-ray diffraction and optical methods. Coreq: 5410 or equivalent.

5511 Laboratory Methods in Polymer Engineering (3) Basic experimental procedures for polymer characterization, x-ray diffraction and optical methods. Coreq: 5110 or consent of instructor. 2 labs.

5512 Laboratory Methods in Polymer Engineering (3) (Basic experimental procedures for polymer characteriza-

5513 Laboratory Methods in Polymer Engineering (3) Basic experimental procedures for polymer characteriza-

5514 Laboratory Methods in Polymer Engineering (3) Basic experimental procedures for polymer characteriza-

5610 Textile Processing (3) (Same as Textiles and Clothing 5610.)

5620 Textile Engineering Mechanics (3) (Same as Textiles and Clothing 5620.)

5710 Phase Transformations in Polymer Systems (3) Analysis of nucleation and growth of phases in polymer systems, spinodal decomposition, application to crystallization from the melt, precipitation from solution.

5810 Physical Properties of Polymer Structures (3) (Same as Textiles and Clothing 5810.)

5910-20-30 Metallurgical Thermodynamics (3, 3, 3) Application of thermodynamic and physicochemical principles to metals and metallurgical reactions. Relation of theory and experiment to structural and solid solutions, and to alloy systems.

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

6110 Optical Properties of Polymers (3) Maxwell's
equations and electromagnetic theory of light, optical properties of isotropic and anisotropic dielectrics including theory of birefringence, applications to spherical structures and fibers studies of Stein, light scattering from polymer films.

6150 Advanced X-Ray Diffraction Methods for Characterization of Macromolecules (3) Classical methods of crystal structure determination; Patterson function and two-dimensional methods, nets and Bessel function techniques; levels of order, thermal motions, defects, order-disorder transitions and para-crystallinity. Precision and technology photography, single crystal and powder diffractometry with applications to synthetic and biological macromolecules.

6210 Nonlinear Viscoelasticity (3) Tensor formulation of constitutive equations; physical and mathematical concepts of solid polymers, failure analysis and general deformation mechanics of solid polymers. Relation of microstructure to molecular structure.

6250 Large Deformation Elasticity (3) Curvilinear tensor analysis, theory of finite strains, Mooney-Rivlin formulation of isotropic non-linear elastic model, solution of large homogenous and non-homogenous deformation problems, application to vulcanized rubber, reinforcement with inextensible cords. Prereq: 5210 or equivalent.


6610 Advanced Industrial Polymer Chemistry (3) Chemistry and properties of new polymeric engineering materials; highly integrated engineering and chemical approach. Prereq: Consent of instructor.

6910-20-30 Recent Advances in Polymer Science and Engineering (3, 3, 3) Treatment of latest developments in polymer science and engineering with concentrations in water quality, water resources, and air quality. 

MAJORS
Civil Engineering

DEGREES
M.E., M.S., Ph.D.
Environmental Engineering
M.E., M.S.

Emeritus Professor:
C. R. Walker, S.M. Massachusetts Institute of Technology, P.E.

Professors:

Associate Professors:


Assistant Professors:
E. S. Houglund, Ph.D. Virginia Polytechnic Institute; R. B. Robinson, Ph.D. Iowa State, P.E.

Lecturers:

The Department of Civil Engineering offers degrees leading to the Master of Science, Master of Engineering, and Doctor of Philosophy with a major in Civil Engineering, concentrating in environmental engineering, structural engineering, soils engineering and materials, and transportation engineering; and to the Master of Science and Master of Engineering in Environmental Engineering with concentrations in water quality, water resources, and air quality. 

MASTER OF SCIENCE PROGRAM
The Master of Science programs in Civil Engineering and in Environmental Engineering are offered to graduates of recognized undergraduate curricula.

Departmental requirements provide that for a major in Civil Engineering, the Bachelor's degree must be in civil engineering, or certain undergraduate prerequisite courses must be taken before admission to candidacy for the Master of Science in Civil Engineering.

CIVIL ENGINEERING
The Department of Civil Engineering offers two options for the Master of Science degree in Civil Engineering.

Option I: A minimum of 45 quarter hours, including at least 9 hours of thesis, is required.

Option II: A minimum of 48 quarter hours, including a 3-quarter-hour special problems is required. The special problem will culminate in a written report which must be approved by the student's major professor.

ENVIRONMENTAL ENGINEERING
For a major in Environmental Engineering the Bachelor's degree may be in fields other than civil engineering. In some cases prerequisite undergraduate courses may be indicated, and in general these must be completed before courses for graduate credit can be taken.

The Department of Civil Engineering offers both thesis and non-thesis options for work toward the Master of Science degree in Environmental Engineering.

Option I: The student must present a minimum of 45 hours of approved graduate courses. The major shall include a minimum of 9 quarter hours of thesis and 18 quarter hours credit of approved environmental engineering course work. A minor may be selected but is not necessarily required.

Option II: The student must present a minimum of 48 quarter hours of approved graduate courses. The major shall include a minimum of 27 quarter hours of approved environmental engineering course work. A minor may be selected but is not necessarily required.

Option II or all must be approved by the department. Normally, the graduate program of study will be adjusted by the head of the department and the student's committee to suit the individual academic requirements.

Masters of Engineering Program
Graduate programs in Civil Engineering and in Environmental Engineering leading to the degree of Master of Engineering are available to qualified graduates of A.B.T.E. accredited undergraduate curricula in civil engineering or environmental engineering. At least one-third of the program of study must be classified as engineering design. The student's advisor will assist in planning the program of study to ensure that it includes the necessary design content. The thesis and non-thesis options noted under the Master of Science programs are available under these programs.

The Doctoral Program
A graduate program leading to the degree of Doctor of Philosophy is offered in Civil Engineering.

Special requirements for the Ph.D. degree include the following:

1. A minimum of 105 quarter hours credit beyond the Bachelor's degree, exclusive of credit for the M.S. thesis. Of this number, a minimum of 56 credits must be in dissertation for the Master of Science and Dissertation will be required.

2. A minimum of 36 quarter hours of graduate courses in the Civil Engineering Department, exclusive of thesis or dissertation credit, at least 9 hours of which must be 6000-level courses.

3. Supporting courses in related scientific and engineering fields, amounting to approximately 36 quarter hours, subject to approval by the student's faculty committee. These related fields will normally include such disciplines as mechanics, chemistry, mathematics, microbiology, physics, and other engineering fields. A minimum of 12 quarter hours of mathematics will be required beyond the civil engineering undergraduate requirements.

4. One foreign language if the student's faculty committee feels that a reading knowledge of a foreign language is crucial to the student's research efforts.

5. Upon completion of at least one-half of all course work, each student must pass a comprehensive examination.

6. After completion of the dissertation, prior to graduation, each student must pass a final examination administered by a faculty committee.

Civil Engineering

4120 Concrete Design (3) Reinforced concrete continuous beams and floor slabs; footings, and retaining walls. Prereq: 4110 and 4410, Sp


4240 Structural Design (3) Plate girders, composite steel and concrete beams, connections and details, and design of small industrial buildings. Prereq: 3260 and 4410. 2.5-3.5 periods. W. Sp.

4260 Photogrammetry (3) Methods of plotting maps from aerial phototographic plotting instruments; applications. Prereq: 2330, Forestry Summer Camp for forestry majors. F.

4240 Analysis of Framed Structures (3) Maximum stresses due to moving loads; uses of influence lines; lateral forces due to earthquake and wind;
5140 Statically Indeterminate Structures (3) Analysis of complex planar and space frames. Prereq: 5110 and 5120. Sp

5150 Matrix Formulation of Structural Problems (3) Review of matrix algebra, vectors, stability consideration of statically indeterminate structures. Analysis of planar trusses, general members and structures composed of general members. Prereq: 4540 or consent of instructor. F

5160 Analysis and Design of Plate Structures (3) Bending and buckling of plates; analysis and design of bridge and building floors and structural plate components. Prereq: 5110. F

5170 Introduction to Structural Dynamics (3) Analysis of free and forced vibrations, and transient response of structures having many degrees of freedom; elastoplastic behavior considered for structural systems; approximate design methods developed. Prereq: 5120, 5150. Sp

5180 Finite Element Structural Analysis (3) Application of finite element method to structural analysis; plane stress, plane strain, axisymmetric, and three-dimensional elements; use of typical computer programs. Prereq: 5150, and Engineering Science and Mechanics 5860. (Same as Engineering Science and Mechanics 5180.) Sp, A

5220 Pavement Design (3) Pavement loads; pavement design; practices; construction and maintenance. Prereq: 5130. Sp

5240 Advanced Properties of Materials: Cement and Concrete (3) Properties of cementitious materials; hydration and hardening; volume changes and creep; elastic and thermal properties of concrete, special types of concrete; causes of failure. Prereq: 4710. W

5250 Advanced Properties of Materials: Bituminous Substances and Mixes (3) Serviceability concepts; pavement failures and remedies; bituminous pavement maintenance techniques; other uses of asphalt products. Prereq: 4720. Sp

5270 Planning and Transportation (3) Preparation of transportation and elements of comprehensive development plans. Analysis of relationships between various transportation systems and between transportation and other community features. (Same as Planning 5270.) W

5310 Engineering Practice (3) Valuation and feasibility studies; depreciation and useful life; engineering economics. F

5320-30 Engineering Practice Applied to Administration of Engineering Projects (3, 3) Engineering administration; planning of governmental and industrial projects; cost estimates and methods of financing. W, Sp

5410 Construction Contract Law and Administration (3) General principles applicable to construction contracts and construction related sales contracts. Emphasis on role of engineer in preparation, award, and administration of construction contracts. Case study method of instruction. Prereq: 4230 or consent of instructor. F

5420 Structural Model Analysis (3) Experimental methods of shear, moment, and stress analysis. F

5430-40-50 Construction Management I, II, III (3, 3, 3) Management and organization of heavy and building construction projects. Prereq: 4430 or consent of instructor. F, Sp

5460-70 Construction Estimating I, II, III (3, 3) Project costs, estimating techniques; market cost conditions and feasibility of design as it applies to costs. Prereq: 4430 or consent of instructor. W, Sp

5550 Slope Stability and Retaining Structures (3) Stability of natural and cut slopes and embankments, lateral earth pressure theories. Design of rigid retaining structures, loose pile walls and anchored bulkheads. Coreq: 4420

5560 Shear Strength and Stress Behavior of Soil (3) Shear strength of fine grain soil from perspective of idealized, simple clay. Drained and undrained shear strength obtained from analysis of behavior of real soils. Consolidation theory. Coreq: 4420

5570 Soil Mechanics—Seepage (3) Saturated flow through embankments, earth dams, foundations, data forces and velocities, subdrains, and embankment failures. Prereq: 3310 or consent of instructor. Sp

5610 Behavior of Steel Structures (3) Behavior of structural steel members; fatigue loading; relation between research results and current specialization for design. Prereq: 3230. W

5730 Prestressed Concrete (3) Properties of prestressing materials and anchorage systems; methods of prestressing and posttensioning; analysis and design of members and continuous structures. F

5740 Behavior of Reinforced Concrete Members (3) Ultimate strength and behavior of reinforced concrete members; relation between research results and current specifications for design. Prereq: 4120. W

5800 Urban Systems: Engineering and Management I (3) Management of various urban systems usually under city manager and/or city engineer. Organization, finance, personnel administration, purchasing and equipment management and dealing with engineering consultants as each deals with municipal public works. Prereq: Graduate standing in Civil or Environmental Engineering or consent of instructor. A, W

5805 Urban Systems: Engineering and Management II (3) Continuation of 5800. Management and engineering of urban systems: waste disposal, air pollution, cleaning and snow removal, water supply and waste water drainage, solid waste, air pollution and regulations. Prereq: 5800. Sp

5810 Traffic Engineering—Characteristics (3) Driver-vehicle-roadway system; level-of-service concept of capacity. Coreq: Statistics 3450. 2 hrs and 1-2 hr lab. F

5820 Traffic Engineering—Operations (3) Fixed-time and 1 2-hr temporary traffic controllers; progressive systems; one-way operations; reversible flows; system operation, including computerized networks; legal aspects of operational controls. Prereq: 5810. 2 hrs and 1-2 hr lab. W

5840 Geometric Design (3) Advanced theory and practice in the geometric design of highways. Prereq: 4600. Sp

5850 Functional Design of City Streets and Urban Freeways (3) Effect of street systems upon urban growth and development; classification and function of streets; design features, including cross section, intersections, utility considerations, parking, effect of mass transportation; channelization; marketing; lighting; freeway, frontage road, surface street system; parking. Prereq: Consent of instructor. Sp

5860 Urban Transportation Planning (3) Prediction of traffic demands and vehicular flows; land use planning; parking needs. Prereq: 5810. F

5870 Public Transit Planning (3) Person movement by bus, rapid rail and taxicab transit. Nature of public transit; its various roles and how they fit community's need; user preferences; modal split models; total social, political, economic and technical impacts of public transit. Prereq: 4600 or graduate standing. W, A

5880 Highway Safety I (3) Transportation safety, highway safety, Legislation, federal-state-local relations, current highway safety standards. Prereq: Graduate standing or consent of instructor.

5885 Highway Safety II (3) Effect of current tort law upon highway safety activities; roadside safety design; cross-section, barriers, guardrails and energy attenuators; identification and correction of high accident locations and system deficiencies. Prereq: 5880 and graduate standing.

5890 Traffic Accident Reconstruction (3) Proper traffic accident data collection and analysis as basis of designing accident prevention or control programs. Many contributing factors to an accident; professional and secondary accident causes as they relate to roadway improvements. Prereq: 4640 or 5810 or consent of instructor. Sp, A
5900 Special Problems in Civil Engineering (1-9)
To fulfill the special problem requirement in the non-thesis program. Enrollment limited to civil engineering students in non-thesis program. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. NC only. E

5910-20-30 Special Topics (1-6, 1-6, 1-6) Topics related to current developments in civil engineering not included in other courses. May be repeated.

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

5209 Research Development (3) Development of research activities in private and public sectors. Improving skills to become competitive in attracting research funding. Course cannot be used to satisfy 6000-level course requirements in doctoral programs. Prereq: 6110.

6110 Behavior of Steel Bridges and Buildings (3) Behavior, analysis, and design of plate girders, columns, and composite members subjected to static and dynamic loading. Prereq: 5170 and 5510. Sp, A

6740 Behavior of Reinforced Concrete Beams and Slabs (3) Strength and behavior of statically determinate reinforced concrete structures; applicability of elastic analysis to framed structures; design of columns and slab systems. Prereq: Mathematics 3150 and Statistics 3450. Sp, A

6750 Behavior of Reinforced Concrete Slabs (3) Behavior, analysis and design of reinforced concrete slabs; finite element solutions. AC Code methods; yield strengths; AC 5160 or Engineering Science and Mechanics 6310. Sp, A

6830 Traffic Flow Theory (3) Queuing theory, Markov processes, Monte Carlo methods, simulations of various conditions and/or designs. Prereq: 4540 or Mathematics 3150. A

6860 Statewide Passenger Transportation Planning (3) Comprehensive multimodal transportation plan, intercity traffic models, functional classification, programming and scheduling. Emphasis on government policy decisions, as they affect air and highway investments. Prereq: 5860. W, A

6870 Future Transit Technology and Research (3) New transit systems and new technology; identification of possible research areas in technology and planning process and possible research designs. Prereq: 5870. Sp, A

6880 Planning Models for Transportation System I (3) Stochastic operations research; optimization, transportation modeling; mathematical, statistical, and computer science techniques. Modai split, trip distribution, and trip assignment procedures integrated into urban transportation planning process. State-of-the-art and new modeling techniques. Prereq: 5860 or 5270. Mathematics 3150 and Statistics 3450. W, A

6890 Planning Models for Transportation Systems II (3) Analytical modeling of modai split, trip distribution, and trip assignment. Mathematical, statistical, and computer science techniques in modeling process. Models integrated for urban transportation planning process. Prereq: 6880. Sp, A

5910-20-30 Special Topics in Civil Engineering (3, 3, 3) Selected advanced problems of current interest in civil engineering. Prereq: Consent of instructor. E

Environmental Engineering

4000 Environmental Protection (3) Managing of wastewater, industrial and municipal waste management, hazardous wastes, and environmental, solid wastes, commercial insects and rodents, food, and excretion of physical energy to promote health, to promote efficiency and comfort, and to safeguard balances in natural ecosystems. Principles of environmental protection; objectives of design and practice without detailing design of practice methods.


4160 Urban Water Management (3) Introduction to urban water modeling; evaluation of optimum urban water policies; formulation of system constraints and analysis of alternative water supply systems. Management of storm water for beneficial use. Prereq: 3330. Sp

4210 Water Resources Engineering Design (3) Elements of water resource structures and systems, including reservoirs, dams, control works, and open channel design. Discussion of flow control, environmental impact of reservoir projects. Prereq: 3330 or consent of instructor.

4220 Water Resources Engineering Development (3) Multispective evaluation procedures for comparing and selecting among water resource developments; achieving project optimality; single- and multipurpose projects; special topics in new developments in water resources engineering. Prereq: 3330 or consent of instructor.

4330 Hydrologic Design (3) Application of frequency and regression analysis to hydrologic design of water resources projects. Analysis of run-off and streamflow modeling; urban peak runoff design using kinematic wave theory; evaluation of effects of land use changes on streamflow quantity and quality. Prereq: 3330. W

4510 Elements of Water and Wastewater Transportation Systems (3) Introduction to theory and design of water transportation and distribution systems. Prereq: 5120 and 5740. W, A

4520 Elements of Water and Wastewater Treatment Systems Designs (3) Introduction to unit operations and processes employed in physical, chemical, and biological treatment of water and wastewater. Application of unit operations and processes; design of water and wastewater treatment plants. Prereq: 3120. Sp, Su

4525 Water and Wastewater Treatment Plant Design (3) Detailed process design of water and/or wastewater treatment plants; sludge handling systems, ultimate disposal of residuals. Prereq: 4520 or equivalent.

4530 Environmental Engineering Laboratory (3) Standard analytical techniques for evaluation of specific air, water and solid waste pollutants. Prereq: 4530, 2hrs and 1 lab. W

4600 Solid and Hazardous Waste Management (3) Magnitude and characteristics of solid and hazardous waste problems; generation, transportation, and disposal systems including landfill, incineration, composting, fixation, resource recovery, and proposed new technologies; current and future regulations. Prereq: Junior standing.

4700 Air Pollution—Air Resources Management (3) Introductory course on concepts of air pollution; analysis of relationship among emission sources, meteorology and topographic factors, and adverse effects on receptors; engineering approaches for air pollution control. Prereq: 4800. Sp

4820 Environmental Engineering Law (3) Legal aspects of air and water pollution, drainage, land use controls and environmental impact statements with emphasis upon federal-state relations, recent legislation concerning air and water pollution, and future regulations. Prereq: Senior standing. F

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

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

5150 Water and Urban Welfare (3) Social, environmental, economic, and political decision-making and management of urban water systems. Involves conflict and choice, reconciliation between environmental and development values, measurement of social well-being and quality of life parameters. Analyzes objectives, subjective measures, with selected case studies. Prereq: Consent of instructor.

5230 Surface Water Transport Processes (3) Dynamics of flow in catchments, streams, lakes and reservoirs. Hydrodynamic; hydrostatic; depository boundary layer effects, unsteadiness, kinematic wave approximation. Geometric and hydraulic non-uniformities. Prereq: 3330, Mathematics and Mechanics 3110 or consent of instructor. F

5322 Sediment Transportation (3) Sediment properties and measurements; bed loads and suspended load movement; erosion, scour, transportation and deposition of sediments; flow in flowing water; siltation of reservoirs and related topics. Prereq: 5230. W

5340 Flood Damage Reduction (3) National, regional, local flood problems; hydrologic design criteria; traditional flood control measures; land use controls and adjustments; floodproofing, flood insurance, and other flood damage reduction elements; interdisciplinary approach in floodplain management; case studies. Prereq: Consent of instructor. Sp

5261 Basic Principles of Remote Sensing (3) Applications of remote sensing in agriculture, engineering, forestry, meteorology, land use planning, and resource management; properties of electromagnetic radiation including wave theory, physical and geometric radiation, and adverse effects on receptors; engineering approaches for EM radiation and matter; current data handling technology. Prereq: Consent of instructor.

5262 Remote Sensing Data Acquisition (3) Active and passive sensors, sensor configurations, instrument design and limitation; description of remote sensing platforms, including the Earth Resources Satellite Communication Systems; mission planning. Prereq: 5261 or consent of instructor.


5301 Stormwater Modeling I (3) Interpretation of hydrologic data using methods of systems analysis. Hydrologic components are analyzed as linear and nonlinear systems integrated into mathematical models of watershed response. Optimizing model parameters with illustrative examples. Prereq: Consent of instructor. W

5302 Stormwater Modeling II (3) Continuous streamflow records interpreted using methods of stochastic hydrology, including flow frequency and time series analysis. Interpreting multiobjective policy alternatives with selected applications in floodplain management; case studies. Prereq: Consent of instructor.


5330 Descriptive Hydrology (3) Occurrence and description of elements of hydrologic cycle, effects on hydrology and relation to humans. Not for civil engineering majors.

5400 Introduction to Environmental Systems (3) Models of air and water quality, water resources, solid waste disposal, and hazardous waste systems; exposure to current literature on environmental management problems; optimization of these systems. Prereq: Fundamentals of Engineering Civil Engineering 4500 or consent of instructor. Sp

5501 Water and Wastewater Treatment Theory I (3) Theory of unit operations employed in sanitary systems using streamflow simulation techniques including autoregressive and fractional Gaussian noise models. Prereq: Consent of instructor. Sp

5502 Water and Wastewater Treatment Theory II (3) Theory of unit operations employed in sanitary systems with selected wastewater systems using streamflow simulation techniques including autoregressive and fractional Gaussian noise models. Prereq: Consent of instructor. Sp

5510 Water and Wastewater Treatment Theory III (3) Theory of unit operations employed in sanitary systems with selected wastewater systems using streamflow simulation techniques including autoregressive and fractional Gaussian noise models. Prereq: Consent of instructor. Sp

5520 Water and Wastewater Treatment Theory IV (3) Theory of unit operations employed in sanitary systems with selected wastewater systems using streamflow simulation techniques including autoregressive and fractional Gaussian noise models. Prereq: Consent of instructor. Sp

5530 Water and Wastewater Treatment Theory V (3) Theory of unit operations employed in sanitary systems with selected wastewater systems using streamflow simulation techniques including autoregressive and fractional Gaussian noise models. Prereq: Consent of instructor. Sp

5540 Water and Wastewater Treatment Theory VI (3) Theory of unit operations employed in sanitary systems with selected wastewater systems using streamflow simulation techniques including autoregressive and fractional Gaussian noise models. Prereq: Consent of instructor. Sp

5550 Water and Wastewater Treatment Theory VII (3) Theory of unit operations employed in sanitary systems with selected wastewater systems using streamflow simulation techniques including autoregressive and fractional Gaussian noise models. Prereq: Consent of instructor. Sp

5560 Water and Wastewater Treatment Theory VIII (3) Theory of unit operations employed in sanitary systems with selected wastewater systems using streamflow simulation techniques including autoregressive and fractional Gaussian noise models. Prereq: Consent of instructor. Sp

5570 Water and Wastewater Treatment Theory IX (3) Theory of unit operations employed in sanitary systems with selected wastewater systems using streamflow simulation techniques including autoregressive and fractional Gaussian noise models. Prereq: Consent of instructor. Sp
cesses employed in sanitary engineering. Prereq: 4520. W

5503 Advanced Water and Waste Treatment Systems (3) Theory, operation, and use of advanced water and waste treatment systems. Emphasis on those systems used for wastewater reclamation. Prereq: Consent of instructor. W

5530 Environmental Engineering and Natural Systems Behavior (3) Seminar in selected issues of environmental engineering science relating to natural system behavior. Emphasis on trace metals and trace organics. Prereq: Graduate standing or consent of instructor.

5551 Water Quality Management (3) Water quality control objectives, methods, and philosophies; water quality criteria; effect of various uses on water quality; receiving water characteristics and waste assimilation capacity; regulatory standards; economic considerations. Prereq: 4520. W

5582 Microbiology for Sanitary Engineers (3) Microorganisms and microbiological processes significant in sanitary engineering, including basic microbiology, detection and identification, enzymes, metabolic reactions, energy transfer, synthesis and growth; aerobic and anaerobic biological treatment processes. Prereq: Consent of instructor. W

5593 Advanced Environmental Engineering Laboratory (3) Application of modern and typical methods, principally instrumental, to analysis of environmental pollutants. Prereq: 4530. 2 hrs and 1 lab.


5630 Design of Solid and Hazardous Waste Disposal Systems (3) Unit operations and processes for solid and hazardous waste disposal: soil attenuation, incineration and heat recovery, biological processes, fixation and encapsulation, and resource recovery. Prereq: 4600, 5592, 5503. 1 lab.

5700 Planning and Air Pollution Control (3) Relationship between air pollution, area development, and regional growth. Social, economic, and political processes involved in air pollution control.

5710 Air Pollution Control Engineering (3) Emission control systems for industrial and power generating processes, stack sampling methods, air monitoring, dispersion of pollutants. Prereq: Graduate standing.

5715 Ambient Air Monitoring (3) Physical and chemical techniques for ambient air monitoring. Survey of current theory and practice of air pollution monitoring as it affects use of ambient air monitoring data. Use of ambient air monitoring data in air quality management programs. Prereq: Consent of instructor.

5720 Air Pollution Particle Collection Theory (3) Number and size distribution of aerosol particles in suspended medium including particle motion, coagulation, and aerodynamic capture of particles. Prereq: Engineering Science and Mechanics 3110. W

5725 Air Quality Modeling and Impact Assessment (3) Techniques to assess the air quality impact of major transportation projects and industrial air pollution sources. Application of atmospheric dispersion models and evaluation of meteorological and air quality data. Prereq: Graduate standing. Computer Science 3150. Sp

5730 Air Pollution Control Device Design (3) Design and evaluation of systems used to control emission of gaseous and particle air pollutants. Comprehensive design of specific devices and systems. Prereq: 5720. Sp

5735 Industrial Source Sampling (3) Sampling methods for gaseous and particulate air pollutants emissions from industrial processes. Prereq: Graduate standing. 2 hrs and 1 lab. Su

5745 Ambient Air Chemistry (3) Reaction mechanisms and their control in outdoor environments, and use of analytical techniques to detect secondary air pollutants from anthropogenic primary pollutants and naturally occurring precursors. Prereq: Consent of instructor.

5760 Diffusion in the Atmosphere (3) Movement and dilution of natural or man-made material released into the atmosphere. Basic theory. Rise of buoyant plumes, relation between Eutarian and Le- granular processes, and interaction between instantaneous and continuous sources, diffusion in a zone of wind shear and diffusion from urban area sources. Prereq: Consent of instructor.

5900 Special Problems in Environmental Engineering (1-0) To fulfill the special problem requirement in the non-thesis program. Enrollment limited to environmental engineering students in the non-thesis program. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/N Only. E

5910-20 Special Topics (1-6, 1-6) Problems and topics related to current developments in field of environmental engineering not included in other courses. May be repeated. E

5990 Environmental Engineering Seminar (1) All phases of environmental engineering including reports on current research at The University of Tennessee, Knoxville. Course credit not applicable to graduate degree program. Prereq: Active graduate standing in environmental engineering. May be repeated. S/N Only. F, W, Sp

6110-20 Advanced Topics in Fluid Mechanics and Convective Transfer (3, 3) (Same as Engineering Science and Mechanics 6110-20.)

6230 Kinematic Wave Theory (3) Approximations of DeSainte and particle-like kinematic wave theory applied to overland flow and streamflow. Criteria for approximation and methods of linkage of overland flow and streamflow. Prereq: 5230 or equivalent. Sp, A

6510 Industrial Waste Unit Operations and Processes (3) Laboratory and pilot plant development of physical, chemical and biological variables for treatment of industrial wastes and residuals, utilization of variables in design. Prereq: 5501, 5502, 5503, 5503, 1 hr and 4 labs.

6520 Industrial Waste Management (3) Sources and characteristics of industrial wastes; recycling, waste reduction, energy recovery, resource recovery, and treatment options; ultimate disposal of residuals including thermal processes, land application, recovery, and encapsulation; design oriented. Field trips. Prereq: 5501, 5503 or consent of instructor.

5530 Rate Processes in Environmental Pollution (3) Application of scientific principles concerning movement and fate of chemicals at interfaces of three geospheres of environment (air, water and earth solid). Development of intuitive sense to enhance problem solving. Prereq: 5501, 5503 or consent of instructor.


6910-20 Special Topics in Environmental Engineering (3, 3) Selected advanced problems of current interest in environmental engineering. Prereq: Consent of instructor. E

NOTE: Prerequisite to all graduate courses: Consent of instructor.

Electrical Engineering

MAJOR

DEGREES

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

Professors:

J. M. Googe (Head), Ph.D. Georgia Institute of Technology (1976), Ph.D. The Johns Hopkins University (1980).

J. A. Bailey, Ph.D. Georgia Institute of Technology; A. O. Blakesley, Ph.D. Texas A&M University; E. S. Brogan, Ph.D. University of Tennessee; R. E. Bolding, Ph.D. University of Tennessee; J. L. Tillman, Ph.D. University of Tennessee; J. C. Hung, Ph.D. University of Tennessee; J. L. Tillman, Ph.D. University of Tennessee.

Wire and Electronics Engineering (3): Theory, operation, and use of advanced water and waste treatment systems. Emphasis on those systems employed in sanitary engineering.

Prerequisites: Consent of instructor.

4520. W

5900 Special Problems in Environmental Engineering (1-0) To fulfill the special problem requirement in the non-thesis program. Enrollment limited to environmental engineering students in the non-thesis program. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/N Only. E

5990 Environmental Engineering Seminar (1) All phases of environmental engineering including reports on current research at The University of Tennessee, Knoxville. Course credit not applicable to graduate degree program. Prereq: Active graduate standing in environmental engineering. May be repeated. S/N Only. F, W, Sp

6110-20 Advanced Topics in Fluid Mechanics and Convective Transfer (3, 3) (Same as Engineering Science and Mechanics 6110-20.)

6230 Kinematic Wave Theory (3) Approximations of DeSainte and particle-like kinematic wave theory applied to overland flow and streamflow. Criteria for approximation and methods of linkage of overland flow and streamflow. Prereq: 5230 or equivalent. Sp, A

6510 Industrial Waste Unit Operations and Processes (3) Laboratory and pilot plant development of physical, chemical and biological variables for treatment of industrial wastes and residuals, utilization of variables in design. Prereq: 5501, 5502, 5503, 5505, 1 hr and 4 labs.

6520 Industrial Waste Management (3) Sources and characteristics of industrial wastes; recycling, waste reduction, energy recovery, resource recovery, and treatment options; ultimate disposal of residuals including thermal processes, land application, recovery, and encapsulation; design oriented. Field trips. Prereq: 5501, 5502, 5503.

5530 Rate Processes in Environmental Pollution (3) Application of scientific principles concerning movement and fate of chemicals at interfaces of three geospheres of environment (air, water and earth solid). Development of intuitive sense to enhance problem solving. Prereq: 5501, 5503 or consent of instructor.


6910-20 Special Topics in Environmental Engineering (3, 3) Selected advanced problems of current interest in environmental engineering. Prereq: Consent of instructor. E

NOTE: Prerequisite to all graduate courses: Consent of instructor.
theory, plasma engineering, power systems, solid-state electronics, and control systems. Specific courses that are prerequisites for courses in the Ph.D. degree include the following:

1. A Master of Science or Master of Engineering degree.
2. A minimum of 72 quarter hours of course work beyond the B.S. degree excluding thesis, research, and dissertation credit.
   a. A minimum of 36 quarter hours of work in electrical engineering at the 5000 and 6000 levels.
   b. A minimum of 12 quarter hours of 6000-level course work. At least 3 quarter hours of this work must be in an area other than the student's major area.
   c. A minimum of 36 quarter hours credit in doctoral dissertation.
3. One foreign language if the student's faculty committee feels that a reading knowledge of a foreign language is crucial to the student's research efforts.
4. Satisfactory performance on both a qualifying and comprehensive examination.

The qualifying examination is prepared by the electrical engineering faculty and consists of a 3-hour written examination in each of four areas. Areas (1) mathematics and transform methods, and (2) basic passive and active networks are required of all Ph.D. students. Areas (3) and (4) are chosen from two of the 12 graduate course divisions in the department and cover material from undergraduate courses and first year graduate courses. A student who fails the qualifying examination must take and pass the examination the next time it is offered to remain in the Ph.D. program. The qualifying examination is normally taken after the completion of 9 hours of graduate course work or immediately after completion of a Master's degree. A minimum of 27 hours of graduate course work must be completed after the student has taken the qualifying examination the first time.

The comprehensive examination is prepared by the student's doctoral committee and consists of a 3-hour written examination in the student's major area, a 2-hour written examination in a related area, and an oral examination. The comprehensive examination is normally taken at least six months after passing the qualifying examination. Part of the comprehensive oral examination will be a defense of a student's dissertation proposal. The comprehensive examination must be passed and the dissertation proposal accepted by the student's doctoral committee before the student is reported as ready for admission to candidacy for the Ph.D. degree.

Participation in departmental seminars.

Many of the electrical engineering courses are offered in the evening. Engineering work is not required and students are encouraged to participate in the department's graduate program.

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

3010 Transient Analysis (3) Analysis of transient response of networks and systems; Laplace transform method and classical differential equation methods for transfer functions; frequency response and steady-state concept and zero-concept responses; applications to engineering problems. Prereq: 2030.


3050 Basic Field Theory (3) Forces between charges, electric and magnetic fields, Gauss's law and divergence, potential and line integrals, material bodies, polarization, magnetic circuits, Maxwell's equations, dynamic potentials. Prereq: Mathematics 2860.

3060 Propagation I (3) Propagation of waves in transmission lines and in other guiding systems. Impedance and reflection principle of analyses of waves, standing wave and traveling wave measurements. Reflections to impedance matching, transmission line filtering, microstrip circuit construction, graphical and computer aided design methods. Prereq: 3050. 3 hrs including biewick lab.


3110 Basic Electrical Engineering—Circuits and Fields (3) For non-electrical engineering majors. Prereq: Mathematics 2850, Physics 2310-30. 3 hrs including biewick lab.

3120 Basic Electrical Engineering—Electronics (3) For non-electrical engineering majors. Prereq: 3110. 3 hrs including biewick lab.

3130 Basic Electrical Engineering—Mechanics (3) For non-electrical engineering majors. Prereq: 3110. 3 hrs including biewick lab.

3160 Logic Design of Digital Systems (3) Introduction to boolean algebra and design of combinational circuits. Presents gate and flipflop characteristics. Design of clocked sequential circuits and other systems containing memory. Introduction to minicomputer architecture and system components to include basic structure and function of arithmetic, storage, input-output, and control systems. Instruction set capabilities and machine language programming. Prereq: 3050 and Computer Science 3150 or 2710. 3 hrs including biewick lab.

3190 Plasma I (3) Engineering applications of physical electronics, plasma effects and devices. Topics include the development of experimental plasma light sources, laser operation and applications (electro-optics), and MHD, controlled thermonuclear and thermal plasma systems. Prereq: Physics 2310-20-30. 3 hrs including biewick lab.

3270 Linear Systems Analysis (3) Linear and time invariant systems; impulse synthesis; Fourier transform, Laplace transform, state variable, and digital computer methods. Prereq: 3110. 3 hrs including biewick lab.

3470 Plasma II (3) Magnetohydrodynamics. Prereq: 3190.
4480 Plasma III (3) Macroscopic plasma equations, particle orbits, interactions, oscillations and waves. Prereq: 3190.


4500 Electro-optics Detection and Instrumentation (3) Sensitivity, resolution (frequency response) and noise concepts of and practical engineering data for both spatial and temporal detectors. Prereq: 3190.


4579 Electro-Acoustics (3) Wave equation for sound, radiation from pistons, impedance of a piston, loudspeakers, horns, speaker systems, phonograph reproducer systems, tone recording and reproduction, noise reducing systems. Prereq: Senior standing.

4600 Analog Signal Processing Circuits for Electronic Instrumentation (3) Operational amplifiers, integrators, and other interfacings in analog circuits in signal processing. Active filters, amplifiers, attenuators, function generators, active rectifiers, and other analog components. Analysis of interfacing problems between transducers and signal processors. Prereq: 3630. 3 hrs including project laboratory.

4610 Analog-Digital Systems (3) Principles of analog computing components. Applied to analog computing to include problem set-up and scaling. Characteristics of analog multipliers, dividers and function generators are developed. Presents comparators, digital to analog conversion, and analog to digital conversion techniques. Prereq: 3180 and 3630. 3 hrs including biweekly lab.

4620 Sequential Machine and Digital System Theory (3) Considers design aspects of pulse-mode, clock-mode, and level-mode sequential circuits. Theory and characteristics of one- and two-dimensional iterative networks. Design of large scale digital systems using MSI and LSI technologies. Introduces principles of reliability and function generators are developed. Presents comparators, digital to analog conversion, and analog to digital conversion techniques. Prereq: 3180 and 3630. 3 hrs including biweekly lab.

4630 Digital System Organization and Design (3) Consideration of system organization of digital systems including minicomputer and microprocessor architectures and comparisons. Characteristics of ALU, control unit, memory addressing modules, peripheral devices, synchronous/asynchronous time sequencing and microprogramming of control functions. Prereq: 3180. 3 hrs including biweekly lab.

4680 Bioelectric Instrumentation (3) Nature and origin of bioelectric potentials, transducers, amplifier requirements, recording systems and noise problems.

4680 Electronic Amplifiers (3) Feedback amplifier principles. Wideband linear amplifiers. Audio and radio-frequency power amplifiers. Prereq: 3630, 3720. 3 hrs including project laboratory.

4690 Communications Electronics (3) Receiver and transmitter design. Prereq: 3040, 3630. 3 hrs including project laboratory.

4700 Digital Integrated Electronics (3) Comparators, logic gates, flip-flops, registers, counters, memories, and other digital system components. Digital design and analysis, clipping, clamping and sweep circuits. Prereq: 3830, 3180. 3 hrs including project laboratory.

4740 Integrated Circuits (3) Processing and fabrication of active and passive components for monolithic and hybrid circuits. Design techniques for linear and digital circuits. Prereq: 3630. 3 hrs including project laboratory.

4780 Synchronous Machines (3) Construction and application, analysis of performance from equivalent circuit models for round rotor and salient pole machine. Analysis of induction machine as a d–d machine; identification experiments on sequential machines. Biweekly lab. Prereq: Elementary linear algebra and differential equations with several variables. (Same as Computer Science 5175.)

5180 Bioengineering Systems II Bioelectrical Phenomena (3) Electrical phenomena associated with biological systems, such as nerve, muscle, heart, and primitive theories in neurophysiology and electrophysiology. Prereq: 4660 or consent of instructor.

5190 Bioengineering Systems III Instrumentation and Analysis (3) Process by which information is gathered and transmitted from biological system under test and process by which this information is treated, to signal analysis and modeling, to maximize yield of meaningful information about original biological system. Prereq: 4660 or consent of instructor.

5210-20 Advanced Electrical Machinery (3, 3) Fundamental processes of elecromechanical energy conversion; application in conventional devices. Differential equations for rotating machinery, Park's transformation and two-axis model, transient behavior, isolated and networked machines. Prereq: 4780 or equivalent.

5220 Advanced Electrical Machinery Applications (3) Linear motors; pole amplitude modulation and control of nonlinear systems; variable frequency operation. Prereq: 5210.

5240-50-60 Control Systems Design I, II, III (3, 3, 3) Analysis and design of continuous and digital control systems using classical and modern techniques. Feedback theory, system modeling; stability analysis; system response analysis; design of estimator and observer; system compensation. Emphasis on engineering aspects of control systems. Coreq: 5070 or equivalent.

5271 Modern Systems Theory I (3) Introduction to systems theory. State-space model, linear dynamic system, dynamical system, exponential, controllability, observability, realizability, stability theory, pole placement, observers, stability theory for linear systems. Prereq: Consent of instructor.

5281 Modern Systems Theory II (3) Optimal control theory. Deterministic optimal control theory, minimum principle and Riccati equation, and dynamic programming, stochastic control theory, stochastic dynamic programming, dual control problem and separation principle, linear quadratic Gaussian control problem, relationship between uncertainty and stability. Prereq: 5271, 5281 or consent of instructor.

5310 Basic Requirements for Plasma Fusion (3) Historical study of fusion systems in nature. Lawson break-even criterion. Inertial fusion systems—hydrogen bomb, laser fusion, and electron-beam fusion. Magnetically-confined plasma systems, tokamak, mirror system, and exotic systems. Confinement regimes, stability, fusion burning, advanced confinement regimes, magnetic and inertial fusion hybrids. Prereq: Consent of instructor or plasma engineering or plasma physics background or employment in fusion work.

5320 Diagnostics for Fusion (3) Hot plasma. Simple gross measurements—resistivity and diamagnetism, Microwave methods. Charge-exchange technique. X-ray techniques, resonant techniques and their limitations. Future possibilities. Prereq: Consent of instructor or plasma engineering or plasma physics background or employment in fusion work.

5400-5600 Advanced Electronic Switching Circuits (3, 3, 3) Switching circuits using active devices in discrete, monolithic, and hybrid configurations; clipping and clamping circuits, negative resistance circuits, comparators, time-base generators, sweep circuits, blocker and synchronizing switches, logic families, registers and counters, analog-to-digital and digital-to-analog converters, and digital memories. Prereq: 4700 or consent of instructor. Project laboratory included.


5615-25 Introduction to Switching Theory and Logic Design (3, 3) Boolean algebra and applications. Combinational switching circuits. Sequential machines. Information structures and sub-systems. For computer science majors and those without prior experience in hardware and logic design. Prereq: Elementary algebra; and calculus of several variables. 4 labs per quarter.


5670-80 Pattern Recognition (3, 3) Same as Computer Science 5840-80.

5690 Artificial Intelligence (3) Same as Computer Science 5210.

5710 Random Process Theory for Engineers (3) Probability and random variables as approached by mathematical methods. Analysis of control problems including load frequency and system reliability. Prereq: 4520. 45440 or consent of instructor.

5420 Fault and Load Flow Studies (3) Analysis of power system under short and series fault conditions. Computer methods for fault studies. Load flow problem is formulated with computer methods emphasized. Prereq: 5410 or consent of instructor.


5440 Distribution System (3) Electric power distribution with particular reference to utility systems. System growth and planning, operation and regulation. Prereq: 4410, 4420, 4430 or equivalent.

5460 Selected Topics in Power Systems (3) To meet special needs of students. Possible topics: power systems reliability, interconnected system theory, power plant operation, electrical transients in power systems, and power system relaying. Prereq: Consent of instructor. May be repeated with consent of department.

5510-20 Advanced Analog Electronics (3, 3, 3) Physical operation of modern electronic devices with emphasis on applications such as bipolar transistors, J-FETs, and MOSFETs. Small-signal equivalent circuits and noise models of active devices. Theory and design of linear, wide-band, low-noise feedback amplifiers and radio-frequency amplifiers using discrete, monolithic and hybrid devices. Transistors, FETs, bipolar transistors, and switching regulators. Use of specialized electronic systems in signal processing devices. Advanced topics in analog signal processing. Prereq: 4370. 4690, 4680, 4740 or consent of instructor. Coreq: Mathematics 4510 or 4710. Project laboratory included.

5540 Thick-Film Hybrid Microcircuits (3) Processing and basic design techniques for prototype production of hybrid thick-film integrated circuits; from circuit design through fabrication to final assembly and inspection. Coreq: Mathematics 4710 or equivalent.

5570-80-90 Advanced Electronic Switching Circuits (3, 3, 3) Switching circuits using active devices in discrete, monolithic, and hybrid configurations; clipping and clamping circuits, negative resistance circuits, comparators, time-base generators, sweep circuits, blocker and synchronizing switches, logic families, registers and counters, analog-to-digital and digital-to-analog converters, and digital memories. Prereq: 4700 or consent of instructor. Project laboratory included.


5615-25 Introduction to Switching Theory and Logic Design (3, 3) Boolean algebra and applications. Combinational switching circuits. Sequential machines. Information structures and sub-systems. For computer science majors and those without prior experience in hardware and logic design. Prereq: Elementary algebra; and calculus of several variables. 4 labs per quarter.


5670-80 Pattern Recognition (3, 3) Same as Computer Science 5840-80.

5690 Artificial Intelligence (3) Same as Computer Science 5210.

5710 Random Process Theory for Engineers (3) Probability and random variables as approached by mathematical methods. Analysis of control problems including load frequency and system reliability. Prereq: 4520. 45440 or consent of instructor.


5770 System Identification (3) Various identification schemes; deterministic, stochastic, and hierarchal methods in the areas of network analysis, system identification, and control. Prereq: Consent of instructor.

5800 Power Transmission Lines (3) New and unconventional power transmission systems. Transmission line parameters for overhead and underground lines. Corona and radio interference of high voltage transmission. Insulation coordination and protection. Design procedures for high voltage transmission. Prereq: 4410-20-30 or equivalent.

5810-20 Electromagnetic Fields (3, 3) Vector analysis, Maxwell's equations, special relativity, plane waves, reflections, waves in anisotropic media, guided waves, rectangular and cylindrical wave guides, radiation from current elements. Coreq: Mathematics 5101 or equivalent.

5830 Linear Antennas and Antenna Arrays (3) Hertzian dipole, linear antennas, impedance loop antennas, receiving antennas, linear arrays. Prereq: 5820.

5840 Aperture Antennas (3) Huygens principle, equivalent currents, Fourier transform and optical transfer function. Horn, lens, and reflector antennas. Prereq: 5820.

5850 Microwave Electronics (3) Space charge waves on electron beams, coupling between beams and guided waves. Klystrons, magnetrons, traveling wave amplifiers and backward wave oscillators. Prereq: 5820.

5860 Electromagnetic Wave Propagation (3) Waves in dielectric, gaseous and semiconducting media, transmitted power, stored energies, propagating and nonpropagating modes, orthogonal properties, bounces, bends and radiation conditions. Sources. Prereq: 5820.

5870 Introductory Microwave Networks (3) Circuit equivalents for n-port, junctions, obstacles, loading and scattering. One way and two way devices, directional devices, parameter measurement, reflection charts. Prereq: 5810. Coreq: 5820.

5930 Digital Image Processing (3) Theory and techniques. Visual system models, two dimensional sampled and integrated circuits, image coding, image processing, image segmentation and transforms, image enhancement, restoration, reconstruction, image coding techniques, image description, scene analysis and scene matching. Prereq: 4830 or consent of instructor.

5940-50 Advanced Small Computer Systems (3, 3) Real-time applications, memory and CPU organization, interface software, and peripheral devices of minicomputer and microprocessor system are studied. Project-oriented supported by hardware and software interface design. Prereq: 4850 or equivalent or consent of instructor. (Same as Computer Science 5940-50.)

6000 Doctoral Research and Dissertation (3-15) E

6240-50-60 Advanced Systems Theory I, II, III (3, 3, 3) Advanced topics in modern theory. Topics vary. Game theory, dual control problem, information structure and control, hierarchical systems, reliable control. Algebraic and geometric systems, theory, systems defined on groups. Qualitative analysis of, systems, nonlinear systems, stability theory. Need not be taken in sequence. Prereq: 5271-81-91 or consent of instructor.

6270-80-90 Special Topics in Systems Methodology (3, 3, 3) Advanced topics of current interest to system analysts and engineers. Discussion of new developments as found in current literature. Prereq: Consent of instructor.

6340-50-60 Special Topics in Quantum Electronics (3, 3, 3) Advanced topics in quantum electronics. Applications to other fields are emphasized. Prereq: 5340. Coreq: Mathematics 5610.


6500-10 Electrical Conduction in Gases and Plasma Physics (3, 3) Same as Physics 6500-10.

6650 Special Topics in Image and Pattern Analysis (3) Continuation of advanced topics as found in current literature. Prereq: 5670-80 (Computer Science 5640-50) and 5830 or consent of instructor.
Graduate programs leading to the degrees of Master of Science and Doctor of Philosophy with a major program in Engineering Science are intended to be of available to graduates of recognized curricula in engineering, mathematics, or one of the physical or biological sciences. Program options include solid mechanics, fluid mechanics and biomedical engineering. The biomedical and engineering science option, interdisciplinary programs are arranged to meet individual needs or interests. Each applicant will be advised as to any prerequisite courses before admission; the student's program of study must be approved by his/her advisory committee, and must comply with the requirements of The Graduate School. The student's major professor may be selected from a department other than the Department of Engineering Science and Mechanics.

A departmental application is required in addition to The Graduate School application. The names and addresses of four references must be included with the departmental application.

The flexibility and interdisciplinary aspect of the program options are intended to be of particular interest to prospective students currently employed in research, development, or design activities and whose interests in continuing education (either full-time or part-time) lie in the biomedical engineering area.

THE MASTER'S PROGRAM

Two M.S. plans are offered: Plan I requires a thesis, while Plan II does not. The second plan is designed to meet the needs of engineers employed in industry, or those who plan to teach in community colleges and technical institutes. It will be available, however, to any student who, in the opinion of his/her advisory committee, can benefit from additional coursework in a thesis. In Plan II a minimum of 45 quarter hours, including the thesis is required. In Plan II a minimum of 45 hours is required. The requirements include the following:

Professors:


Associate Professors:

R. J. Jendrucko, Ph. D., Virginia, P. E.; K. H. Kim, Ph. D., North Carolina State; W. Mathews, Ph. D., Illinois, P. E.; T. F. Monforty, Ph. D., Illinois, P. E.; W. E. Scott, Ph. D., Johns Hopkins; J. Wasserman, Ph. D., Cincinnati, P. E.

Assistant Professor:

O. Soliman, Ph. D., Tennessee.

Program plans

Two M.S. plans are offered: Plan I requires a thesis, while Plan II does not. The second plan is designed to meet the needs of engineers employed in industry, or those who plan to teach in community colleges and technical institutes. It will be available, however, to any student who, in the opinion of his/her advisory committee, can benefit from additional coursework in a thesis. In Plan II a minimum of 45 quarter hours, including the thesis is required. In Plan II a minimum of 45 hours is required. The requirements include the following:

Professors:


Associate Professors:

R. J. Jendrucko, Ph. D., Virginia, P. E.; K. H. Kim, Ph. D., North Carolina State; W. Mathews, Ph. D., Illinois, P. E.; T. F. Monforty, Ph. D., Illinois, P. E.; W. E. Scott, Ph. D., Johns Hopkins; J. Wasserman, Ph. D., Cincinnati, P. E.

Assistant Professor:

O. Soliman, Ph. D., Tennessee.

**Engineering Administration**

**5002 Non-Thesis Graduation Completion (3-15)**

Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

**5900 Project in Engineering Administration (3)**

Study and formal report of engineering administration in selected topics. Prerequisite: mathematics 5610. May be repeated. Maximum 3 credit hours may be applied toward degree. Must register for 5900 until project is complete. S/NC only. E

**Engineering Science and Mechanics**

**MAJOR**

**DEGREES**

M.S., Ph. D.
The qualifying examination will be administered by the department's Graduate Studies Committee. The examination will be written and will cover at least four graduate level subject areas. One subject area will be mathematics, and the others will be designated by the student subject to the approval of the department's Graduate Studies Committee.

The comprehensive examination is to be taken by students within six credit hours of completion of graduate course work required for the Ph.D. degree. This examination is to be administered by the student's advisory committee and shall consist of at least two written and oral portions.

After successfully passing the qualifying and comprehensive examinations, the student must present the Ph.D. dissertation research proposal to the student's advisory committee and obtain approval before being admitted to candidacy for the Ph.D.

8. A final examination on the student's dissertation and related fields will be taken by the student after completion of the Ph.D. dissertation and course requirements.

3311 Mechanics of Materials (4) Concepts of stress and strain; stress-strain relations and Mohr's circle; static analysis of members; area moment of inertia; stress concentration in axially-loaded members; torsion; bending. Not for graduate department credit. Prereq: Basic Engineering 1310. Coreq: Mathematics 2850.

3410 Introduction to Biomedical Engineering (4) Designed to introduce the facets and opportunities of biomedical engineering, and to provide basic terminology and background knowledge for further courses in the field. Subjects include anatomy, physiology, biomaterials, mathematical models of body systems. Coreq: Mathematics 2840 or consent of instructor.

3420 Introduction to Clinical Engineering (3) Applications in clinical/hospital setting; description, analysis, and design of health care delivery systems; history and evolution and structure; clinical use of biomedical equipment; principles of safety engineering in the hospital and applicable codes, standards and regulations. Prereq: 3410, Physics 2320, or consent of instructor.

3520 Materials Behavior and Chemical Process Design (3) (Same as Metallurgical Engineering 3520)

3700 Dynamics (4) Kinematics of rigid bodies; mass moments of inertia; coulomb friction; kinetics of rigid bodies using force, mass, acceleration, work, energy, impulse-momentum. Not for department graduate credit. Prereq: 2705 or Basic Engineering 1320. Mathematics 2840.

3710 Intermediate Dynamics (3) Three-dimensional dynamics of particles and rigid bodies; dynamics of bodies with varying mass; central force motion; LaGrange's equations. Prereq: 3700, Mathematics 2850.

4200 Computer-Aided Design (3) Use of computer graphics and computer assisted design programs for design of selected systems, structures, and components. Evaluation of design alternatives. Prereq: 4810.

4520 Biomedical Fluid Mechanics (3) Discuss objectives, review foundations and present developments in biomedical and fluid mechanics. Properties of human blood and blood vessels, determinants of cardiac performance, analysis and measurement of flow through arteries, noninvasive study of circulatory system, mechanics of microcirculation. Applications to areas of hemolysis, hemorhoids, and fluid flow in arteries, veins, and other biological vessels. Prereq: 4500 or a course in fluid mechanics or consent of instructor.

4530 Biomechanics (3) Discuss objectives, review foundations and present developments in areas of mechanical properties of living tissues, biomechanics of injury and amputation, mechanics of prosthetic devices and biomechanical problems related to impact. Prereq: 3311 or 4500 or consent of instructor.

4540 Fracture-Safe Design (3) A critical review of mechanical properties of materials that are indicative of fracture resistance, including transition temperature, Re-curves, stress intensity factors, and J-integrals; the use of these properties in design. Prereq: 3310 and Metallurgical Engineering 2110. (Same as Metallurgical Engineering 4540.) 3 hrs or 2 hrs and 1 lab.

4580 Principles of Nondestructive Testing (3) (Same as Physics 4580.)

4610 Experimental Stress Analysis (3) Basic concepts; theory, techniques, and instrumentation of strain gauge, deflection, strain, and electrical methods; interpretation of stress analysis methods. Prereq: 3310, Electrical Engineering 4810. 3 hrs or 2 hrs and 1 lab.

4620 Dynamic Data Acquisition (4) Instrumentation of measuring systems for dynamic events and responses; signal conditioning; oscillographs, oscilloscopes, and magnetic tape recording; telemetry and data transmission; data processing. Prereq: 3311, 4710, Electrical Engineering 3120. 3 hrs and a 3-hr lab.

4630 Introductory Photomechanics (3) Introduction to photomechanics; photoelastic coating materials; Moire method, interferometry, and holography. Prereq: 3310, Physics 2320; 2 hrs and a 3-hr lab.

4710 Fundamentals of Vibrations (3) Free and forced vibrations of damped and undamped lumped parameter systems; energy methods. Prereq: 2720, Mathematics 2840.


4810-20 Engineering Analysis (4, 3) Integration of fundamental physical laws and mathematical methods of analysis with emphasis on application to realistic engineering problems. Prereq: 3110, 3311, and Mathematics 3150.

4850 Elementary Structural Matrix Methods (4) (Same as Architecture 4850 and Civil Engineering 4850.)

4910 Special Engineering Science Topics (3) Problems related to recent developments and practice. Open to juniors or seniors with consent of instructor. May be repeated. Maximum 6 hrs.


5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during the semester(s) in which the student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E 2000-4500.

5110-20 Fluid Dynamics (3, 3) Kinematics of fluids, vorticity, rate deformation, plane and axially symmetric stream functions; Navier-Stokes equation, exact solutions, solving flow and boundary-layer approximation; nonviscous flow, potential theory, complex potentials, conformal mapping. Prereq: 5800.

5130 Introduction to Turbulence (3) Macroscopic effects, analogies, statistical treatment, correlation functions, history of Langmuir's discovery, application of turbulent jets and pipe flow. Prereq: 5800.

5140 Finite Element Methods in Fluid Mechanics (3) Computational fluid mechanics using finite element techniques; matrix interaction; accuracy and convergence concepts. Laminar and turbulent boundary layer flows, inviscid and aerodynamic flows; incompressible viscous flows with separation and recirculation. Prereq: 5110 and 5860.

5180 Finite Element Structural Analysis (3) (Same as Civil Engineering 5180.)

5220 Mechanics of Viscous Flow (3) Viscous flows in fluid phenomena; application of Navier-Stokes equations; numerical methods of solutions; stress-optic methods of laminar flow analysis. Prereq: Mathematics 4610. (Same as Chemical Engineering 5810.)


5410-20 Theory of Elasticity (3) Stress, strain in three dimensions; torsion and bending of prismatical bars; axisymmetric stress distribution; stress concentration; plane stress, plane strain. Prereq: 5800.

5430 Thermal Stresses (3) Heat conduction; thermoelectric equations; thermal stresses in beams, rings, plates, and shells; thermal buckling problems. Prereq: 5410 or 5310-20-30, and Mechanical Engineering 3440.

5440 Theory of Linear Viscoelasticity (3) Linear viscoelasticity of solids; quasistatic problems; vibroacoustic problems; dynamic problems; stability problem; time-dependent stress-strain, three-dimensional linear viscoelasticity. Prereq: 5800.


5630-40 Photoelasticity (3) Physical optics, wave motion, polarization of light, basic principles of photoelasticity, equipment, and techniques; application to two-dimensional elasticity and stress concentration, numerical methods in photoelastic stress analysis, photographing systems, photoelastic plates, three-dimensional photoelasticity. Prereq: 3311, Mathematics 4610, and consent of instructor. 5640: 2 hrs and 3 labs.

5710-20 Advanced Dynamics (3, 3) Physical laws relating to rigid bodies and dynamical systems; rigid body dynamics; variational methods; Lagrange's equations; Hamilton's principle. Prereq: 3710 or 4710, Mathematics 4610.

5730 Advanced Vibrations (3) Vibrations of multiple degree of freedom lumped parameter systems. Iterative and approximate solutions. Introduction to random vibrations. Prereq: 4710 and 4850.

5740 Vibrations of Continuous Media (3) Equations of motion for strings, rods, beams, membranes, plates, and shells; natural modes and frequencies; response of damped and undamped components to applied dynamic loads; approximate methods of solution. Prereq: 5410 and Mathematics 4650.

5750 Orbital Mechanics (3) Planetary, satellite, and astronomical orbits and trajectories; orbital perturbations; classical principles of minimization. Prereq: 3710 and 4710.

5800 Introduction to Continuum Mechanics (3) Fundamentals of mechanics of solids and fluids; Cartesian tensors; stress, deformation, and flow in continuous medium; constitutive equations, applications to solids and fluids. Prereq: 3310 and 3311 or equivalents, Mathematics 4610.


5850 Introductory Finite Element Methods (3) General finite element procedure; convergence requirements; programming concepts. Stress analysis, heat transfer, flow, and solution of differential equations. Prereq: 5800 or 5310, or Mechanical Engineering 5540, or consent of instructor.

5910 Special Topics in Engineering Mechanics (3) Mechanics problems related to recent developments. Prereq: Consent of instructor. May be repeated with consent of department.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E 2000-4500.
6110-20 Advanced Topics in Fluid Mechanics and Convective Transfer (3, 3) Survey of literature on advanced convective momentum, heat, and mass transfer; boundary layer theory based on the Navier-Stokes equations; boundary layer stability analysis; phenomenological theories of turbulence; turbulent boundary layer flow; high speed flow of phenomena in nonreacting and reacting systems. Prereq: 5110-20-30 or equivalent; Mathematics 4510, 4540-50, 4720. (Same as Environmental Engineering 6110-20.)


6310 Theory of Plates (3) Classical theory of bending of plates of various shapes; thick plate; plates of variable thickness; buckling and large deflection problems. Prereq: 5030.

6320 Analysis and Design of Thin Shell Structures (3) Geometries of surfaces, design of thin shell theory, and applications of theory for structural engineer. Prereq: 6310. Coreq: Civil Engineering 5160.


6340 Theory of Plasticity (3) Yield conditions; strain hardening; general constitutive equations; plastic potential, uniqueness theorems; extremum principles; principles of perfectly plastic solids; finite plastic deformations; piecewise linear plasticity. Prereq: 5410 and Mathematics 4550.

6610 Photoelasticity (3) Stress-optic law in three dimensions and index ellipsoid, rotational effects in three-dimensional photoelasticity, techniques and approximation methods for photoelasticity, scattered light method, dynamic photoelasticity, photothermoelasticity, photoplasticity and photoviscoelasticity, recent developments in photoelasticity. Prereq: 5640, 5420 and consent of Instructor. 2 hrs and 3 labs.


6800 Nonlinear Viscoplasticity (3) (Same as Polymer Engineering 6210.)


6910 Special Topics in Engineering Mechanics (3) Advanced problems of interest in mechanics, worked either as group or individually. Prereq: Consent of instructor. May be repeated with consent of department.

NOTE: Not all of the above courses will be offered in any one year.

Industrial Engineering

MAJOR

DEGREES

M.S., M.E.

Professors:


Associate Professors:

W. W. Claycombe, Ph.D. Virginia Polytechnic Institute, P.E.; D. H. Hutchison, Ph.D. Virginia Polytechnic Institute; D. H. Hutchison, P.E. Georgia Institute of Technology.

Assistant Professors:


THE MASTER'S PROGRAM

A graduate program leading to the degree of Master of Science is open to graduates of A.B.E.T.-accredited undergraduate curricula in industrial engineering or to graduates of other technical curricula who take an approved list of prerequisite course work. A non-thesis option with 45 hours of course work plus a 3-hour design project is available.

Graduate work in Industrial Engineering provides for concentrations in operations research, engineering management, manufacturing systems, human factors engineering, information systems, reliability and quality control, and traditional industrial engineering. Either one or two minors can be elected in Engineering, Mathematics, Psychology, Business, Computer Science, Statistics or Economics.


This professional degree program is intended as a culmination year in a five-year baccalaureate-master program which emphasizes engineering design and professional practice. Admission requirements include those presented above plus the requirement of a Bachelor's degree from an A.B.E.T.-accredited engineering program. This 45-hour program requires 18 hours of course work in an industrial engineering core, 9 hours of technical electives, 9 hours of industrial engineering design electives and 9-hour thesis or design project.

Any 4000-level course required in the Bachelor of Science in Industrial Engineering program at The University of Tennessee may not be used for graduate credit in the M.S. or M.E. graduate program in Industrial Engineering.


4060 Production Systems Planning and Control I (3) Theory and applications of forecasting, capacity and materials planning, production systems design and inventory control. Prereq: 3510-20. Available for graduate credit for industrial engineering students.

4070 Production Systems Planning and Control II (3) Theory and application of master scheduling, materials requirements planning systems, lot sizing and safety stocks, distribution requirements planning. Prereq: 4060.

4080 Forecasting Methods in Industrial Engineering (3) Application of technological forecasting techniques to industrial engineering problems. Includes predicting moving averages and exponential smoothing, linear and polynomial regression models, autocorrelated time-series analysis, Delphi methods and other selected industrial forecasting methods. Prereq: 4060.

4150 Project Control with CPM and PERT (3) A study of project planning and control based primarily on "critical path" techniques, including resource allocation and time-phased control charts. Prereq: Consent of instructor, project control, and computer programs. Prereq: 4150.

4160 Materials Handling (3) Analysis and planning for the overall problem of moving, packaging, and storing of materials; equipment selection and design; cost analysis. Prereq: 4520 and Engineering Science and Mechanics 3310. Not available for graduate credit for industrial engineering students.

4200 Production Facilities Design (4) Materials handling, plant layout, service areas, inventory control applications, and operating procedures design. Prereq: 3510-20, 4060, 4520.

4230 Scheduling Systems (3) Performance measures for job shop and flow shop scheduling, including both static and dynamic conditions, as well as techniques for generating production schedules. Deterministic and probabilistic dispatching conditions. Prereq: 3520.

4250 Work Measurement Applications (3) Application of learning curves, queuing theory, standard dynamic methods and incentive systems to the design of industrial work situations.

5200 Engineering Economy (3) Methods and problems in selection or replacement of equipment. Decisions among engineering alternatives, involving capital recovery, economic life of equipment, and rate of return on investment. Not available for graduate credit for industrial engineering students.

5300 Case Studies in Engineering Economy (3) Extension of basic engineering economy principles and methods to practical problems as they apply to actual problems faced by competitive firms and regulated industries. Case studies taken from literature form basis of classroom discussion. Out-of-class assignment is made which involves working with local companies to evaluate make or buy options, leasing versus cash purchases, equipment replacement studies, energy source economies. Prereq: 4520.

5450 Industrial Development (3) Factors other than mechanical or chemical which enter into successful establishment of manufacturing enterprise. Cost and location studies and market analysis to determine the commercial feasibility of new plants or projects.


5600 Predetermined Time Systems (3) Work design and measurement using predetermined time systems; methods that measure tasks, basic motion time-study, or work factor. Theory and application. Prereq: 3630.

5610 Human Factors in Work Design II (3) Human capabilities and limitations affecting work place lay outs, working environments, design of tools and equipment, and communications and response in human-machine systems. Prereq: 3660, 3630, or consent of instructor.

5830 Health Systems Engineering (3) Hospital management systems and means by which they may be improved through application of modern industrial engineering principles and techniques.

8700 Mini-Computer Applications in Industrial Engineering (3) Introduction to current mini-computer and human-computer interfaces; emphasis on small computers as element of larger system; applications and human-computer interfaces; emphasis on small computers in solving industrial engineering problems. Prereq: Senior standing.

910-20-30 Special Industrial Engineering Topics (3, 3, 3) Prereq: Consent of instructor. May be repeated.

4850 Industrial Safety (3) Development of organization and programs for prevention and control of
accidents with emphasis on OSHA Rules and Regulations.

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

5020 Non-Thesis Graduation Completion (3-15) Required for the nonthesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree completion. May not be used toward degree requirements. May be repeated. S/NC only. E

5110 Work Design (3) Advanced methods analysis of design and improvement of work systems, human factors, workers' response and management participation. Prerequisite: Motion and time study or work methods and design.

5210 Advanced Work Measurement (3) Characteristics of predetermined time systems, application to formula construction, and practice in application. Prerequisite: 3600 or 3620.

5240 Facilities Planning and Design (3) Modern materials handling techniques, computer-aided layout techniques, applications of operations research models, and use of these to design manufacturing facility. Prerequisite: Production facilities planning or consent of instructor.

5250 Advanced Scheduling (3) Scheduling problems for time dependent and Markov dependent systems. Application, analysis, and development of heuristic procedures for scheduling. Emphasis on objectives and costs of scheduling. Prerequisite: 4230.

5260 Information Systems Design (3) Systems engineering approach to information systems design. System model, analysis, and evaluation of information systems, information objectives and design criteria. Optimization and simulation in system design.

5280 Production and Inventory Systems (3) Application of OR techniques to production and inventory systems, closed form solutions, search heuristics, and use of available computer codes. Prerequisite: 5700. Coreq: 5710.

5340 Applied Decision Theory (3) Application of theory of decision making to problems in industrial engineering. Decision making under conditions of incomplete information. Bayesian and Neyman-Pearson statistical decision models, utility functions, value of information, linear and quadratic loss analysis and parallel and sequential decision processes. Prerequisite: Statistics 3450.

5360 Statistical Methods in Industrial Engineering (3) Sampling distributions and theory of estimation and hypothesis testing. Emphasis on application to industrial engineering. Prerequisite or consent of instructor.

5420 Reliability Engineering (3) Reliability concepts, failure distribution, equipment reliability, time dependent and Markov dependent systems. Maintenance data analysis and replacement problems. Prerequisite: Statistics 3450.


5600 Human Factors Engineering (3) Human characteristics which influence design of tools, equipment, and products. Modeling of human behavior for system control. Prerequisite: Consent of instructor.

5610 Human Factors Engineering (3) Human operator, performance characteristics, and environmental requirements. Formal description of human operator by mathematical or psychological models and models describing operator as informa-

5700 Optimization Methods in Industrial Engineering (3) Operations research. Analytical tech-

5701 Operations Research Applications (3) Survey of operations research techniques with emphasis on application to industrial engineering problems. Prerequisites: Mathematics 2860 (or equivalent), Statistics 3450, computer programming. Available for credit only to students without a B.S. degree in industrial engineering.

5710 Linear, Quadratic and Stochastic Programming (3) Mathematical programming: linear programming, quadratic programming, and separable programming. Computer solutions to programming problems. Prerequisite: Computer Science 3150 and matrix algebra.

5720 Queuing Models and Simulation (3) Theory and application of waiting line models and simulation methods employed to evaluate complex queueing systems. Data analysis and hypothesis testing related to pertinent waiting line probability density functions. Prerequisites: 5700, 5360.

5730 Game Theory and Random Processes (3) Operations research. Analytical techniques for applications to decision making in competitive environment, and random processes to queueing, inventory models and decision making. Prerequisite: 5360.

5810 Theory of Industrial Automatic Control (3) Industrial control systems. Modes analysis with Laplace and Z-transforms. Compensation techniques, using root-locus and Bode plots, simulation; roles of state variables as aid in model synthesis. Prerequisite: 4170.

5830 Health Systems Engineering II (3) Health systems for analysis and improvement of function and total health system. Prerequisite: 4830.


5860 Dynamic System Simulation (3) Development and use of models for computer simulation of dynamic systems. Simulation techniques in systems design. Prerequisite: 4590 and Computer Science 3150.

5900 Design Project (1-9) Industrial engineering topical course to fulfill design project requirement in nonthesis program. Enrollment limited to industrial engineering students. May be repeated. Maximum 9 hrs. S/NC only.

5910-20-30 Special Topics in Industrial Engineering (3, 3, 3) Special topics for students qualified to do individual or group research projects. Prerequisite: Consent of instructor. May be repeated. Maximum 9 hrs.


6520 Operations Research Models in Engineering (3) Traditional capital planning and budgeting techniques; operations research approaches to capital budgeting problems. Mathematical programming and computer simulation. Interrelated projects, uncertain cash flows, and choice of appropriate evaluation criteria. Prerequisite: 5520, 5710.

6730 Dynamic Programming (3) Solving multi-stage optimization problems as sequence of single-stage optimization problems. Computational and theoretical aspects of dynamic programming. Decision making under certainty and risk. Prerequisite: 5700.

6740 Advanced Topics in Optimization of Dynamic Systems (3) Multi-stage optimization theory. State dependent dynamic programming, adaptive optimization theory, and other selected topics. Prerequisite: 5730.

6910 Advanced Topics in Industrial Engineering (3) Will cover topics not covered in other graduate courses. A forum for advanced graduate students to study individually or in groups as appropriate. Prerequisite: Graduate standing and consent of instructor. May be repeated with consent of department.

1Alumni Distinguished Service Professor.
2Space Institute, Tullahoma.
student's advisor will assist in planning the program of study to ensure that it includes the necessary design content.

MASTER OF SCIENCE PROGRAMS

Entrance into the Master of Science programs is available to qualified graduates of recognized undergraduate curricula in mechanical or aerospace engineering and to qualified graduates of other curricula who satisfy the necessary prerequisites.

MASTER'S PROGRAM OPTIONS

Three program options are available:

A. The Thesis Option. The requirements of this option are that the student must satisfactorily complete a program of study that includes:
1. A minimum of 36 quarter hours of course work which includes at least 18 quarter hours of graduate (5000-level or above) courses in mechanical and/or aerospace engineering and normally 9 quarter hours of course work (4000-level or above) in mathematics.
2. A minimum of 9 quarter hours of credit in thesis.
3. Participation in the departmental seminar program.

B. The Course Option. Normally, this program is restricted to those students who have had significant engineering work experience. The evaluation of the work experience and the final selection of the student's program of study are left to the student's committee. The requirements of this option are that the student must satisfactorily complete a program of study that includes:
1. A minimum of 45 quarter hours of course work which includes at least 27 quarter hours of graduate (5000-level or above) courses in mechanical and/or aerospace engineering and normally 9 quarter hours of course work (4000-level or above) in mathematics. No more than 3 quarter hours of engineering course work may be below the 5000 level.
2. Participation in the departmental seminar program.
3. Passing a comprehensive written final examination on all work submitted for the degree.

C. The Problems Option. The requirements of this option are that the student must satisfactorily complete a program of study that includes:
1. A minimum of 36 quarter hours of course work which includes at least 18 quarter hours of graduate (5000-level or above) courses in mechanical and/or aerospace engineering and normally 9 quarter hours of course work (4000-level or above) in mathematics.
2. A minimum of 9 quarter hours credit in Selected Engineering Problems (5900). A written report must be submitted for each problem investigated.
3. Participation in the departmental seminar program.
4. Passing a comprehensive written final examination on all course work submitted for the degree and an oral examination of all work (including problems) submitted for the degree.

THE DOCTORAL PROGRAM

Admission into the doctoral program will be granted to those applicants who have demonstrated superior achievement in their engineering backgrounds.

The student must satisfactorily complete an approved program of study which normally includes:
1. A minimum of 72 quarter hours credit beyond the Bachelor's degree, exclusive of credit for the M.S. thesis or problems.
2. A minimum of 36 quarter hours of credit in doctoral dissertation.
3. A minimum of 18 quarter hours in mechanical and/or aerospace engineering courses numbered 5000 and above, with at least 12 quarter hours of 6000-level courses. These are exclusive of thesis, problems or dissertation credit.
4. Participation in the departmental seminar program.

GRADUATE CREDIT FOR UNDERGRADUATE COURSES

Junior (3000-level) and senior (4000-level) mechanical and aerospace engineering courses may be taken for graduate credit by non-mechanical or non-aerospace engineering majors, if approved by the student's major department. Mechanical or aerospace engineering majors may not normally use more than one 4000-level aerospace engineering course to meet their advanced degree requirements. Non-mechanical or non-aerospace engineering graduate students should consult with instructors regarding prerequisites for undergraduate courses.

Mechanical Engineering

3000 Energy—An Overview (4) Introduction to available energy resources, recovery and utilization; power generation technologies including conservation schemes; emphasis on the resources-environment-human interaction associated with energy; primarily for non-engineering students.
3110 Applied Engineering Thermodynamics (3) Energy and laws governing energy transformations; thermodynamic properties; applications to engineering problems.
3311 Engineering Thermodynamics (3) Energy and laws governing energy transformations; thermodynamic properties and applications to mechanical engineering problems.
3339 Engineering Thermodynamics (3) Properties of gases and mixtures; chemical reactions; equilibrium; applications to mechanical engineering problems.
3410 Fluid Mechanics (3) Development of continuity, momentum and energy principles for fluid systems; applications of mechanical and aerospace engineering problems.
3520-36-49 Thermal Sciences (3, 3, 3) Fundamental principles of thermodynamics and transport phenomena as applied to engineering design. To be taken in sequence.
3610 Mechanics of Machinery—Kinematics (3) Machine motions, graphical and analytical methods; instantaneous velocities, accelerations.
3620 Mechanics of Machinery—Dynamics (3) Applications of Newton's laws, work, energy, and impact to machinery. Force analysis of mechanisms, balancing, gyroscopic effects, flywheels. Prereq: 3610.
3650 Introduction to Machine Design (3) Dull-brute behavior of materials under static and cyclic loading. Stress concentrations, factors and theories of failure. Changes in material behavior in processing and fabrication. 2 hrs. and 2-1/2 hr. lab.
3910 Engineering Analysis (3) Advanced analysis techniques for problems of aerospace and mechanical engineering. Emphasis on approximate methods.
4140 Energy Conversion Systems (3) Operating and design characteristics including new technology development; selected direct conversion techniques.
4150 Energy Conversion Systems (3) Fossil fuel systems with emphasis on coal technology.
4180 Design of Energy Conversion Systems (3) Synthesis and design of system including economic and technical aspects. Participation in team design effort including formal presentations and design report.
4170 Turbo-Machinery (3) Basic principles of turbo-machinery; systematic methods or analysis, design, performance evaluation.
4180 Energy Production and Utilization (5) Thermodynamics constraints on energy production; comparison of power generation methods; evaluation of new energy sources and concepts; energy conservation schemes.
4220 Environmental Noise (3) Basic principles of acoustic—measurement and control of noise in industrial and community environments.
4420 Heat Transfer (3) Heat transfer by free and controlled convection, heat transfer with phase changes, heat exchanger applications.
4450 Lubrication (3) Hydrodynamic theory of lubrication of sliding bearings; application of Navier-Stokes equations to infinite and finite bearings; analytical and numerical solutions; applications to design and theory.
4471-91 Experimental Mechanical Engineering (3, 3) Experimental methods and measurements of force, length, time, temperature, pressure, transport rates, and physical properties. Planning, conducting, analyzing, and reporting experimental tests run according to test standards and other specifications.
4510 System Dynamics (4) Analytical models of physical systems, linearization, Laplace transforms, dynamic characterizations and stability of systems, numerical simulations, and analog computer solutions. Not for departmental graduate credit.
4520-30 Creative Design (3, 3) Application of engineering principles to the solution of current problems with emphasis on design innovation.
4621 Manufacturing Processes (3) Comparison of machining methods; plastic production; metrology.
4622 Tool Design (3) Principles underlying tool and die design, design of high-volume production tools and molds, work holding fixtures.
4624 Manufacturing Engineering Systems Design (3) Design of complete manufacturing systems for a particular product; manufacturing planning, tool and fixture design, selection of manufacturing operations, redesign of product to reduce costs.
4625 Manufacturing Process Engineering I (3) Production specification and functional analysis of size and form; true position tolerance theory; tolerance analysis; and workpiece control for production to tolerance.
4631 Energy Methods in Mechanical Design (3) Application of strain energy principles in complex beams and structures.
and method of storage; selected applications. Transfer topics pertinent to solar energy collection of heating ventilation and air conditioning systems.

4720 Thermal Environmental Systems (3) Design of heating ventilation and air conditioning systems.

4740 Solar Energy Utilization (3) Nature and availability of solar energy; review of selected heat transfer topics pertinent to solar energy collection and use; design analysis of solar energy collectors and field properties. Prereq: Consent of instructor.

4810 Internal Combustion Engines (3) Thermochemical phenomena in internal combustion and propulsion engines. Combustion, detonation, equilibrium, dissociation. Analysis of internal combustion engines using ideal and real fluids. Prereq: Consent of instructor.

4910-20 Selected Topics in Mechanical Engineering (3, 3) Problems related to developments and practice in mechanical engineering. Prereq: Consent of instructor.

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

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

5110 Conduction Heat Transfer (3) Analysis of steady state and transient heat transfer by analytical and numerical techniques. Prereq: 3910, 4420 and Mathematics 5150.

5120 Convection Heat Transfer (3) Equations of viscous fluid flow, energy equation, convection analysis of internal and external flows including effects of variable heat flux, surface temperature, and fluid properties. Selection and design of heat exchangers. Prereq: 3910, 4420.


5140 Phase Change Heat Transfer (3) Fundamental mechanisms, modeling and prediction of nucleate, transition and film boiling; critical heat flux; forced convection boiling and post-dry-out heat transfer. Prereq: 3910, 4420. Prereq: 3910, 4420 and Pressure drop; condensation heat transfer. Prereq: 5120 or consent of instructor.

5210 Classical Thermodynamics (3) Macroscopic thermodynamics with emphasis on First and Second Law analyses, equilibrium criteria, and thermodynamics of phase relationships. Prereq: 3330.

5220 Microscopic Thermodynamics (3) Thermodynamic properties of solids, liquids, gases and statistical mechanics. Prereq: 5210.

5230 Special Topics in Thermodynamics (3) Prereq: Consent of instructor.

5310 Intermediate Fluid Mechanics (3) Vector descriptions in fluid mechanics: derivation of basic equations; two dimensional potential flows; viscous flows with emphasis on boundary-layer theory. Prereq: 3410.


5410-20-30 Research in Mechanical Engineering (3, 3, 3) Design of experiments; data analysis; experimental investigation.

5510-20-30 Mechanical Engineering Design (3, 3, 3) Design of mechanical engineering units and systems. Prereq: Consent of instructor.


5601 Dynamics of Mechanical Systems (3) Computational techniques derived from Lagrangian mechanics and kinematic principles applied to complex mechanical systems. Prereq: 4831 or consent of instructor.

5602 Computer Aided Mechanical Design (3) Application of computer aided design to structural analysis and design in the static and dynamic analysis and redesign of complex, three dimensional, statically indeterminate structures. Prereq: Consent of instructor.

5610-20-30 Experimental Stress Analysis (3, 3, 3) Theory of elasticity; experimental methods; photoelasticity, strain gages, lacquer coatings. Prereq: 3650.


5670-80 Dynamics of Machinery (3, 3) Kinematics and kinetics; fixed, moving, and rotating coordinate systems; linear and angular momentum; energy methods; variable mass; rigid body dynamics; Lagrangian methods. Prereq: 3650, 3910.

5690 Vibrations of Mechanical Systems (3) Free and forced vibrations of single and multi degree of freedom systems; linear and nonlinear. Prereq: 3630.

5710 Metal Machining (3) Analytical approach to mechanics of machining. Basic phenomena-plastic flow, friction, and wear. Prereq: 3650, 3440, and Metallurgical Engineering 2110.


5810-20-30 Rockel Propulsion System (3, 3, 3) Rocket propulsion fundamentals. Chemical, electrical and nuclear propulsion systems.

5840-50-60 Turbomachinery Systems (3, 3, 3) Design, development, and systems integration of turbo-engine components. Prereq: First year graduate standing and consent of instructor.

5870 Dynamic Modeling and Simulation (3) Modeling physical systems including mechanical, thermal, hydraulic, pneumatic and electromechanical systems. Techniques for experimentally determining system parameters. Analog and digital computer simulation techniques. Prereq: 3630, 4420, and Aerospace Engineering 3511.

5900 Selected Engineering Problems (3-9) Selected problems in mechanical engineering to fulfill requirement of Problems Program. Enrollment limited to Mechanical Engineering Program. Prereq: Consent of advisor. May be repeated. S/NC only.

5950 Seminars (1) All phases of mechanical engineering, including reports on current research at The University of Tennessee, Knoxville. May be repeated. S/NC only.

5990 Special Topics in Mechanical Engineering (1-3) May be repeated.

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

6110-20 Advanced Topics in Fluid Mechanics and Heat Transfer (3, 3) Advanced theory and applications of fluid mechanics and heat transfer; natural convection, two-phase flows, high speed reacting and non-reacting flows, advanced boundary layer theories. Prereq: Consent of instructor.

6130-40 Advanced Radiation Heat Transfer (3, 3) Radiation heat transfer in absorbing, emitting and scattering media: interaction of thermal radiation with conduction and convection heat transfer; radiation heat transfer in hypersonic flow; radiative characteristics of luminous flames and nonuniform gases; scattering by planetary atmospheres. Prereq: 5110-30; Mathematics 4550.

6420 Selected Topics in Thermodynamics (3) Comparison of macroscopic and microscopic approach; equilibrium of pure substance; metastable states. Prereq: Consent of instructor.

6430 Selected Topics in Thermodynamics (3)

6610 Engineering Vibrations (3) Mechanical transmission and motion, and linear single degree of freedom systems. Prereq: Consent of instructor.

6610 Engineering Vibrations (3) Mechanical transmission and motion, and linear single degree of freedom systems. Prereq: Consent of instructor.

Aerospace Engineering

5610 Dynamics (3) Newton's Law: work-energy impulse-momentum, Lagrange equations, central force, gyroscopic effects. Applications to aerospace systems.

5620 Mechanical Vibrations (3) Free and forced vibrations of single and multiple degree of freedom systems, balancing of rotating machinery.

5630-40 Structural Analysis of Aerospace Vehicles (3, 3) Fundamentals of structural analysis as applied to configurations of aerospace interest. Introduction to aeroelasticity phenomena. Must be taken in sequence.


5820 Propulsion (3) Principles of propulsion devices; rocketjet, ramjet, and scramjet engines. Prereq: Consent of instructor.

5840-50-60 Turbomachinery Systems (3, 3, 3) Design, development, and systems integration of turbo-engine components. Prereq: First year graduate standing and consent of instructor.

5870 Dynamic Modeling and Simulation (3) Modeling physical systems including mechanical, thermal, hydraulic, pneumatic and electromechanical systems. Techniques for experimentally determining system parameters. Analog and digital computer simulation techniques. Prereq: 3630, 4420, and Aerospace Engineering 3511.

5900 Selected Engineering Problems (3-9) Selected problems in mechanical engineering to fulfill requirement of Problems Program. Enrollment limited to Mechanical Engineering Program. Prereq: Consent of advisor. May be repeated. S/NC only.

5950 Seminars (1) All phases of mechanical engineering, including reports on current research at The University of Tennessee, Knoxville. May be repeated. S/NC only.

5990 Special Topics in Mechanical Engineering (1-3) May be repeated.

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

6110-20 Advanced Topics in Fluid Mechanics and Heat Transfer (3, 3) Advanced theory and applications of fluid mechanics and heat transfer; natural convection, two-phase flows, high speed reacting and non-reacting flows, advanced boundary layer theories. Prereq: Consent of instructor.

6130-40 Advanced Radiation Heat Transfer (3, 3) Radiation heat transfer in absorbing, emitting and scattering media: interaction of thermal radiation with conduction and convection heat transfer; radiation heat transfer in hypersonic flow; radiative characteristics of luminous flames and nonuniform gases; scattering by planetary atmospheres. Prereq: 5110-30; Mathematics 4550.

6420 Selected Topics in Thermodynamics (3) Comparison of macroscopic and microscopic approach; equilibrium of pure substance; metastable states. Prereq: Consent of instructor.

6430 Selected Topics in Thermodynamics (3)

6610 Engineering Vibrations (3) Mechanical transmission and motion, and linear single degree of freedom systems. Prereq: Consent of instructor.
perceptions and maneuvers; theory and design of control surfaces; stability.

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

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

5110 Fundamentals of Aerodynamics (3) Kinematics and dynamics of perfect fluids; potential flow about a body; conformal mapping; hodographs. Prereq: 4220 or Mechanical Engineering 5310. Mathematics 4250.

5120 Experimental Methods in Fluid Mechanics (3) Experimental techniques with laboratory experiments: hot wire anemometry and turbulence measurements, flow visualization, wind tunnel tests (supersonic and subsonic), water table experiments, supersonic flow measurements, boundary-layer measurements. Prereq: 4210-20 or Mechanical Engineering 5310.

5150-60-70 Air Vehicle Aerodynamics and Performances (3, 3, 3) Application of aerodynamics to air vehicles to provide estimates of performance, stability, and control characteristics for subsonic to hypersonic speeds. Relationships among thrust, drag, lift and altitude. Propulsion systems, vehicle performance characteristics, and trajectory optimization. Prereq: 4220.

5210-20 Aerodynamics of Compressible Fluids (3, 3) One-dimensional flow; waves, small-perturbation theory, slender body theory; similarity rules; method of characteristics. Prereq: 4210 for 5210, and 5210 for 5220.

5240 Dynamics of Viscous Fluids (3) Equations of viscous fluid flow; laminar and turbulent flow; transition to turbulence; boundary layer theories; exact and approximate solutions. Prereq: Mechanical Engineering 5310 or equivalent.

5250 Introduction to Hypersonic Flow (3) Slender body flow; hypersonic flow, blunt body flow; viscous interactions; free molecule and rarefied gas flow. Prereq: 5240.

5260 Selected Topics in Aerodynamics (3) Transonic, supersonic, and hypersonic flow theories. May be repeated. Maximum 9 hrs.

5270-80-90 Aerospace Ground Test Facilities (3, 3, 3) Aerosol models and similarity considerations. Aerospace test facilities including wind tunnels, drop tower, ballistic range, high speed rocket propulsion test facilities for air breathing and rocket engines. Space environment. Theoretical and practical considerations of space environment test facilities. Prereq: 5240, Mechanical Engineering 5130 and 5230.

5310 Magneto-hydrodynamics (3) Electromagnetic field theory; chemical kinetics, thermodynamic and theoretical field of aerodynamics; nuclear propulsion equations and applications. Prereq: 4220 and Mathematics 4710.

5340-50 Atmospheric Entry (3, 3) Motion and heating along ballistic and lifting trajectories; dynamic stability; heat protection systems. Prereq: 5220. Recommended: 5240.

5440-50 Transonic Flow (3, 3) Theoretical and experimental aspects. 5440—Nature of flow at transonic speeds; inviscid and viscous flow, pitch and roll and roll stabilization; control surfaces. Prereq: 4230 and 5530.

5560 Vertical or Short Take-Off and Landing Aircraft (3) Effects of lift and control surfaces on performance and inherent stability and control of rotary wing, tilt wing, vectored lift and jet vertical riser type aircraft. Problems encountered in vertical and transition flight modes. Separation and boundary layer development and flight testing. Lift high airflow. Automatic controls. Prereq: 5550.

5570 Aerospace Vehicle Flutter and Vibration (3) Dynamic stability and control. Applications to missiles. Prereq: 4230 and 5530.


5610 Applied Acoustics (3) Static sound propagation in nonhomogeneous moving medium, sound waves due to heat, shock, sound, pseudosound, propagation and absorption of sound in ducts, instrumentation and measuring techniques. Prereq: Consent of instructor.

5620 Aeroacoustics I (3) Special topics and recent research in field of aeroacoustics. Turbo-jet machinery, noise jet, and general theoretical developments, empirical equations. Prereq: 5610.


Nuclear Engineering

MAJOR

DEGREES

MAJOR IN NUCLEAR ENGINEERING

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

Nuclear Engineering

Professors:

P. F. Paqua (Head), Ph.D. Northwestern, P.E.; H. L. Dodds, Ph.D. Tennessee, P.E.; J. B. Fussell, Ph.D. Georgia Institute of Technology; T. W. Kerlin, Ph.D. Tennessee; J. T. Mihalacu, Ph.D. Tennessee; R. Perez, Ph.D. Madrid (Spain); J. C. Ropson, Ph.D. Tennessee; H. C. Roland, Ph.D. Tennessee; P. N. Stevens, Ph.D. Northwestern, P.E.

Associate Professor:

L. Miller, Ph.D. Texas A&M, P.E.

Assistant Professors:

E. M. Katz, Ph.D. Tennessee; B. Upadhyaya, Ph.D. University of California, Berkeley.

The Department of Nuclear Engineering offers degrees leading to the Master of Science, Master of Engineering, and Doctor of Philosophy with concentrations in nuclear dynamics, nuclear reliability and risk, radiation transport, thermal hydraulics, and core analysis.

MASTER OF SCIENCE PROGRAM

A graduate program leading to a degree of Master of Science is available to graduates of recognized undergraduate curricula in engineering and physics. Each applicant will be advised as to the necessary prerequisite courses before beginning the program.

The student must complete a program of study of 45 quarter hours which has been approved by the student's advisory committee and which includes, at a minimum, a total of 15 quarter hours of graduate courses in nuclear engineering.

2. A minor of 9 quarter hours in mathematics, statistics, or computer science.


6410 Physical Gasdynamics (3) High-speed, high temperature flow of gas from molecular point of view; molecular theory of gases; nonequilibrium properties of gases and gas mixtures from steady-state kinetic theory, chemical thermodynamics, and statistical mechanics. Prereq: 5220 and Mechanical Engineering 5220.

6420 Physical Gasdynamics (3) Continuation of 6410; flows of gas mixtures in local thermodynamic and chemical equilibrium; physical and chemical boundary layer equations; flow with vibrational and chemical nonequilibrium. Prereq: 6410.

6510-30-40 Advanced Aerodynamics (3, 3, 3) Subsonic, transonic, supersonic, and hypersonic flow treatments in a generalized and unified manner with combined viscous/inviscid effects. Relationships among various regimes of fluid flows. Fundamental assumptions, limitations of approximations and consequences. Foundations of gas dynamics with emphasis on applications to airplane, rocket, ground testing, and jet propulsion. Discussion of special topics according to students' interest. Prereq: 5110, 5220, and 5240 or equivalent.


6810 Advanced Topics in Gasdynamics (3) Special topics based on the specific interests of the students. Prerequisites: 5240, 5220, 5210, and 5230. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6910 Advanced Topics in Aerodynamics (3) Special topics in aerodynamics and mechanics of flight. Prereq: 5240. Consent of instructor. May be repeated. Maximum 9 hrs.

6920 Aerodynamics II (3) Advanced topics in aerodynamics and mechanics of flight. Prereq: 5240. Consent of instructor. May be repeated. Maximum 9 hrs.


6940-50 Advanced Aerodynamics (3, 3) Subsonic, transonic, supersonic, and hypersonic flows treated in an integrated manner with combined viscous/inviscid effects. Relationships among various regimes of fluid flows. Fundamental assumptions, limitations of approximations and consequences. Foundations of gas dynamics with emphasis on applications to airplane, rocket, ground testing, and jet propulsion. Discussion of special topics according to students' interest. Prereq: 5110, 5220, and 5240 or equivalent.

6950 Advanced Boundary Layer Theory (3) Derivation and critical review of governing equations. Asymptotic solutions; similarity methods; boundary layer approximations. Applications of integral methods to aerodynamic design problems. Prereq: 5110, 5210, and 5220.

6960 Advanced Topics in Gasdynamics (3) Special topics based on the specific interests of the students. Prerequisites: 5240, 5220, 5210, and 5230. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6970 Advanced Topics in Aerodynamics (3) Special topics in aerodynamics and mechanics of flight. Prereq: 5240. Consent of instructor. May be repeated. Maximum 9 hrs.
4. Final examination covering the thesis and graduate coursework.

An alternate program is available for the Master of Science degree which involves engineering practice rather than a thesis. The student must complete a program of study which includes the following:

1. Thirty-six quarter hours of course work similar to the requirements for the regular Master of Science program (see above).

2. Twenty-four quarter hours of Nuclear Engineering 5980. A student usually registers for 6 hours of Nuclear Engineering 5980 each quarter and investigates problems assigned by a member of the faculty. At the end of each quarter the student submits a written report and makes an oral presentation of the work.

3. Final examination covering graduate coursework and practice school problems.

**MASTER OF ENGINEERING PROGRAM**

A graduate program in Nuclear Engineering leading to the degree of Master of Engineering is available to those graduates with an accredited engineering degree or one which satisfies A.B.E.T. basic level criteria.

In addition to Graduate School requirements the following degree requirements must be met:

1. Thirty-six quarter hours of course work, 18 of which must be in graduate nuclear engineering.

2. A minimum of 9 hours of design project, thesis, or 24 hours of Nuclear Engineering Practice (5980). Documentary proof of significant engineering experience may be submitted in lieu of the design project, thesis or Nuclear Engineering Practice, but in this case 45 hours of course work are required.

3. Nine hours of course work submitted must be from out of department.

4. A minimum of one-third of the program must be in engineering design, and one-third in one of, or a combination of, advanced math, computer sciences, basic sciences, or engineering sciences.

5. A candidate must pass a final oral examination on all work presented for the degree.

**THE DOCTORAL PROGRAM**

Students in the field of nuclear engineering desiring to study for the degree of Doctor of Philosophy must have a Bachelor of Science or Master of Science degree from a recognized university, with a major in engineering or physics, and present at least a B average. All candidates will be required to demonstrate general competence in a comprehensive examination in the areas of engineering science, mathematics, and physics. At the same time, all candidates will be required to demonstrate special competence in nuclear design.

Specific course requirements for the Ph.D. degree in Nuclear Engineering include:

1. A minimum of 72 quarter hours credit beyond the Bachelor's degree, exclusive of credit for the M.S. thesis or Nuclear Engineering Practice.

2. A minimum of 36 quarter hours of credit in doctoral research.

3. A minimum of 45 quarter hours in nuclear engineering courses numbered 5000 and above (or the equivalent), with at least 12 quarter hours of 5000-level courses. These are exclusive of thesis or dissertation credit.

4. A minimum of 18 quarter hours in mathematics, computer science, or statistics in courses beyond nuclear engineering undergraduate requirements. Must be numbered 4000 or above.

5. A minimum of 9 quarter hours in courses numbered 5000 and above from a discipline other than nuclear engineering. The choice depends on the student's overall program and should expand his/her knowledge in a given field.

6. A reading knowledge of one foreign language will be determined by the student's doctoral committee.

**5110-20-30 Transport Processes in Nuclear Engineering (3, 3, 3) Momentum and heat transfer; development of conservation equations; elementary theory of turbulence; heat transfer and flow through conduits; conduction; reactor core thermal analysis. Prereq: 4720 or equivalent. Mathematics 4710, 4550. F; W; Sp**

**5210 System Dynamics (3) Transient analysis, Laplace transforms, flow diagrams, block schemes (linear and non-linear), and sensitivity analysis by state variable methods. Dynamic analysis of distributed systems. Prereq: Graduate degree.**

**5220 Reactor System Dynamics (3) Application of methods of general system dynamics to reactor systems. Modeling of neutron and non-neutron processes. Dynamics, stability, and control of zero power reactors and power reactor systems. Prereq: 5210, 4130 or equivalent. W**


**5240 Reactor Instrumentation (3) Instrument components and systems for operation, control, and safety of nuclear reactors; role of instrumentation in public health and safety safeguards. Nuclear power plants. Prereq: 4820, or consent of instructor. A**

**5310-20-30 Nuclear Systems Reliability (3, 3, 3) System reliability analysis as applied to nuclear systems. Qualitative and quantitative methods. Coreqs: Statistics 3450. F; W; Sp**

**5410 Nuclear Fuel Cycle Analysis (3) Alternative fuel cycles, symbiotic reactor systems and appropriate reactor systems; resource utilization, potential growth rates and system design considerations. Impact of selecting alternative systems from technical and economical viewpoints. Prereq: 4130 or equivalent.**

**5510-20-30 Nuclear Systems (3, 3, 3) Various reactor types; flow diagrams, thermodynamic analysis, control methods, component descriptions of power systems using various reactor types and nuclear power economics. Prereq: 4810-20-30 or equivalent or consent of instructor.**

**5710-20-30 Nuclear Design (3, 3, 3) Analytical techniques for neutron aspect of nuclear reactor core design, fuel management; nuclear reactor fuels. Disposition of radionuclides: reprocessing, site selection and environmental effects. Prereq: 4130 or equivalent.**

**5740 Reactor Shielding (3) Application of analytic solutions of Boltzman transport equation to shield design problems. Spherical harmonics, moments methods, numerical solutions, adjoint calculations, and variational imbedding cases (see Prereqs).**


**5810 Fundamentals of Fusion Physics and Engineering (3) Basic analysis of fusion plasmas and description of fusion engineering problems. Plasma properties; collision processes; electromagnetic confinement criteria; kinetic theory; fluid equations; plasma equilibria, transport, and stability; plasma heating and fueling; confinement experiments; tokamaks: reactivity of plasma components; and fundamental fusion engineering problem areas.**
5820 Plasma Engineering (3) Integration of plasma physics models, fusion engineering design criteria, and fusion technology constraints into design of fusion plasma experiments and reactors. Requirements of fusion reactors; particle, momentum, and energy balance equations; burn dynamics; power balance; fuel cycles, heating and fueling requirements; plasma wall interaction; and simulation of various fusion reactor plasmas. Prereq: 5810.

5830 Fusion Technology (3) Engineering problems associated with fusion reactor design; vacuum and magnets systems; materials and irradiation; plasma heating, fueling, and impurity control; first wall, blanket, shield, and neutronics; electrical systems; maintenance, environment; and review of major reactor design studies. Prereq: 5820.

5840-50 Fast Breeder Reactors (3, 3) Special characteristics of fast breeder reactors; emphasis on LMFBR. Need for breeders; neutron physics and thermal characteristics of reactor core; development status of engineering components; fuel cycle cost analysis; safety; coolants other than sodium; world status of development.

5970 Special Topics in Nuclear Engineering (3) Lectures and recitation on recent advances in nuclear engineering. Prereq: Consent of instructor. May be repeated with consent of department.

5980 Nuclear Engineering Practice (3-12) Experiences in solving and reporting on engineering problems. Prereq: Approval of Nuclear Engineering Department. May be repeated. Only Alternate Plan students may take this course. S/NC only. E

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

6110-20-30 Selected Topics in Reactor Theory (3, 3, 3) Transport theory, control rod theory, and perturbation theory. Selected topics from literature. Prereq: Consent of instructor. F, W, Sp

6140 Radiation Shielding (3) Advanced topics in radiation shielding. Monte Carlo techniques and space radiation problems. Natural space radiators, energy-source radiators, dose conversion, probability. Selected neutron, gamma, and space-radiation shielding problems. Prereq: Consent of instructor. Sp

6150 Reactor Dynamics (3) Special topics in reactor dynamics and control. Prereq: Mathematics 5630. Sp

6410 Selected Topics in Nuclear Systems Reliability Engineering (3) Advanced state-of-the-art topics in nuclear systems reliability engineering and risk assessment. Prereq: 5330 or consent of instructor.

6510 Nuclear Reactor Noise Analysis (3) Modern system theoretical methods for evaluating reactor performance descriptors from operating data. Prereq: 4610 and Electrical Engineering 5740 or equivalent.

6710 Two-Phase Flow and Heat Transfer (3) Pool boiling and flow boiling; hydrodynamics of two-phase flow, boiling crises, two-phase instabilities. Prereq: 5130 or equivalent. Su
College of Home Economics

Nancy Beick, Dean
Jay Stauss, Associate Dean, Graduate Studies and Research
Fran Andrews, Assistant Dean, Undergraduate Studies
Helen Grove, Assistant to the Dean

Graduate studies in Home Economics prepares the student for teaching, research and public service in colleges and universities or managerial positions in government, business, and industry.

The College of Home Economics offers two graduate degrees, the Master of Science and the Doctor of Philosophy. The Ph.D. degree in Home Economics is offered in three optional areas: interdisciplinary, food science, and nutrition. The M.S. degree program has seven major or minor areas. Both thesis and non-thesis options are available except in public health nutrition (non-thesis only).

Programs Leading to the Degree of Master of Science

Thesis Option:

Child and Family Studies
Consumer Studies and Housing: Public Policy
Food Science
Food Systems Administration
Nutrition
Textiles and Clothing

Major (minimum of 9 hours of 5000 courses) 18 hrs

Thesis 9 hrs

Minor area(s) of study

(minimum of 12 hours of 5000 courses) 18 hrs

Total 45 hrs

A minimum of 30 hours at or above the 5000-level is required.

In some instances two related minor areas may be selected with 9 hours in each area and a minimum of 3 hours of a 5000 course in each.

Minor area(s) of study are chosen in an area other than in home economics with the approval of the major professors.

An oral examination is required.

Nine hours is the maximum credit allowed for special problems work and seminar work in any one area of home economics.

Non-Thesis Option:

The non-thesis program of study for all majors except Consumer Studies and Housing: Public Policy will consist of 45 credit hours with a minimum of 24 hours in the major field with 18 hours at the 5000 and 6000-level. A minimum of 30 hours of 5000 and 6000-level courses is required in the program. Some majors may require 9 hours in one minor area. A written comprehensive examination is required.

Master of Science and Housing: Public Policy

The Master of Science in Consumer Studies and Housing: Public Policy is offered through the Departments of Child and Family Studies (CFS) and Textiles, Merchandising and Design (TMD). Students choose either consumer studies (CFS) or housing (TMD) as the base area. A minor area comprising 12 credit hours is required; these hours are to comprise a related sequence of courses which support the student's program and may be drawn from any unit within the University. A minimum of 9 hours must be taken outside the College, and a minimum of 27 credit hours within the College. A minimum of 30 hours at the 5000-6000 level is required. Students must also take a 3-hour course in research methods or statistics. The thesis option requires 24 credit hours in the base area, including 9 hours of Thesis. The non-thesis option requires 21 credit hours in the base area, including 6 hours of practicum.

Doctoral Program

The doctoral program in Home Economics includes three options of study: interdisciplinary, food science, and nutrition. The interdisciplinary option is available in all departments in the College.

The doctoral program requires:

1. A minimum of 96 quarter hours in courses beyond the Bachelor's degree exclusive of credit hours for the Master's thesis to include a minimum of 12 quarter hours of 6000-level courses.

2. Selection of an option and fulfillment of the requirements as directed by the major professor and approved committee.

3. The faculty committee for each doctoral student shall determine whether a reading knowledge of a foreign language is required.

4. Written comprehensive examination.

5. Doctoral research and dissertation (minimum 36 hours; maximum 48 hours) may be included in the 96 hours presented for the degree.

6. Final oral examination.

Other Requirements:

Interdisciplinary option: The interdisciplinary option of the Doctor of Philosophy degree in Home Economics provides for advanced graduate study with an approach that focuses on the development, integration and application of knowledge to innovative solutions of the multi-level problems of society. A student in the interdisciplinary doctoral program is in the relatively unique position of having a number of alternatives available which are developed as a function of the student's creativity within the general framework.

Individual and Family Behavior (base department of Child and Family Studies):

- Normal developmental processes in individuals and families
- Socialization through childhood, adolescence, and adulthood
- Behavior in diverse environmental and cultural settings
- Interaction processes within families
- Community services and planning to meet development needs of individuals and families

Physiological Development and Well-being (base department of Nutrition and Food Sciences):

- Physiological response to nutrient intake
- Improvement of nutritional status through informed community action
- Cultural, economic, and technological influences on food selection

Environmental Factors (base department of Textiles, Merchandising, and Design or Nutrition and Food Sciences):

- Design, space planning, housing, food service systems, clothing, and textiles as they relate to human needs
- Cultural, sociological, psychological, and economic change
- Technological developments
ACADEMIC COMMON MARKET

The ACM is an interstate agreement among southern states for sharing academic programs. Through this agreement students from participating states are eligible for in-state tuition. Potential students enrolled in the doctoral program in Home Economics at The University of Tennessee, Knoxville, who are residents of Alabama, Arkansas, Georgia, Kentucky, Louisiana, Mississippi, South Carolina, or West Virginia are eligible to participate in the Academic Common Market. Those who plan to enter a Master's program in Food Systems Administration in the College of Home Economics and are residents of Arkansas, Kentucky, or West Virginia also are eligible. Those who plan to enter the Master's program in Nutrition (public health) and are residents of Alabama, Kentucky, or Virginia are eligible. Those who plan to enter the Master's program in Consumer Studies and Housing; Public Policy and are residents of South Carolina are eligible.

APPLICATION FOR ADMISSION

Requirements for admission to The Graduate School are on page 10 of this catalog. A College of Home Economics application and three Graduate School Rating Forms are required. These may be obtained at the Dean's Office, Jessie Harris Building, or write/call: Jay Stauss, Associate Dean for Graduate Studies and Research College of Home Economics The University of Tennessee Knoxville, Tennessee 37996-1900 Phone: (865) 974-5221 Graduate Record Examination scores for the aptitude test including the quantitative, verbal, and analytical sections are required for application to all programs except Interior Design and Housing and Textiles and Clothing.

Graduate programs at both the doctoral and Master's levels are available for students interested in home economics extension. At the doctoral degree level, programs of study may be planned in the interdisciplinary or in the food science or the nutrition options. A Master's degree major in Consumer Studies and Housing; Public Policy is particularly suitable for students interested in home economics extension, although Master's programs may be planned in any subject matter area of home economics with agricultural extension education as a collateral area. Additionally, four-week courses are offered in February each year for students particularly interested in home economics extension.

making activities; evaluation of equipment, work centers and work procedures in terms of time and energy demands. Adaptations for the handicapped.

4260 Adult Development and Aging (3) Adult life in our society. Adjustment to internal and environmen- tal changes through years of age; Prereq: 2110 or Home Economics 1510 or equivalent background in adult development or consent of instructor.

4350 Advanced Child Development (3) Survey of selected theories relevant to child development with emphasis on research literature and research methodology. Prereq: 4 hrs psychology and 6 hrs child development or equivalent.

4420 Learning Experiences with Parents (3) Dynamics of parent-child interaction. Emphasis on a variety of techniques for developing communication and working relationships between parents and teachers through experiences in a variety of settings. Prereq: 3210 or Home Economics 1510. W

4430 Family Interaction (3) Dynamics of family interaction at different points in the life cycle. Includes dynamics of parent-child relationships and the marital dyad, with family and as family interacts within community; formal and informal support systems within community. Prereq: 3515.

4610 Child in the Community (3) Needs of children; community agencies meeting these needs; visits to agencies contributing to the welfare of children. Prereq: 2110 or Home Economics 1510 or equivalent. W

4620 Administration of Programs for Young Children (3) Planning, staffing, housing, feeding, scheduling, and financing for day care of infants and young children, nursery school programs, and specialized programs for deprived preschool children. Prereq: 3350 or 4110.

4710 Contemporary Developments (1-3) Student or staff-initiated course for study of special topical(s) pertinent to the field; topics selected to be determined by students and instructor with departmental approval. Elective credit only. Prereq: Consent of instructor. May be repeated with departmental approval. Maximum 9 hrs.

4810 Afro-American Families (3) Historical back-ground, contemporary family structure and relationships, emerging needs and programs. Prereq: 4 hrs in social sciences.

4920 Consumers and the Market (3) Analysis of elements in marketplace which create problems for consumers. Special attention is given to consumer decision making, need for information and constraints and opportunities associated with government protection of consumers. Prereq: Economics 2110. W, Sp

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

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

5060 Practicum (1-12) Field experience in selected agencies and organizations that focus on solutions to problems in consumer studies. Prereq: Consent of instructor. S/NC only. E

5110 Field Work in Family Life (3) School and community programs concerned with education for family living. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. E

5140 Consumption and Standards of Living (3) Economic and welfare aspects of consumption. Analysis of factors associated with changes in the standard of living. Review of major consumption stud- ies. Prereq: 4830 or 5170 or consent of instructor.

5150 Assessment of Family Behavior (3) Methods of measurement related to study of family. Current methodological issues. Prereq: 5410 or 5530 or consent of instructor.

5160 Management of Time and Energy in the Home (3) Labor-saving methods and devices for
able-bodied and handicapped. Survey of literature. Current trends and methods of research. Prereq: 4220 or consent of instructor.

5170 Consumer Economics (3) Consumer functions in economy; structure of consumer markets; government action relating to consumers; factors affecting prices of consumer goods.

5174 Public Consumption (3) Relationships between consumers and public sector: Market system failures from consumer perspective. Government re- versal patterns and on terms of their impacts on consumers. Effects of consumer oriented public agencies. Prereq: 5170 or consent of instructor.

5180 Family Financial Consultation (3) Analysis of family expenditure patterns, common financial difficulties, avenues by which families are assisted. Field experience with consumer consulting services. Prereq: 4210, 4830 or 5170. Sp

5180 Standards in Consumer Protection (3) Product and performance standards in consumer protection. Theoretical and operational questions relating to standards: analysis of costs and benefits to consumers. Prereq: 4830, 5170 or consent of instructor.

5210 Theories of Child Development (3) Prereq: 4350 or equivalent. W

5220 Family Life Programs (3) School and community programs in family life; survey and evaluation of programs concentrate on type best suited to their experience and future professional orientation. Prereq: 3 hrs child development, 3 hrs family relations, 3 hrs sociology. 2 hrs and 1 lab.

5310 Theory and Research on Human Sexuality (3) Cultural, social, and psychological dimensions of human sexuality. Major contributions from anthropological, physiological, and personality theory and research. W

5410 Advanced Family Relationships (3) Problems in modern family life; individual adjustments, group relationships. Prereq: 3515, 4430, or consent of instructor.

5420 Parents and Children (3) Common problems of young children faced by parents and teachers; emphasis on methods available to modify problem behavior.

5420 Families in Crisis (3) Interpersonal transactions in disordered family behavior. Prereq: 5410 or equivalent.

5450 Conceptual Frameworks for the Family (3) Theoretical perspectives for understanding families. Exploration and applications of frameworks on theoretical and research levels. Historical to contemporary development of family studies. Prereq: 5410 or consent of instructor.

5510 Survey of Research in Child and Family Studies (3) Research literature; locating, abstracting, reporting research studies. Prereq: 3515 or 4430 or consent of instructor. W

5530 Research Methods in Child and Family Studies (4) Research procedures in child and family behavior; basic methodology of behavioral sciences. Recommended as prerequisite to beginning thesis work in this area. Prereq: 9 hrs child and family studies, 3 lectures and 1 discussion. W

5540 Learning in Preschool Programs (3) Description, analysis and evaluation of various preschool models and programs. Prereq: 6 hrs in child and family studies or preschool education. Sp

5550 Supervision in Preschool Programs (3) Guidance of students working in nursery school and day care centers. Guiding students through seminar discussion, individual conferences, and various evaluation techniques. Prereq: 5540, 3 hrs and 1-2 lab hr.

5610 Theories of Management in the Family Environment (3) Fundamental management concepts, development and application to current family situations.

5620 Nursery School Administration (3) Organization and operating schools and play groups for pre-school children. Housing, staff, schedules, programs, financing, Prereq: 4110 or equivalent.

5630 Seminar in Infant Development (3) Theory and research relating to development during infancy. Prereq: 3220.

5640 Teaching Child and Family Studies (3) Seminar and practice in techniques for teaching child development and family relationships. Prereq: Consent of instructor. S/N/C only.


5720 Consumer Protection (3) Regulatory agencies, standards, information disclosure and other consumer protection concepts and policies. Prereq: consent of instructor. May be repeated. Maximum 6 hrs.

5800 Problems in Child, Family and Consumer Studies (1-3) Advanced study of child development and family variables in family planning programs. In-怎能者 programs and clinic. Prereq: 5170, 5190, or consent of instructor.

5850 Children's Effects on Parents and Marriage (3) Theory and research about how children change parents and influence marital relationships. Prereq: 4350 or consent of instructor.

5900 Seminar in Child and Family Studies (1-3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5910 Research Seminar (1-2) Required 1 hr for M.S. students, 2 hrs for Ph.D. students. S/N/C only. E


6250 Advanced Topics (3) Individual study and group discussion of individual and group dynamics. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6310 Individual and Family Development—Physiological Determinants (3) Family members' physiological potential for growth and development and to realization of hu- man potential. Prereq: 6 hrs advanced child and family studies, 4 hrs nutrition, 4 hrs physiology, or equivalent. Sp

6320 Individual and Family Development: Cogni- tion (3) Processes through which human individuals learn to understand and adapt to their environment. Prereq: Consent of instructor. Maximum 9 hrs.

6330 Individual and Family Development: Socialization (3) Processes of socialization throughout life cycle. Family as primary socializing agent. Prereq: 5210, 5410, or equivalent.

6410 Theory Construction in Family Studies (3) Process and application of theory construction in contemporary research areas and family studies. Emphasis on understanding, criticizing and con- structing theoretical models based on research find- ings. Prereq: 5410 or consent of instructor.

6540 Seminar in Programs for Infants and Pre- school Children (3) Research related to programs for infants and young children. Various program models for education of infants and young children, methods of working with parents, and student training programs. Prereq: 5210, 5540 or equivalent.

6610-20 Applied Behavior Analysis in Natural Settings (3, 3) Individual supervision in application of applied behavior analysis in natural settings. Prereq: 5420 or consent of instructor.

6710 Elements of Consumer Choice (3) Analysis of consumer decision making, theory of consumer choice. Impact of affluence on consumers, and con- sideration of dynamic aspects of consumer behavior, including role of aspirations, expectations, uncer- tainty and information. Prereq: 5170 or consent of instructor.

6730 Urban Consumers (3) Focus on how consum- ers act in an urban economy. Urban growth and land use from consumer perspective. Relationship between consumers and local government. Prereq: 5170 or consent of instructor.

Home Economics

MAJOR

DEGREE

Home Economics Ph.D.

5600 Practicum (1-12) Field experience in selected organizations that focus on interdisciplinary solutions to multilevel problems of society. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

5100 International Studies (1-15) Student- or staff-initiated course for study in foreign country of topic(s) pertinent to field. Topic to be determined by student and instructor with department and college approval. May be repeated. Maximum 15 hrs.

5210 History and Philosophy of Home Economics (3) Historical development of home economics; survey of concepts and philosophy of component disciplines and analysis of current programs; emphasis on projection of future developments.

5220 Development of Community Services Pro- grams (3)

5230 Evaluation of Community Services Programs (3) Purposes of evaluation, clarification of objectives and procedures for determining progress.

5700 Current Programs and Trends in Human Re- source Development (1-3) Current developments in area related to human resources and impact on soci- ety through community service programs; and other programs in education, business, and government. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5800 Problems in Community Services (1-3) Prereq: Consent of professor in charge of investigation. Prereq: 4210. S/N/C only. Maximum 9 hrs.

5900 Seminar in Human Resource Development (1-3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6000 Doctoral Research and Dissertation (3-15) Prereq: 5100. P/N/P only. E

6110-20 Theoretical Issues in Human Resource Development (3, 3) Interdisciplinary approach to de- velopment and use of human resources in solution of family and consumer problems. Prereq: Consent of instructor. May be repeated. Maximum 500 0-level courses representing 2 areas of home offices. F/W

6310 Advanced Topics (3) Comprehensive individual study and group discussion of individual and family behavior, physiological development and well-being, environmental factors, and economic and socio- cultural well-being. Prereq: 6110. May be repeated.

6500 Methodological Issues in Human Economics (3) Advanced methodology in home economics, in- terdisciplinary research methods and issues. Prereq: 1 graduate-level course in research methodology or consent of instructor.

6900 Seminar (1-3) May be repeated. S/N/C only.

Home Economics Education

The graduate program in Home Economics Education is administered by the College of Education with home economics education being one of the five service areas within the Department of Vocational Technical Education. The department offers the M.S., Ed.S., and Ed.D., degree programs with a
Nutrition and Food Sciences

MAJORS

Food Science
Nutrition
Food Systems Administration
Home Economics

DEGREES

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

Professors:

R. E. Beauchene, Ph.D. Kansas State; B. R. Carruth (Head), Ph.D. Missouri; M. J. Hitchcock, Ph.D. Wisconsin; J. R. Savage, Ph.D. Wisconsin; J. T. Smith, Ph.D. Missouri; M. A. Smith (Memphis), Ph.D. Tennessee.

Associate Professors:

F. E. Andrews (Assistant Dean), Ph.D. Ohio State; G. W. Disney, Ph.D. Tennessee; N. L. Marable, Ph.D. Massachusetts; M. P. Penfield, Ph.D. Tennessee; G. W. Disney, Ph.D. California; M. N. Traylor, M.P.H. California.

Assistant Professors:

J. B. Bittle (Memphis), Ph.D. Tennessee; M. J. Brooks (Memphis), M.S. Alabama; M. R. Evans, M.A. Kentucky; J. D. Skinner, Ph.D. Oregon State; C. M. Wilson, Ph.D. Missouri.


3140 Physiological Chemistry (4) Metabolism of carbohydrates, lipids, and proteins. Role of vitamins and minerals in metabolism. Not for graduate credit for developmental majors. Prereq. 3150 or equivalent. Sp, Su

4000 Origin of Food and Foodways (3) Food origin and development of individual and group foodways. Prereq: 8 hrs social science or humanities. F, Su

4020 Introductory Sensory Evaluation of Foods (3) Sensory evaluation methods. Prereq: 4010 or 9 hrs of food technology and science; Plant and Soil Science 3610 or equivalent. 2 hrs and 1 lab.

4040 Food in Contemporary Society (3) Consumers' options, responsibilities, and potential influence with respect to food supply. F, Su

4050 Food Preservation (3) Application of basic principles and research findings to food preservation in home. Prereq: 2010 or 3010, 4 hrs microbiology and 1510 or equivalent recommended. 2 hrs and 1 lab.

4110 Introduction to Nutrition Research (3) Nutrition principles and laboratory experiences involving small animals. Prereq: 3160. 2 hrs and 1 lab. Sp

4130 Nutrition in Disease I (4) Nutrition problems in diseases influenced by diet. Prereq: 3160. W, Su

4131 Clinical Experiences in Dietetics (1) Planned clinical experiences applying principles of nutrition in disease. Coreq: 4130. Open only to students in the coordinated undergraduate program in dietetics. Su

4140 Nutrition in Disease II (3) Interdisciplinary lectures and discussions on the metabolic processes of normal and diseased organs and tissues and the dietary or behavior modifications required. Prereq: 4130. Designed for senior students in the coordinated undergraduate program in dietetics. F

4150 Community Nutrition (3) Nutrition problems and services in the community; supervised field experiences. Prereq: 3120 or 3160. W

4190 Diet and Drug Therapy (3) Effect of drug therapy on absorption, utilization and toxicity of drugs. Prereq: 3160 or consent of instructor.

4210 Design and Layout of Food Systems (3) Design of physical facilities, selection and purchasing of equipment for food service systems. Prereq: 3220. Sp

4220 Food and Lodging Information Systems (3) Design of information system for decision making in hotel-motel complex; computer application in hospitality industry. Prereq. Accounting 2130; Computer Science 2130.

4240 Food Systems Personnel Development (3) Development of training programs and personnel management policies for food systems personnel. Prereq: Economics 3420 or Psychology 4460 or consent of instructor.

4250 Food Systems Managerial Cost Control (3) Cost analysis for food and beverages; use of financial statements for decision making in food service systems. Prereq: 3220.

4260 Food and Lodging Physical Plant Planning and Maintenance (4) Fundamentals of mechanical systems and building components of food and lodging physical plant organization and principles of management. Prereq: 4210. 3 hrs and 1 lab.

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

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

5010 Food Texture (3) Classification of foods according to textural parameters; instrumentation in evaluation of textures. Prereq: 4010 or Food Technology 4130; Plant and Soil Science 3610 or equivalent; or consent of instructor. F, Sp

5020 Food Sensory Testing Methods (3) Principles and methodology of sensory evaluation of food; application of methods; analysis of sensory data. Prereq: 4010. Sp only. E

5030 Advanced Experimental Food Science (3) Application of research methods to individual problems. Prereq: 5010-20 or consent of instructor. Sp

5040 Food Behavior of the Individual (3) Development of and changes in choices of food and principles of food habits of individual. Prereq: 4000, 3 hrs of nutrition, or consent of instructor. Sp or Su

5050 Foodways in the United States (3) Current foodways of selected subcultures in United States and historical basis for their development. Prereq: 4000, 3 hrs of nutrition, or consent of instructor. W

5060-65 Advanced Food Science (3) Biochemical and biophysical interactions in food. Prereq: 4010; 3150 or equivalent, or consent of instructor. W, Sp

5070 Carbohydrates and Fats in Relation to Food Science (3) Physical and chemical characteristics of sugars, starches, and fats with emphasis on their behavior in food. Prereq: 4010; 3140-50 or equivalent.

5075 Proteins in Relation to Food Science (3) Physical and chemical characteristics of the proteins of milk, eggs, flour, and meat with emphasis on their behavior in food. Prereq: 4010; 3140-50 or equivalent.

5100 Advanced Physiological Chemistry (4) Bioenergetics and related metabolism of nutrients. Prereq: 3140 or equivalent. 3 hrs and 1 lab. F

5105 Advanced Physiological Chemistry (3) Nutritional factors in relation to body fluids, gas transport, and endocrine function. Prereq: 3140. W

5110 Community Nutrition (3) Nutrition problems and practices in community; supervised field work. Prereq: 3160 and consent of instructor. 3 labs. F

5115 Community Nutrition (3) Observations and participation in nutrition programs of local and state agencies. Prereq: 5110 and consent of instructor. 3 labs. W

5120 Community Nutrition (3) Nutrition programs of state and federal agencies; preparation of material for nutrition education; supervised field work. Prereq: 5110 and consent of instructor. 3 labs. W

5125 Field Study in Community Nutrition (1-12) Personal participation in and analysis of state or regional community nutrition program. Location of indepth study to be selected in consultation with instructor. Prereq: 5115 and consent of instructor. S/NC only.

5130 Mental Retardation or Other Developmental Disorders of Childhood (3) Multidisciplinary core course required of all full-time students in training at Child Development Center, UT Center for the Health Sciences, Memphis. Prereq: Consent of department head. F, W, Sp


5140 Experimental Methods in Nutrition (3) Use of small animals in experimental nutrition. Prereq: 3140-50-60, 3410. 2 hrs and 1 lab. F


5160 Physiological Bases for Diets in Disease (3) Development of dietary treatment of disease in which nutrition plays a major role. Prereq: 3160 or equivalent. Su


5170 Survey Methods in Human Nutrition (3) Food consumption, practices and nutritional status of population groups. Prereq: 5150-55. 2 hrs and 1 lab.

5175 World Food Supply and Human Nutrition (3) Food supplies and food practices as related to human nutrition throughout the world. Regional, national and international agencies concerned with food and nutrition problems. Prereq: 5150-55. Sp

5180 Nutrition and Aging (3) Nutritional problems of the individual aged individual. Nutritional problems of prenatal, infant and child nutrition. Prereq: 5150-55. W

5210-20 Experimental Quantity Food Study (3, 3) Analysis of food production, holding environment, and service problems related to quality of food prepared in volume. Management resources. Prereq: 3210, 3220, or consent of instructor. F, Sp

5230 Methods of Food Systems Research (3) Research methods applicable to food systems administration. Prereq: 3210 or equivalent. W, A

5240 Experimental Design of Food System Facilities (3) Environment in which food is prepared, held, and served in volume. Prereq: 4210.

5250 Food Systems Evaluation (3) Management resources in food systems. Standards for control. Prereq: Consent of instructor.


5270 Administration of Food Service Delivery Systems (3) Role and responsibilities of administrator in maintaining desired qualitative and quantitative standards in food service delivery systems. Prereq: 3220 or consent of instructor. W, A

5310 Clinical Training in Health Care Agencies (3) Instructional and supervisory techniques in clinical settings by nurses and dietitians for training of entry-
level health care providers. Prereq: Nursing 4760 or consent of instructor. Sp

5340 Foods and Nutrition: Physicochemical Principles (3) Thermodynamics: physicochemical properties of proteins, carbohydrates and lipids; chemistry of colloids; chemical kinetics; specialized kinetics of enzymatic processes. Prereq: 3140 or equivalent. Sp, A

5350-50 Research Techniques (3, 3) Human metabolic balance experiments. Analytical methods for assessing food and biological materials. Prereq: 5140. 3 labs. A

5380 Field Experience (3-9) Experience in food-related industry or agency under supervision of faculty member. Prereq: Consent of instructor.

5760 Current Programs and Trends (1-3) Recent advances in nutrition and food sciences; implications for professionals. Prereq: Consent of instructor. May be repeated.

5800 Problems in Nutrition and Food Sciences (1-3) Advanced study in nutrition and food sciences. Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. S/NC only.

5900 Seminar (1-3) Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. S/NC only.

5910 Graduate Seminar in Public Health (1-2) (Same as Public Health 5900, Nursing 5900, Physical Education 5900, and Social Work 5900.) S/NC only.

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

6010 Food Dispersion (3) Physical characteristics of solutions, colloidal dispersions, and suspensions in relation to treatments applied. Prereq: 5050.

6020-30 Food and Sociocultural Change (3, 3) Critical evaluation of factors and interrelationships affecting food intake and consumption patterns. Must be taken in sequence. Prereq: 5040 or 5050; or consent of instructor. F, W

6110 Proteins and Amino Acids (3) Lectures, reports, and discussions. Prereq: 5150 or 55. Sp, A

6120 Mineral Metabolism (3) Lectures, reports, and discussions of functions of minerals in physiological processes. Prereq: 5150-55. Sp, A

6130 Lipid Metabolism (3) Lectures, reports, and discussions. Prereq: 5150-55.

6140 Vitamin Metabolism (3) Lectures, reports, and discussions. Prereq: 5150-55. A

6210 Manpower Planning and Training for the Food Service Industry (3) Identification of manpower needs by skill levels; programs for personnel in food service industry. Prereq: 4240, 5250 or consent of instructor. Sp, A

6220-30 Quantitative Methods to Control Resources in Food Service Systems (3, 3) Interrelationships of resources and evaluation of efficiency and effectiveness in food service systems. Prereq: 5230 or consent of instructor. Taken in sequence. Credit for 6220 contingent upon completion of 6230. F, A

6310 Advanced Topics (3) Comprehensive individual study and group discussion of topics related to current problems in food science. Prereq: Consent of instructor. May be repeated.

6900 Seminar (1-3) May be repeated. S/NC only. E

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**Textiles, Merchandising, and Design**

**MAJORS**

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**Professors:**

R. G. Blakemore, Ph.D. Florida State; J. O. DeJonge (Head), Ph.D Iowa State; B. C. Goswami, Ph.D. Manchester (England).

**Associate Professors:**


**Faculty Associate:**

T. L. Vigo, Ph.D. Tulane.

**Assistant Professors:**

E. C. Cox, Jr., Ph.D. Tennessee; S. Dillard, M.S. Tennessee; G. K. McCurry, M.S. California State.

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**Interior Design and Housing**

A student's course of study may include intensive training in interior design beyond an undergraduate program, behavioral design management, and consultation. Some courses are required for the completion of an undergraduate studio work to the department. This portfolio may include slides or original work.

**4320 Family Housing Problems (3)** Housing requirements of families. Reading and judging house plans; effective use of space; maintenance procedures. Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. S/NC only.

**5610 Furniture Design (3)** Analysis of human factors and objectives of furniture design. Storage furniture pieces and systems; selection and neighborhood development; financing procedures. Prereq: 6 hrs from Economics 2110-20-30. Sp

**5640-51 Advanced Interior Design (6, 6)** Intensive interior design experiences: complex design projects utilizing systemic design methodology. Project types: multi-family housing, commercial and institutional environments, or complex working environments. Assistance and critiques from area professionals. Prereq: 3432 for 448. Courses taken in sequence or consent of instructor.

**5710 History of Contemporary Interior Architecture (4)** Furniture; design and design philosophies of Europe and America in relation to forces that shaped them; movement in the field; and structural variability, and form potentials of design. Prereq: Consent of department head and professor in charge of interior design projects. May include slides or original work.

**5800 Problems in Housing and Food Sciences (1-3)** Advanced study in nutrition and food sciences. Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. S/NC only.
6120 Advanced Topics in Housing Research (3)
Various concepts, theories and methodologies of social sciences in housing research. Prereq: Consent of instructor.

6210 Environmental Design Analysis (3)
Advanced methodology in psychobiology of environmental design, multidisciplinary research data and methods. Prereq: 5610-20-30.

6420 Perspectives in Interior Design (3)
Historical influences related to contemporary concepts in interior design. Prereq: 5040, 6 hrs of graduate level art history, or consent of instructor.

Textiles and Clothing

4210 Elementary Textile Microscopy (3)
Microscopic techniques as applied to the study of textile fibers and fabrics. Prereq: 4010. 1 hr and 2 labs. W, A

4280 Design Analysis: Functional Apparel (3)
Systematic approach to apparel design integrating aesthetic, psychological, social and physiological aspects of apparel problems for special reference groups. Garment specifications translated for production. W

4410 Apparel Production Management (3)
Management perspective of apparel production industry: production planning, process, and management of human resources. Plant tours and case studies on production problems. Field trips required. S

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

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


5120 Advanced Problems in Textiles and Clothing (3) Refresher course; new developments in textiles. Selecting fabrics, agencies aiding consumer, and individual problems in textile field. 2 hrs and 1 lab. F

5130 Advanced Tailoring (3) Comparison of hand tailoring and trade methods used in making suits, coats, or costumes. 3 labs.

5150 Principles of Design Analysis (3) Application of flat pattern theory to garment design incorporating relationships of fabric geometry, texture, hand, and surface ornamentation to design. Prereq: Consent of instructor. 1 hr and 2 labs. W

5160 Review of Literature (3) Intensive survey and evaluation of recent literature. Prereq: Consent of instructor. 1 hr and 2 labs. W

5170 Social, Psychological and Economic Aspects of Clothing (3) Clothing as it relates to human behavior. Prereq: 6 hrs or equivalent from each of following areas: sociology, psychology, economics. W

5180 Advanced Textile Economics (3) Economic problems or problem areas of current importance in textile and apparel industries—production, consumption, and governmental policy. Prereq: 3420, 6 hrs economics or consent of instructor. W

5210 Evaluation of Instructional Materials in the Field of Textiles and Clothing (3) Evaluating instructional materials in communicating information in various areas of textiles and clothing. 1 hr and 2 labs.

5220 Historic Textiles (3) Development of textile industry in world; fibers used, design, and color. F

5240 Practicum (1-8) Off-campus experience with business, industry, governmental agencies and civic groups; preplanned, supervised. Prereq: Consent of major advisor and department head. May be repeated. Maximum 9 hrs. S/NC only.

5250-5260 Problems in Textile Chemistry (4, 4, 4) Theoretical and experimental study of chemistry of textile fibers including polymerization, reactions, dyeing and finishing. 5260 must be taken first. 5260 and 5270 need not be taken in sequence. 5250—Emphasis on structure; property relationships and reactions of fibers. 5260—Emphasis on fabric finishes. 5270—Emphasis on dyes and dyeing. Prereq: 3420 or equivalent; 1 qtr organic chemistry. 2 hrs and 2 labs.

5310 Fashion Analysis (3) Fashion as social and economic force; evolutionary theories of fashion operation. Prereq: 6 hrs each of sociology and economics.

5320 Problems in Historic Costume (3) Variable flow of styles in relation to cultural determinants. Prereq: 3480 or consent of instructor. May be repeated. Maximum 9 hrs. W

5610 Textile Processing (3) Methods and mechanics of texturing continuous filament yarns, methods and mechanics of processing staple yarns, spinning system, composite yarns weaving, knitting, non-woven fabric formation. Prereq: Engineering Science and Mechanics 3311, Mathematics 2840. (Same as Polymer Engineering 5610.)


5700 Current Programs and Trends in Textiles and Clothing (1-3) Pertinent developments and trends in textiles and/or clothing and implications for new types of programs, techniques and/or curricula approaches. Content and emphasis vary according to changes in field and needs of groups serviced. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5800 Problems in Textiles and Clothing (1-3) Advanced study selected from field of textiles and clothing. Prereq: Consent of department head and professor in charge of investigation. May be repeated. Maximum 9 hrs.

5900 Seminar in Textiles and Clothing (1-3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E


6110 Selected Issues in Textiles and Clothing (3) Advanced topics of current significance. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6140 Selected Behavioral Theories in Clothing (3) Role of clothing in functioning of people, utilizing behavioral theories. Prereq: 5170. 6 hrs of graduate level sociology or psychology, or consent of instructor.

6150 Social-Psychological Theories of Clothing Consumption (3) Analysis and evaluation of social science theories of consumer behavior in relation to textiles and apparel. Prereq: Child and Family Studies 5170, 6 hrs of graduate level sociology or psychology, or consent of instructor.

6160 Textile Flammability (3) Factors affecting textile flammability as consumer issue. Standards, regulations, test methods, economic impact. Prereq: 5120, 5180, 5250, or consent of instructor.

6170 Physical Performance Behavior of Textile Structures I (3) Fundamentals of yarns and fabric structures; relationship of structure to physical characteristics of textile materials. Prereq: 5120, or consent of instructor.

6910 Seminar in Textiles and Clothing (1-3) May be repeated. Maximum 6 hrs.
Intercollegiate Programs

Aviation Systems

MAJOR DEGREE
Aviation Systems M.S.

Lead Professor:
M. A. Wright, Ph.D. Wales.

Professors:
W. Frost, Ph.D. Washington; W. F. Jacobs, Ph.D. Goettingen (Germany); A. A. Mason, Ph.D. Tennessee; J. M. Wu, Ph.D. California Institute of Technology; V. L. Young, Ph.D. Northwestern.

Associate Professors:
F. G. Collins, Ph.D. California (Berkeley); R. D. Kimberlin, M.S. Tennessee; J. R. Maus, Ph.D. North Carolina State.

Assistant Professors:
W. B. Baker, Jr., Ph.D. Tennessee; V. K. Smith, III, Ph.D. Georgia Institute of Technology.

The University of Tennessee Space Institute offers a program leading to the Master of Science with a major in Aviation Systems. The Aviation Systems program is designed for those who possess a Bachelor's degree in engineering or science and who wish to study under a "systems philosophy" toward careers in research and development or administration in various phases pertinent to aviation. The program features 18 quarter hours major field credit in various aspects of aviation systems, 6 or more quarter hours credit in each of the areas of research, development and administration, and electives which permit further specialization to either area.

To qualify for admission to this program, the applicant must possess a Bachelor's degree in engineering or science from a recognized institution, show evidence of ability to pursue and benefit from the program, and fulfill The University of Tennessee Graduate School admission procedures and grade point standards. Subject matter prerequisite to the program includes basic knowledge of computer utilization (Computer Science 3150 or equivalent), a background in statistics (Statistics 3450 or equivalent), a basic understanding of aerodynamic fundamentals, aircraft propulsion and performance (Aerospace Engineering 4110 and 4120 or equivalent), background in accounting (Accounting 5010 or equivalent basic accounting courses), a basic knowledge of economics (introductory economics or equivalent).

Both thesis and non-thesis programs are available. The thesis program involves satisfactory completion of the following minimum requirements:

1. 18 hours in the major field of aviation systems.
2. For the research and development area, Industrial Engineering 5700 and 5710; for the administration area, Economics 5030.
3. 6 hours of electives selected from the major field, engineering and/or the areas in item 2.
4. 9 hours in Aviation Systems 5000, Thesis, demonstrating the ability to conduct and report on an independent investigation.

The non-thesis program will be permitted in special circumstances and involves satisfactory completion of the following minimum requirements:

1. 18 hours in the major field of aviation systems.
2. For the research and development area, Industrial Engineering 5700, 5710, and 5720; for the administration area, Economics 5030, and Finance 5010-20.
3. 6 hours of electives in one of the areas in item 2.
4. 6 hours of electives in the major field, engineering and/or the areas of item 2.
5. Satisfactory completion of Aviation Systems 5100.
6. Satisfactory completion of a comprehensive final written examination on all course work submitted for the degree and defense of the project course paper.

The thesis program involves 45 quarter-hour credits minimum while the non-thesis program involves 51 quarter-hour credits minimum.

Electives suitable for credit in the major field include: Aerospace Engineering 5810 and 5820, Industrial Engineering 5940; Aviation Systems 5070, 5080, 5090, 5210, 5220, and 5970.

Electives typical of those suitable for credit in the area of aviation systems, research and development include: Aerospace Engineering 5150-60-70; Computer Science 4550 and 5655-65-75; Industrial Engineering 4060, 4150, 4230, 5720, 5730, 6700, 6730; Mathematics 4225-35-45, 4510-20-30; Metallurgical Engineering 5810-20-30; and Statistics 3450.

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

5070 Airports and the Community (3) Structure of airports and their communities. Technology and economics of cargo, baggage, ticket and passenger handling, Airport management, economics and logistics. Interfaces with the community, collection and distribution, demand requirement analyses, types of developments and their projections. Prereq: Aerospace Engineering 5810.

5080 Collection and Distribution (3) Capabilities, technology, plans, programs and developments for collecting and distributing passengers and freight to and from various types of airports. Ground, water, air and mixed transportation modes, present and future; requirements analysis, and model analysis of the system. Prereq: Aerospace Engineering 5810.

5090 Governmental Policies for Aviation (3) Theoretical and legal basis for economic and governmental regulation of aviation. Historical and legislative development of aviation regulatory agencies, organizational structure and administrative and enforcement procedures. Prereq: Aerospace Engineering 5810.

5100 Project in Aviation Systems (3) In-depth study and formal report on aviation systems topic, normally performed during last quarter of work toward degree in non-thesis program. For aviation systems degree candidates only.

Comparative and Experimental Medicine

MAJOR
Comparative and Experimental Medicine

DEGREES
M.S., Ph.D.

Joint Graduate Coordinating Committee
H. Kitchen (Chairperson); C. C. Congdon; J. E. Fuhr; J. M. Holland; J. E. Lawler; R. L. Michel.

The Comparative and Experimental Medicine degree program (M.S. and Ph.D.) is a strong program that has been designed to provide students with the opportunity to develop advanced skills in the biomedical sciences. The program emphasizes the comparative approach to the study of medical sciences, including laboratory, clinical, and public health sciences. The program includes coursework in pathology, immunology, hematology, oncology, and genetics.

ADMISSION REQUIREMENTS

General Requirements
Admission requirements for The Graduate School of UTK apply. In addition, all applicants will be required to furnish three letters of recommendation from individuals who are familiar with their scholastic or professional records.

Requirements for Admission to the Master of Science Degree Program
Applicants will be required to have a professional degree in one of the medical sciences (M.D., D.D.S., D.V.M.) or a baccalaureate degree with coursework including chemistry through organic mathematics, in addition to calculus, one year of physics, and one year of biology. The following additional courses are recommended: five quarter hours of science beyond the baccalaureate degree; one year of chemistry beyond introductory level; one year of advanced study in physics; and one year of advanced study in mathe

Requirements for Admission to the Doctor of Philosophy Degree Program
Applicants will be required to have a Master's degree in one of the biomedical sciences or a professional degree in one of the medical sciences. Applicants will be required to demonstrate proficiency in the following areas: anatomy, physiology, biochemistry, immunology, hematology, and oncology.

For more information, please contact the Office of the Graduate Dean, College of Veterinary Medicine, Knoxville, TN 37901.
THE DOCTORAL PROGRAM

I. Course Requirements (Currently under review and subject to change for Fall 1983 entries)

A. Minimum course requirements:
   1. Management or Psychology 5170-80-90.

B. Recommended electives:
   1. For preparation for advanced section (81) GRE: Psychology courses as appropriate.

II. Program Requirements**

A. Attainment of a B average*** in Management or Psychology 5170-80-90.

B. Completion of a comprehensive examination in general psychology within no more than two years of entry by attaining a score of 650 or the 90th percentile on the GRE Advanced Test in Psychology.

C. Completion of a comprehensive examination in scientific methodology before beginning the third year of study. This examination covers the following specific areas: statistics, psychometrics, experimental design.

D. Completion of a special comprehensive examination in the area of the student's major research and professional interest. A student is expected to take this examination by the end of twelve quarters. This examination may be repeated once, normally no later than six months after the first attempt, at the discretion of the student's doctoral committee.

E. By the end of nine quarters a student is expected to choose a major advisor (Chairperson of Doctoral Committee).

F. Completion of an oral examination following the preparation of a doctoral dissertation. This examination covers the field of doctoral research and related topics, and must be passed at least four years prior to the awarding of the degree.

G. Maintenance of at least 3.0 grade point average.

THE MASTER'S PROGRAM

I. Course Requirements (Currently under review and subject to change for Fall 1983 entrants)

A. Management or Psychology 5170-80-90.

B. Statistics 5050-60-70 and 3 hours of applied psychometrics.

C. Eighteen hours of additional course work to be selected primarily from among the 5000-level course offerings in management and psychology (e.g., Management 5110, 5220, 5230).

D. Nine hours of Psychology or Management 5000 (Master's Thesis).

II. Program Requirements

A. Completion of a comprehensive examination in general psychology within no more than two years of entry by attaining a score of 630 or the 85th percentile on the GRE Advanced Test in Psychology.

B. The Ph.D. program requirements described below in sections II A and II G comprise the major requirements for a Master's degree. An oral examination covering the thesis and related topics must also be completed.
Life Sciences

MAJOR DEGREES
Life Sciences M.S., Ph.D.

Coordinating Council:
W. H. Calfourn (Chairperson); Animal Physiology: H. G. Welch, Cellular and Molecular Biology; J. M. Becker; Environmental Toxicology; L. B. Brattsten; Ethology: G. B. Burgardt; Plant Physiology/Biochemistry: R. W. Holton; Reproductive and Developmental Biology: J. A. MacCabe.

The programs leading to the M.S. and Ph.D. degrees in Life Sciences are interdepartmental and intercollegiate programs which augment the programs of individual departments.

The graduate program in Life Sciences supports studies and research in the following concentrations: animal physiology, cellular and molecular biology, environmental toxicology, ethology, plant physiology/biochemistry, and reproductive and developmental biology. Students interested in any of these areas should contact either the Chairperson of Life Sciences or the director of the area of interest. Each concentration area is overseen by a committee and may have unique admission and graduation requirements above the minimums for the overall program.

GENERAL ADMISSION REQUIREMENTS
1. A Bachelor's degree with a major in a biological, behavioral or physical science.
2. GRE (aptitude) scores.
3. Three letters of recommendation.
4. Course work including a year of calculus (differential and integral), one year of chemistry, and a year of physics. Specific course deficiencies may be corrected during the first year.

GENERAL PROGRAM REQUIREMENTS
The program requirements are in general the same as those of The Graduate School. The Master's program requires 45 hours of study approved by the student's committee, a final examination, and graduation requirements above the 6000 level, 36 hours of course above the 6000 level, 36 hours of course load will remain 50 hours for all non-thesis students and 45 hours for all thesis students; however, the number of hours of electives can be reasonably expected to vary between 6 and 18 as a function of prior background.

The Master's Program
The M.S. program in Management Science is designed as preparation for a career in the application of quantitative techniques for the solution of management problems in large organizations. The program's flexibility also makes it appropriate as preparation for doctoral study in Management Science. Management Science course work will expose students to both the theoretical development of quantitative techniques and their application to managerial decision making. In addition to the development of sufficient mathematical maturity for creative use of quantitative skills, the program requires concentrated study in a supporting area. Supporting areas are available in other departments of the College of Business Administration (excluding statistics) as well as in computer science, public administration, ecology and other areas, subject to approval by the Management Science Committee.

Applications are encouraged from all majors, but mathematics background equivalent to the completion of at least two years of college calculus and proficiency in a computer language (e.g. Computer Science 150) is required. The program is designed to be completed in one calendar year by full-time students.

Management Science

MAJOR DEGREE
Management Science M.S.

Committee: R. S. Garfinke (Chairperson), Management Science; R. W. Boling, Management; J. S. Bradley, Mathematics; E. Glusstoff, Economics; J. K. Ho, Management Sciences; W. J. Morse, Accounting; R. E. Rosenthal, Management Science; R. E. Shrieve, Finance; C. C. Tappan, Statistics; M. G. Thomason, Computer Science; K. C. Gilbert, Management.

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The Master's Program
The M.S. program in Management Science is designed as preparation for a career in the application of quantitative techniques for the solution of management problems in large organizations. The program's flexibility also makes it appropriate as preparation for doctoral study in Management Science. Management Science course work will expose students to both the theoretical development of quantitative techniques and their application to managerial decision making. In addition to the development of sufficient mathematical maturity for creative use of quantitative skills, the program requires concentrated study in a supporting area. Supporting areas are available in other departments of the College of Business Administration (excluding statistics) as well as in computer science, public administration, ecology and other areas, subject to approval by the Management Science Committee.

Applications are encouraged from all majors, but mathematics background equivalent to the completion of at least two years of college calculus and proficiency in a computer language (e.g. Computer Science 150) is required. The program is designed to be completed in one calendar year by full-time students.

The programs leading to the M.S. and Ph.D. degrees in Life Sciences are interdepartmental and intercollegiate programs which augment the programs of individual departments.

The graduate program in Life Sciences supports studies and research in the following concentrations: animal physiology, cellular and molecular biology, environmental toxicology, ethology, plant physiology/biochemistry, and reproductive and developmental biology. Students interested in any of these areas should contact either the chairperson of Life Sciences or the director of the area of interest. Each concentration area is overseen by a committee and may have unique admission and graduation requirements above the minimums for the overall program.
The College of Liberal Arts offers programs leading to eight advanced degrees: M.A., MACT, M.F.A., M Math, M Mus, M.P.A., M.S., and Ph.D. See page 9 for majors and degrees.

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 work experiences, community involvement, working in political campaigns, etc. Credit per quarter will vary from 1-12 hours. The maximum credit which may be applied toward a degree in the College is established in each individual case by the department in which the student is working.

INDEPENDENT STUDY

Certain educational goals may best be met through independent study done by an individual under the direction of a faculty member. Students who wish to do such independent work should obtain the approval of the faculty members and the departments concerned prior to embarking upon their study. Credit per quarter will vary from 1-12 hours. The maximum credit which may be applied toward a degree in the College is established in each individual case by the department in which the student is working.

Departments of Instruction

Anthropology

MAJOR

Anthropology

DEGREES

M.A., Ph.D.

Professors:

W. M. Bass (Head), Ph.D. Pennsylvania; C. H. Faulkner, Ph.D. Indiana; A. K. Guthe, Ph.D. Michigan; R. L. Jantz, Ph.D. Kansas; P. W. Parmalee, Ph.D. Texas A. & M.

Associate Professors:


Assistant Professors:

B. J. Howell, Ph.D. Kentucky; W. E. Klippel, Ph.D. Missouri.

Instructor:

M. A. Bass, (Part-time), Ph.D. Kansas State.

The Department of Anthropology offers the Master of Arts and the Doctor of Philosophy degrees with concentrations in physical anthropology, cultural anthropology, archaeology, zooarchaeology, and folk culture.

THE MASTER'S PROGRAM

The formal requirements for the Master's degree include:

1. A minimum of three quarters of residence at The University of Tennessee, Knoxville.

2. A minimum of 45 quarter hours for graduate credit, including preparation of a thesis. Thirty-six of these 45 hours must be in anthropology, 9 hours may be taken in closely related disciplines (at least two-thirds of the courses must be at the 5000 level).


4. A thesis. In addition to the two (2) copies required by The Graduate School, one bound copy of the thesis is to be presented to the department and one bound copy to the student's thesis advisor.

THE DOCTORAL PROGRAM

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

1. Admission to Ph.D. program through passing Graduate Evaluation Examination at completion of first year of study, or through departmental acceptance of a previously earned M.A. degree in Anthropology.

2. Formation of an advisory committee and establishment in consultation with that committee of a program of study. Delineation of field(s) of competence by the student and committee and subsequent presentation to graduate advisor.

3. Demonstration of competence in a foreign language as determined by the student's committee.

4. Successful completion of oral and written comprehensive examinations and admission to candidacy.

5. Successful completion of the dissertation and final oral examination.

3270 Genetics and Society (3) (Same as Botany 3070.)

3410 Principles of Cultural Anthropology (3) Basic concept and objectives in study of culture. Range of cultural phenomena and approaches to its study. Recommended prereq: 2530. F or W

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

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

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

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

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

3575 Afro-American Anthropology (3) Anthropolological perspectives on Blacks in New World: examination of Afro-Americans via anthropological theories and methodologies.

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

3610 Archaeology of United States and Canada I (3) Survey of prehistoric peoples north of Mexico from initial occupation to European contact. Recommended prereq: 2520. F

3611 Archaeology of United States and Canada II (3) Historic archaeology of Euro-American, Afro-American, and Asian American cultures in United States and Canada from 15th to 20th centuries.

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

3630 European Prehistory II (3) Cultural developments during Metal Ages. From the close of Neolithic through Iron Age. Recommended prereq: 2520. 3620 and 3630 should be taken in sequence. W, A

3560 Prehistory of Tennessee (3) History of archaeological research in Tennessee and survey of prehistoric American Indian cultures identified through research. Sp

3570 Principles of Archaeology (3) Research strategies in archaeological excavation, interpretation, and explanation. Prereq: 2520 or consent of instructor. A

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

3000 Language and Culture (3) Relationship between linguistic categories and patterns of culture. Prereq: 2540 or consent of instructor. Recommended prereq: 2530.

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

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

3920 Principles of Physical Anthropology (3) Survey of materials and methods in physical anthropolo-

3930 The Biology of Races of Man (3) Processes of racial differentiation; criteria of significant differences among existing stocks, influence of biology and culture in race formation; analysis of studies concerning blood groups, race mixture, constitution growth and nutrition. Recommended prereq: 2530. Sp

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

4200 Contemporary North American Indian (3) Peoples occupying these areas prior to initial Euro-American contact to present; emphasis on culture change, U.S. Government Indian policy, reservation life. Prereq: 2530 or consent of instructor. A

4210 Ethnographic Research Techniques (3) Materials of collecting, ordering, and analyzing data. Prereq: Consent of instructor. A

4240 Applied Cultural Anthropology (3) Application of anthropological theory, methods, and findings to a research project. Emphasis on public health, international aid, and military assistance. Examination of the roles of anthropologists, questions of values and ethics in intervention schemes, and of organization of planned changes in applied programs. Intensive analysis of selected case studies. Prereq: 2530. A

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


4390 Field Work in Anthropology (3-9) Practicum in collection and analysis of human biological data. May include either skeletal or living populations. Prereq: 2510-20-30 and consent of instructor. May be repeated. Maximum 9 hrs.

4390 Field Work in Physical Anthropology (3-9) Practicum in collection and analysis of human biological data. May include either skeletal or living populations. Prereq: 2510-20-30 and consent of instructor. May be repeated. Maximum 9 hrs.

4390 Field Work in Physical Anthropology (3-9) Practicum in collection and analysis of human biological data. May include either skeletal or living populations. Prereq: 2510-20-30 and consent of instructor. May be repeated. Maximum 9 hrs.

4610 African Prehistory (3) Survey of cultural history in Africa, south of the Sahara, from earliest evidence of human activity to time of European contact. Prereq: 2520 or consent of instructor. A

4640 Zoology and Anthropology Laboratory (4) Examination and comparison of terrestrial and freshwater mollusks. Prereq: 2510 or consent of instructor. W, A

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


4720 American Folklore (3) Anthropological perspective of folklife of geographical regions and ethnic groups of the United States. Prereq: 3700 or consent of instructor.

4740 Southern Appalachian Folk Culture (3) Survey of settlement history and economic development of southeastern Appalachian communities: traditional culture: technology and economics, social organization, beliefs and values, oral traditions, and customs. Prereq: Consent of instructor.

4741 Research in Southern Appalachian Folk Culture (3) Research-oriented, wide range of traditional culture in Southern Appalachia: settlement patterns, folk housing, economy, clothing, beliefs, speech, art, song, dance, and oral traditions and customs. Prereq: 4740. May be repeated. Maximum 6 hrs.

4780 Italian Folklore (3) (Same as Italian 4780.)

4870 Cherokee Language (3) Linguistic survey of structure of the Cherokee language.

4930 Physical Growth and Constitution (3) Comparative growth patterns throughout the human life cycle. Measurement of skeletal and somatic changes; differences in growth; human constitutional types. Prereq: 2510 or consent of instructor.

4940 Biology of Native Americans (3) American Indian growth and evolution from standpoint of skeletal remains and morphology and genetics of living populations. Emphasis on North American Indians. Prereq: 2510 or consent of instructor.

4950 Primate Studies (3) Survey of field and laboratory investigations of comparative anatomy and non-human primate behavior. Prereq: 2510 or consent of instructor.

4980 Paleontological (3) Survey of fossil faunal forms: origin and evolution of major primate lineages emphasizing the earliest Hominid and related forms. Prereq: 2510. Recommended prereq: Zoology 4380. Sp


4975 Human Paleontology Laboratory (1) Detailed examination of casts and other materials pertinent to study of human paleontology. Prereq or coreq: 4970. Sp

5000 Thesis (1-2) P/NP only. E

5010 Graduate Research (1-9) Independent investigation of special problems in anthropology. May be repeated. Maximum 16 hrs. E.

5100 Seminar in Cultural Anthropology (3-9)

5101 Foreign Study (1-12) See page 96.

5102 Off-Campus Study (1-12) See page 96.

5103 Independent Study (1-12) See page 96.

5140 Seminar in Zoosearchology (3) Approaches to analysis and interpretation of archaeological faunas. Intensive reading; evaluation and discussion of major faunal studies, methods of identification, methods of presenting faunal data. May be repeated. Maximum 6 hrs. A

5149 Laboratory Studies of the Vertebrate Skeleton (4) Examination and comparison of skeletons of major groups of fish, amphibians, reptiles, birds, mammals. Oriented toward identification of archaeologically derived faunas. May be repeated. Maximum 8 hrs. E.

5159 Laboratory Study of the Mollusks (4) Examination and identification of terrestrial and freshwater mollusks of eastern U.S. Emphasis on living and fossil mollusks and pelecypods. Prereq: 4640. 1 hr and 3 labs. Sp, A
5160 Seminar in Archaeology (3-9) Theoretical and practical issues central to contemporary archaeology. Prerequisite: Consent of instructor. May be repeated. Maximum 9 hrs.

5180 History of Thought in American Archaeology (3) Intensive review of continuity and change in concepts and methodologies; contributions of influential anthropologists. Prerequisite: 2520, 3610 and consent of instructor.

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

5210 Community Anthropology: The Local Community (3) Ethical issues, researcher models and research methods on local community. Prerequisite: 4440 or consent of instructor. A

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

5400 History of Anthropological Theory (3) Theoretical contributions of more influential anthropologists. Prerequisite: Consent of instructor. A

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

5450 Comparative Social Organization (3) Social structure in nonliterature societies. Kinship, age, sex, and economic factors in determining relations between individuals and groups. Prerequisite: At least one area course A

5460 Quantitative Methods in Anthropology (3) Application of quantitative methods to anthropological case studies of action and derivative procedures, distance analysis, discriminant analysis, and implementation of computer routines. Prerequisite: Statistics 2100 or equivalent. F

5470 The Healer in Cross-cultural Perspective (3) Graduate seminar dealing with socialization, methods of diagnosis, and therapeutic modes of healing in predominantly non-euro-american milieu. Prerequisite: 4250. W

5510 Education in Cultural Perspective (3) Same as Curriculum and instruction 5516. F

5511 Non-Western Education: Anthropological Approaches (3) Analysis of traditional educational patterns among non-Western peoples, problems and processes resulting from application of Western models of education among American Indian, African tribal groups and African cultures. (Same as Curriculum and instruction 5511.) W

5500 Theory in Archaeology (3) Review of development of archaeological theory. Coverage up to and including recent systems approaches. F

5510 Problems in North American Archaeology (3) Seminar to explore specific research problems in North American archaeology. Research topics on prehistoric ecology and settlement patterns in North America. Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs. A

5520 Problems in Old World Archaeology (3) Selected topics and research problems in European, Asian and African prehistory investigated in depth. Prerequisite: Consent of instructor. May be repeated. Maximum 9 hrs. (Same as Classics 5520.)

5530 The Maya (3) Intensive survey of Mayan culture of Yucatan and Guatemala from pre-Columbian times to present. Prerequisite: 3580. A

5540 Archaeological Resource Management (3) Theory and practice—public, conservation, contract, and salvage/research archaeology. Legislation; contracts, responsibilities, and certification; agencies and policies; project design, administration, and logistics; standards of field work, analysis and publication; archaeology and public; conservation of archaeology as career. May be repeated. Maximum 6 hrs. W

5560 Seminar in Prehistoric Lithic Technology (3) Analysis of techniques employed in production of prehistoric materials, raw materials employed; resultant implements, morphology and function; and typological constructs utilized in archaeological analysis. Prerequisite: Consent of instructor.

5570 Seminar on Aboriginal Lithic Resources (3) Training and research in stone materials utilized by prehistoric populations—properties, natural occurrence and geological context, relative abundance and quality extraction and distribution, processing and ultimate forms and functions. Theory and implementation of various ways, discrete religious and ideological contexts. Terminology of lithic and cultural homogeneity, particularly East and Middle Tennessee. Input from professional geologists, and field research. Recommended prerequisite: 5560.

5700 Theory in Folk Culture Studies (3) Seminar analyzing major theoretical viewpoints of European and American folklore and folk life study trends from inception to present. A

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

5900 Dental Anthropology (3) Dental anatomy, theories of dental evolution, genetic and environmental influences controlling dental morphology, comparison of American Indian, European, and Asian dental tracings, use of dentition for skeletal aging, and dental casing. Prerequisite: 3900. A

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

5920 Advanced Physical Anthropology (3) Intensive investigation of theory and problems in physical anthropology. A

5930 The Human Skeleton in Forensic Medicine (3) Application of physical anthropology to problems in human identification. Determination of age, race, and sex of skeleton and preparation of reports for legal medicine. Prerequisite: 3900. Sp

5940 Biological Ecology of the Human Population (3) Practical and theoretical approaches to analysis of prehistoric human skeletal populations. Demography, vital statistics, pathology, nutrition, and measurements of various skeletal populations. Prerequisite: Consent of instructor. A

5950 Craniometry and Anthropometry (4) Laboratory-oriented course dealing with functional anatomy of primate skulls. Musculoskeletal system and evolution of various primate adaptive patterns. Prerequisite: Osteology and one dissection course in zoology.

5950 Paleopathology (4) Identification and descriptive analysis of pathological conditions affecting human skeleton. Roentgenological, histological, and gross visual examination of skeletal material. Prerequisite: 3900 and/or consent of instructor. Lecture and lab.

5960 Dermatognathics (3) Methods of dermatognathic analysis; genetics and pathology; variation of various dermatognathic elements; forensic applications; relationships to various genetic and chromosomal abnormalities. Prerequisite: Consent of instructor.

5970 Emergence and Early Evolution of Man (3) Ancestry and evolutionary significance of Australopithecines. Prerequisite: 4790 or consent of instructor. W, A

5980 Neanderthal Man and Human Evolution (3) Morphology, distribution, and evolutionary relationships of Neanderthals. Prerequisite: 4790 or consent of instructor. W, A

5990 Human Variation (3) Nature of human biological variation and emphasis on microevolutionary processes responsible for establishing and maintaining variation and relationships of variation to population structure. Prerequisite: 3900 or consent of instructor. A

8000 Doctoral Research and Dissertation (3-15) Prerequisite: 6000 only. E

6410-20-30 Seminar in Cultural Anthropology (3, 6, 9) Seminar is offered each quarter primarily for doctoral candidates.

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

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

6970 Seminar in Human Paleontology (3) Prerequisite: 4970 or consent of instructor.

Archaeology—Greek and Roman

See Classics

Art

MAJOR

DEGREES

Art

M.A., M.F.A.

Professors:


Assistant Professors:


Assistant Professors:


Instructors:

L. Kocianski, M.F.A. California (Davis); T. Sauple, M.F.A. Wisconsin.

The Art Department offers two graduate degrees: Master of Arts and Master of Fine Arts. In order to become a candidate, the applicant must be admitted by The Graduate School and approved by the Department of Art. In addition to the admission requirements of The Graduate School, the Department of Art specifically requires the following:

1. A detailed letter of intent.
2. Three letters of recommendation from former professors or professionals in the field.
3. An undergraduate major in art or evidence of equivalent proficiency.
4. A portfolio to be evaluated by the faculty. Application forms and further information are available by writing to the Department of Art.

MASTER OF ARTS

Areas of concentration consist of ceramics, communication design, drawing and painting, film, graphic design, sculpture, and watercolor. One year of residence is required.

Curriculum:

Quarter Hours

Thesis

9

Area of concentration

12

Drawing and composition

3
equivalent, and reading knowledge of French, German, or Italian, unless waived by the art history faculty.

3516 Typography (4) Theories and techniques of typesetting and printing as fine art medium. Creative problems using types and printing presses. May be repeated. Maximum 12 hrs.

3517 Airbrush (4) Technique of airbrush. Emphasis on skill and creative applications. For art majors only. F, Sp

3704 Medieval Art (4) Byzantine and western art of Middle Ages; manuscript illumination, mosaic, Romanesque pilgrimage church, Gothic cathedral. F

3705 Northern European Painting: 1350-1600 (4) From country art of late Middle Ages to Northern Renaissance. Jan van Eyck, Roger van der Weyden, Bosch, and Durer. (4) F

3715 Early Italian Renaissance Art: 1300-1450 (4) Development and exploration of naturalism. Revival of antiquity and development of theories of perspective in Early Renaissance. Duccio, Giotto, Masaccio, Donatello, Botticelli. A

3716 The Art of Italy, 1457-1575 (4) Leonardo da Vinci, Michelangelo, Titian, Raphael, Pontormo and Giorgione. F

3725 Art of Southern Europe and New World, 1550-1830 (4) Titian, El Greco, Caravaggio, Zurbaran, Velazquez, Bernini and Goya. Artistic relations between Iberia and Latin America. Sp

3726 The Art of Northern Europe, 1550-1675 (4) Concentrated study of Bruegel, Rubens, Rembrandt, Georges de La Tour, Vermeer, Poussin and Hals. W

3727 History of Nineteenth-century Painting in Europe and America (4) Emphasis on France; Neoclassicism, Romanticism, Friedrich, Constable, Turner, Courbet and Barbizon landscape painters. Hudson River Group, pre-Raphaelite Brotherhood, Manet, Couture, Impressionism, Eakins, Homer, Seurat through Cezanne. W

3728 History of Twentieth-century Painting in Europe and America (4) Fauvism, Cubism, De Stijl, Die Bruecke, Cubism, Der Blaue Reiter, Futurism, Dada and Surrealism, geometric abstraction, social commentary painting, Abstract Expressionism in the U.S.A. and parallels in Europe; Pop, Op, Minimal, and Concept Art. F


3746 History of Modern Sculpture in Europe and America (4) From 1800 to 1900; Neoclassicism to Rodin. From 1900 to present: emphasis on Cubism, Constructivism, Expressionism, Assemblage, Pop, Primary Forms, Environment, and Earthworks. Sp

3760 Crafts in America (4) Craft movement: growth and development. Educational, social, economic, and aesthetic values. Role of designer in society as producer and teacher.

3785 History of North American Art (4) Survey of landmarks in painting, architecture, sculpture, and design from prehistory to 1900. F

3786 History of Twentieth-century American Art (4) Analysis of developments in architecture, painting, sculpture, and design from prehistory to 1900. F

3787 Nineteenth-century American Painting (4) From West Coast art and emergence of "The Eight," 1877. Art of Indian Asia (4) History of Indian art with consideration of art of central Asia and Southeast Asia. Sp

3777 Chinese Art (4) F

3778 Japanese Art (4) F

3811 Introduction to Museology (3) Concepts, practices and historical development of museums of art, archaeology, anthropology and science. (Same as Anthropology 3811.)


4006 Special Topics in Architecture (2-4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.

4015 Individual Problems (4) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

4016 Special Topics in Drawing (4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.

4115 Drawing IV (4) Individualized pursuit of personal drawing techniques and concepts; individual and group critiques; weekly life drawing sessions. Prereq: 12 hrs 3115. May be repeated. Maximum 12 hrs. E

4119 Advanced Design Studio (4) To explore strengths, structural variability and form potentials of design materials, aesthetic potential. Prereq: Senior or graduate standing or consent of instructor.

4206 Special Topics in Painting (4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.

4215 Painting IV (4) Individual concepts of personal expression with varied media on canvas. Prereq: 12 hrs 3215 for art majors; consent of instructor for non-majors. May be repeated. Maximum 12 hrs. E

4256 Special Topics in Fiber and Fabrics (4) Student- or instructor-initiated course to be offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.


4315 Watercolor IV (4) Individual concepts of personal expression with varied water-based media in paper. Prereq: 12 hrs 3315 for art majors; consent of instructor for non-majors. May be repeated. Maximum 12 hrs. E

4406 Special Topics in Sculpture (4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.

4415 Advanced Sculpture IV (4) Individual development of sculptural problems and techniques. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. E

4470 Advanced Wood Sculpture (4) Application of lamination, carving, and joining techniques in designing and constructing contemporary forms. Prereq: 3400 or consent of instructor. May be repeated. Maximum 12 hrs.

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


4516 Portfolio and Exhibition Techniques (4) Application of design principles to promotion, construction, display and evaluation for two- and three-dimensional artists. Prereq: Senior or graduate standing or consent of instructor. Sp

4545 Visual Communications Seminar (2) Political, social, economic and ethical problems of contemporary designer. Sessions with outside guest speakers and field trips. Prereq: 4515. W

4606 Special Topics in Printmaking (4) Student or instructor-initiated course offered at convenience of
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Credit Hours</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>4615</td>
<td>Intaglio IV  (4)</td>
<td>Determined by department.</td>
<td>16 hrs.</td>
<td>May be repeated.</td>
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<tr>
<td>4616</td>
<td>Lithography IV (4)</td>
<td>Extensive use of aluminum plates, color combination printing, photographic techniques.</td>
<td>12 hrs.</td>
<td>F, W, Sp</td>
</tr>
<tr>
<td>4617</td>
<td>Screen Printing (4)</td>
<td>Traditional hand cut and photographic stencils; color combination printing on paper and other surfaces.</td>
<td>12 hrs.</td>
<td>F, W, Sp</td>
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<tr>
<td>4656</td>
<td>Special Topics in Metal Design (4)</td>
<td>Student- or instructor-initiated course offered at convenience of department.</td>
<td>May be repeated.</td>
<td>Maximum 12 hrs.</td>
</tr>
<tr>
<td>4657</td>
<td>Special Topics in Ceramics (4)</td>
<td>Student- or instructor-initiated course offered at convenience of department.</td>
<td>May be repeated.</td>
<td>Maximum 12 hrs.</td>
</tr>
<tr>
<td>4956</td>
<td>Special Topics in Ceramics (4)</td>
<td>Student- or instructor-initiated course offered at convenience of department.</td>
<td>May be repeated.</td>
<td>Maximum 12 hrs.</td>
</tr>
<tr>
<td>4970</td>
<td>Glaze Calculation (4)</td>
<td>Prereq: Senior or graduate standing and consent of instructor.</td>
<td>12 hrs.</td>
<td>F, W, Sp</td>
</tr>
<tr>
<td>4971</td>
<td>Klin Construction (4)</td>
<td>Prereq: Senior or graduate standing and consent of instructor.</td>
<td>12 hrs.</td>
<td>F, W, Sp</td>
</tr>
<tr>
<td>5000</td>
<td>Thesis (1-15)</td>
<td>P/N only.</td>
<td>E</td>
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<tr>
<td>5002</td>
<td>Non-Thesis Graduation Completion (3-15)</td>
<td>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.</td>
<td>May not be repeated.</td>
<td>S/NCG only.</td>
</tr>
<tr>
<td>5011-21-21</td>
<td>Exhibition in Lieu of Thesis (3, 3, 3)</td>
<td>S/NCG only.</td>
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<tr>
<td>5101</td>
<td>Foreign Study (1-12)</td>
<td>See page 96.</td>
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<td>5102</td>
<td>Off-Campus Study (1-12)</td>
<td>See page 96.</td>
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<td>5103</td>
<td>Independent Study (1-12)</td>
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<tr>
<td>5115</td>
<td>Graduate Drawing I (2-4)</td>
<td>May be repeated.</td>
<td>Maximum 18 hrs.</td>
<td>F, W, Sp</td>
</tr>
<tr>
<td>5125</td>
<td>Graduate Drawing II (2-6)</td>
<td>May be repeated.</td>
<td>Maximum 18 hrs.</td>
<td>F, W, Sp</td>
</tr>
<tr>
<td>5215</td>
<td>Graduate Painting I (2-6)</td>
<td>May be repeated.</td>
<td>Maximum 18 hrs.</td>
<td>F, W, Sp</td>
</tr>
<tr>
<td>5225</td>
<td>Graduate Painting II (2-6)</td>
<td>May be repeated.</td>
<td>Maximum 18 hrs.</td>
<td>F, W, Sp</td>
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<tr>
<td>5255</td>
<td>Graduate Fiber and Fabrics I (2-6)</td>
<td>May be repeated.</td>
<td>Maximum 15 hrs.</td>
<td>F, W, Sp</td>
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<tr>
<td>5275</td>
<td>Graduate Fiber and Fabrics II (2-6)</td>
<td>May be repeated.</td>
<td>Maximum 18 hrs.</td>
<td>F, W, Sp</td>
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<tr>
<td>5315</td>
<td>Graduate Watercolor I (2-6)</td>
<td>May be repeated.</td>
<td>Maximum 18 hrs.</td>
<td>F, W, Sp</td>
</tr>
<tr>
<td>5325</td>
<td>Graduate Watercolor II (2-6)</td>
<td>May be repeated.</td>
<td>Maximum 18 hrs.</td>
<td>F, W, Sp</td>
</tr>
<tr>
<td>5415</td>
<td>Graduate Sculpture I (2-6)</td>
<td>May be repeated.</td>
<td>Maximum 18 hrs.</td>
<td>F, W, Sp</td>
</tr>
<tr>
<td>5425</td>
<td>Graduate Sculpture II (2-6)</td>
<td>May be repeated.</td>
<td>Maximum 18 hrs.</td>
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</tr>
<tr>
<td>5515</td>
<td>Graduate Graphic Design I/Illustration I (2-6)</td>
<td>May be repeated.</td>
<td>Maximum 15 hrs.</td>
<td>F, W, Sp</td>
</tr>
<tr>
<td>5525</td>
<td>Graduate Graphic Design I/Illustration II (2-6)</td>
<td>May be repeated.</td>
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**Audiology and Speech Pathology**

**MAJORS**

<table>
<thead>
<tr>
<th>Degree</th>
<th>Majors</th>
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<tbody>
<tr>
<td>MA</td>
<td>Audiology</td>
</tr>
<tr>
<td>MA</td>
<td>Speech and Hearing Science</td>
</tr>
<tr>
<td>M.A.</td>
<td>Speech Pathology</td>
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<td>Speech Pathology</td>
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</tbody>
</table>

**Professors:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>H. L. Lupeki (Head), Ph.D. Ohio State; S. Adler, Ph.D. Ohio State; C. W. Asp, Ph.D. Ohio State; P. J. Carney, Ph.D. Iowa; D. M. Lipscomb, Ph.D. Washington; I. Nabelek, Sc.D. Prague; H. A. Peterson, Ph.D. Illinois; B. Silverstein, Ph.D. Purdue.</td>
<td></td>
</tr>
</tbody>
</table>

**THE MASTER'S PROGRAM**

A major is offered in Audiology or in Speech Pathology. A major cannot be shared with another major in the two areas when approved by the department.

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

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

Students may elect either the thesis program or the non-thesis option. Students in both programs are required to take 5110 and 5119. The Master's program with the thesis will include a minimum of 45 quarter hours of approved graduate credit, including 9 quarter hours of 5000 credit in the preparation of an acceptable thesis representing original independent work, and a final oral examination. At least two-thirds of these total courses must be at the 5000 or 6000 level, no more than 5 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 a final written examination. A minimum of 32 quarter hours must be at the 5000 or 6000 level. The decision as to choice of the thesis or non-thesis program is normally made following completion of 5110 and a conference with the student's advisor.

**THE DOCTORAL PROGRAM**

The Ph.D. program in Speech and Hearing Science seeks to develop individuals for research or college teaching in any of the areas in the field of speech and language pathology, audiology, or speech and hearing science. This degree program is research oriented, with primary emphasis upon developing the scientific and cognitive skills which allow individuals to identify and independently study important questions concerning the human act.
of oral and aural communication. Students will be expected to master the accumulated knowledge in the area of:
1. Basic speech, hearing and language processes;
2. Speech, hearing and language disorders;
3. Related disciplines providing insight into human communication processes;
4. Technical skills in instrumentation and experimental design which enable the student to investigate problems pertaining to speech and hearing processes.

The program will normally consist of 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.

Specified programs of study will be determined by the student in consultation with his/her faculty committee. In addition to the general Graduate School requirements, specific requirements for the degree of Doctor of Philosophy in Speech and Hearing Science will include:
1. Successful completion of course work in the study of one or more research tools, or other specific scientific methodological vehicles pertinent to the research interests of the candidate. The choice of research tool(s) is subject to departmental approval.
2. A minimum of 9 quarter hours of graduate credit obtained in course work in a cognate field outside of 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 consist of a general knowledge of the basis of audiology, speech and language pathology, and speech and hearing science; advanced knowledge of the specifics of the area of specialization.
5. Research and dissertation to give at least 36 hours of graduate credit (6000 level).
6. A final oral examination.

4040 Appraisal of Speech and Language Disorders (4) Diagnostic procedures for children and adults with speech and language problems including observation and practice with diagnostic tests. Prereq: 3040, 3200, or consent of instructor. (Same as Special Education 4040.) F, Sp.

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

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

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

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

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

4310 Stuttering (3) Nature and treatment. Review and integration of various theories. Prereq: 3040 or consent of instructor. (Same as Special Education 4310.) F, Su.

4320 Introduction to Clinical Practice in Speech Pathology (3) Prereq: 3040, 3050, 3310, 4040, and consent of instructor. (Same as Special Education 4320.) S/NC only. E

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

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

4400 Voice Disorders (4) Etiology, diagnosis, and treatment of organic and functional voice disorders. Prereq: 3040, 3065, or consent of instructor. (Same as Special Education 4400.)

4450 Clinical Practice in Audiology (1-6) Prereq: 4470 and 4490. E

4460 Clinical Practice in Audiology (1-6) Prereq: 4470, 4490, or consent of instructor. E

4470 Clinical Practice in Audiology (1-6) Prereq: 4460, 4470, 4490. E

4500 Voice Pathology (3) Independent study of voice problems in speech pathology. Prereq: Consent of instructor. E

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

4560 Problems in Audiology (1-6) Prereq: Consent of instructor. E


4620 Birth Defect Syndromes and Language Retardation (3) Examination of research literature relevant to birth defects and language retardation including clinical, educational and socioemotional implications of such disorders. Prereq: 4610 or consent of instructor. F.

4630 Practical Applications of Language Habilitation Techniques (3) Discussion and demonstration of various methods and procedures used in treating language retarded children. Prereq: 4610 or consent of instructor. F.

4640 Parent Participation in Language Habilitation Programs (3) Nature of counseling and educational relationships with parents of exceptional children including emotional support for families, behavior management strategies, home training methods. Prereq: 4610 or consent of instructor. Sp.

4650 Speech and Language of the Culturally Different Child (3) Discussion of speech and language differences of children of different ethnic and class membership and from different geographic regions; their causes, and their effects upon educational programs. F, W, Su.

4660 Topics in Language Retardation and its Habilitation (3) Lectures on selected topics by representatives of such fields as special education, educational psychology, genetics, and psychology. Prereq: 4610 or consent of instructor. F.

4720 Audiology II (4) Basic principles of clinical audiology; pure-tone, speech, masking and overview of special auditory tests. Prereq: 3710. (Same as Special Education 4720.) W, Su.

4760 Introduction to Hearing Conservation (4) Roles of noise and noise hazard evaluation, medical monitoring, early childhood education, educational psychology, genetics, and psychology. Prereq: 4610 or consent of instructor. F.

4790 Aural Rehabilitation: Speechreading and Auditory Training (3) Rehabilitation of acoustically impaired by maximizing use of residual hearing and utilizing speechreading as receptive communicative process. Prereq: 4720. (Same as Special Education 4990.) F, W, Su.

4940 Introduction to the Verbo-Tonal System (4) Prereq: 3710. Recommended prerequisite: 4380 and 3050. (Same as Special Education 4940.) F, W, Su.

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

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

5400 Advanced Clinical Practice in Audiology Study and Practice (1-6) Prereq: 4720 and 4930. May be repeated. Maximum 12 hrs. (Same as Special Education 5400.) E

5450 Practicum in Hearing Aid Orientation and Communication Counseling (1-6) Practical exposure to counseling hard of hearing and family members concerning use and expectations of hearing aids. Prereq: 4720, 4930, and consent of instructor. May be repeated. Maximum 9 hrs. E

5500 Practicum in Verbo-Tonal Habilitation (1-6) Prereq: 4940, 4950, or consent of instructor. May be repeated. Maximum 9 hrs. E

5505 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. Prereq: 3065. F, W.

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

5701 Electrophysiological Assessment of Auditory Function (2) Techniques for electrophysiological measurement of auditory sensitivity, sound transmission by ear, distortion in ear, and ear as an aural mechanism. Prereq: 4720, 5070 or consent of instructor. Sp, Su.

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


5119 Laboratory in Instrumentation in Audiology and Speech Pathology (1-6) Laboratory assignments designed to familiarize student with instruments for recording speech and hearing processes. Prereq: 5117. E

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

5201 Aphasia (3) Historical review of aphasia literature; theories of brain functioning, aphasic classification and terminology, tests and rationale for testing, etiology, therapy considerations and prognosis for recovery. Prereq: 5060 or equivalent or consent of instructor. W, Su.

5220 Seminar: Articulation Disorders (3) Current significant research in therapy and management of articulation disorders. Prereq: Undergraduate course in articulation disorders or consent of instructor. F, Sp.


5320-30 Advanced Clinical Practice in Speech Pathology
and Language Disorders (1-6, 1-6, 1-6) Prereq: 4340 or equivalent and consent of instructor. Maximum 9 hrs. F, SNC only. E

5350-60-70 Advanced Clinical Practice in Speech Diagnosis (1-6, 1-6, 1-6) Prereq: 4040, 4340 or equivalent. Maximum 9 hrs. SNC only. E

5360 Cerebral Palsy (3) Neurological foundations and speech and language training. Prereq: 5060. (Same as Special Education 5360.) F

5381. Adult Dysarthria (3) Neurornotor organization for speech production; types of adult dysarthria and associated neurological and muscular symptoms; diagnosis and management of adult dysarthric speakers. Prereq: 5060. Su

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


5450 Sound Measurement and Audiometer Calibration (3) Noise measuring systems and techniques; factors in military and industrial audiology, role of audiologist in industry. Prereq: Basic Acoustics or consent of instructor. W

5451 Noise and Audiology (3) Audiologist's role in noise-related activity: clinical, legal and consulting applications. Prereq: 5450 or consent of instructor.

5460 Advanced Audiology (3) Theory and practice of advanced pure tone and speech audiometry; instrumentation and interpretation of audiometric findings with differential diagnosis. Prereq: 4720. F

5470 Impedance Measurement in Audiology (2) Theoretical considerations behind emergence of impedance measurement in clinical measurement of hearing. Practical experience in using several impedance measuring devices. Prereq: 4720 and 5070. W

5490 Practicum in Hearing Conservation (1-6) Supervised on-site experience in hearing conservation programs at industrial settings. Prereq: 5040. May be repeated. Maximum 6 hrs. E

5500 Seminar in Audiology (1-6) Significant research in various areas of audiology. Prereq: Consent of instructor. May be repeated. Maximum 16 hrs. F, Sp

5503 Special Auditory Tests (3) Theoretical and practical considerations of auditory procedures used for evaluation of normal cochlear vs. retrocochlear auditory lesions, identifying central auditory lesions and nonorganic hearing loss. Prereq: 5460 S

5505 Special Problems in Audiology (1-6) Prereq: 4720 or equivalent consent of instructor. May be repeated. Maximum 6 hrs. E

5520 Seminar in Speech Pathology (3) Current significant research in speech pathology. Topics vary from quarter to quarter. Prereq: 12 hrs in speech pathology. May be repeated with consent of department. Maximum 12 hrs. E

5540 Seminar in Language Pathology (3) Nature, etiology and treatment of retarded language development. Prereq: 4610. (Same as Special Education 5540.) W

5550 Special Problems in Speech Pathology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

5560 Independent Study in Speech Pathology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

5570 Management and Supervision for Speech-Language-Hearing Professionals (3) Management systems, accountability, performance appraisal and clinical supervision. For audiologists and speech language pathologists interested in private practice, supervisory or administrative positions.

5600 Independent Study in Audiology (1-6) Special research, consultation, and research activities in the field of audiology. May be repeated. Maximum 6 hrs. E

5610 Practicum: Language Pathology in Children (3) Seminar and/or practicum involving discussion and utilization of testing tools and analyses of habitable philosophies, specialties and techniques. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

5651 Seminar in Language Differences (3) Significant research relevant to language difference of culturally different children. Prereq: 4500. Su

5730 Hearing Disorders (3) Advanced study of auditory disorders commonly encountered in medical environment. Etymology, pathology and evaluative procedures to differentiate lesions of auditory mechanism. Field trips may be required. Prereq: 4720 or equivalent and 5070. Su

5740 Pediatric Audiology (3) Advanced study of theoretical and practical considerations of procedures to evaluate hearing of infants and small children. Prereq: 4720 or equivalent. Sp

5750 Educational Audiology (3) Advanced case management of hearing impaired child: audiologic follow-up; educational alternatives, teacher and parental counseling, social adjustment, classroom acoustics and state and federal guidelines. Prereq: 5040 and 5540.

5790 Seminar in Psycholinguistic Concepts in Speech Pathology (3) Psycholinguistic concepts and information theory in studying the normal acquisition of language and certain disorders of language. Prereq: Consent of instructor. (Same as Psychology 5790.) Sp

5930 Advanced Articulation and Rehabilitation (3) Procedures and program, assessment of communicative functions and counseling strategies for hearing-impaired. Prereq: 4830. Sp

5950 The Verbo-Tonal System (3) Theory, procedures, and instrumentation of voice in rehabilitation, habilitation, diagnosis, speech therapy, and foreign languages. Prereq: 3710. Recommended: 3090, 4720, and 4930. F, W, Su

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

6010 Experimental Phonetics (3) Acoustical and physiological analyses of speech production and perception. Prereq: 5119 or consent of instructor. F

6019 Experimental Phonetics Laboratory (2) Must be taken concurrently with 6010. Sp

6020 Psychoacoustics (3) Auditory reception and perception of nonspeech stimuli. Prereq: 6100. W

6029 Psychoacoustics Laboratory (2) Must be taken concurrently with 6020. W

6060 Applied Anatomy and Physiology of Speech Mechanism (3) Dissection and related readings. Prereq: 5060 or equivalent. Sp

6069 Laboratory in Applied Anatomy & Physiolo gy of Speech Mechanism (2) Must be taken concurrently with 6060. Sp

6070 Experimental Techniques in Cochlear Physiology and Neurophysiology (3) Prereq: 5070 or equivalent. W, A

6080 Seminar in Speech Science (3) Advanced study of experimental areas such as speech physiology, acoustic analysis, recognition, perception and intelligibility of speech, communication theory, and psychological measurement of speech and hearing. Topics vary from quarter to quarter. Prereq: 6010 or consent of instructor. May be repeated. Maximum 9 hrs. Sp, W, A

6090 Seminar in Hearing Science (3) Advanced study of perception of nonspeech acoustic signal; detectability, pitch, loudness, differential threshold, adaptation, and fatigue. Prereq: 6020 or consent of instructor. May be repeated. Maximum 9 hrs. W, A

6110 Experimental Design in Speech and Hearing (3) Analysis of experimental design in theses and related research. Prereq: Basic experimental methods for data acquisition. Generation of experimental designs based on parametric and nonparametric statistics. Prereq: 5110 or equivalent and consent of instructor. S

6117 Theories of Hearing (3) Physiological process basic to classical theories of hearing related to sensitivity, loudness, pitch, and discrimination of acoustic stimuli. Prereq: 70 or consent of instructor. Sp, A

6119 Advanced Instrumentation in Speech and Hearing Science (3) Selection, use and calibration of instrumentation used in speech and hearing research. Prereq: 5117. 5118 or equivalent. Sp

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

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

6550 Directed Research (1-6) Participation in ongoing or non-dissertation research. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. E

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

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

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

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

Biochemistry

MAJOR

DEGREES

Biochemistry

M.S., Ph.D.

Professors:

W. D. Wicka (Head), Ph.D. Harvard; J. C. Church, Ph.D. Sheffield (England); J. G. Joshi, Ph.D. Poona (India); K. J. Monty, Ph.D. Rochester

Associate Professor:

L. Huang, Ph.D. Michigan State.

Assistant Professors:

L. B. Brattsten, Ph.D. Illinois; R. Bryant, Ph.D. Illinois; R. H. Feinberg, Ph.D. California (Berkley); E. Frese, Ph.D. Virginia; J. W. Koontz, Ph.D. Kentucky.

The graduate program involves successful completion of a series of graduate courses and seminars and a qualifying examination at the end of the first year. The M.S. degree requires research leading to the writing and oral defense of a thesis, while the Ph.D. degree requires successful completion of a comprehensive examination and extensive research leading to the Ph.D. dissertation and its oral defense.

The qualifying examination: At the conclusion of the first year’s work in 5510-20-30, 5310-20-30 and 4230, a comprehensive qualifying examination covering all of the material will be taken by all first year graduate students, without exception, in the first week of the summer quarter. On the basis of results of the examination, the student will be counseled concerning his/her future in the biochemistry program.

THE MASTER’S PROGRAM

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

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

1. Introductory Organic Chemistry with laboratory (at least one year); at least one quarter of analytical chemistry, and a minimum of three quarters of approved physical chemistry.
2. A minimum of 12 quarter hours of approved biology courses beyond the introductory level, including at least 3 hours of genetics and 3 hours of physiology.
3. Biochemistry 5510-20-30, 5310-20-30, 4230, and at least one special topics course (5450), or 5610 or 5110 or 5120 or 5130 or 5210.
4. A qualifying examination as described above.
5. At least 9 hours of advanced lecture-seminar courses from the following: Biochemistry 6410, 6010.
6. At least 9 hours of Master's research and a thesis.
7. A final comprehensive examination which will cover both the thesis endeavor and the subject matter of the course requirements.

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

1. Introductory Organic Chemistry with laboratory (at least 1 year);* at least one quarter of analytical chemistry, Chemistry 4510,* Introductory Physics,* Differential and Integral Calculus;* at least three quarters of approved graduate courses in chemistry or physics, for example: Chemistry 5110-20-30-35, Chemistry 5340, Physics 5210-20-30, Physics 5440, Physics 5510-20-30; plus minimum of three quarters of approved physical chemistry courses in chemistry or physics, for example: Chemistry 4230, Chemistry 4910-20 and Biochemistry 4510, or Chemistry 4110-20-20-20. At least 18 hours of biology beyond the introductory level including at least 3 hours of genetics and 3 hours of physiology. At least 3 hours must be graduate credit in an approved area of special interest which should be identified early so that necessary prerequisites can be taken.

*Though completion of these courses or the equivalent is required, they may not be taken for graduate credit.

3. In addition to the courses listed in item 3 above, four courses selected from those numbered 5110 or higher, excluding 5300 or 5640.
4. Qualifying examination.
5. Participation in Biochemistry 6410 and in the advanced biochemistry seminars 6010 during the entire period of residence.
6. Comprehensive: Students who pass the comprehensive qualifying examination with sufficiently high marks and those who complete a mandatory M.S. degree (required prior to the comprehensive examination) will take the examination, at a time and of a format compatible with Graduate School requirements as determined by the student's committee.
7. A dissertation reporting the results of original and significant research carried out during the term of candidacy.
8. A final examination which will be concerned primarily with the student's dissertation.

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

a. The completion of at least 45 hours of approved course work for graduate credit, at least two-thirds of which must be at or above the 500 level.
b. The preparation of a research manuscript suitable for submission for publication in a major scientific journal;

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

4110-20 Cellular and Comparative Biochemistry (4, 4) Electrylote behavior; chemistry and structure of proteins; enzyme behavior and biological function; catalase and energy capture; synthetic metabolism; nucleic acid function, protein synthesis and biochemical genetics; regulation of biological processes. Must be taken in sequence. Prereq: Chem- istry 3211-21-31, 3219-29-39, and 1 course from Biology 1210-20-30 or Botany 1110-20. 3 lectures and discussion. F. W. Sp; W, Sp

4119 Cellular and Comparative Biochemistry Laboratory (2) Basic biochemical procedures of general application in molecular biology. Prereq or coreq: 4110. F. W. Sp

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

4220 Introduction to Physical Biochemistry (3) Physical characterization of macromolecules; pola- rized light, absorption and fluorescence, sedimenta- tion and transport hydrodynamics; electrophoretic mobility, light scattering, electron microscopy, x-ray crystallo- graphy of proteins and nucleic acids. Prereq: 4220 or Chemistry 5430, or equivalent. Sp

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

5910 Biochemical Techniques (2) Theory and laboratory use of chromatographic and electrophoretic techniques in isolation and character- ization of macromolecules of importance in biochemistry and molecular biology. Prereq: 4119 or equivalent. Open to undergraduates with consent of department.


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

5130 Protein Structure and Enzyme Function (3) Physicochemical properties of proteins; primary, secondary, tertiary and quaternary structure; de- naturation, renaturation and other conformational change; structure-function correlations; enzyme specific models of catalysis; steady-state, transient, relaxation, and allosteric kinetics of catalysis. Prereq: 4110-20 and either 4220 or Chemistry 3450.

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

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

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

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

5310-30 Experimental Techniques (2, 2, 3) Tutorial laboratory course in modern experimental methodology and problem solving. Emphasis on practical and experimental points of view to explain actions and interactions. Prereq: Chemistry 3211-21-31; Chemistry 2140 recommended.

5520 Molecular Basis of Metabolism and its Reg- ulation (3) Regulation of metabolic pathways depend on energy demands of organism and on syn- thesis of macromolecular precursors. Prereq: 5510 or consent of department.

5530 Biosynthesis and Regulatory Functions of Informational Molecules (3) DNA, RNA, and Proteins; Roles in replication; transcription, translation and metabolic regulation. Prereq: 5520 B

5610 Environmental Toxicology (3) Basic con- cepts in toxicology; effects at subcellular; cellular, organ, organismal, population, and environ- mental levels; environmental studies; current topics on biochemical toxicology. Prereq: 4110-20, Chemistry 2141-31, Chemistry 4910-20-30, or consent of instructor. (Same as Ecology 5610.) W

5640 Techniques in Environmental Toxicology (3) Survey of experimental techniques for assess- ment of presence, toxicity, and impacts of pollutants in global ecosystem. Laboratory exercises focus on application of biochemical, and bioassay methods em- ployed in toxicological studies. Prereq: Chemistry 2140-49, 3211-21-31, 3219-29-36. (Same as Ecol- ogy 5640.) Sp
professional persons, a short statement describing probable areas of interest in botany, and the following specific courses: (1) general botany or biology, 12 quarter hours; (2) advanced botany or closely allied biological sciences, 18 quarter hours; (3) physical sciences; general inorganic chemistry, 12 quarter hours organic chemistry and physics, as recommended; (4) college mathematics, 9 quarter hours.

General degree requirements are given on pages 18-21. Educational service is required of each graduate degree candidate and such service will include teaching and/or ancillary services performed in the department related to the instruction of courses. Special departmental requirements include successful completion of the following.

THE MASTER'S PROGRAM
A. Thesis Program
1. Satisfactory preparation of a written formulation and oral defense to the student's committee of a research proposal suitable for a thesis problem. Must be completed before enrollment in Botany 5000.
2. Satisfactory performance on an examination in a foreign language or an A or B in French 3030 or German 3030 (can also be applied to the doctoral program).
3. Satisfactory completion of 2 credit hours at the 6000 level.
5. Presentation of a thirty-minute departmental seminar.
B. Non-Thesis Program
1. Satisfactory completion of 51 quarter hours of approved graduate courses of which 30 quarter hours must be in Botany 5003 and 5004.
2. Satisfactory completion of 2 credit hours at the 6000 level.
3. Satisfactory performance on a final written examination on all work offered for the degree. The department may or may not follow this examination with an oral examination.

THE DOCTORAL PROGRAM
1. Satisfactory presentation of a written formulation and oral defense to the student's committee of a research proposal suitable for a dissertation problem. Must be completed before enrollment in Botany 6000.
2. Satisfactory performance on a written comprehensive examination.
3. Presentation of one or more cognate areas outside of the department totaling 9 graduate credit hours with at least a B average.
4. Satisfactory performance on an examination in one modern foreign language or an A or B in French 3030 or German 3030.
5. Satisfactory completion of 9 credit hours at the 6000 level (excluding dissertation).
7. Presentation of a one-hour departmental seminar near the end of the doctoral program.

*Note: Graduate School requirements are denoted by an asterisk. These requirements should be interpreted as minimal requirements and specific stipulations or requirements such as additional foreign languages, additional oral preliminary examinations may be required by the individual student's faculty committee.
5000 Thesis (1-15) P/NP only. E

4061 Field Phyiology (3) Field experience on identification of fresh water algae. Frequent field trips, field recognition of species and habitats, laboratory sessions. Prereq: 6 hrs of botany. Recommended prereq: 3010-20 or equivalent. Su, A

4075 Botanical Photography (3) Photography of natural history subjects and achievement of technical and aesthetic skills and knowledge to produce illustrations for class, seminar or public lecture. Entrance, habitat, close-up and small object photography, in color, using 35 mm format. Limited shared equipment available. Students encouraged to use own equipment. Film and processing costs paid by student. Photos processed and critiqued in class. Prereq: 6 hrs of botany. Recommended prereq: 3010-20 or equivalent. Su, A

4080 Field Pteridology (3) Field experience on identification, field morphology of morphology, field recognition of species and habitats, laboratory sessions. Prereq: 6 hrs of botany. Recommended prereq: 3010-20 or equivalent. Su, A


4240 Paleobotany (4) Same as Geology 4240.

4310 Plant Ecology (4) Interactions between individual organisms, communities, species and ecosystems. Prereq: 1110-20. Sp

4310-20-30 Special Problems in Botany (1-6) 5310-20-30 Special Problems in Botany (1-6) 5310-20-30 Special Problems in Botany (1-6) 5310-20-30 Special Problems in Botany (1-6)

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

5002 Non-Thesis Graduation Completion (3-15) Stipends for thesis candidates. May not be used toward degree requirements. May be repeated. S/NC only. E

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

5011 Mycology (4) Intensive survey of fungi, including major groups, utilizing lecture, laboratory and field methods. Prereq: 3010. 3 hrs and 1 lab. Sp

5012 Morphology and Evolution of the Phycocya (4) Study of Phycocya; dealing with physiology of algae. Prereq: 5011 or consent of instructor. F, A

5021 Bryology (4) Taxonomy, phylogeny, ecology, physiological adaptations by populations to environments. Prereq: 1 yr of physics. F; W

5022 Lichenology (4) Taxonomy, phylogeny, ecology, physiological adaptations by populations to environments. Prereq: 1 yr of physics. F; W

5023 Advancement Morphology of Basidiomycetes (4) Structure and function of somatic and sexual life cycles as applied to evolution in group. Prereq: 3010 or equivalent. F, A

5024 Plant Physiology III (4) Growth and differentiation of plants at molecular, cellular and organ levels. Emphasis on normal and aberrant meiotic systems, cell fractionation and isolation of subcellular components; differentiation and analytical centrifugation; phycology and other microcinematography. Intended for graduate students in the biological sciences. 2 hrs and 2 labs. F, A

5025 Advanced Plant Physiology III (3) Growth and differentiation of plants at molecular, cellular and organelle levels. Principally on development, macromolecular interpretation of differentiation dormancy, germination, flowering, and senescence. Prereq: 5210 or Biochemistry 4120 and plant or cell physiology course. Recommended prereq: 1 yr of physics. W

5026 Plant Nutrition (3) Principles of plant nutrition, including mechanisms of absorption, transport, assimilation, absorption, and photosynthesis. Prereq: 3010 or equivalent. P/NP only. E

5027 Plant Nutrition (3) Principles of plant nutrition, including mechanisms of absorption, transport, assimilation, absorption, and photosynthesis. Prereq: 3010 or equivalent. P/NP only. E

5028 Plant Nutrition (3) Principles of plant nutrition, including mechanisms of absorption, transport, assimilation, absorption, and photosynthesis. Prereq: 3010 or equivalent. P/NP only. E

5029 Quaternary Problems (4) Same as Geology 5250 and Zoology 5290.

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

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

5350 Analysis of Plant Communities (4) Plants as species and ecosystems components considered from standpoint of genealogy, variation, and ecosystem function. Prereq: 4310. 2 hrs and 2 periods (field trips). Sp

5360 Marine Ecology (3) Relationships of marine organisms to environment and their interactions with each other. Trophic relationships in neric, coastal and estuarine ecosystems; succession; one ecosystem/economy; stability. Prereq: One previous ecology course, W

5410-20-30 Seminar in the Teaching of College Botany (1, 1, 1) Objectives in teaching of general botany. Supervised teaching in general course; seminars in techniques, testing, concepts, and materials. Required of teaching assistants. Prereq: Consent of instructor. F, W, A

5540 Seminar in Botany (1) Readings and discussions of current literature and/or selected topics in botanical research. May be repeated. Maximum 12 hrs. S/NC only. E


5580 Plant Cytology (4) Intensive consideration of cellular organization, structure and function, with emphasis on correlation where possible of ultrastructure, biochemistry and function, controlling of subcellular organelles. Principles and application of various analytical and electron microscope techniques, cell fractionation and isolation of subcellular components; differentiation and analytical centrifugation: phycology and other microcinematography. Intended for graduate students in the biological sciences. 2 hrs and 2 labs. F, A

5590 Phycology (4) Organization and developmental morphology, physiology of algae. Prereq: 3010 or equivalent. 3 hrs and 1 lab. Fall

5591 Phycology (4) Organization and developmental morphology, physiology of algae. Prereq: 3010 or equivalent. 3 hrs and 1 lab. Fall


5670 Experimental Plant Genetics (4) Genetics of plants stressing molecular aspects and including mechanisms of crossing over, gene conversion, mutation, transformation, cytoplasmic inheritance, and adaptation. Prereq: Biology 3110 and Chemistry 3231. 3 hrs and 1 lab. Fall

5680-51-52-53-54 Methods and Instrumentation in Field Investigations (1, 1, 1, 1, 1) Laboratory course providing project experience and theoretical background in various research methods, long range research projects. Techniques used include: colorimetry, spectrophotometry, biological sciences. 1 hr and 1 lab. Required of teaching assistants. Prereq: Consent of instructor. F, W, A

5700 The Field Research Problem (4) Conceptual design, planning, and implementation of field research. Criteria for choosing instruments, sampling methods, and locations for study of populations, communities, and ecosystems. Advanced concepts and development and critique of formal research proposal like those required by granting and contracting agencies. Prereq: 4310, 5510, 5530 & Zoology 4240. 2 hrs and 2 labs. Fall

5830-51-52-53-54 Methods and Instrumentation in Field Investigations (1, 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/NC only.

5870 Experimental Plant Genetics (4) Genetics of plants stressing molecular aspects and including mechanisms of crossing over, gene conversion, mutation, transformation, cytoplasmic inheritance, and adaptation. Prereq: Biology 3110 and Chemistry 3231. 3 hrs and 1 lab. Fall

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

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

College of Liberal Arts/Botany 105
CHEMISTRY

MAJOR DEGREES
Chemistry
M.S., Ph.D.

Professors:
D. C. Kleinfelter, Ph.D. (Head), Ph.D. Louisiana State; J. E. Bloor, Ph.D. Manchester; N. S. Bowman, Ph.D. Princeton; C. A. Buerkle, (Emeritus), Ph.D. Ohio State; W. E. Bull, Ph.D. Illinois; J. Q. Chambers, Ph.D. Kansas; J. A. Dean (Emeritus), Ph.D. Michigan; J. E. Eastham, Ph.D. California (Berkeley); W. J. Fletcher, Ph.D. Minnesota; G. L. Fieser, Ph.D. Harvard; C. W. Keenan, Ph.D. Texas; D. C. Kleinfeld, Ph.D. Princeton; J. W. Larson, Ph.D. Purdue; M. H. Lietzke, Ph.D. Wisconsin; J. T. Moore, Ph.D. Yale; G. O. Kelley, Ph.D. California (Berkeley); R. M. Pagni, Ph.D. Florida; J. R. Peterson, Ph.D. California (Berkeley); G. G. Karlton, Ph.D. Illinois; D. A. Shirley (Emeritus), Ph.D. Iowa State; H. A. Smith (Emeritus), Ph.D. Harvard; W. T. Smith (Emeritus), Ph.D. Ohio State; W. A. Van Hook, Ph.D. Johns Hopkins; E. L. Wehry, Ph.D. Purdue; P. M. Walker, Ph.D. Pennsylvania; H. Wood (Emeritus), Ph.D. North Carolina.

Associate Professors:
F. A. Grimm, Ph.D. Cornell; J. F. Kinlassie, Ph.D. Akron; C. A. Lane, Ph.D. California (Berkeley); L. J. Magid, Ph.D. Tennessees; F. M. Schell, Ph.D. Indiana.

Assistant Professors:
J. L. Adduce, Ph.D. Texas; S. D. Alexandratos, Ph.D. California (Berkeley); J. D. Kovac, Ph.D. Yale; M. J. Sepanek, Ph.D. Iowa State; C. Woods, Ph.D. North Carolina State.

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

THE MASTER'S PROGRAM

The department offers specialization in seven areas for the M.S. degree: analytical chemistry, environmental chemistry, energy, inorganic chemistry, organic chemistry, polymer science, and physical chemistry. The program leading to the M.S. degree with specialization in polymer science is conducted jointly with the Department of Chemical, Metallurgical, and Polymer Engineering, which offers a degree with similar specialization.

The requirements for the M.S. degree in Chemistry consist of the satisfactory completion of:

1. Research and a thesis to give 9 to 18 hours of graduate credit (5000).
2. Participation in seminar (5911-21-31) during the entire period of graduate study. (No more than 3 credit hours of seminar may be applied to the above requirements.)
3. Sufficient graduate course work in chemistry and/or a related field to make an overall total of 45 hours.
   a. 4160-70.
   b. Two of the following (except for polymer science): 5511, 5521, 5531.
   c. For emphasis in polymer science, 5531, 5140-50, Polymer Engineering 4810 and participation in the Polymer Seminar Program during the entire period of graduate study.
   d. For emphasis in environment, 5220, 5250-60-70, Ecology 5310, and Environmental Engineering 4030.
   e. For emphasis in energy, 5410, 5610-20-30, a chemistry sequence (5110-20-30 or 5250-60-70 or 5420-30 or 5710-20-30, 5810), Mechanical Engineering 4180, plus other courses in areas such as catalysis, heterogeneous equilibria, kinetics, chemical science, combustion and propulsion engines, thermal science, resource and propulsion engines, environmental science, and environmental engineering.
   f. For specialization in chemical physics, an examination on the basic principles of mechanics, electricity, and magnetism; 5410-20-30-50, 5110-20 or 5710-20, 6730 or 6810, Mathematics 4540, 4610, 4710, Physics 4610-20-30, 5110-20-35, 5160-30-50, 5161-30-50.
   g. A program leading to the Ph.D. degree with specialization in polymer science is conducted jointly with the Department of Chemical, Metallurgical, and Polymer Engineering, which offers a degree with similar specialization.
   h. 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 (5911-21-31) during the entire period of graduate study.
      3. Course work and specialization requirements:
         a. 4160-70.
         b. Two of the following (except for polymer science): 5511, 5521, 5531.
         c. For specialization in analytical, inorganic, organic, or physical chemistry, 39 hours of additional graduate course work including at least 6 hours at the 6000 level and one of the following groups: (1) for analytical, 5250-60-70; (2) for inorganic, 5420, 5710-20-30; (3) for physical, 5110-20-30-35; (4) for theoretical, 5340-50, 5420-30-50. (5) for theoretical, 5340-50, 5420-30-50; Physics 5210.
         d. For specialization in environment or energy, a six-month internship in a governmental or industrial laboratory; 39 hours of additional graduate course work including 6 hours at the 6000 level and the following: (1) for environment, 5220, 5250-60-70, Ecology 5310, Environmental Engineering 4030; plus selected courses from other areas of chemistry, environmental engineering, meteorology, microbiology, health physics, economics, industrial health, statistics, and industrial health; (2) for energy, 5410, 5610-20-30, a chemistry sequence (5110-20-30-35 or 5250-60-70 or 5420-30 or 5710-20-30, 5810), Mechanical Engineering 4180, plus other courses in areas such as catalysis, heterogeneous equilibria, kinetics, resource and propulsion engines, thermal science, combustion and propulsion engines, resource and propulsion engines, nuclear engineering, and electrical engineering.
         e. For specialization in chemical physics, an examination on the basic principles of mechanics, electricity, and magnetism; 5410-20-30-50, 5110-20 or 5710-20, 6730 or 6810, Mathematics 4540, 4610, 4710, Physics 4610-20-30, 5110-20-35, 5160-30-50, 5161-30-50.
   f. For specialization in polymer science, 4160-70, 5531, 5140-50, 5160 or 5170, Polymer Engineering 4910; 30 hours of additional graduate course work, including at least 6 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.
   g. Graduate course work in related fields may be used for undesignated course work in this requirement upon approval of the student's faculty committee.
   h. All course selections must be approved by the appropriate departmental committee.
   i. A comprehensive advanced examination in the field of specialization.
   j. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.
   k. A final oral examination.

THE DOCTORAL PROGRAM

The department offers specialization in nine areas for the Ph.D. degree: analytical chemistry, chemical physics, environmental chemistry, energy, inorganic chemistry, organic chemistry, physical chemistry, polymer science, and theoretical chemistry. The program in chemical physics is conducted jointly with the Physics Department which offers a similar degree.
4220 Advanced Analytical Chemistry (3) Electronic analytical methods of analysis (including potentiometry, potentiometry, polarography, and voltammetry); magnetic resonance methods; mass spectroscopy by absorption and fluorescence techniques. Prereq: 4210. Coreq: Psychological chemistry. Recommended: 3420 or 4920. Sp

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

4420 Physical Inorganic Chemistry (3) Theoretical concepts leading to an understanding of inorganic chemistry; quantum theory of the atom, principles of molecular structure, and elementary nuclear chemistry. Prereq: 4120-20. 4110. W

4430 Intermediate Inorganic Chemistry (3) Application of theoretical concepts to inorganic elements, their chemical states, and their reactions. Prereq: 4420. Sp

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

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

4610-20 Advanced Chemical Experimentation (2, 2) Laboratory course in application of modern experimental techniques to problems of chemical problems. Synthesis and characterization of organic and inorganic compounds with emphasis on independent study using advanced techniques. Prereq: 3231-39 or 3351-39, 3430-39. 4620. 4610 not open to students who have completed 4510. W, Sp

4810-20-30 Biophysical Chemistry (3, 3, 3) Physicochemical principles with application to biological systems. Must be taken in sequence. Not open to students having 4140-20-30. 4910—Gas laws; first, second and third laws of thermodynamics; equilibrium. 4920—Solution chemistry; electrochemistry; kinetics; nuclear chemistry. 4930—Elementary quantum chemistry; optical and magnetic spectroscopy; light scattering; chromatographic properties. Prereq: 1110-20-30. Mathematics 1540-50 or equivalent. F, W, Sp

5000 Thesis (1-15) F/NP only. E


5129 Advanced Organic Chemistry Laboratory (3) Synthesis of organic compounds illustrating modern techniques. Prereq: 1 yr of organic chemistry. Sp

5139 Spectroscopic Characterization of Organic Compounds (3) Organic structure elucidation by IR, NMR, and mass spectrometry. Prereq: 3529-39 or equivalent. F

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

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

5160 Organic Chemistry of Polymers (3) Synthesis of monomers; molecular structure of polymers; and sequence distribution of polymerizations. Formation of block, graft, and network polymers. Reactions of polymers, including degradation. Prereq: 5140 and 5531. A

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

5220 Analytical Chemistry of Environmental Pol- lutants (3) Application of physical and chemical analytical chemistry to problems in aquatic and atmospheric pollution. Prereq: 5250-60-70 or consent of instructor. A

5240 Chemical Instrumentation (4) Principles of chemical instrumentation. Practice in design and construction of chemical instruments; special project. Prereq: Consent of instructor.

5250-60-70 Advanced Analytical Chemistry (3, 3, 3) 5250—Absorption and emission spectrophotometry, structure elucidation by IR, NMR, UV, and mass spectra; 5260—Chemical separation methods: solvent extraction, chromatography, electroanalytical methods; fluorescence; x-ray methods; 5270—Electroanalytical, magnetic and thermal analytical methods; on stream and automated analysis. Prereq: 1 yr of physical chemistry. F, W, Sp


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

5410-20-30 Advanced Physical Chemistry (3, 3, 3) 5410—Classical thermodynamics. 5420—Molecular spectroscopy and structure. 5430—Chemical kinetics. Prereq: 3410-20. 5440 not open to students not having credit for the laboratory: 3510-39 or 3529-39 as a coreq; 5450 not open to students not having credit for the laboratory: 3510-39.


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

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

5531 Survey of Organic Chemistry (3) Bonding in organic molecules, stereochemistry of stereocenters, all-carbon compounds and conformational analysis, monofunctional oxygenated derivatives, carbohydrate compounds, stereochemistry, and spectral analysis of organic molecules by infrared, ultraviolet, nuclear magnetic resonance and mass spectral techniques. F

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

5610-20-30 Chemical Basis of Energy Conver- sion (1, 1, 1) Chemistry of various energy and fuel interconversion systems. Introduction to homogeneous and heterogeneous catalysis, thermodynamics of chemical conversion systems, fuel chemistry, and electrochemical conversion systems. Prereq: 5610 and one 5000 sequence. F, W, Sp

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

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

5911-21-31 Chemistry Seminar (1, 1, 1) Departmental research, current topics in literature of general chemistry. May be repeated. Registration required each
quarter except summer for resident graduate students. S/NC only. F, W, Sp.

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

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

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


6160 Physical Organic Chemistry (3) Solvent and substituent effects on environmental chemistry, chemical reaction mechanisms. Organic reaction mechanisms. Prereq: Two of 5110-20-30-35.

6185 Orbital Symmetry Control (3) Application of Woodward-Hoffmann rules and other theories to mechanism and stereochemistry of concerted organic reactions. Prereq: Two of 5110-20-30-35.


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

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

6211 Selected Topics in Analytical Chemistry (3) Subject matter varies among important topics of current significance. Prereq: 5110-20-30-35. Inter- and intramolecular processes, mass spectrometry, modern liquid chromatography, new instrumental methods, instrumentation, and microcomputer applications in chemical instrumentation. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

6311 Selected Topics in Polymer Chemistry (3) Subject matter varies among important topics of current significance. Prereq: Two of 5110-20-30-35. Consent of instructor. May be repeated.

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

6411 Selected Topics in Physical and Theoretical Chemistry (3) Subject matter varies among important topics of current significance. Prereq: Two of 5410-20-30-35. May be repeated. A

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

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

6450 Electrochemistry (3) Electrical double layer; electron transport properties of electrolytes; electroanalytical methods. Prereq: 5450 or 5270.

6475 Electronic Structure of Radicals (3) Applications of electron spin resonance to study of molecular conformation, structure, and bonding in inorganic and organic radicals; comparison of experimental results with theoretical predications based on Bruneau rules and on INDO molecular orbital calculations. Prereq: 5340-50 and 6520.

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

6495 Advanced Chemical Kinetics (3) Mechanism of elementary chemical reactions at molecular level including topics such as dynamics of molecular collisions, potential-energy surfaces, reaction cross-sections, direct vs complex modes of reaction, photonfragmentation, energy partitioning and transfer, chemiluminescence, and chemical lasers. Prereq: 5430.

6510 Thermodynamics of Solutions (3) Theory of regular solutions, electrolyte solutions; measurement of activity coefficients and other thermodynamic properties; selected topics from literature. Prereq: 5410.

6520 Magnetic Resonance (3) Principles of magnetic resonance spectroscopy underlying nuclear magnetic resonance and electron spin resonance. Chemical applications to solid and liquid systems. Prereq: 5340.

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


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

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

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

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

Classics
Professors: H. C. Flinthedge (Head), Ph.D. D. Ohio State; A. Raep (Emeritus), Ph.D. Illinois.

Associate Professors: G. G. Gesell, Ph.D. North Carolina; J. E. Shellen, Ph.D. Vanderbilt.

Assistant Professors: C. P. Craig, Ph.D. North Carolina; S. D. Martin, Ph.D. Michigan; D. W. Tandy, Ph.D. Yale.

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

Greek
3010 Plato (3) A
3020 Herodotus (3) A
3030 Euclid (2) A
4020 Aeschylus, Sophocles (3) A
4030 Lysias (3) A
4040 Aristophanes (3) A

Latin
3440 Livy (3) A
3450 Pliny and Martial (3) A
3450 Elieliac Poets (3) A
3410 Selected Readings from Latin Literature (3, 3) May be repeated. A; A
3440 Horace, Odes (3) A
3450 Tacitus (3) A
3450 Lucretius (3) A
3470 Readings in Medieval Latin (3) A
5400-50-20 The Latin Epic: Lucretius, Vergili, Lucan (3, 3, 3) A; A A
5510-20-30 Roman Comedy; Plautus, Terence (3, 3, 3) A; A; A

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

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

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

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

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

3330 Art and Archaeology of Hellenistic Greece and Rome (3) Hellenistic Greek, Etruscan, and Roman sculpture, painting, and architecture with attention to city planning. Illustrated lectures. Sp
MAJOR ARCH ACHAELOGICAL SURVEY OF GREEK AND ROMAN CITIES

3340 CITIES OF THE GREEK AND ROMAN WORLD (3)
Archaeological survey of Greek and Roman cities from 3000 B.C. to 500 A.D. with emphasis on development of cities and qualities of life. Such cities as Mycenae, Athens, Priène, Alexandria, Rome, and Lepcis Magna will be studied. F

3350 SHRINES AND SANCs of GREEK AND ROMAN WORLD (3)
Survey of major shrines and sanctuaries of Greek and Roman world with emphasis on archaeological remains. Thus sites as Olympia, Ephesus, Pergamum, Paestum, and Baalbek will be considered. Readings in selected historical authors will add to understanding of place of great shrines and sanctuaries in Greek and Roman life. Sp

4010 GREEK DRAMA IN ENGLISH TRANSLATION (3)
Survey of dramatic masterpieces of Greek literature. A

4210 TEACHING OF LATIN (3) Carries no language credit. Purpose: techniques, materials, and evaluation; directed observation in public schools; preparation of teaching plans and materials. A

4220 SEMINAR IN CLASSICAL STUDIES (3) Special problems in literatures and other arts of Greece and Rome. May be repeated with consent of the department. W

4230 CLASSICAL MYTHOLOGY AND ITS USES (3) Intensive review and survey of Greek and Roman mythology. Emphasis on uses of classical mythology in literature, music, and plastic arts, especially of modern times. A

4510 SELECTED READINGS IN LATIN LITERATURE IN TRANSLATION (3) Content varies; may be repeated. Maximum 9 hrs.

4520 PROBLEMS IN OLD WORLD ARCHAEOLOGY (3) (Same as Anthropology 5620.) A

COMPUTER SCIENCE

MAJOR

DEGREE

M.S.

Computer Science

Professors:
T. Faegin (Head), Ph.D., Texas (Aerospace Engineering); F. Donaldson, Ph.D., Texas; R. C. Gonzalez, Ph.D., Florida (Electrical Engineering); R. T. Gregory, Ph.D., Illinois (Mathematics), B. N. Halt, Ph.D., Missouri (Electrical Engineering); G. R. Sherman, Ph.D., Purdue (Director of Computing Center); M. G. Thompson, Ph.D., Duke.

Associate Professors:
R. M. Aiken, Ph.D., Northwestern; K. C. O'Kane, Ph.D., Pennsylvania State; C. P. Pfleeger, Ph.D., Pennsylvania State.

Assistant Professors:
J. R. B. Cockett, Ph.D., Leeds (United Kingdom); R. W. Heller, Ph.D., Southern Methodist; D. L. Matsuzaki, Ph.D., Texas; M. R. O'Kennon, Ph.D., Clarkson; D. L. Perry, Ph.D., Ohio State; R. H. Sady, Ph.D., Notre Dame; D. W. Straight, Ph.D., Texas.

Instructor:
K. Y. Sodder, M.S., Tennessee.

ENTRANCE REQUIREMENTS

TO M.S. PROGRAM

Upon admission to the Graduate School, students who wish to enter the Master's degree program in Computer Science should have the following background:
1. Mathematical maturity at least equivalent to that of a student who has completed the calculus sequence through one year of multivariable calculus and matrix algebra.
2. Computer Science 3155 or an equivalent introductory numerical algorithms course.
3. An introduction to probability and statistics at least at the level of Statistics 3450.
4. Computer Science 2215 or an equivalent introductory course in discrete structures and logical foundations of computer science.
5. Computer Science 2610, 2710 and 3520 or equivalent courses in advanced programming, machine organization and assembler language programming.

THE MASTER'S PROGRAM

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

1. Computer Science 4510, 4550, 5100 and 5109.
2. Electrical Engineering/Computer Science 5175 and 5940.
3. One of the three courses Computer Science 4710, 4730, or 4225. The student may then select either Plan A or Plan B.

Plan A: Thesis Option
1. Complete 36 hours of courses at the 4000 level or above. These must include at least 18 hours at the 5000 level in addition to the 5000 level courses explicitly required for the degree.
2. Complete at least 9 additional hours of thesis credit, Computer Science 5000.
3. Pass an oral examination by a committee of at least three faculty members.

Plan B: Non-Thesis Option
1. Complete 36 courses at the 4000 level or above. These must include at least 27 hours at the 5000 level in addition to the 5000-level courses explicitly required for the degree.
2. Pass written and oral comprehensive examinations.

Under either plan, a student wishing to count a course from another department towards the graduate degree must have prior written approval from the computer science graduate committee.

3150 INTRODUCTION TO NUMERICAL ALGORITHMS AND PROGRAMMING (3) Roots of equations, systems of linear equations, least-squares data fitting, numerical integration, numerical methods for ordinary differential equations. Introduction to programming in FORTRAN. Students may not receive credit for both 3150 and 3155. Prereq: Computer Science 2610. (Same as Mathematics 3150.) E

3155 INTRODUCTION TO NUMERICAL ALGORITHMS (3) Roots of equations, systems of linear equations, least-squares data fitting, numerical integration, numerical methods for ordinary differential equations. Students with knowledge of FORTRAN should take 3150. Prereq: Computer Science 2610. (Same as Mathematics 3155.) E


3725 ADVANCED DISCRETE STRUCTURES (3) Advanced topics in discrete structures useful in computer science. Graphs and algorithms for manipulating data. Algebraic structures, Boolean algebra, lattices, groups, monoids. Prereq: Computer Science 2215 or equivalent. (Same as Mathematics 3725.) W

4050 NUMBER SYSTEMS FOR DIGITAL COMPUTERS (3) Floating-point number representation, fixed-radix number representation, multiple-modulus residue number representation, finite-segment p-adic number representation, errors in floating-point computation, finite fields and exact computation using digital computers. Prereq: Computer Science 3155. W


4225 NUMERICAL SOLUTIONS TO EQUATIONS AND NUMERICAL APPROXIMATIONS (3) (Same as Mathematics 4225.) F, W

4235 NUMERICAL METHODS FOR ORDINARY DIFFERENTIAL EQUATIONS (3) (Same as Mathematics 4235.) F, Sp

4310 STATISTICAL DATA PROCESSING (3) FORTRAN language for organization and analysis of statistical data. SPSS and SAS programs for standard statistical analyses; frequency distributions, percentiles, correlation and regression; analysis of variance. Not for credit for computer science majors. Prereq: Statistics 2100 or equivalent. F, Sp

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

4340 INTERACTIVE STATISTICAL DATA PROCESSING (3) Interactive statistical data processing using interactive computer system. Timesharing systems and statistical programs; StatPack, editors, and FORTRAN. Not for credit for computer science majors. Prereq: Statistics 2100 or equivalent and 4310 or knowledge of a procedural-oriented language such as FORTRAN.

4470 PROGRAMMING LANGUAGES (4) Comparison and analysis of programming languages, design, features and implementation. Processors, operations, sequence control, data control, and storage management. Detailed discussion and programming experience in LISP and either SNOBOL, APL, or SIMULA. Prereq: 4510.

4510 DATA STRUCTURES AND NON-NUMERIC PROGRAMMING (3) Data structures and algorithms for their manipulation. Arrays and orthogonal lists; stacks, queues, rings, doubly-linked lists, trees; dynamic storage allocation; organization of files; programming languages for information structures. Prereq: 1625 and 2610.

4550 SYSTEMS PROGRAMMING (3) Computer organization, architecture and programming. Machine language and design of computers, representation of information, microprogramming, software systems, input-output systems, interpreters, macro assemblers. Prereq: 3520 or equivalent. E

4570 INTRODUCTION TO DATA BASE MANAGEMENT SYSTEMS (3) Hierarchical, network and relational models, logical and physical views of data. Data definition and data manipulation languages. Data independence, implementation and operational considerations; performance, integrity, security, and reliability. Prereq: 4510 or equivalent. Students may not receive credit for both 4570 and 5570. F

4610 OPERATING SYSTEMS—CONCEPTS AND FACILITIES (3) Detailed examination of major operating systems. Memory, processor, device and data management. Interrupts, machine-level input/output, loaders and relocation, device characteristics, data set organization. SPOLLON and SIMULA. Students may not receive credit for both 4610 and 5670. F

4620 OPERATING SYSTEMS—CASE STUDIES (3) Alternatives in operating system design, dynamic relocation, paging, segmentation, time sharing, time slicing, protection, concurrency, real time systems. Experiments from different operating systems as appropriate. Prereq: 4610 or equivalent or consent of instructor. W
4660 Principles of Compiler Design (3) Techniques of compiler design, scanning and parsing of languages described by regular and context-free grammars. Prereq: 4510.

4710 Formal Languages and Automata (3) Grammars of Chomsky hierarchy and their recognizers. Properties of formal languages and automata. Emphasis on regular and context-free languages. Introduction to computability and enumerability. Prereq: 2215F, S.


4750 Interactive Computer Graphics (3) Point plotting, vector generation, interactive graphical techniques, two- and three-dimensional transformation, hidden line elimination, shading, software and hardware system design. Discussion of use of these techniques in design, problem-solving, mapping, architecture, and many other areas. Prereq: Senior standing in Computer Science, electrical engineering or geography and a knowledge of computer programming, or consent of instructor. (Same as Geography 4750.)

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

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

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

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

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

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

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

5010 Computer-Assisted Instruction (3) History and development of CAI systems. Emphasis on studying success and failure of major projects, future role in education. Use of a CAI programmed language to implement a CAI course. Prereq: Programming experience or consent of instructor.

5050 Computer Modeling and Simulation of Physical Systems (3) Techniques for computer modeling and simulation. Inputs, driving functions, errors, outputs, interactive simulations as applied to various physical systems. Models to represent spatial relationships. Prereq: 3510 or 3515, and 3520 and Statistics 3450. A

5100 Immigration to Computer Science (3) Designed for graduate students with limited computer science background who wish to enter computer science major or minor program. Advanced programming for input-output devices; machine organization and assembly languages programming; introduction to data structures and algorithm analysis. Prereq: One course in programming.

5109 Immigration to Computer Science Practicum (2) Design and implementation of medium to large-scale computer programs. Coreq: 5100.

5175 Introduction to Logic Design (3) (Same as Electrical Engineering 5175) S

5210 Artificial Intelligence (3) Simulation of intelligent processes by computer. Techniques of representation, search, and manipulation for various areas; problem solving, game playing, pattern perception, theorem proving, semantic information processing. Overview of current and future role of AI problems. Prereq: 4510 or consent of instructor. (Same as Electrical Engineering 5690.) W

5250 Medical Computing (3) Achievements and problems in computer applications to health care. Various areas of medical computing: laboratory data systems, patient monitoring systems, diagnostic imaging, patient records, automatic history taking, and hospital administration systems. Prereq: 4510. Sp

5430 Advanced Compiler Design (3) Design and implementation of compilers, affix and two-level grammars, compiler compilers, incremental compilation, run-time organization, data flow analysis, optimization, and error recovery. Prereq: 4680 and 4710. A

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

5465 Finite Element Methods (3) (Same as Mathematics 5465.) W

5475 Advanced Topics in Numerical Partial Differential Equations (3) (Same as Mathematics 5475.) Sp

5570 Database Management Systems (3) Data model theory, comparison of several existing database systems, implementation technology, selection and evaluation techniques, integrity, security, authorship and protection, hardware architectures, and future trends in DBMS area. Prereq: 4510 and 4550 or consent of instructor. W

5585-65-75 Numerical Mathematics (3, 3, 3) (Same as Mathematics 5565-65-75.) F, W, Sp

5670-80 Advanced Operating Systems (3, 3) Theory and analysis of operating systems. Synchronization and deadlock. Analysis of operating systems using mathematical models, simulation, and hardware and software monitors. Comparison of good heuristic scheduling algorithms with best possible schedulers; scheduling anomalies. Case studies of virtual memory systems. Analysis of page swapping and placement strategies. Prereq: 4610 or equivalent or consent of instructor. F, W


5730 Computability and Computational Complexity (3) Computability and decidability; Turing machines and their machines, recursive sets and recursively enumerable sets; partial recursive functions. Time and space bounded computations; the P vs NP problems. Prereq: 4710. A

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

5775 Combinatorial Algorithms (3) Algorithms for solving optimization problems in graphs, networks and matroids. Precise notions of time and space complexity. Prereq: 4720. (Same as Mathematics 5775.) A

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


5880 Data Security (3) Need for security and methods for achieving it; encryption, machine architecture, hardware and software implementations, historical and current approaches. Case studies in fraud and misuse. Prereq: 3520 or consent of instructor.

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

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

5970 Independent Study in Computer Science (1-3) Special project under faculty guidance. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

Cultural Studies

Asian Studies

5670 Islamic Literature in English Translation (4) Survey from origins to modern period of major Islamic literatures, especially Arabic, Persian and Turkish. Readings include The Arabian Nights, The Rubaiyat of Omar Khayyam and Gibran's The Prophet.

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

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

4531-32-33 Advanced Chinese (4, 4, 4) Taped language program. Prereq: 3531-32 or equivalent or consent of instructor. Must be taken in sequence.


 Afro-African Studies

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

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

4300 Resource Materials in Afro-American Studies (4) Basic references such as bibliographies, indexes, and listings of audiovisuals in Afro-American history, African history, and children's literature. Prereq: 2010 or 2020 and consent of instructor.

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

4500 Issues and Topics in Afro-American Studies (4-4-4) Problems, topics and issues in areas of Afro-American Studies. Content and credit determined by instructor. May be repeated. Maximum 12 hrs.

4830 Afro-American Women in American Society (4) Historical and contemporary social, economic and political factors in American society as they relate to the Black woman. (Same as Women's Studies 4830.)

4880 Afro-American Psychology (4) (Same as Psychology 4880.)
Comparative Literature  
4012-22-32 Special Topics in Comparative Literature (3, 3, 3) Content varies; may be repeated. F, W, Sp  
4050-60-70 Dante and Medieval Culture (3, 3, 3) (Same as Italian 4050-60-70). A, A, A  
5012 Comparative Theories of Literature (3) Croce, Richards, Frye, Wellesk, and others. Prereq: Completion of three literature courses in foreign language above 3000, or equivalent. W  
5022 Approaches in Comparative Literature (3) French and American schools; "comparative literature" vs "general literature"; Van Tieghem, Carre, Baldensperger, Wellesk. Prereq: 5012; completion of three literature courses in foreign language above 3000, or equivalent. W  
5032 Studies in Comparative Literature (3) Independent research problems. Prereq: 5012 and 5022. Sp  

Cultural Studies  
5101 Foreign Study (1-12) See page 96.  
5102 Off-Campus Study (1-12) See page 96.  
5103 Independent Study (1-12) See page 96.  

Linguistics  
4000 Topics in Linguistics (3) Content varies. May be repeated. Maximum 9 hrs.  
4020-30 Historical Linguistics, Neogrammarian School, and Growth of Structuralism (3, 3) 4020—Traces development of scientific approach to linguistics from Jacob Grimm and Franz Bopp through nineteenth century. 4030—Traces change in linguistics from Jacob Grimm and Franz Bopp through nineteenth century. 4030-Traces change in linguistics from Jacob Grimm and Franz Bopp through nineteenth century. 4040-Traces development of scientific approach to linguistics from Jacob Grimm and Franz Bopp through nineteenth century. (Same as French 4450.)  
4280 Introduction to Comparative Linguistics (3) (Same as French, German, Russian, Spanish 4280.)  
4270 Introduction to Romance Linguistics (3) (Same as French, Spanish 4270.)  
4271 Introduction to Slavic Linguistics (3) (Same as Russian 4271.)  
4440 Sociolinguistics (3) (Same as English 4440.)  
4450 Dialectology (3) (Same as English 4450.)  
4460 Special Topics in English Linguistics (3) (Same as English 4460.)  
4471-81 English as a Second or Foreign Language (3, 3) (Same as English 4471-81.)  

Women's Studies  
4830 Afro-American Women in American Society (4) (Same as Afro-American Studies 4830.)  
5110 Psychology of Women (3) (Same as Educational and Counseling Psychology 5110.)  

Economics  
See College of Business Administration.  

English  

MAJOR  

DEGREES  

M.A., MACT, Ph.D.  

Professors:  
J. B. Trahern (Head), Ph.D. Princeton; E. W. Bratton (Associate Head), Ph.D. Illinois; R. M. Kelly (Director)  

College of Liberal Arts/English  

with the student and his/her project director. In addition to the director, two other English Department faculty members will supervise and approve the project.  

b. A creative project, for which 9 quarter hours credit is given. A collection of poems or short stories, a novel, a play, or a creative work of non-fiction prose would be acceptable as creative projects. The nature and length of each project will be determined by the Director of Graduate Studies after consulting with the student and his/her project director. In addition to the director, two other English Department faculty members will supervise and approve the project.  

3. A final examination. A candidate presenting a thesis or creative project must pass a one-hour oral examination, consisting chiefly of questions covering the general history and interpretation of English and American literature, not merely the courses which he/she has taken. A reading list of primary works designed to help the M.A. with Writing Option student prepare for these questions 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 writing interests. The nature of the oral examination should focus upon the literature outlined in the original reading list.  

4. Evidence of proficiency in one foreign language, to be fulfilled in one of the following ways:  

a. The completion of a second year of language at college level with a grade of C or better.  

b. The completion of French 3020 or German 3020 at UTK with a grade of B or better.  

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

For the degree of Master of Arts in College Teaching (MACT) the requirements include:  

1. (1) 45 quarter hours of course in English, arranged as for the non-thesis M.A., (2) 2 hours in a seminar course for MACT students, (3) 3 hours of a tutorial in the teaching of freshman composition, (4) a thesis of 9 additional quarter hours of 5000- or 6000-level courses in English, (5) evidence of proficiency in one foreign language, (6) a final examination, and (7) a program of supervised teaching approved by the department.  

THE DOCTORAL PROGRAM  

The departmental requirements for the Ph.D. degree in English include: (1) thesis and 36 quarter hours of courses in the Department of English or 45 quarter hours without a thesis, (2) evidence of proficiency in one foreign language, and (3) a final examination. The courses should include 12 hours at the 6000 level, 12-21 hours of additional courses at the 5000-6000 level, and 12 hours at any level for graduate credit, including the 3000-4000 level. The M.A. with Writing Option is intended for these students who plan to do free-lance writing, specialize 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 M.A. 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 hours 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.  

A student must at least take 15 hours in writing and 15 hours in literature, the remaining 6 hours to be selected from any English course at the proper level. Of the courses in writing, at least 9 hours must be taken at the 6000 level.  

2. Students in the M.A. with Writing Option program may choose one of the following writing projects:  

a. A thesis, using research to analyze some aspect of writing or rhetorical theory, for which 9 hours credit is given. The nature and length of each project will be determined by the Director of Graduate Studies after consulting with the student and his/her project director. In addition to the director, two other English Department faculty members will supervise and approve the project.  

b. A creative project, for which 9 quarter hours credit is given. A collection of poems or short stories, a novel, a play, or a creative work of non-fiction prose would be acceptable as creative projects. The nature and length of each project will be determined by the Director of Graduate Studies after consulting with the student and his/her project director. In addition to the director, two other English Department faculty members will supervise and approve the project.  

3. A final examination. A candidate presenting a thesis or creative project must pass a one-hour oral examination, consisting chiefly of questions covering the general history and interpretation of English and American literature, not merely the courses which he/she has taken. A reading list of primary works designed to help the M.A. with Writing Option student prepare for these questions 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 writing interests. The nature of the oral examination should focus upon the literature outlined in the original reading list.  

4. Evidence of proficiency in one foreign language, to be fulfilled in one of the following ways:  

a. The completion of a second year of language at college level with a grade of C or better.  

b. The completion of French 3020 or German 3020 at UTK with a grade of B or better.  

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

For the degree of Master of Arts in College Teaching (MACT) the requirements include:  

1. (1) 45 quarter hours of course in English, arranged as for the non-thesis M.A., (2) 2 hours in a seminar course for MACT students, (3) 3 hours of a tutorial in the teaching of freshman composition, (4) a thesis of 9 additional quarter hours of 5000- or 6000-level courses in English, (5) evidence of proficiency in one foreign language, (6) a final examination, and (7) a program of supervised teaching approved by the department.  

THE DOCTORAL PROGRAM  

The departmental requirements for the Ph.D. degree in English is completion of a minimum of three academic years of resident graduate study. This includes a balanced program of at least 72 quarter hours (and equivalent) in English: 36 hours at the 6000 level; 24 additional hours at the 5000-6000 level; and 12 hours for graduate credit at any level, including the 3000-4000 level. In addition, 9 or (6) hours approved by the department must be taken for graduate credit in a subject or subjects other than English. Normally a student with the M.A. from another university must transfer at least 36 quarter hours (and equivalent) in English: 36 hours at the 6000 level; 24 additional hours at the 5000-6000 level; and 12 hours for graduate credit at any level, including the 3000-4000 level. In addition, 9 or (6) hours approved by the department must be taken for graduate credit in a subject or subjects other than English. Normally a student with the M.A. from another university must transfer at least 36 quarter hours (and equivalent) in English: 36 hours at the 6000 level; 24 additional hours at the 5000-6000 level; and 12 hours for graduate credit at any level, including the 3000-4000 level. In addition, 9 or (6) hours approved by the department must be taken for graduate credit in a subject or subjects other than English. Normally a student with the M.A. from another university must transfer at least 36 quarter hours (and equivalent) in English:
examinations will be followed by the writing of the dissertation and by an oral examination in the field of the dissertation.

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

*1211 Written and Oral English for Foreign Students (6) Rapid review of English grammar structures and pronunciations with intensive oral, aural, and written drill. Required during the first quarter of residence of all foreign students (graduates, undergraduates and transfer students) who are not excused from it on the basis of the English Proficiency Examination required of every new foreign student. A, B, C, I, F, W grading. Students registered for this course are permitted to register for only 2 other courses. E

*1221 Written and Oral English for Foreign Students (6) Emphasis on the more advanced structures of English grammar and on paragraph writing. Required during the first quarter of residence of foreign students who on the English Proficiency Examination demonstrate need for work in English structure, but not at the intensive level of English 1211. Required also of foreign students who complete English 3330 or 3340 or consent of instructor. A, B, C, I, F, W grading. Students registered for this course are permitted to register for only 2 other courses. E

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

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


3135 Tennyson and His Successors (3) Includes such poetry as that by the Pre-Raphaelites, humorists, and Decadents.

3136 Browning, Arnold, and Hopkins (3)

3150 Melville (3)


3280 Restoration and Eighteenth-century Drama (3) Dryden through Sheridan.

3290 Restoration and Eighteenth-century Prose (3) Defoe, Addison, Steele, Swift, and others.

3295 The Age of Johnson (3)

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

3711 Literature of the English Bible (3) Old Testament Wisdom literature and types of New Testament literature. A

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

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

3940 The Novel of the Contemporary Western World (3) Prerequisite: 3920 or consent of instructor. A

4010-20 Shakespeare (3, 3) 4010—Early plays, c. 1590-1601, including Henry IV, Twelfth Night, and Hamlet. 4020—Later plays, 1601-1613, with emphasis upon tragedies and dramatic romances. E

4042-43 Topics in Mode and Genre (3, 3) Content varies. Special topics in principal forms and modes of British and American Literature, e.g., comedy, tragedy, epic, lyric, satire, etc. May be repeated with consent of department. Maximum 6 hrs each.

4045-46 Topics in Literary Theory and Criticism (3, 3) Content varies. Special topics in theoretical and practical approaches to British and American Literature. May be repeated with consent of department. Maximum 6 hrs each.

4050-60-70 American Novel (3, 3, 3) 4050—From earliest sentimental novels through Brown, Cooper, and Kennedy, and major figures to 1875. 4060—Herman Melville and Mark Twain through early works of Faulkner and Hemingway. 4070—Early thirties to present. F, W, Sp

4090 Topics in Film Study (3) Content varies. In-depth study of particular directors, film genres, national cinema movements, or other topics. May be repeated with consent of department. Maximum 6 hrs each.

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

4250 Advanced Fiction-Writing (3) Further development in basic Writing Fiction course. Prereq: 4240 or consent of instructor.

4254 Writing the Detective and Mystery Story (3) Instruction and writing cover entire crime field—suspense, police procedural, private eye, spy, and adventure fiction. Recommended prereq: 3450 or 70-80 or consent of instructor.

4256 Writing Science Fiction and Fantasy (3) Survey of general development and basic texts of Science Fiction, Speculative Fiction and Fantasy. Exercises in writing in genres, in accordance with techniques learned in basic Writing Fiction course.

4270 Advanced Poetry Writing (3) Further development of skills acquired in basic Writing Poetry course. Prereq: 4260 or consent of instructor.


4420 Social Linguistics (3) Exploration of language patterns in terms of correlations between them and their social context. Examination of effects of language upon culture, and vice versa. Prereq: 3330 or consent of instructor. (Same as Linguistics 4440.)

4450 Dielectrology (3) Theories and methodologies of dialect research, fieldwork, and analysis. Prereq: 3340 or consent of instructor. (Same as Linguistics 4450.)

4455 Variables of English (3) Theories, methodologies, and findings of English and American dialectology with emphasis on implications for cultural pluralism. Prereq: 3330 or consent of instructor.

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

4471-81 English as a Second or Foreign Language (3, 3) 4471—Applied linguistics in teaching and learning as a second or foreign language. Phonological and grammatical structure of present-day English. Analysis of differences (phonological, grammatical, and lexical) between English and another language. Prereq: Second year of a foreign language. 4481—Materials and methods of language teaching, with emphasis on preparation of materials and structured teaching situations. Theory of language testing and competence, with emphasis on construction of tests. Teaching with an experienced member of the staff. Prereq: 4471. (Same as Linguistics 4471-81) W; Sp

4510-20-30 Black Literature (3, 3, 3) Trends and developments.

4551 Southern Literature through the Nineteenth Century (3) Southern writing from colonial period to end of nineteenth century, including frontier humorists and local color writers. A

4552 Southern Literature in the Twentieth Century (3) Modern Southern literary renaissance, the Fugitives and Agrarians, Faulkner and more recent writers such as Welty, O’Connor, and Porter. A

4560 Emerson and Thoreau (3)

4580 American Humor through Mark Twain (3)

4721-31-41 Ballard and Folktales (3, 3, 3) 4721—Study of traditional English and Scottish popular ballads and their North American variants; 4731—Study of native American ballad and folktale; 4741—The folk narrative; functions, categories, and patterns of storytelling.

4585 Milton (3) Emphasis on major poems. A

4660 Seventeenth-century Prose and Poetry (3) Bacon and Donne to Marvell. A

4930-40 Chaucer (3, 3) 4930—The Canterbury Tales. 4940—Trollop and Crisseyde and early poems.

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

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

5101 Foreign Study (1-12) See page 96.

5102 Off-Campus Study (1-12) See page 96.

5103 Independent Study (1-12) See page 96.

5140 Teaching Freshman Composition (3) Introduction to teaching of Freshman English through study of various techniques and philosophies of composition. Required of all first-year teaching assistants.

5150 Old English Prose (3) A

5170-80 History of the English Language (3, 3) 5170—Old English, including Old English grammar and phonetics, Old English, development of inflection and word order, 5180—Middle and Early Modern English, developments in pronunciation and vocabulary. F; W

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

5240 Readings in Black American Literature (3) Critical analysis of poetry, prose, drama, criticism; historical and cultural background; discussion of relevance or irrelevance of race as influence on text and reader.

5250 Fiction Writing (3) Advanced fiction projects, under supervision of instructor and time for independent study. Prereq: Extensive background in reading and writing fiction.

5255 Writing of Advanced Non-Fiction Prose: The Genres (3) Practice in writing of biography, travel book, historical study, and associated genres; viewpoint is creative. Prereq: 4000-level writing course or consent of instructor.

5270 Poetry Writing (3) Major poetic project or concentration; project begun in 4270. Individual consultation with instructor supplements class analysis; readings in contemporary poetry and theory. Prereq: 4270 or consent of instructor.

5280 Special Topics in Writing (1-3) Topic varies.
Critical judgements about text of literary work. Pre-Req: 5860 or consent of instructor.

**French**

*See Romance Languages*

**Geography**

**MAJOR**

**DEGREES**

M.S., Ph.D.

**Professors:**

- W. T. Blasing (Head), Ph.D. Tennessee; C. Aiken, Ph.D. Georgia; E. H. Hammond, Ph.D. California (Berkeley); C. W. Ninko, Ph.D. Syracuse;
- T. H. Schmudde, Ph.D. Wisconsin.

**Associate Professors:**

- J. W. Bell, Ph.D. Iowat; L. W. Brinkman, Jr., Ph.D. Purdue;
- G. T. Paladgan, Ph.D. Denver (UT Space Institute);
- B. Ratcliff, Ph.D. Northwestern; J. B. Rehder, Ph.D. Louisiana State.

**Assistant Professors:**

- W. T. Blasing (Adjunct), Ph.D. Wisconsin; R. Foresta, Ph.D. Rutgers; L. Pulsifer, Ph.D. Southern Illinois.

The Department of Geography offers the degrees of Master of Science and Doctor of Philosophy with concentrations in geography of development, physical geography and human systems, urban geography, geography of Anglo-America, and rural and nonmetropolitan geography.

**THE MASTER'S PROGRAM**

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 sound undergraduate major program. At least two-thirds of the total hours in the graduate program must be at or above the 5000 level, and must include 5100, 5160 and 60 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 doctoral committee. Comprehensive examinations required for admission to candidacy include a written comprehensive, written examinations on two special fields, and an oral examination on the student's program, the special fields, and the dissertation proposal. Also required is a final oral examination on the dissertation and on other aspects of the student's program as determined by the student's doctoral committee.

**Intermediate Economic Geography (4)**

- Concepts, theories, and techniques.
- Location patterns in agriculture, manufacturing, and other service activities. For W

**Urban Geography (4)**

- Concepts and theories concerning development, significance, and identification of systems of cities and internal morphology of cities. For W

**Rural Geography (4)**

- Geographical appraisal of rural areas of the United States, including small towns and urban fringes. Problems and potentials of rural America. For W

**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

**Climatology (4)**

- General circulation system leading to world patterns of climates. Climatic change and modification, interrelationship of climate and human activity. For W or Sp

**Land-Surface System and Man (4)**

- Nature and regional variations in relationships among surface form, water, vegetation, and surface materials. Humans as evaluators and agents of change. For F or Su

**Political Geography (4)**

- Importance of geographic factors for understanding political relationships within and among nations; spatial implications of political decision-making processes; geography of administrative units. For F

**Cultural Geography (4)**

- Basic concepts of culture: methods and background of cultural geography, world patterns and regionalization. For F or Sp

**Geography of Middle America (4)**

- Covers Mexico, Central America, and the West Indies. For Sp

**Geography of South America (4)**

- Survey of the physical, cultural, and economic characteristics of the countries of South America, excluding the Soviet Union.

**Regional Geography of the United States and Canada (4)**

- Major physical, economic, and social developments as these developments give distinctive character to the region and its parts, especially Southern Appalachia. Appalachia in perspective in the current American scene. For F

**Geography of Transportation (4)**

- Geographic examination of transportation systems, emphasizing transport of people on highways, and public facilities. Relationships of these systems to changing geography of cities and urban hinterlands. For Sp

**Quantitative Methods in Geography (4)**

- Geographic applications of statistics as descriptive techniques, point pattern analysis and analysis of areal units. Prereq: Mathematics 3300 or consent of instructor. For Sp

**Problems in Geographic Method (4)**

- Examples of problems and approach in geographic analysis and synthesis. Emphasis on character of geographic analysis, areal sampling, generalization, classification, regionalization, and questions of scale. For Sp

**Historical Geography of the United States (4)**

- Survey of changing human geography of United States during four centuries of settlement and development. Emphasis upon changing population patterns, development of agricultural regions and patterns of urban development. For Sp
4510 Principles of Geomorphology (4) (Same as Geology 3210)

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

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

4630 Geography of Agriculture (4) A

4710 Cartographic Design and Production (4) Principles and practice of design, construction, and reproduction of maps. Recommended prereq: 3700. 2 hrs and 2 labs.

4720 Data Mapping (4) Automated techniques of representing surfaces, using geographic information systems. Recommended prereq: 3700 and knowledge of a computer language.

4730 Advanced Cartography (4) Map production from design through color proofs. Prereq: 3700, 4710, and 4720 or consent of instructor. Su

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

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

4799 Practicum in Cartography/Remote Sensing (2-6) Prereq: Written consent of instructor required prior to registration. May be repeated. Maximum 6 hrs. E

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

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

5100 Colloquium in Geography (1) Discussion of departmental research, current research literature, and general topics. Registration at each offering required of resident graduate students. May be repeated. Maximum 6 hrs. S/NC only. W, Sp

5101 Foreign Study (1-12) See page 96. Prereq: Written consent of instructor prior to registration. E

5102 Off-campus Study (1-12) See page 96. Prereq: Written consent of instructor prior to registration. E

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

5160 Research Design and Field Problems (4-6) Development of research problems, preparation of appropriate study designs, and practical field application. Su

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

5200 Special Problems in Geography (2-6) Reading and research on problems or topics of interest to individual students. Students must define topic and receive instructor's approval of study plan before registration. Prereq: Written consent of instructor prior to registration. May be repeated with consent of instructor. E

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

5260 Advanced Cultural Geography (3) Geographical analysis of rural settlement in Eastern United States, with emphasis upon New England, Tidewater East, and Upland South, and specific application to Southern Appalachians. Includes field work and final paper. Prereq: 3600 or consent of instructor. A

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

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

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

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

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

5610 Topics in Climatology (3) Examination of trends, problems, and methods in modern climatology. Prereq: 3510 or consent of instructor. May be repeated with consent of instructor.

5660 Advanced Political Geography (3) Geographical consequences of public decisions, emphasis on understanding how administrative and political processes affect public land management, spatial distribution of public goods, and urban morphology. Prereq: 3610 or consent of instructor.

5710 Seminar in Geography (3)

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

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

5790 Topics in Cartography (3) Trends, concepts, problems, and methods of cartography. Prereq: 3700, or consent of instructor. May be repeated with consent of instructor. Maximum 9 hrs. A

5815 Regional Geomorphology (4) (Same as Geology 5915.)

5900 Doctoral Research and Dissertation (3-15) P/NP only. E

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

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

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

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

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

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

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

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

NOTE: Registration in 6000-level courses may be repeated with consent of department.
3180 Mineralogy (4) Introduction to crystallography and study of minerals. Laboratory includes hand specimen, chemical, and X-ray methods of identification. Prereq: 1410. Chemistry 1110-20 or equivalent. 3 hrs and 1 lab.

3210-20 Invertebrate Paleontology (4, 4) Systematic review of important Metazoa invertebrate fossil groups. 3210—Porifera to Annelida, including cnidarians, brachiopods, and echinoderms. 3220—Mollusca through lesser Chordata, including arthropods and echinoderms. May be taken separately or in sequence. Prereq: 3260; Biology 1210-20 or consent of instructor. 3 hrs and 1 lab or field period.

3260 Paleobiology (4) Introduction to principles and methods of interpreting fossil assemblages and preservation of earth history. Prereq: 1420. 3 hrs and 1 lab or field period. A

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

3310 Introductory Petrology (4) Introduction to the classification and properties of igneous and metamorphic rocks, processes which produce them, and environments in which they form. Prereq: 3180. Coreq: 3190. 3 hrs and 1 lab. A

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

3350 Stratigraphy-Sedimentation (4) Introduction to stratigraphic principles and practices and sedimentary processes and interpretation of depositional environments. Prereq: 1420 and 3180. 3 hrs and 1 lab. A

3370 Structural Geology (4) Introduction to the study of structures such as folds, faults, joints, cleavage, and primary structures. Laboratory work includes depth and thickness problems, structure sections in which they form. Prereq: 3180. Coreq: 3190. 3 hrs and 1 lab. A

3390 Introductory Environmental Geology (4) Geologic processes involving earth environment and resources, and geologic parameters associated with their control and misuse. Prereq: 1420 or consent of instructor. 2 hrs and 2 labs or field periods.

3380 Quaternary Field and Lab Techniques (4) Techniques for environmental characterization and recognition of ancient analogs; facies applications to exploration and production geology. Prereq: 12 hrs geology and consent of instructor. A

3410 Principles of Economic Geology (4) Geologic processes, classification, of mineral deposits, survey of different types of mineral deposits and subjects of general interest. Registration requires approval of students. S/NC only.

3460 Photogeologic Interpretation (4) Advanced photogrammetry and remote sensing. Computation of grades and reserves. Application of phase equilibria studies in rock-forming and ore systems as aid to understanding conditions of formation and modification of rocks. Prereq: 4610 or consent of instructor.


3475 Exploration of Oceans and Continents (4) Introduction to sources and changes that have occurred in earth's crust with emphasis on modern concepts of continental drift and plate tectonics. Prereq: 1420.

4420 Optical Mineralogy (4) Identification of minerals and rocks. Prereq or coreq: 3180 or consent of instructor. 2 hrs and 2 labs.

4650 Mineral Phase Equilibria (3) Principles of phase equilibrium. Application of phase equilibria studies in rock-forming and ore systems as aid to understanding conditions of formation and modification of rocks. Prereq: 4610 or consent of instructor.


4800 Environmental Geochemistry Laboratory (1-3) Independent lab study of problem in geochemistry using lab techniques. Prereq: Consent of instructor. A

5210 Special Problems in Geology (1-4) May be repeated. Maximum 12 hrs.

5290 Quaternary Problems (4) Interdisciplinary approach to interpretation of physical and biological phenomena directly or indirectly influenced by Pleistocene glaciation. Prereq: Elements of geology (3 quarters) or consent of instructor. (Same as Botany 5250 and Zoology 5250.)

5910 Depositional Environments and Models for Exploration (4) Modern depositional environments and recognition of ancient analogs; facies applications to exploration and production geology.

5910 Process Geomorphology (4) Gradational processes acting at earth's surface and landforms produced. Prereq: 1420-30 or equivalent. (Same as Geography 4510.) 3 hrs and 1 lab.

5920 Geologic Photography, Photogrammetry and Remote Sensing (4) Terrestrial, airborne, and satellite geologic remote sensing, photographic principles and practice, geometry of terrestrial and aerial photography, principles of nonphotographic remote sensing systems.

5930 Quaternary Field and Lab Techniques (4) Techniques for environmental characterization and reconstructions, pollen and plant-macrofossils identification, description of site stratigraphy and sedimentology. Prereq: 1410, equivalent course, or consent of instructor. 2 hrs and 2 labs.

5940 Field Geology (9) Five-week field course, first term summer quarter. Advanced undergraduates or first-year graduates in geology. Employs entire time of students. Field techniques demonstrated, practiced, and applied to solution of geologic problems. Prereq: 12 hrs geology and consent of instructor.

5950 Quaternary Geology of North America (4) Quaternary geologic processes, stratigraphy, sedimentology, and vegetation of glaciated and unglaciated North America and oceans. Prereq: 1410, equivalent course, or consent of instructor. 2 hrs and 1 2-hr seminar.

5960 Sedimentary Rock Processes (4) The nature of sedimentary rocks. Laboratory includes hand specimens and mineralogical and geochemical characteristics. Prereq: Coreq.

5970 Biostratigraphy (3) Application of paleontologic data to stratigraphic study, codification of stratigraphic nomenclature and recommended practice. Prereq: 3360 and 3180. 3 hrs and 1 2-hr seminar.

5980 Sedimentary Processes and Interpretation of Deposits (4) Application of sedimentary processes and interpretation of depositional environments. Prereq: 3180 or consent of instructor. 3 hrs and 1 lab.

5990 Optical Mineralogy (4) Identification of minerals and rocks. Laboratory includes hand specimens and mineralogical and geochemical characteristics. Prereq or coreq.

6050 Geochemistry of Ore Mineral Deposits (3) Study of ore deposits based on experimental, empirical, and theoretical geochemical considerations. Prereq: 4650 and 4110 or consent of instructor.

6060 Experimental Geochemistry Laboratory (1-3) Independent lab study of problem in geochemistry using lab techniques. Prereq: Consent of instructor.

6100 Special Problems in Geology (1-4) May be repeated. Maximum 12 hrs.

6150 Elementary Applied Geophysics (4) Geophysical principles of electrical, seismic, gravity and magnetic surveying. Recommended: 1420. Physics 2220 or 2320. 3 hrs and 1 lab.

6160 Elementary Geophysical Methods (4) Basic principles of geophysics, seismic, gravity and magnetic surveying. Recommended: 1420. Physics 2220 or 2320. 3 hrs and 1 lab.

6170 Geologic Photography, Photogrammetry and Remote Sensing (4) Terrestrial, airborne, and satellite geologic remote sensing, photographic principles and practice, theory of terrestrial and aerial photography, principles of nonphotographic remote sensing systems.

6250 Principles of Geomorphology (4) Gradational processes acting at earth's surface and landforms produced. Prereq: 1420-30 or equivalent. (Same as Geography 4510.) 3 hrs and 1 lab.

6300 Process Geomorphology (4) Gradational processes operating on and near earth's surface, applied geologically on field work in geomorphology. Prereq: 1430 and 4510. 3 hrs and 1 lab or field period.

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

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

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

5000 Thesis (1-15) PrN only.

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

5990 Experimental Geochemistry Laboratory (1-3) Independent lab study of problem in geochemistry using lab techniques. Prereq: Consent of instructor.

5210 Special Problems in Geology (1-4) May be repeated. Maximum 12 hrs.

5290 Quaternary Problems (4) Interdisciplinary approach to interpretation of physical and biological phenomena directly or indirectly influenced by Pleistocene glaciation. Prereq: Elements of geology (3 quarters) or consent of instructor. (Same as Botany 5250 and Zoology 5250.)

5310 Depositional Environments and Models for Exploration (4) Modern depositional environments and recognition of ancient analogs; facies applications to exploration and production geology.

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

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

5370 Mesoscale Analysis (4) Techniques of gathering, processing, and interpreting tectonic and sedimentary fabric data. Prereq: 3570. 3 hrs and 1 lab or field period.

5460 Photogeologic Interpretation (4) Advanced photogrammetric techniques to obtain geological measurements from aerial photographs. Practice in photographic interpretation of various types of aerial photographs. Prereq: Consent of instructor.

5470 Plate Tectonics and Orogeny (4) Geometry and kinematics of plate motion are used to devise models of geosynclines, fold belts, metamorphic and plutonic belts. Development of plate tectonic model for certain ancient examples. Prereq: 3370. 3 hrs and 1 seminar or lab.

5550 Igneous Petrology (4) Genesis and emplacement of magma, and mineralogical, chemical, and textural properties of igneous rocks. Laboratory emphasizes petrographic description and classification of rocks in thin section. Prereq: 3310 and 4650. 2 hrs and 2 labs.

*Not available for graduate credit for geology majors.

A college undergraduate in an appropriate foreign language.
5540 Terrigenous Clastic Sedimentary Petrology (4) Field and microscopic analysis of terrigenous clastic rock types, role of transport and depositional processes. Prereq: 3360 or consent of instructor. 3 hrs and 1 lab.

5550 carbonate Sedimentology (4) Environments of deposition of modern and ancient carbonates. Prereq: 4130 or consent of instructor. Recommented: 4550. 3 hrs and 1 lab.

5635 X-Ray Diffraction: Single Crystal Techniques (3) Single crystal diffraction techniques, emphasis on prefecion and Weissenberg photography. Crystal symmetry and diffraction, reciprocal lattice and Ewald sphere constructions, space group determination and application to geological problems. Prereq: Knowledge of introductory crystallography and consent of instructor.

5640 Clay Mineralogy (4) Origin of clay minerals; structures and properties, application of mineralogical techniques in clay mineral studies. Prereq: 3180 and 5630 or equivalent. 2 hrs and 2 labs. A

5650 Thermodynamics for Geologists (3) Principles of thermodynamics as applied to geological processes. Prereq: Chemistry 1110-20-30 and calculus of a single variable or equivalents.

5690 Cathodoluminiscence Petrography (2) Application to geological problems. Prereq: 3180 and 4550. 1 hr and 1 lab.

5710 Advanced Paleontology (4) Fossil Invertebrates.

5720 Paleontological Nomenclature and Techniques (4) Codification of biologic nomenclature as it applies to paleontology; basic techniques in preparation and illustration of paleontologic materials and manuscript preparation for publication. 3 hrs and 1 lab.

5820 Strata-bound and Stratiform Sulfide Deposits (4) Classification, distribution, characteristics and genesis of strata-bound and stratiform sulfide deposits. Mississipp Valley-type Pb-Zn deposits, strata-bound massive Cu-Zn-Pb deposits of volcanic and sedimentary associations, and stratiform Cu deposits. Prereq: 4110 or consent of instructor. 2 hrs and 2 labs and seminar periods.

5830 Magmatic Mineral Deposits (4) Classification, distribution, characteristics and genesis of mineral deposits related to magmatic processes. Magmatic segregation deposits, ultramafic-mafic association and porphyry Cu-Mo deposits. Prereq: 4110 or consent of instructor. 2 hrs and 2 lab/field/seminar periods.

5840 Ore Petrology (4) Ore mineral assemblages by reflected-light microscopy, identification of ore minerals and interpretation of paragenesis from textures. Typical samples from different types of ore deposits, selection of choice. Prereq: 4110 and 4550, or consent of instructor. 2-2.5 hrs lab.

5850 Regional Studies in Geology (1-3) Literature study and seminars on specific regions of geologic interest, to be supplemented by field trips. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5860 Coal Depositional Environments (4) Coal stratigraphy and depositional environments, Carboniferous rocks of Appalachian region, problems of coal mining and coal quality. Prereq: 3360 or 4130.

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

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

6110 Seminar in Stratigraphic Geology (3)

6210 Seminar in Palaeontology (3)

6310 Seminar in Structural Geology (3)

6410 Seminar in Mineralogy (3)

6510 Seminar in Petrology (3)

6610 Seminar in Economic Geology (3)

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

6918 Seminar in Geomorphology (3) Prereq: 4610 or consent of instructor.

NOTE: Registration for 6000-level courses may be repeated with consent of department. Maximum 9 hrs per course.

Germanic and Slavic Languages

MAJORS

German

German Language and Literature

DEGREES

MA, M.A.

Ph.D.

Emeritus Professors:

H. W. Fuller, Ph.D., Wisconsini, R. L. Hillier, Ph.D. Cornell.

Professors:

H. Kratz (Head), Ph.D. Ohio State; J. F. Falen, Ph.D. Pennwater; J. C. Osborne, Ph.D. Northwestern; M. P. Rice, Ph.D. Vanderbilt.

Associate Professors:

J. L. Elliott, Ph.D. Michigan; D. M. Fiebe, Ph.D. Indiana; N. A. Laukner, Ph.D. Wisconsin; D. E. Lee, Ph.D. Stanford; C. J. Melor, Ph.D. Chicago.

Assistant Professors:

C. Hodges, Ph.D. Chicago; U. RitzenhoN, Ph.D. Connecticut.

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

THE MASTER'S PROGRAM

In addition to the general Graduate School regulations as stated on page 18, the department requires a minimum of 45 quarter hours including 21 hours of coursework above 3000 level and 9 hours of Thesis 5000.

MASTERRARTSOFCOLLEGE TEACHING PROGRAM

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

THE DOCTORAL PROGRAM

The student must fulfill the general requirements for the Ph.D. degree set by the Graduate School. The candidate for the doctoral degree must complete a minimum of 81 quarter hours of course work beyond the Bachelors degree in addition to 36 hours of doctoral research and dissertation. At least 45 quarter hours of the minimum must be taken in 5000 or 6000 courses. Oft these 45 hours, a minimum of 18 hours must be derived from the preseminar (5200) and the literary or philological seminars (6210-20-30-40-50-60 and 6310-20-30). At least 9 hours must be taken in a cognate field. Students are encouraged to take additional work in allied fields. A minor in an allied field must consist of at least 18 hours of 5000 or 6000 courses. Students must show proficiency in one or two German languages, both oral and written, and a knowledge of two foreign languages, French and another language, such as Italian, Latin or Russian, appropriate to the field of research. A comprehensive examination, both written and oral, on German language and literature and the minor field or fields, must be passed before the student may be admitted to candidacy. The student will be examined on an extensive reading list which covers the whole range of German literature, and will be expected to show familiarity with major works of world literature. The candidate will be required to defend the dissertation in an oral examination, which will cover also the general area of the dissertation. Central emphasis is put on the doctoral dissertation as a final test of the candidates scholarly qualifications.

THE FIELD OF STUDY is divided into (1) German literature and (2) German (or Germanic) philology or linguistics. A student may concentrate on one or the other. Dissertation and seminar research topics will be chosen in accordance with the students interest, supplemented by field trip. Open to graduate students preparing for language examinations, and upper division students desiring reading knowledge of the language. Undergraduate credit only. No credit for students having completed elementary German.

3210-20-30 German Literature in English Translation (3, 3, 3) No foreign language credit. No change in credit hours after add deadline. Students opting for 4 hrs credit will be expected to present an appropriate amount of extra work above that required for 3 hrs. F, W, Sp.

3240 Old Norse Literature in English Translation (3-3) Prose readings of sagas of Norwegian kings, great Icelandic family sagas, and VINland sagas, narrating discovery of America around the year 1000. Mythological and heroic poems of the Edda.

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

4140-50 Selected Topics in German Literature from 1750 to the Present (3, 3) Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30), or courses in English translation) or equivalent. May be repeated with consent of department.

4160 Studies in German Authors (3) Life and works of a single outstanding German literary figure. Content varies. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30), or courses in English translation) or equivalent. May be repeated with consent of department.

4170 Theatrical German (1-3) Performance in one or more German plays. Prereq: Intermediate German or equivalents of instructor. May be repeated with consent of department. W, Sp.

4210-20-30 Studies in German Literary Types (3, 3, 3) 4210—Lyric poetry. 4220—Drama. 4230—Narrative prose. Prereq: 8 hrs of 3000 courses (exclusive of 3010-20-30, 3210-20-30, 3310) or equivalent.

4250 Introduction to Descriptive Linguistics (3) (Same as French, Russian, Spanish, and Linguistics 4250)
4260 Introduction to Historical and Comparative Linguistics (3) Linguistic change, protolanguages. Phylo-
nological and morphological change. Cultural, his-
torical, sociological influences upon the develop-
ment of language. Semantics. Lexicography. All
these topics copiously illustrated by selected ex-
amples from Indo-European languages. Prereq: 9
hrs of upper division English, or 9 hrs of upper di-
vision courses in one more ancient language exclu-
sive of German and French 3010-20-30, courses in
literature in translation, and general courses in Lat-
in and Greek requiring no knowledge of these lan-
guages, or consent of department. (Same as French,
Russian, Spanish, and Linguistics 4260.) W

4270 Introduction to Germanic Linguistics (3)
Phonetics and phonemics of German. German
grammar and vocabulary from descriptive point of
view. Dialects of German. Other Germanic lan-
guages.

4310-20 History of German Language (3, 3)
4810-20-30 German Civilization (3, 3, 3) Prereq:
Intermediate German or equivalent.

4810-20-30 Advanced Conversation and Com-
position (3, 3, 3) Prereq: 3810-20-30 or equivalent
or consent of department. F; W; Sp

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

5100 German Phonetics and Advanced Grammar
(3) Advanced work in phonetics, pronunciation, and
selection of advanced German grammar. Prereq: Consent
of instructor.

5101 Foreign Study (1-12) See page 96. E

5102 Off-campus Study (1-12) See page 96. E

5103 Independent Study (1-12) See page 96. E

5160 Introduction to German Semantics (3)

5200 Proseminar (3) Bibliography: methods; illus-
trative problems; preparation of papers. F

5210-20-30 College Teaching of German (1, 1, 1)
Required of all M.A., MACT, or Ph.D. candidates,
except those whose previous teaching experience
varies. May be repeated. Maximum 9 hrs. Su

5240, and either 5250 or 5260; one M.A.

5250 German Realism and Naturalism (3)

5300 Elements of Russian for Graduate Students
and Seniors (3) For students preparing for language
examinations and seniors desiring reading knowledge
of a second foreign language. Prereq: 2
years of some foreign language in college or consent of
department. May be repeated. No credit for students
having completed 1 yr of Elementary Russian.

3210 Nineteenth-century Russian Literature in
English Translation (3-4) Russian modernism and
literary point of view. Development of language
in Old High German period.

3140 Old Saxon (3) Phonology, morphology, and
syntax of Old Saxon. Representative readings.

3120-30-30-40-50-60 Seminar in German Liter-
ature (3, 3, 3, 3, 3, 3) May be repeated. E

6310-20-30 Seminar in German and Germanic
Philology (3, 3, 3) May be repeated. E

Russian

3030 History of Russian for Graduate Students
and Seniors (3) For students preparing for language
examinations and seniors desiring reading knowledge
of a second foreign language. Prereq: 2
years of some foreign language in college or consent of
department. May be repeated. No credit for students
having completed 1 yr of Elementary Russian.

3210 Nineteenth-century Russian Literature in
English Translation (3-4) Russian modernism and
literature under the soviets.

3240 The Russian Drama in English Translation
(3-4) Realism and the novel; Chekhov in English Translation (3-4)

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

3260 Russian Folklore in English Translation
(3-4)

3270 Russian Philosophical and Theological
Thought (4) A survey of the development of philo-
osophical and theological thought in Russia from the
Middle Ages to the Revolution. Special emphasis on
the expression of this thought in Russian literature and
literary criticism. No knowledge of Russian re-
quired. (Same as Philosophy 3270 and Religious
Studies 3270.)

4010 Selected Topics in Russian and East Euro-
pean Studies (3) Interdisciplinary seminar on selected
topic using comparative approach.

4110-20-30 Studies in Major Russian Writers (3,
3, 3) Content varies. May be repeated. Maximum 9 hrs. Su

5270 Russian and East European Problems (3)

5520 Modern German Language (3)

5570 German Realism and Naturalism (3)

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

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

5600 German Literary Theory and Criticism (3) W

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

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

5720 Readings in Old Norse Prose (3) Intensive
reads of Old Norse prose works. Icelandic saga as literary
source.

5730 Readings in Old Norse Poetry (3) Intensive
reading of Eddaic poems as a literary genre and re-
pository of ancient Germanic customs, legends, and
mythology.

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

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

6120-30 Old High German (3, 3) 6120—Introduc-
tion: phonology, morphology, and syntax of Old High
German of eighth and ninth centuries. Dialects: Rep-
resentative prose readings. 6130—Literature and
Linguistics: prose and poetry of period from linguistic
and literary point of view. Development of language
in Old High German period.

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

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

6310-20-30 Seminar in German and Germanic
Philology (3, 3, 3) May be repeated. E

Greek

See Classics

History

MAJOR DEGREES

History

Professors:

P. H. Bergeron, Ph.D. Vanderbilt;
E. V. Chinian, Ph.D. Harvard; R. E. Duncan;
Ph.D. California (Berkeley); S. F. Fink (Emeritus);
Ph.D. Princeton, L. P. Grill, Ph.D. Harvard;
Ph.D. Emory; G. D. Lues, Ph.D. Harvard;
Ph.D. Harvard; R. W. Haskins (Emeritus), Ph.D. California (Berkeley); C. O. Jackson, Ph.D. Emory;
Ph.D. Columbia, R. L. Landen, Ph.D. Princeton.

Associate Professors:

J. D. Bing, Ph.D. Indiana; S. R. Blaneshi (Head), Ph.D. Bryn Mawr; J. R. Finger, Ph.D. Washington;
C. W. Johnson, Ph.D. Michigan; P. A. Marr, Ph.D. Harvard;
M. J. McDonald, Ph.D. Pennsylvania; J. H. Morrow, Ph.D. Pennsylvania; J. Muldowney,
Ph.D. Yale; J. P. Pinchney, Ph.D. Vanderbilt;
E. H. Trainer, Ph.D. Emory; J. G. Ulley, Ph.D. Illinois;
W. B. Wheeler, Ph.D. Virginia.

Assistant Professors:

T. W. Barnett-Robisheaux, Ph.D. Virginia;
S. D. Becker, Ph.D. Case-Western Reserve;
J. Bohstedt, Ph.D. Harvard; W. W. Farris, Ph.D. Harvard;
Ph.D. Illinois;
Ph.D. Duke.

THE MASTER'S PROGRAM

Plan I: Course requirements include History
5240, and either 5250 or 5260; one M.A.
reading course, at least 6 additional hours
5300 or above of which 3 hours must be 6300
or above. Total hours, including these—45.
Plan II: History 5240, and either 5250 or
5260; two M.A. reading courses; 12 additional
hours 5300 or above, at least 2 of which must
be 6300 or above. Total hours—45.

THE DOCTORAL PROGRAM

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

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

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

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

*Distinguished Service Professor.

**Alumni Distinguished Service Professor.
of the required 9 quarters of residence work shall be under the supervision of the staff of the University.

3. Language Requirements: Candidates must possess a reading knowledge of one foreign language and such additional languages as may be determined by the student's committee. Under normal circumstances, those specializing in European history will need two languages. The committee may also specify any other research tools, such as statistics, essential for the student's preparation. Upon student petition, the committee may accept in place of a language B or better performance in appropriate statistical courses and History 5260.

The foreign language requirements may be satisfied in one of two ways:

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

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

4. Comprehensive Examination and Committee: Incoming students will be advised by the department head.

The comprehensive examination must be taken after all course work is completed, language requirements fulfilled, and at least nine months before the degree is expected. This exam should normally be taken before the student's committee. Under normal circumstances, those specializing in European history will need two languages.

The comprehensive examination will be written and oral.

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

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

3140-50-60 History of England (3, 3, 3) 3140—1688. 3150—1689 through the Reform Bill of 1832. 3160—1832 to present. Medieval state, church, and society; origins of Anglo-American law; monarchy, parliamentary government, Reformations, seventeenth century revolutions, commercial, agricultural and industrial growth, society; empire, welfare state, wars of aggression, economic crisis.

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

3411-12 The Reformation (3, 3) 3411—Renaissance, 3412—Reformation, Counter Reformation, and Wars of Religion, 1517-1618. (Same as Religious Studies 3411-12.)

3421-22 Early Modern Europe 1600-1815 (3, 3) 3421—Seventeenth century Europe. 3422—Eighteenth-century Europe.

3431-32 Nineteenth Century Europe (3, 3) 3431—French and industrial revolutions to 1848. The milieu for fermenting conflictive economic, social and political ideas, culminating in major revolutionary uprisings. 3432—Maturity and challenge (1848-1890). Industrial and capitalist maturity in the era of intense national rivalry; triumph of bourgeois, intellectual climate of realism, scientism, and materialism.

3445-46 History of France (4, 4) 3445—Emergence of Modern France (1715-1875). Social, intellectual and economic theses in an agrarian regime; era of experimentation as revolutionary and traditional France confront one another. 3446—Since 1871.

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


3710-30-30 History of Germany (3, 3, 3) 3710—Germany to 1700: First Reich's fortune and failure. Development of absolutist imperial state from medieval greatness to baroque age weakness, disastrous dynastic and religious struggles, rise of powerful princes, economic and cultural growth and decline. 3720—Germany 1700-1900: quest for nationhood. Austrian-Prussian rivalry in times of Frederick the Great, Metternich, and Bismarck; effects of absolutism, Enlightenment, romanticism, revolution, reaction, and industrial economics on German society, and state. 3730—Germany since 1890: Catastrophic Century. From empire, world wars and Third Reich to defeat and partition, role of military, political impact of economic crises, Hitler and Nazism, and interplay of extremism, socialism and democracy.

3740 The City in Europe, ca. 1200-1500 (3) Survey of European urban growth, with comparative analysis of the major periods of urbanization of the thirteenth and nineteenth centuries. Emphasis on the relationship between demographic, economic and social foundations of cities and political and cultural development.

3751 Ancient Near Eastern Civilization (3) Bronze and Iron Ages.

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

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

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

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


3870-80 History of Latin America (3, 3) 3870—Colonial and independence decades. 3880-3890—National Development, 1825 to present.

3911-21 United States, 1877 to the Present (3, 3) 3911—Gilded Age and Progressive Era, 1877-1914. 3921—1914-1945. American experience during World War I, Great Depression, New Deal, and World War II. Domestic history including military and foreign policy. 3931—1945 to present. Demobilization and Cold War after World War II followed by wars in Korea and Vietnam; attempts to find labor peace, national prosperity, and full equality for minorities. From Truman's administration to present.

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

4130 History of Colonialism and Imperialism (3) Nineteenth century to present.

4250-50-60 European Intellectual and Cultural History (3, 3, 3) 4250—From Reformations to the scientific revolution, 1500-1700. 4260—From the Enlightenment to the Age of Realism, 1700-1870. 4270—From Subjectivism to Relativism, 1870-present.

4280 Women in European History (4) Comparative analysis of role and image of women in Medieval, Renaissance, and Victorian periods. Attention given to parallel changes in structure of family as well as relationship between Western culture and women's protest movements.

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


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

4300 Civilian-Military Relationships in the Modern Western World (3) Civilian-military affairs from about 1000 to 1860 in Western Europe, Russia, and America; emphasis in Western Europe: e.g., Dreyfus Affair, Army in Nazi Germany, and Truman-MacArthur controversy.


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

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

4490 Soviet Foreign Policy (3)

4500 History of Medieval England (3) From Anglo-Saxons to coming of Tudors; relationship between legal and constitutional developments and structure of society.


4551 British Society and the Industrial Revolution, 1760-1848 (3) Emergence of modern industrial society: urbanization, mechanized factory production, social engineering via schools and police, mass politics and reform, class conflict, economic and population growth.

4570 Twentieth Century Britain (3) Emergence of welfare state, political impact of Labour movement, World War and Depression, chronic economic crisis, persistence of class.

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

4641-51 America: Mind, Mood and Society (3, 3) Social and cultural history and thought from mythologies behind colonization to major beliefs and values which form the foundation of present-day life in the United States. 4641—Colonial period to 1865. 4651—1865 to present.

4661 Studies in American Social and Cultural History and Thought (3) Intensive examination of specific themes, problems, or ideas.

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

4710-20 Medieval History (3, 3, 3) 4710—Age of Heroes. 500-1000. Pattern of early medieval heroism, its social and intellectual assumptions, individuals who exemplify it, continuing harsh environment of early Middle Ages. 4720—Age of Chivalry. 1000-1300. Emergence of chivalry from heroes of feudal epics of eleventh century to questing knights of thirteenth century. 4725-30-35-The Romanesque World.

4741 Italian City-States, 1250-1500 (3) Evolution of urban civilization in northern and central Italy in medieval and Renaissance periods. Architectural and townscapes forms studied in sociocultural as well as cultural contexts. Florence is primary focus, but other major city-states also included.

4770 Austria and Central Europe (3) To 1867.

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

4811-21 History of Japan (4, 4)

4840 History of Mexico (3)

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

4870-90 China (3, 3, 3) 4870—Chinese high culture from Confucius to Mao Tse-tung. Traditional religion, philosophy, fine arts; literature; cultural legacy under communism; similarities and differences between Chinese and Western cultures. 4880—To 1850. Uniqueness of Chinese experience, its influence on Japan and West, relevance in today's world. 4890—Modern China since 1850. Chinese Revolution in context: Imperialism, reform, nationalism, communist movement, Mao Tse-tung; China in today's world. No previous knowledge of China required.


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

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

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

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

5019 Foreign Study (1-12) See page 96. E

5020 Off-campus Study (1-12) See page 96. E

5038 Independent Study (1-12) See page 96. E

5211-5255 M.A. Reading Courses (3 hrs each) Directed reading courses in preparation for fields required for Master's oral examination. 5211, Ancient; 5212, Medieval; 5213, Early Modern Europe; 5214, Europe Since 1769; 5215, American History to 1815; 5216, American History Since 1769; 5217, Latin America; 5218, Far East; 5219, Colonialism and imperialisn; 5221, England; 5222, Russia; 5223, Germany; 5224, France; 5225, Middle East. Open only to Master's candidates in history. S/NC only. E

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

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

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

5271-72-73 The Teaching of College History (5, 0, 3) Introduction to problems of teaching at college level. Place of history in curriculum, types and levels of courses, and techniques of teaching. Prereq: Consent of instructor. Required of candidates for the M.A. Prereq: Consent of instructor. Required of candidates for the M.A. Credit will be withheld until the completion of 5273, with grades of "S" or "NC" submitted at each of first two quarters. E

5280 Philosophy and Methodology (3) Philosophical theory and their relationship to methods from which they emerge; modern trends in historical methodology. Sp

5290 Quantitative Analysis of Historical Data (3) Prereq: Sociology 3320 and 3330, or consent of instructor. Sp

5300 Topics in History (3)

5310 Topics in Women's History (3)

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

5360 Topics in American Foreign Relations (3)

5410 Topics in Early Modern European History (3)

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

5444 Topics in French History (3)

5445 Topics in Nineteenth-century European History (3)

5450 Topics in Twentieth-century European History (3)

5480 Topics in Russian History (3)

5510 Topics in Tudor-Stuart England (3)

5520 Topics in Modern English History (3)

5550 Reaction and Reform in England, 1789-1848 (3)

5560 Anglo-Irish Relations (3)

5640 Topics in American Social and Cultural History (3)

5645 Topics in American Urban History (3)

5650 Topics in the American Westward Movement (3)

5660 Topics in Negro History (3)

5670 Topics in American Colonial History (3)

5675 Topics in the Early National Period of American History (3)

5680 Topics in Nineteenth-century American History (3)

5690 Topics in Twentieth-century American History (3)

5720 Topics in Medieval History (3)

5740 Topics in European Urban History (3)

5750 Topics in Ancient History (3)

5780 Topics in German National Socialism (3)

5790 Topics in Middle Eastern History (3)

5810 Topics in Andean History (3)

5820 Topics in Mexican History (3)

5850 Topics in Chinese History (3)

5860 Topics in Japanese History (3)

5910-20 Topics in Southern History (3, 3) 5910—Old South 5920—New South.

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

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

6300 Seminar in Special Studies (3)

6310 Seminar in Tennessee History (3)

6350 Seminar in American Diplomatic History (3)

6410 Seminar in Western Europe (3)

6444 Seminar in French History (3)

6480 Seminar in Russian History (3)

6510 Seminar in English History (3)

6610 Seminar in American Colonial History (3)

6620 Seminar in the Era of the American Revolution (3)
6630 Seminar in Early National Period of American History (3)
6635 Seminar in Jacksonian Period (3)
6640 Seminar in Social and Cultural History of the United States (3)
6650 Seminar in the American Westward Movement (3)
6710 Seminar in Medieval Institutions (3)
6770 Seminar in Central European History (3)
6810 Seminar in Latin American History (3)
6910 Seminar in the Civil War Era (3)
6930 Seminar in Twentieth-century America (3)
6940 Seminar in the History of the South (3)
6960 Seminar in Negro History (3)

NOTE: Registration in topics and seminar courses may be repeated for credit with consent of department.

Latin
See Classics

Mathematics

MAJOR

Mathematics

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

DEGREES

Professors:
G. E. Albert (Emeritus), Ph.D. Wisconsin;
J. S. Bradley (Head), Ph.D. Iowa; J. H. Carruth,
Ph.D. Illinois;
C. E. Clark, Ph.D. Louisiana State;
R. E. Cline, Ph.D. Purdue;
R. J. Daavenport, Ph.D. Wisconsin;
J. D. DeSart, Ph.D. Maryland;
D. F. Dobbs, Ph.D. Cornell; E. D. Eaves (Emeritus),
Ph.D. Texas; H. Frandsen, Ph.D. Illinois;
D. A. Gardiner, Ph.D. North Carolina State;
R. T. Gregory, Ph.D. Illinois; G. Hallman, Ph.D.
Missouri; D. B. Hinton, Ph.D. Tennessee;
A. S. Householder (Emeritus), Ph.D. Chicago;
L. S. Huch, Ph.D. Florida State; R. M. McConnel,
Ph.D. Duke; H. T. Mathewes, Ph.D. Tulane;
D. D. Miller (Emeritus), Ph.D. Michigan;
B. S. Rapu, Ph.D. Illinois; K. C. Reddy*, Ph.D.
Indian Institute of Technology (India);
P. W. Schaefer, Ph.D. Maryland; F. W. Stallmann,
Ph.D. Giessen (Germany); W. W. Wade, Ph.D.
California (Riverside); C. G. Wagner, Ph.D. Duke.

Associate Professors:
P. D. Anderson, Ph.D. Chicago; V. A. Douglas,
Ph.D. Harvard; G. S. Jordan, Ph.D. Wisconsin;
K. R. Kimber,* Ph.D. Ohio State; G. A. Klasseen,
Ph.D. Nebraska; Y. Ku, Ph.D. Cincinnati; H. L. Lee
(Emeritus), Ph.D. Duke; W. H. Row, Jr., Ph.D..
Wisconsin; Rowlett, Ph.D. Wisconsin; J. Sarbin,
Ph.D. Cornell; J. Smith, Ph.D. California (Berkeley);
K. Soni, Ph.D. Oregon State; R. P. Soni, Ph.D.
Oregon State; K. R. Stephenson, Ph.D. Wisconsin;
J. J. Wash, Ph.D. SUNY (Binghampton).

Assistant Professors:
V. Alexiadis, Ph.D. Delaware; L. Bailes, Ph.D.
Cornell; L. Barker, Ph.D. Florida State; J. Cohen,
Ph.D. Washington; S. Elther, Ph.D. Cornell;
J. G. Gross, Ph.D. Cornell; O. Karakashian, Ph.D.
Harvard; S. Ienkart, Ph.D. Kentucky; M. Miller,
Ph.D. Illinois; S. Mulay, Ph.D. Purdue; H. Simpson,
Ph.D. California Institute of Technology;
C. Sundberg, Ph.D. Wisconsin.

MASTERS OF MATHEMATICS PROGRAM

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

Before admission to this program, the applicant must 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 requirements 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. The course work must include:
   a. 36 hours of mathematics courses numbered 3050 or above;
   b. 9 hours of additional work from mathematics courses numbered 3050 or above from or courses in other departments selected in consultation with the advisor.
2. Passing a comprehensive examination upon completion of all course work.

THE MASTER'S PROGRAMS

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

The department offers two options for these degrees. The first option requires a thesis for which 45 hours must be earned along with 36 additional hours of work in acceptable courses numbered above 4000. Of the additional hours, 9 may be in an area outside the department and 21 must be in courses in mathematics numbered above 5000.

After two quarters of graduate study, a student who supervisory committee gives its approval may choose the non-thesis option, for which 45 hours of work in courses numbered above 4000 are required. Of these, 30 hours (at least 24 of which are in mathematics) must be in courses numbered above 5000. Of the 45 hours, 15 in courses approved by the supervisory committee may be taken in fields other than mathematics. For this option it is also required that a written comprehensive examination be passed, and that credit be received for a 3-hour seminar or reading course (5990-5995) in which a term paper or project is required.

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

THE DOCTORAL PROGRAM

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

1. Pass written examinations covering four subjects, at least three of which must be from the following list:
   a. Algebra 5510-20-30
   b. Functions of a Complex Variable 5110-20-30
   c. Topology 5910-20-30
   d. Functions of a Real Variable 5210-20-30
   e. Linear Analysis 5250-60
   f. Partial Differential Equations 5450-60-70
   g. Ordinary Differential Equations 5870-90-90
   h. Numerical Mathematics 5655-65-75
   i. Mathematical Statistics 5750-60-70

Students may not take examinations in both d. and e. or nor may they take examinations in both f. and g. as their comprehensive examination subjects. Those students who choose four areas from this list must choose one from a. through e. and the students who choose only three from this list must choose one from a. to e.

A student selecting only three from the above list will take a year, 6000-level, and pass a written exam on an area of applied mathematics (e.g., Fluids, Elasticity, Mathematical Ecology) approved as an examination topic for that student by the Graduate Committee. For a given student and a given area, the Graduate Committee will appoint a section of faculty whose responsibility is to submit a list of topics and references to the Graduate Committee and the Applied Mathematics Committee for its approval.

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

1. The exams to be taken must be approved in advance by the student's supervisory committee.
2. At most 4-n exams may be taken at any one time, where n denotes the number of exams previously passed by the student.
3. A student may take a collection of written examinations a maximum of three times, but no one failing five exams, counting possible repetitions, will be permitted to take another round of exams.
4. Pass an intensive exam in the field of specialization. This exam will be given by a committee appointed by the department head at some time after the requirements in 1. have been met. A student may take this specialty exam only twice.
5. The conditions for the doctoral degree are to include a demonstrated proficiency in one foreign language, normally from among French, German, or Russian; this requirement is to be met prior to the examination in the area of specialization. The student's doctoral committee may require that the student pass a second language exam.

In addition, the department requires that each student take at least one semester course in mathematics outside of his/her area of concentration. The use of the course selected to fulfill this requirement must be approved by the department head and the student's Doctoral Committee. (Such approval may occur after completion of the course.)

The written exams mentioned in 1. are normally given twice each year, once in the fall and once in the winter. The fall exams usually are given before the fall quarter begins, and the winter exams are given early in January.

Note: Math 3050, 3060, 3090, 3100, 3110, 3310, 3320, 3330, 3510, and 3720, are intended primarily for students preparing to teach in elementary or secondary schools. Any 3000 or 4000 course in the department whose course number ends in "zero" may be offered as an honors version. In this case, the last digit will appear as an "8" and the title will be preceded by the word "Honors" both in the timetable and on the student's transcript. Honors versions of courses listed in the Graduate Catalog are acceptable for graduate credit. Such courses may be offered upon the
College of Liberal Arts/Mathematics 121

initiative of interested faculty, students, or the department head (though in all cases subject to the approval of the department head).

3050 Elementary Probability and Statistical Analysis (3) Combinatorial problems; sample spaces, events, and probability; axioms of probability; random variables and their distributions; simple random processes. Does not satisfy requirements of major or minor in mathematics. Prereq: 1550-60 or equivalent. W, Sp

3060 Elementary Statistical Analysis (3) Elementary probability distributions used in statistics: binomial, Poisson, and normal and their properties; sampling theory; confidence intervals and statistical tests of hypotheses; least squares and linear regression. Does not satisfy requirements of major or minor in mathematics. Prereq: 3050 or consent of instructor. Sp, Su

3090 Polynomials and Rings (3) An introduction to abstract algebra, beginning with study of integers followed by more general notion of rings, integral domains, and fields. Emphasis is given to certain ring theoretic properties shared by integers and polynomial rings over certain fields. Prereq or coreq: 3100 or 3110.

3100 Logic and Sets (3) Elements of mathematical logic; elementary algebra of sets. Primarily for students in the College of Education. Does not satisfy requirements of major or minor in mathematics. Prereq or coreq: 3100 or 3110.

3110 Real Number System (3) Laws of arithmetic; rational and irrational numbers; fields. Preq: 1 yr of college mathematics. Primarily for students in the College of Education. Does not satisfy requirements of major or minor in mathematics. Su


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

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

3220 History of Mathematics (3) Survey of development of branches of mathematics, from ancient to modern times. Prereq: 1850 or 2550 or equivalent. F

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

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

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

3510 Intermediate Analysis for Teachers (3) Primarily for students in secondary mathematics education. Course covers elementary calculus from advanced viewpoint with emphasis on proofs of basic theorems. Covered include the rigorous development of limits of sequences and functions, continuity, functions, derivatives, definite integral, and fundamental theorem of integral calculus. Does not satisfy requirements of major or minor in mathematics. Prereq: 1550-60 or 1860. Su


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

3780-90 Introduction to Combinatorial Theory (3-3) Introduction to problems of arrangement and selection within discrete systems. Enumeration by recurrence relations, generating functions, application of group theory, finite geometries and finite fields, partitions, block designs. Prereq: 2860 or consent of instructor. F, W, or W, Sp

3810 How To Prove It (3) Course is designed to improve understanding of nature and methods of mathematical proof by means of practice and participation in seminar setting. Variable content but will include certain standard topics such as elementary set theory, relations and functions, and mathematical induction. Coreqs: 2860 or 2560. E

3861 Mathematical Models in the Life Sciences (3) Introduction to difference equations and differential equations. Mathematical modeling techniques applied to biological phenomena. Does not satisfy requirements of major or minor in mathematics. Prereq: 1841-51 or consent of instructor.

3920-30 Topology of Euclidean Spaces (3, 3) Topology topics will include topology of line and plane, separation properties, compactness, connectedness, and continuity, continuous functions, homeomorphisms, continuity, and topological invariants. Must be taken in sequence. Preq: 3810. F; 2860, or consent of instructor, W, Sp.

3990 Studies in Mathematics (1-4) Credit determined at registration. Prereq: Consent of instructor. May be repeated with consent of department. Max. Imum 9 hrs.

4050-60 Matrix Algebra and Applications (3, 3) Vector spaces, linear transformations, eigenvalues and eigenvectors, similarity and unitary transformations, singular value decomposition and least square problem, vector and matrix norms. Jordan canonical form, evolution of discrete and continuous systems, quadratic forms and variational principles, related topics. Must be taken in sequence. Prereq: 2860.

4070 Matrix Algebra and Applications (3) Topics to be chosen at discretion of instructor.

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

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

4225 Numerical Solution to Equations and Numerical Approximations (3) Numerical solution to equations and numerical approximations. Introduction to computation, instabilities, rounding errors. Solution of a single nonlinear equation; introduction to iterative methods for linear and nonlinear systems. Polynomial interpolation, numerical methods for eigenvalues. Approximation by polynomials, piecewise polynomials, trigonometric and rational functions. Prereq: 3550 or 3155. (Same as Computer Science 4225.) F, W


4250-60 Introduction to Complex Analysis (3, 3) Complex numbers, Cauchy-Reimann equations, Cauchy's theorem. Taylor and Laurent series, residues and their applications. 4250-60 Complex mapping, Schwarz-Christoffel transformations, Dirichlet problem, applications (steady temperature, electrostatics, etc.), additional topics in complex function theory. Must be taken in sequence. Prereq: 2860; one 4000-level mathematics course recommended.


4540 Infinite Series and Functions of Several Variables (3) General theory, power series and Taylor's formula, uniform convergence. Partial differential equations and many applications to science and engineering. Preq: 1550-60 or consent of instructor.


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

4650-60-70 Introduction to Mathematical Statistics (3, 3, 3) Introduction to probability; discrete and continuous distributions; correlation, regression, and statistical independence, special probability distributions; significance tests; must be taken in sequence. Prereq: 2860. F, W, Sp

4710 Vector Analysis (3) Fundamental operations, basis vectors, dot and cross products, directional derivatives, divergence and curl of vector fields, line and surface integrals, divergence theorem of Gauss, and Stokes' theorem. Does not satisfy requirements of major or minor in mathematics. Prereq: 2860. E

4750-60-70 Introductory Probability Theory (3, 3, 3) 4750—Elementary combinational analysis, probability, and expectation; discrete probability and stochastic independence, binomial, Poisson, hypergeometric and normal distributions. 4760—Stochastic processes, Markov chains, characteristic function of random variables, infinite sequences of random variables, the weak and strong laws, extreme numbers, and the central limit theorem. 4770—Markov chains; limiting probabilities; steadystate and stationary distributions; Gaussian processes; Birth and death processes; Kolmogorov equations. Prereq: 2840-50-60. F, W, Sp

4810 Elementary Number Theory (3) Divisibility; congruences; theorems of Fermat and Wilson, primality testing, continued fractions. Prereq: 2860 or consent of instructor. Su

4980 Readings in Mathematics (1-3) Open to superior students with consent of department head. Independent study with faculty guidance. May be repeated for credit. Max. Imum 9 hrs.
4990 Studies in Mathematics (1-4) Credit determined at registration. Prereq: Recommendation of Mathematics Department faculty member and consent of department. May be repeated. Maximum 12 hrs.

5000 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before the degree is completed. May not be used toward degree requirements. May be repeated. S/N/C only. E

**5011 Elementary Functions from an Advanced Standpoint for Teachers (3-4) Order and completeness axioms of real numbers; sequences of limits, derivatives of functions; definitions and derivatives of exponential, logarithmic and trigonometric functions; infinite series; Taylor and McLaurin's series; applications to construction of logarithmic and trigonometric tables. Prereq: 3510 or 3110 or consent of instructor.

**5012 Differential Geometry for Teachers (3-4) Advanced techniques applied to graphing functions. Curves, surfaces, parametrizations, singular points, tangent lines and tangent planes, osculating planes, arc length of curves in plane and curves on surface, curvature, torsion, asymptotes, local coordinates. Riemannian surfaces. Prereq: 1 yr of calculus, or consent of instructor.

**5013 Geometry for Teachers (3-4) Primarily for high school teachers of geometry. Historical and modern presentations of topics encountered in a high school geometry class: axioms, synthetic and metric; models; betweenness; congruence of segments and triangles; parallel postulate; similarity area; ruler and compass constructions; Klein's. Erlangen Program. Prereq: Consent of instructor.

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

**5015 Probability and Statistical Inference for Teachers (3-4) Probability distributions including binomial, hypergeometric, and Poisson; moment generating functions; expectation of continuous random variables; element functions generating functions of uniform and normal distributions. Sampling including Chi-square, F, and t distributions; interval estimation of means and variances; simple hypothesis testing. Prereq: 1 yr of calculus and 3050 or consent of instructor.

5050-60-70 Mathematical Logic (3, 3, 3) Truth functions; syntax and semantics of some propositional calculi; completeness theorems; models of natural deduction; algebraic logic; syntax and semantics of first order theories; elementary mathematical logic; automated theorem proving; consistency, completeness, decidability.

5051 Introductory Business Mathematics (3) Graphing of simple equations, straight line, circle, parabola, functions, algebra of functions, limits, continuity, derivatives of algebraic functions, applications to maxima and minima, convexity and concavity, implicit and explicit differentiation, chain rule, higher derivatives, integration over simple regions, applications, introductory matrix algebra, application to solution of simultaneous equations. Credit available only to satisfy MBA core requirement. Prereq: Math 5051 or equivalent.

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


5310-20-30 Introduction to Higher Geometry (3, 3, 3) Projective spaces; coordinates and transformations; conics and quadrics. Elliptic and hyperbolic geometry from viewpoint of projective geometry. Prereq: 4510-60. Must be taken in sequence.

5370-80-90 Mathematical Principles of Fluid Mechanics (3, 3, 3) Equations of motion, incompressible and compressible perfect and inviscid flows; shock waves in perfect fluids, viscous flows and boundary layer phenomena, additional special topics. Prereq: 4530 or 4710 or consent of instructor. A


5450-60-70 Introduction to Partial Differential Equations (3, 3, 3) Uniform convergence, solutions in two variables; properties of elliptic, hyperbolic and parabolic equations, separation of variables, and Fourier series. Advanced techniques of solution in higher dimensions, multiple Fourier series, Fourier and Laplace transforms. Prereq: 4510-20-30 and 4610. Sp

5460-65 Finite Difference Methods for Partial Differential Equations (3) Finite difference techniques for solution of parabolic, elliptic, and hyperbolic equations. Computer implementation, stability, consistency and convergence; nonlinear problems; curved boundaries; solution of linear systems. Prereq: 3213 for 4660, 3155, and 4225 or consent of instructor. (Same as Computer Science 5465.) F

5465 Finite Element Methods (3) Finite element techniques for solution of ordinary and partial differential equations. Analytical and computational techniques. Computer implementation. Prereq: 3150 or 3155, and 4225 or consent of instructor. (Same as Computer Science 5465.)

5470 Advanced Topology (3) Seminars and more advanced topics from topology. Other topics, such as modern methods, further study of finite difference methods, etc. at discretion of instructor. Prereq: 5450-65. (Same as Computer Science 5470.) Sp

5480-90 Mathematical Programming (3, 3) Optimization of functions or variables subject to constraints. Prereq: 3150, 4060 and 4530. W, Sp

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

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


5550-55-65 Numerical Analysis (3, 3) (Same as Physics 5610-20-30.) F, W, Sp

5560 Numerical Methods in Physics (3, 3) (Same as Physics 5640.)


5710-20-30 Tensor Analysis (3, 3, 3) Absolute differential calculus in three-dimensional Euclidean space; differential geometry of curves and surfaces; applications to physics; extension to n-dimensional space. Prereq: Major in mathematics or physics. Must be taken in sequence.


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

5810-20-30 Number Theory (3, 3, 3) Arithmetic functions, distribution of primes, Diophantine equations, approximation theory, Riemann density and

6500-60-70 Partial Differential Equations (3, 3, 3) Advanced topics in classical and modern theoretical partial differential equations. Prereq or coreq: 5110-20-30 and 5210-20-30 or consent of instructor.

6510-20-30 Modern Algebra (3, 3, 3) Intensive study of some major branch of algebraic theory. Subject matter will vary according to interests and preparation of students. Prereq: 4610, 4050, 4520-30-40. F, W, Sp, A


5940-50-60 Applied Probability (3, 3, 3) Development of probabilistic techniques useful in applications to queueing, inventory control, signal theory, biological and physical sciences. Prereq: MATH 1110 or consent of instructor.

5700-80 Mathematical Systems Theory (3, 3) Theory of deterministic models. Prereq for 5840-50: 4610, 4050 or consent of instructor; prereq for 5860: 4750 or consent of instructor.

5650-60-70 Theory of Semigroups (3, 3, 3) Congruences and homomorphisms; ideal theory; representations, decompositions, and extensions; free, regular, inverse, simple, and completely simple semigroups. Prereq: 5550.

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

6610-20-30 Advanced Ordinary Differential Equations (3, 3, 3) M. A. Brown (Emeritus), Ph.D. Kansas; C. J. Mundt Ph.D. Guelph (Canada); J. T. C. Montie Ph.D. Yale; B. T. Rouse Ph.D. Syracuse; M. D. Buenos Aires.

6510-20-30 Modern Algebra (3, 3, 3) Intensive study of some major branch of algebraic theory. Subject matter will vary according to interests and preparation of students. Prereq: 4610, 4050, 4520-30 or consent of instructor. F, W, Sp, A

5940-50-60 Applied Probability (3, 3, 3) Development of probabilistic techniques useful in applications to queueing, inventory control, signal theory, biological and physical sciences. Prereq: 4610, 4050, 4520-30 or consent of instructor.

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

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

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5940-50-60 Applied Probability (3, 3, 3) Development of probabilistic techniques useful in applications to queueing, inventory control, signal theory, biological and physical sciences. Prereq: 4610, 4050, 4520-30 or consent of instructor.

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

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5940-50-60 Applied Probability (3, 3, 3) Development of probabilistic techniques useful in applications to queueing, inventory control, signal theory, biological and physical sciences. Prereq: 4610, 4050, 4520-30 or consent of instructor.

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

6610-20-30 Advanced Ordinary Differential Equations (3, 3, 3) M. A. Brown (Emeritus), Ph.D. Kansas; C. J. Mundt Ph.D. Guelph (Canada); J. T. C. Montie Ph.D. Yale; B. T. Rouse Ph.D. Syracuse; M. D. Buenos Aires.
5819 Molecular Genetics Laboratory (3) Principles and methods of research in molecular genetics. Fundamental genetic concepts (mutation, complementation, recombination) at molecular level. Studies of lactose operon of Escherichia coli. Prereq: 4140 and Biochemistry 4110-20 or consent of instructor. S/NC only.

5820 Microbiology of Foods (3) Lectures and seminars dealing with current advances and selected topics in food microbiology. Prereq: 4430. Spring. S/NC only.

5820 Seminar in History of Microbiology (1) Microbiologists and their achievements from Pasteur to present. S/NC only.

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

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

6130 Seminar in Immunology (1) Readings and discussions based on current literature. May be repeated. S/NC only.

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

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

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

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

6360 Seminar in Filamentous Fungi (1) Readings and discussions based on current literature. May be repeated. Maximum 8 hrs. S/NC only. F

6410 Concepts of Immunity (3) Discussion and readings of recent advances in immunology and immunopathology.

6420 Current Topics in Biological Membrane Research (3) Prereq: 4430. Spring. S/NC only.

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

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

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

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

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.

Music

MAJOR

Music

DEGREES

M.M., M.A.

Professors:

J. F. Meacham (Acting Head), M. M. Northwestern; J. Coker, M.A. Sam Houston; G. F. DeVine, Diploma, Schurz (Chicago); W. Dorn, M.A. Columbia; R. W. Fred, Ph.D. North Carolina; R. C. Huber, Ph.D. North Carolina; M. M. Pederson, Ph.D. Iowa; E. H. Zambra, M.M. New England Conservatory.

Associate Professors:


Assistant Professors:


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

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

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

General requirements for the Master's degree begin on page 16 of this catalog.

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 coursework in music history/literature and/or theory and allow for elective courses. Music theory and composition requirements are distributed according to the student's faculty committee.

THE MASTER OF ARTS PROGRAM

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

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

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

3122 Orchestration (3) Advanced techniques in instrumental writing with emphasis on scoring for the concert orchestra. Prereq: 3112 or consent of instructor.

3240 The Symphony (3) Survey of symphonic literature from precursors of classical symphony to present.

3260 Chamber Music (3) Survey of chamber music from 1750 to present.
3271-81 History of Opera (3, 3) Dramatic, vocal and orchestral elements in opera of Italian, French, and German School. 3271—1600-1800; 3281—1800 to present.

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

*3500 Flute (1-4)

*3505 Oboe (1-4)

*3510 Bassoon (1-4)

*3515 Clarinet (1-4)

*3520 Saxophone (1-4)

*3525 Horn (1-4)

*3530 Trumpet (1-4)

*3535 Tuba (1-4)

*3540 Baritone (1-4)

*3545 Tuba (1-4)

*3550 Percussion (1-4)

*3560 Violin (1-4)

*3565 Viola (1-4)

*3570 Cello (1-4)

*3575 String Bass (1-4)

*3580 Piano (1-4)

*3585 Harpsichord (1-4)

*3590 Organ (1-4)

*3595 Guitar (1-4)

*3597 Composition with Electronic Media (1-3) Prereq: Consent of instructor.

*3599 Composition (1-3) Prereq: Consent of instructor.

3590 Evolution of Jazz (3) Study of origin, development and styles of jazz music and its exponents.

4003-04-05 The Organ and Its Literature (3, 3, 3) Development of organ and organ literature from Middle Ages to present; problems of style and interpretation; pedagogical literature and methods; organ design. Prereq or coreq: 3201-30-30-30 and consent of instructor.

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

4026-37-38 Advanced Piano Literature (2, 2, 2) Piano music for pre-classic period to present. Prereq: Consent of instructor.

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

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

4055-56-57 Elementary and Intermediate Piano Pedagogy (2, 2, 2) Piano methods and materials designed for teaching pre-college level students. Prereq: Consent of instructor.

4060 Choral Techniques (3) Techniques and methods in producing total choral program.

4074-84 Church Music Seminar (3, 3) History and philosophy of church music, liturgies and liturgical music; church music administration. Prereq: Consent of instructor.

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

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

4114 Stage Band Arranging (3) Analysis of scores and scoring for the stage band. Prereq: 3112 and consent of instructor.

4117 Choral Arranging (3) Analysis of scores and writing of arrangements for men's, women's and mixed choruses. Prereq: 3112 or consent of instructor.

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

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


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

4261-71 Introduction to Ethnomusicology (3, 3) Basic attitudes and techniques of ethnomusicology. Survey of music cultures throughout world. 4261-Pacific, Near East and Asia; 4271—Africa, Europe and Americas.


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

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

4400 Jazz Directing (1) Rehearsal techniques for jazz ensembles; special conducting techniques, repertoire, library systems, programming, and supervised laboratory experiences in rehearsing university jazz ensembles. Prereq: Enrollment in Applied Music with jazz emphasis or consent of instructor.

*4500 Flute (1-4)

*4505 Oboe (1-4)

*4510 Bassoon (1-4)

*4515 Clarinet (1-4)

*4520 Saxophone (1-4)

*4525 Horn (1-4)

*4530 Trumpet (1-4)

*4535 Trombone (1-4)

*4540 Baritone (1-4)

*4545 Tuba (1-4)

*4550 Percussion (1-4)

*4555 Voice (1-4)

*4560 Violin (1-4)

*4565 Viola (1-4)

*4570 Cello (1-4)

*4575 String Bass (1-4)

*4580 Piano (1-4)

**4585 Harpsichord (1-4)

**4590 Organ (1-4)

**4595 Guitar (1-4)

**4597 Composition with Electronic Media (1-3) Prereq: Consent of instructor.

**3599 Composition (1-3) Prereq: Consent of instructor.

**4700 Advanced Improvisation (2) Emphasis on further development of individual skills and solving individual problems in jazz improvisation. Prereq: 3052-53.

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

5001 Choral Conducting Project (1-3) Analytical-critical-historical-technical essay on choral music.

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

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

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

5020 Piano Literature Seminar (3) Topics vary.

5030 Choral Literature Seminar (3) Topics vary.

5033-34-35 Advanced Diction for Singers (2, 2, 2) Practical performance and application of diction theory. Prereq: 2055-25-15 or equivalent.

5040 Vocal Literature Seminar (3) Topics vary.


5050 Graduate Recital (3)

5051 Opera Performance (3)

5052 Vocal Chamber Music Performance (3)

5054 Lecture-Recital (3)

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

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

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

5061 Choral Conducting (3) Development of choral conducting skills.

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

**May be repeated. Maximum 6 hrs.

*May be repeated.
5080 Instrumental Conducting Performances (1) Jury performance; conducting band or orchestra in public.
5090 Special Topics in Performance (1-3) Prereq: Consent of department head.
5100 Independent Study in Music Theory (1) Prereq: Consent of department head.
5114 History of Music Theory (3) Work and contributions of theorists from ancient Greece to present. Emphasis on 1600 to present. Prereq: Consent of instructor.
5116 Musical Styles (3) Elements of design and their role in definition of musical styles. Exercises in aural and visual identification. Prereq: Consent of instructor.
5121 Analytical Techniques (3) Analytical techniques with emphasis on contemporary approaches. Tonal and neotonal music. Prereq: Consent of instructor.
5125 Practicum in Computers and Music Research (3) Programming languages, design and implementation of projects in musical analysis, composition and indexing. Prereq: Consent of instructor.
5150 Seminar in Music Theory (3) Topics vary. Prereq: Consent of instructor.
5200 Independent Study in Music History and Literature (1-3) Prereq: Consent of department head.
5210 Introduction to Music Research (3) Principles and techniques of research. Required of all candidates with concentrations in musicology or in music theory; recommended for all music students who intend to enroll in a doctoral program.
5220 Music Bibliography (3) Bibliographic methods; illustrative projects in information retrieval and problem solving in music.
5270 Composer Seminar (3) Topics vary. Prereq: Consent of instructor.
5315 Band Literature (3) Band literature and origins of band emphasizing its important, expanded cultivation during past century in United States and Europe.
5350 Music in the Middle Ages (3) Emphasis on early Christian chant, medieval secular song, early theory, and the development of polyphony and musical notation.
5352 Music in the Renaissance (3) From 1400 to 1600. Mass, motet, chansons, madrigal, and other vocal and instrumental forms and genre.
5353 Music in the Baroque Period (3) From 1600 to 1750; rise of opera and oratorio, church and secular cantata, instrumental forms, performance practice.
5355 Music in the Classic Period (3) Preclassic music (Rococo) and music of Haydn, Mozart and early Beethoven. Includes background of other cultural and artistic activities.
5357 Music in the Romantic Period (3) Survey from Beethoven through post-Romantic instrumental and vocal styles.
5359 Music in the Twentieth Century (3) From 1890 (Debussy) to the present (Stockhausen and others).
5400 Musical Aesthetics (3) Nature of music and musical experience, sense perception and emotions, value in music, and role of artist in society. Aesthetic viewpoint of individuals and historical eras through selected writings.
5500 Flute (1-4)
5505 Oboe (1-4)
5510 Bassoon (1-4)
5515 Clarinet (1-4)
5520 Saxophone (1-4)
5525 Horn (1-4)
5530 Trumpet (1-4)
5535 Trombone (1-4)
5540 Baritone (1-4)
5545 Tuba (1-4)
5550 Percussion (1-4)
5555 Voice (1-4)
5560 Violin (1-4)
5565 Viola (1-4)
5570 Cello (1-4)
5575 String Bass (1-4)
5580 Piano (1-4)
5585 Harpsichord (1-4)
5590 Organ (1-4)
5595 Guitar (1-4)
5597 Composition with Electronic Media (1-3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.
5599 Composition (1-3) Prereq: Consent of instructor.
*5600 Small Ensemble (1)
*5601 Woodwind Choir (1)
*5602 Brass Choir (1)
*5604 Jazz Ensemble (1)
*5606 Trombone Choir (1)
*5610 Percussion Ensemble (1)
*5611 Marimba Choir (1)
*5612 Baroque Ensemble (1)
*5620 UT Singers (1)
*5630 Chamber Singers (1)
*5632 Collegium (1)
*5634 Saxophone Choir (1)
*5640 Opera Theatre (1)
*5642 Opera Workshop (1)
*5650 Concert Band (1)
*5652 Campus Band (1)
*5654 Versity Band (1)
*5656 Laboratory Band (1)
*5657 Marching Band (1)
*5670 Symphony Orchestra (1)
*5680 Concert Choir (1)
*5682 University Chorus (1)
*5687 Women's Chorale (1)
*5689 Accompanying (1)

**May be repeated.  
Maximum 6 hrs.

Philosophy

MAJOR

Philosophy

DÉGUEES

M.A., Ph.D.

Professors:

J. W. Davis (Head), Ph.D. Emory; R. E. Aquilu, Ph.D. Northwestern; L. B. Cebik, Ph.D. Nebraska;
R. B. Edwards, Ph.D. Emory; G. C. Graber, Ph.D. Michigan; M. H. Moore (Emunus), Ph.D. Chicago; D. Van de Vate, Jr., Ph.D. Yale.

Associate Professors:


Assistant Professors:

H. P. Hamlin, Ph.D. Georgia; R. Jones, Ph.D. Chicago; J. E. Nott, Ph.D. Ohio State; S. Reaven, Ph.D. California (Berkeley).

THE MASTER'S PROGRAM

The department offers both an M.A. with a thesis and a non-thesis M.A. The latter is available only to students who have passed the doctoral comprehensive exams and are ready to begin writing a dissertation, but who have not written a Master's thesis. See general requirements on page 18. Courses below 4000 may not be taken for graduate credit by philosophy majors except with special permission.

THE DOCTORAL PROGRAM

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

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

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

MEDICAL ETHICS

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

RELIGIOUS STUDIES

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

3111 Ancient Western Philosophy (4) F, W
3121 Medieval Philosophy (4) F, Sp
3131 Seventeenth- and Eighteenth-century Philosophy (4) E
3141 Nineteenth-century Philosophy (4) F, Sp
3151 Contemporary Philosophy (4) Survey of recent movements in philosophy. F
3270 Russian Philosophical and Theological Thought (4) (Same as Religious Studies 3270 and Russian 3270.)
A student who enrolls in The Graduate School with the intention of attaining an advanced degree in Physics shall, in general, have completed an undergraduate major in physics or its equivalent. Physics 3210-20-30, 3710-20-30, or 5210-20-30 constitute the minimum course prerequisite to graduate study. A student who intends to present Physics as a graduate minor, or shall, in general, have completed an undergraduate minor in Physics or its equivalent. Physics 3210-20, 4210-20 constitute the minimum course work prerequisite to graduate study.

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

THE MASTER'S PROGRAM

The Physics Department has two Master's degree programs—thesis and non-thesis. The thesis program is primarily designed for students intending to go into industrial or governmental laboratories as physicists. The course requirements include 36 quarter hours in such courses as Physics 4510-20-30, 4610-20-30, 4910-20-30, 5110-20-30, 5210-20-30, 5310-20-30, 5610-20-30 and appropriate courses in related fields. Each candidate must present an acceptable thesis, equivalent to 9 hours of credit, and pass an oral examination on course material and thesis.

The non-thesis program is primarily designed for students intending to teach in colleges or universities on the elementary or intermediate level, prior students specifically intending to work toward a Ph.D. Students seeking an M.S. in Physics by this method must apply to the department's graduate committee for permission to enroll under this program. The requirements for the M.S. under this method are the satisfactory completion of 45 hours of course work composed of 30 hours from courses numbered above 5000 (e.g., 5110-20-30, 5210-20-30, 5310-20-30); 9 hours in a minor field (e.g., mathematics); and 9 hours from other courses in physics numbered above 4000 (preferably of advanced laboratory nature). In addition, the candidate must pass a comprehensive examination administered by the committee. The Physics Department is also participating in the program which leads to the Master of Arts in College Teaching degree. In addition to the requirements for either of the Master's programs described above, the MACT degree in Physics requires 15 more hours of credit, making a total of 60 quarter hours. Nine of these hours are specified as follows: 3 hours in a seminar course dealing with general problems of college teaching; 3 hours in a seminar course dealing with special problems in the teaching of physics; and 3 hours in a seminar dealing with the history and philosophy of physics. The other 6 hours of course work may be elected from any of the physics courses numbered above 5000. During the two-year program following the MACT degree, the candidate will be continually engaged in supervised teaching activities.

THE DOCTORAL PROGRAM


A reading knowledge of one foreign language in which there exists a significant body of literature is required. German or French 3030 with a grade of A or B may be substituted for the corresponding language examination.

The thesis topic will be chosen with reference to one of the fields in which research facilities can be made available either at the University laboratory or at the Oak Ridge National Laboratory, Oak Ridge, Tennessee. A program leading to the Ph.D. in chemical physics is conducted jointly with the Chemistry Department. There is a similar degree. Physics departmental requirements for the degree in chemical physics include the successful completion of: Physics 4510, 4610-20-30, 4810-20-30, 5110-20-30, 5210-20-30, 5310-20-30, 5410-20-30, 5510-20-30, 5610-20-30, 6110-20-30, and either 6310 or 5720. Chemistry 4160-70, 5430, and either two quarters from 5340-50, 6730 or 6810-20-30.

Astronomy

4110-20-30 Astrophysics (3, 3, 3) Physics of stars and interstellar matter, planets and interplanetary matter: atmospheres, interiors, and evolution; nebulae, quasars, pulsars. Observational data and their determination. Credit: 3 hours. Approval by department chairman is required. Open only to graduate students. Consent of instructor is required. Another course may be approved by the department chairman as an equivalent. Open only to graduate students. Consent of instructor is required.

4110-20-30 Astronomy (3, 3, 3) Physics of stars and interstellar matter, planets and interplanetary matter: atmospheres, interiors, and evolution; nebulae, quasars, pulsars. Observational data and their determination. Credit: 3 hours. Approval by department chairman is required. Open only to graduate students. Consent of instructor is required. Another course may be approved by the department chairman as an equivalent. Open only to graduate students. Consent of instructor is required.

4110-20-30 Physics (3, 3, 3) Physics of stars and interstellar matter, planets and interplanetary matter: atmospheres, interiors, and evolution; nebulae, quasars, pulsars. Observational data and their determination. Credit: 3 hours. Approval by department chairman is required. Open only to graduate students. Consent of instructor is required. Another course may be approved by the department chairman as an equivalent. Open only to graduate students. Consent of instructor is required.
Students specializing in some areas may be required to demonstrate knowledge of a second language or appropriate research tools or both.

3. Admission to candidacy shall be based on a written and oral comprehensive examination which must be passed not later than three quarters before the date on which the degree is granted.

4. The candidate must pass a final oral examination on the doctoral dissertation.

5. Successful completion of the degree also depends on course performance and other evidence of professional interest and conduct.

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

3545 United States Constitutional Law: Sources of Power and Restraint (4) Analysis of judicial review, constitutional powers of President and Congress, federalism, sources of regulatory authority, and constitutional protection of political rights. Recommended prerequisite: 2510-20. F, W


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

3565 Introduction to Public Administrative Organization and Management (4) Organization and decision-making theory, line and staff services, politics of organization, leadership, personnel and finance, management, administrative responsibility. Recommended prerequisite: 2510-20. F, W, Sp


3605 Political Change in Developing Areas (4) Characteristics and problems of political changes with primary focus on developing areas. F, Sp

3615-16 Dynamics of Black African Politics (4, 4) F, W

3621 Contemporary China and Japan (4)

3625-26 Latin American Government and Politics (4, 4) F, W

3631-32 Government and Politics of the Soviet Union (4, 4) F, W

3635-36 Politics in Western Democracies (4) Political culture, patterns, and institutions of Western democratic systems F, Sp; A

3710 State Politics (4) Focus on formal and informal setting of state government. State government's role in formulating, enacting, and implementing state policy. F

3720 State Government and Policy Making (4) Nature and functions of the institutions of state government: governors, courts, legislatures, and state administrative agencies. Attention will be paid to state government's role in formulating, enacting, and implementing state policy. W

3750 The Urban Policy (4) Analysis of political institutions and processes in metropolitan areas. W

3760 Urban Policy Process (4) Analysis of urban problems and policies in metropolitan areas. Sp

3796 Contemporary Problems of Soviet Foreign Policy (4) Sp

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 theories of religion and politics. W or Sp

3803 Studies in Early Modern Political Thought (4) Machiavelli through the Enlightenment. W

3804 Studies in Nineteenth- and Twentieth-Century Political Thought (4) Political theories of industrial and technological societies, nineteenth and twentieth centuries. F

3880 American Political Thought (4) Examination of role of selected political ideas, doctrines, and themes in America, emphasizing their development and relationships to diverse political interests. F

4060 Revolution: Characteristics, theories, and consequences of revolution, with particular focus on left-wing revolutions and movements. Sp

4110 Law and the Administrative Process (4) Powers, procedures, of controls over administration. Sp

4535-36 Political Attitudes, Opinions, and Communication (4, 4) Nature, development, formation and dissemination of politically relevant attitudes and opinions; role of leadership, persuasion, and communication in opinion-policy process. F, W


4545-46 The Judicial Process (4, 4) The study of courts as components of political systems, and public policy formulation through judicial decision making. Recommended prerequisite: 2510-20. F, Sp; W

4550 Congress (4) Nature, functions, and processes of U.S. Congress. Sp

4575 Special Topics in United States Government and Politics (4) May be repeated with consent of department. Maximum 8 hrs.

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

4620 Public Personnel Administration (4) Development of the merit system in government, career systems, public personnel management functions, organization for personnel management. F or W

4655-56 Policy Making in Democracies (4, 4) Comparative approach to theory and process of making public policies. F or Sp; W

4675 Special Topics in Comparative Government and Politics (4) May be repeated with consent of department. Maximum 8 hrs.


4711 International Law (4)

4727 Politics of Inter-American Relations (4) Analysis of selected theoretical and policy issues concerning international relations in the Americas with emphasis upon imperialism, intervention, and the Cuban Revolution, nationalism, foreign assistance, trade and economic integration. Sp, A

4740 Political Parties and Elections (4) Analysis of party systems and electoral process. F, W

4750 Political Campaigns (4) All aspects of campaign process. F, W

4940 Politics and the Environment (4) Examination of public policy formulation and implementation of public policy related to physical environment with emphasis upon water and air pollution control. Sp

5000 Thesis (1-12) P/NP only. E

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

5101 Foreign Study (1-12) See page 96. E

5102 Off-campus Study (1-12) See page 96. E
5103 Independent Study (1-12) See page 96. E

5110-20 Seminar in Political Theory (3, 3) Selected political thinkers, schools, historical periods. F; W, Sp

5140 Politics, Administration and Community in Nonmetropolitan Areas (3) Analysis of problems and processes associated with community development. F; W

5150 Internship in Political Science (3-9) Open to students participating in approved internship programs. May be repeated with consent of instructor. Maximum 9 hrs. Nonmet. Sp

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

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

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

5270 Seminar in the Politics of Development (3) Selected topics dealing with political problems of less developed countries. F

5310-20 Seminar in Comparative Government (3, 3) Selected topics in modern governments.

5340-50 Seminar in Latin American Government (3, 3)

5370-80 Seminar in Political Science and Government Administration (3, 3)

5410-20 Seminar in Public Law (3, 3) Special problems in constitutional and administrative law. F

5440-50 Theory and Analysis of U.S. Foreign Policy Processes (4, 4) Theoretical approaches to decision making in foreign policy area and analysis of policy-making process. W

5510-20 Seminar in International Organization (3, 3) 5510—Introduction to regional international organizations; political integration at international level. 5520—Functional international organizations.

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

5550 Seminar in Administration in Developing Countries (3)

5600 Public Administration (3) Public administration theory and functions, approaches to public management, contemporary problems in public administration. F

5605 Research and Methodology in Public Administration (3) Basic assumptions and techniques of research in public administration; measurement, analysis, and reporting of data. W

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

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

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

5635-45 Operations Research for Public Administrators (3, 3) Operations research methodology, applications and limitations in public sector; linear programming, transportation and assignment problems, network analysis, PERT, dynamic programming and other methods.

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

5641 Seminar in Contemporary Public Policies (3) Problems in one or more public policy areas from political and administrative perspectives. Topics selected by instructor.

5670-80 Seminar in Policy Analysis (3, 3) Role of administrators in policy analysis and decision making with special attention to historical and current issues. Sp

5710 Seminar in the Politics of Administration (3) Examination of public administration in context of American political system with emphasis upon policy making and political roles of public administrators and agencies. W

5730 Seminar: Public Budgeting (3) Technical and political aspects of planning, preparing, and adopting government budgets.

5735 Seminar: Public Financial Management (3) Management of public expenditures and management implications of revenue collection, debt management, treasury function, accounting, internal auditing, purchasing, risk management, post-auditing.

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

5750-55 Seminar in Public Management (3, 3) Selected programs. F; W

5765-75 Law and the Administrative Process (3, 3) Constitutional position; decisional processes, regulation and management; limitations on governmental action; questions of structure, role, and administrative choice. W

5770 Practicum in Public Administration (3) F

5785-95 Seminar in Staff Functions (3, 3) Functions of administrative staff personnel serving political executives, public bureaucracies, legislative bodies, and advisory and community groups in public sector. Selected topics include budgeting, personnel, evaluation, and other staff functions.

5790 Seminar in Public Personnel Management (3) Functions and organizations of personnel administration in public service. Sp

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

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

5831-32 The Systematic Study of Politics (3, 3) Scope, methods and procedures of analysis in political science. F; W

5840 Ethics, Values, and Morality in Public Administration (3) Moral-ethical-value dilemmas confronting administrators in American political system.

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

5910-20 Quantitative Political Analysis (3, 3) Methods and techniques in quantitative political analysis. F; W

5930 Topics in Quantitative Political Analysis (3) Selected topics in quantitative methods.

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

6210 Advanced Studies in International Politics (3)

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

6410 Advanced Studies in International Organization (3) Research in selected topics.

6440 Advanced Studies in Comparative Politics (3) Research into selected topics. Sp

6510-20 Advanced Studies in American Constitutional Law (3, 3) Systematic investigation of federal relationships, civil liberties, courts in political setting, judicial institutions, personnel, and public policy content.

6610-20 Advanced Studies in Public Administration (3, 3) Research into selected topics. W; Sp

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

5810-20 Advanced Studies in the Political Process (3, 3) Open to graduate students upon approval of instructor. F; W

Psychology

MAJOR

DEGREES

Psychology

M.A., Ph.D.

Professors:

W. H. Calhoun (Head); Ph.D. California (Berkeley); G. M. Burghardt, Ph.D. Chicago; A. G. Burstein, Ph.D. Chicago; J. F. Byrne, Ph.D. Tennessee; C. F. Cohen, Ph.D. Kansas; H. A. Fine, Ph.D. Syracuse; S. J. Handel, Ph.D. Johns Hopkins; L. Handler, Ph.D. Michigan State; R. L. Lorton, Ph.D. Rochester; J. F. Ljuter, Ph.D. Chicago; J. C. Malone, Ph.D. Duke; K. R. Newton, Ph.D. Tennessee; H. R. Polito, Ph.D. Michigan; N. L. Rasch, Ph.D. Pennsylvania; F. Samaei, Ph.D. Keio (Japan); R. R. Shadur, Ph.D. Tennessee; W. S. Verplanck (Emeritus); D. Brown; R. G. Walter, Ph.D. Washington; J. A. Wilberney, Ph.D. Syracuse.

Associate Professors:


Assistant Professors:

W. Dye, Ph.D. Tennessee; S. Friedlander, Ph.D. Georgia State; K. R. Lounsbury, Ph.D. Michigan State; M. A. Persitz, Ph.D. Syracuse.

The Psychology Department emphasizes the doctoral degree and requires professionalizations in clinical, school, community, social, developmental, experimental, cognitive, physiological, and comparative psychology, psycholinguistics, psychometrics, and learning. Some students complete a Master's degree as part of their doctoral program.

For detailed information on graduate programs and admissions requirements write: Graduate Secretary, Department of Psychology, University of Tennessee, Knoxville, Tennessee 37996-0900.

THE PSYCHOLOGICAL CLINIC

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

3720 Ethology and Sociobiology (3) Evolutionary approach to behavior with special reference to controversial issues in applications to psychology, social sciences, and arts.

4107 Experience in Individual Instruction (1-4) Experience as proctor in individualized instruction. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. S/N/C only. E

4120 Topics in Social Psychology (4) Intensive analysis of selected research topics. Prereq: 3120 or Sociology 3190. (Same as Sociology 4120.)

4230 Sensory Processes and Perception (4) Survey of sensory and perceptual processes with emphasis on audition and vision. Prereq: 3105. Recommended: 2520. F

*Part-time.

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

4460 Organizational-Industrial Psychology (3) Cannot be taken for credit by students who have credit for Management 3460. E

4510 Personality Theories (4) Prereq: 3650 or consent of instructor: F, Su

4520 Personality and Social Systems (4) Prereq: 2520.

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

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

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

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

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

4700 Cognitive Development (4) Theory and research on development of language and thinking in children and adolescents. Prereq: 3210 or 3550.

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

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

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

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

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

4770 Psychology and the Law (4) Psychological aspects of the legal system. Prereq: Junior standing.

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

4850 Learning Theories (4) Theoretical and experimental development of learning models. Prereq: 3210.

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

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

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

5000 Thesis (1-15) P/NP only: E

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

5017 Colloquium in Ethnology (1) May be repeated. Maximum 9 hrs. (Same as Zoology 5017). S/NC only.

5019 Research Practicum (1-3) Required of all first-year students in an experimental, physiological, and comparative psychology. May be repeated. Maximum 9 hrs. S/NC only.

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

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

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

5100 Developmental Psychology (3) Prereq: 3550 or Educational Psychology 2430. (Same as Educational Psychology 5130.) F, Sp

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

5110 Clinical Aspects of Human Sexuality (3) Nature of sexuality; societal perspectives, personal identity, application, intimacy and inclusion including psychosocial and psychosexual identity and models for deciding one's sexuality in clinical settings. Prereq: Consent of instructor.

5111 Seminar in Current Issues in School Psychology (3) Historical, legal, ethical and technological issues in practice of school psychology. Multiple instructors. (Same as Educational Psychology 5111.) S/NC only.

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


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

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

5300 Readings and Special Problems in Psychology (1-5) May be repeated. Maximum 20 hrs. S/NC only.

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

5325 Behavioral Interventions (3) Principles and techniques for planning, implementing, and evaluating interventions derived from social learning theory. Focuses on interventions by people in community (teachers, parents, etc.), includes token economies and strategies for self-control.

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

5350-60-70 Seminar in Psychology (3, 3, 3) May be repeated. Maximum 18 hrs.

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

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

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

5490 Continuing Education in Mental Health (1-4) Topics of interest to persons in mental health and allied fields. Workshop, seminar, or lecture. Topic and format to be announced. Prereq: Graduate standing or consent of instructor. May be repeated. Maximum 6 hrs.

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

5510 Instrumentation for Psychological Research (3)

5520 Theory of Mental Measurement (3) Reliability, validity, scaling and equating, norms, combining tests into batteries. Prereq: 1 qtr of graduate-level course approved field settings. Prereq: Consent of instructor: W

5523 Experimental Psychopathology (3) (Same as Zoology 4720.) F

5540 Probability Models in Psychology (4) Introduction to use of probability models in theory of binary test items, differential psychology, comparison of populations, and population of psychological parameters, individual choice behavior, and testing of psychological hypotheses in human and animal behavior: probability theory and statistical theory. Prereq: 1 qtr calculus or consent of instructor.

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

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

5580 Theories of Personality (3)

5581 Psychoodynamic Approach to Clinical Psychology (3) Basic concepts. Selected theorists with examples of work with patients. Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.

5582 Behavioral Approach to Clinical Psychology (3) Normal development and psychopathology, emphasis on existential theory. Comparison of underlying assumptions of different theories. Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.

5583 Phenomenological Approach to Clinical Psychology (3) Normal development and psychopathology, emphasis on existential theory. Comparison of underlying assumptions of different theories. Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.

5589 Adult Psychological Assessment (3) Basic concepts and techniques of adult assessment, including intelligence tests and personality tests. Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.

5591 Seminar in Object Relations Theory (3) European and American concepts of normal and psychopathologic development of object relations, practical significance for psychotherapy and psychodynamic analysis. Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.

5592 Descriptive Psychopathology (2) Diagnostic criteria of the DSM-III. Examples from written case histories and recorded interviews. Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.

5594 Personality Disorders (2) A psychodynamic and social psychology view of the development of major psychoses, neuroses and adjustment disorders. Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.

5596 Dynamics of Psychopathology (3) Psychodynamic and social psychology view of the development of major psychoses, neuroses and adjustment disorders.
5610-20 Psychology of Learning (3, 3) Prereq: 3210 or Educational Psychology 3730; F, W

5650 Ethics in Professional Psychology (2) Review of ethical concerns in professional psychology. Multiple instructors. Meets 3 hrs per week. Sp

5670 Forensic Psychology (2) Psychologist's role in the law, issues surrounding liability, insurance questions, and legal concerns. Involves case studies. Offered in alternate years. Prereq: M.A. in psychology or equivalent.

5680 Neural Basis of Behavior (3) Neuroanatomy and functional aspects of the human brain. Introduction to the field of neuropsychology. Prereq: M.A. in psychology or equivalent.

5690 Psychophysiology (3) Review and evaluation of major physiological processes and their relationship to psychology. Prereq: Consent of instructor.

5702 Community Psychology (3) Theoretical perspectives and intervention strategies for addressing social and psychological problems in community settings. Prereq: Consent of instructor. Sp, A

5712 Learning Modules for Techniques in Professional Psychology (1-4) Set of learning packages; each develops skill in assessment or intervention, or both. Consent of instructor may be repeated. S/NC only.

5750 Ethological Psychology (3) Ethological and physiological basis of comparative psychology and implications for human behavior. Prereq: Introduction to Psychology or consent of instructor. May be repeated. S/NC only.

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

5769 Advanced Techniques in Physiological Psychology (3) Animal and human laboratory procedures. Prereq: Consent of instructor. May be repeated with consent of instructor.

5790 Seminar in Psycholinguistic Concepts in Speech Pathology (3) Same as Speech Pathology 5790.

5840 Student Appraisal (3) (Same as Educational Psychology 5640)

5850 Child Psychological Assessment (3) Introduction to the use of psychological assessment techniques in child psychology: observation, interview, projective tests, and classifiable behaviors. Prereq: 5100 and Admission to Clinical Training Program or consent of instructor.

5859 Practicum in Psychological Appraisal (2) Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.

5860 Interpersonal Assessment (3) Focus on objective tests such as MMPI and Leary System of interpersonal diagnosis. Prereq: 5850 or equivalent and admission to Clinical Training Program or consent of instructor.

5869 Practicum in Psychological Appraisal (3) Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.

5870 Projective Techniques in Assessment (3) Examination of psychological disorders using case history and mental status; projective techniques. Prereq: 5691 or equivalent and admission to Clinical Training Program or consent of instructor.

5879 Practicum in Psychological Appraisal (3) Prereq: 5869.

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

5950-60 Theory and Practice of Consultation (3, 2) Issues in consultation, models of consulting process; role and function of consultation techniques. Must be taken in sequence. Coreq: 5959-69 and consent of instructor. (Same as Educational Psychology 5950-60) W, Sp

5959-69 Practicum in Psychological Appraisal (2, 2) Coreq: 5850-70. Prereq: Consent of instructor. Must be taken in sequence. (Same as Educational Psychology 5890-49; S/NC only. W, 3rd yr)

6000 Doctoral Research and Dissertation (3-15) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.

6090 Internship in Community Psychology (1-6) Supervised field experiences planned for students seeking to gain practical experience in community psychology. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.

6100 Seminar in Community Psychology (3) Evaluation of consulting techniques. Must be taken in sequence. Prereq: 5702.

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

6158 Practicum in Program Evaluation (3) Designing, conducting, and analyzing results of program evaluation in school or community setting. Prereq: 5702. Coreq: 5750.

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

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

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

6310 Seminar in Motivation and Emotion (3) Prereq: 4610. Research and consultation techniques related to motivational and emotion. Prereq: Consent of instructor. May be repeated. S/NC only.

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

6320 Seminar in Research Methods (3)

6330 Seminar in Learning (3)

6340 Seminar in Developmental Psychology (3)

6350 Seminar in Thinking (3)

6360 Seminar in Sensation and Perception (3)

6370 Seminar in Theoretical Psychology (3)

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

6385 Hypnosis and Imagery (3) Demonstration and practice of hypnotic induction methods, survey of clinical applications of hypnosis and imagery. Prereq: Consent of instructor.

6390 Seminar in Psychotherapy (2) Treatment of current case, focusing upon psychodynamics, psychopathology, and therapeutic techniques employed. Prereq: Consent of instructor.

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

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

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

6410-20 Psychotherapy (2, 2) Theories and principles. Prereq: Consent of instructor.

6411 Seminar in Group Processes (2) Theory and practice of group therapy; communication skills. Prereq: Admission to Clinical Training Program or consent of instructor.

6412 Seminar in Inference in Psychotherapy (3) Uses of actuarial and inferential data for assessment of strategies and tactics used in psychotherapy. Prereq: Admission to the Clinical Training Program or consent of instructor.

6413 Seminar in Techniques of Behavior Modification (2) Practical applications of systematic desensitization, operant conditioning, aversive conditioning, and related techniques for modification of behavior disorders. Prereq: Admission to the Clinical Psychology Program.

6414 Seminar in Marital and Family Therapy (2) Evaluating marital and family problems; methods of investigation. Psychodynamic, behavioral, and systems-theory concepts. Prereq: Admission to the Clinical Psychology Program.


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

6460 Continuing Education in Professional Mental Health (1-4) Topics of interest to persons in mental health and allied fields. Workshop, seminar, or lecture and/or fieldwork. Prereq: Professional degree in field related to mental health or consent of instructor. May be repeated. Maximum 9 hrs.


6492 Psychology Clinic Placement (1-4) Required of students assigned to Psychology Clinic. Maximum 24 hrs. S/NC only.

6493 Psychology Clinic Activity (1-4) Continuation beyond 6439. May be repeated. Maximum 12 hrs. S/NC only.

6494 Field Experience in Clinical Psychology (1-4) For students who have finished internship with placement in clinical psychology in local area. May be repeated. Maximum 12 hrs. S/NC only.

6500 Seminar in Psychometrics (3) Seminar for advanced graduate students in psychometrics or quantitative psychology. Prereq: 5440 and 5500 or equivalent and consent of instructor. May be repeated. Maximum 9 hrs.

6550 Seminar in Advanced Social Psychology (3)

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


6669 Practicum in Organizational Development in Human Service Settings (2) Recommended coreq: 6660. Prereq: Consent of instructor. S/NC only.

6702 Social Ecology (3) Seminar on current topics: ecological psychology, quality-of-life, social impact assessment, and environmental classification. Prereq: Consent of instructor.
Radiation Biology (Interdepartmental)

5000 Thesis (1-15) P/NP only. E
5300 Graduate Research Participation (3-9) May be repeated. Maximum 12 hrs. E
5610-20 Foundations of Radiation Biology (4, 4) (Same as Zoology 5610-20.)
5780 Radiation Physiology (4) (Same as Zoology 5780.)
6000 Doctoral Research and Dissertation (3-15) P/NP only. E
6910 Seminar in Radiation Biology (2) (Same as Zoology 6910.)

Religious Studies

Assistant Professors: J. L. Fitzgerald, Ph.D. Chicago; M. Harris, Ph.D. Harvard; M. Levinson, Ph.D. Harvard.

An M.A. in Philosophy with a concentration in religious studies is available for graduate work in these related fields. Details of this program are available in the office of either department. Graduate courses in religious studies further provide opportunity for students in a variety of disciplines to pursue work in religious studies as a graduate concentration.

3050-70-80 History of Western Religious Thought and Institutions (3, 3, 3) 3050—First Century to Fifth Century 3070—Sixth Century to Fifteenth Century. 3080—Sixteenth Century to 1900. (Same as History 3060-70-80.) A

3210 Early Greek Mythology (3) (Same as Classics 3210.) F
3220 Early Greek Mythology in the Classical Period (3) (Same as Classics 3220.) W
3230 Roman Mythology (3) (Same as Classics 3230.) Sp
3270 Russian Philosophical and Theological Thought (4) (Same as Philosophy 3270 and Russian 3270.)
3411-12 The Reformation (3, 3) (Same as History 3411-12.)
3440 Religion of Primitive Peoples (3) (Same as Anthropology 3440)
3850 Philosophy and Religion in India (4) (Same as Philosophy 3850.) F
3860 Buddhist Philosophy and Religion (4) (Same as Philosophy 3860.) W
3871 Religion and Philosophy in China (4) (Same as Philosophy 3871.)
3890 Philosophy of Religion (4) (Same as Philosophy 3890.)
4111-21 Modern Religious Philosophies (4, 4) Examination of the religious implications of major thinkers and movements. 4111—Nicolas de Cusa to Hume. 4121—Kant and the nineteenth century. Prereq: 9 hrs of philosophy other than logic. (Same as Philosophy 4111-12.)
4200 Classical Indian Systems of Philosophy: The Moksha Tradition (4) Basic writings and philosophical problems of the traditions of Samkhya, Yoga, and Vedanta. Prereq: 3850 or 3860. (Same as Philosophy 4200.)
4210 Topics in Ancient Israelite and Ancient Near Eastern Religions (4) Prereq: 3110-20 or consent of instructor. May be repeated. Maximum 8 hrs.
4310 Jesus and Paul Compared (4) Jesus' teaching and activity in the context of first-century Palestine Judaism: analysis of what the Apostle Paul made of the tradition of and about Jesus. Recommended prerequisite: 2610 or 2611.
4370 Theoretical Issues in Medical Ethics (4) (Same as Philosophy 4370.)
4410 American Religious Thought (4) Selected figures, movements, and problems in American religious thought from colonial period to present.
4450 Topics in American Religion (4) Prereq: One of the following: 3510, 3520, 4410, or consent of instructor. May be repeated. Maximum 8 hrs.
4540 Social and Religious Change (4) (Same as Sociology 4540.)
4610 Topics in Western Religious Thought and Institutions (4) Selected figures, issues, and institutions. Seniors and graduate students only, except by consent of department. Prereq: 3060-70-80. May be repeated. Maximum 12 hrs.
4840 Topics in Early Christianity and Hellenistic Religions (4) Selected figures, issues, and institutions. Seniors and graduate students only, except by consent of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
4870 Topics in Eastern Religions (4) Selected figures, issues, and institutions. Seniors and graduate students only, except by consent of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
4810-20-30 Readings and Research in Religious Studies (3-4, 3-4, 3-4)
4840 Readings In Selected Languages Related to Religious Studies (4-3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
4840 Sociology of Religion (4) (Same as Sociology 4840.)
4950 Theory of Religion (4) Elements for constructing a theory of religion drawing on resources from fields of psychopathology, social psychology, sociology of religion, cultural anthropology, theology and comparative religion.
4960 Tradition, Change and Modernity in Asia (4) Comparative study of processes of religious and social change seen in historical context in Asian societies. Comparative focus of course will vary each year (e.g., China and Japan, India and South Asia). May be repeated. Maximum 8 hrs.
5101 Foreign Study (1-12) See page 96.
5102 Off-Campus Study (1-12) See page 96.
5103 Independent Study (1-12) See page 96.
5310-20 Topics in Religion and Society (4, 4) 5355 Orientation to Medical Ethics (2) (Same as Philosophy 5355.)
5355 Applied Ethical Theory (4) (Same as Philosophy 5355.)
5510-20 Topics in the History of Religion (4, 4) 5710-20 Topics in Religious Thought (4, 4)

Romance Languages

MAJORS
French M.A., Ph.D.
Spanish
DEGREES
MAJORs
French W. H. Helfin (Head), Ph.D. Florida State; E. P. Barrette, Ph.D. California (Berkeley); C. W. Cobb, Ph.D. Tulane; J. C. Elliott, M.A. Illinois; T. B. Irving (Emeritus), Ph.D. Princeton; F. D. Maurino (Emeritus), Ph.D. Columbia; M. Petrovskaya, Ph.D. Kentucky; J. O. Swan (Emeritus), Ph.D. Illinois; A. M. Vasquez-Big, Ph.D. Minnesota; G. E. Wade (Emeritus), Ph.D. Ohio State; A. H. Wallace, Ph.D. North Carolina.

Associate Professors: W. F. Byes (Emeritus), Ph.D. Wisconsin; R. M. DeRuycke, Ph.D. Illinois; M. H. Handelman, Ph.D. Florida; K. D. Levy, Ph.D. Kentucky; C. Pinkley, Ph.D. California (Berkeley); Y. M. Washburn, Ph.D. North Carolina.

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.

THE MASTER OF ARTS PROGRAM
The student may select either Plan A or B:
Plan A
1. Completion of a minimum of 36 quarter hours of which 24 must be taken in courses numbered above 5000, including 5011 (French or Spanish, as appropriate).
3. A written examination covering the course work and selected items from a master reading list.
4. A final oral examination covering the thesis.

Plan B
1. Completion of 45 quarter credits of which 33 must be in courses beyond 5000, including 5011 (French or Spanish, as appropriate).
2. Three term papers that have been accepted as satisfactory by the Advisory Committee.
3. A written examination covering the course work and selected items from a master reading list.

THE DOCTORAL PROGRAM
Residence and Course Work:
Completion of at least three consecutive quarters of full-time residence, a minimum of 81 credit hours in course work beyond the Bachelor's degree or its equivalent, and a dissertation (36 credit hours).
No less than 54 quarter hours should be taken in courses pertaining to the student's major field; of these a minimum of 18 hours are to be taken in courses above 6000, a maximum of 12 hours may be taken in courses of the 6000 level and the rest in courses above 5000. All students must complete the series in methods of research (5151-61-71) for a total of 3 credits. The minor shall consist of at least 18 hours of which at least 12 hours must
be numbered above 5000 and the rest above 4000, and should represent a meaningful complement to the student's area of concentration. In addition 9 hours of course work above 4000 in a related discipline are required. In special cases the latter requirement may be waived in favor of additional course work in the major field.

Language Requirements:

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

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.

For additional information on the doctorate consult pages 19-20.

French

3010-20-30 Elements of French for Upper Division and Graduate Students (3, 3, 3) Elements of language, elementary and advanced readings. Open to graduate students preparing for language examinations, and upper division students desiring reading knowledge of the language. Undergraduate credit only. No credit for those having had Elementary French. No auditors. F; W; Sp; Su

4001-02-03 Introduction to Consecutive and Simultaneous French Translation (3, 3, 3) 4001—Oral translation into English; 4002—Consecutive translation to and from English; 4003—Simultaneous translation to an 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 variety of practical subjects such as business, economics, politics, and sciences. Given mainly in language lab with additional classroom supervision by instructor. Prereq: 3430 or equivalent. Must be taken in sequence.

4010 Masterpieces of French Literature in English Translation (3) No foreign language credit. A

4020 Masterpieces of French Drama in English Translation (3) No foreign language credit. A

4110-20-30 French Literature of the Seventeenth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A

4150 Théâtral French (1-3) Performance in one or more French plays. Prereq: Intermediate French or equivalent and consent of instructor. May be repeated with consent of department. A

4160-70-80 Advanced Conversation (2, 2, 2) Intensive training in prepared and spontaneous conversations. Subjects range from travel and current events to literature and aspects of national culture. Prereq: Completion of 9 hrs of courses on 3000 level. F; W; Sp

4210 Phonetics (3) Prereq: 2130, 2520, or equivalent. F

4220-30 Advanced Grammar (3, 3) Prereq: 2130, 2520, or equivalent. W; Sp

4250 Introduction to Descriptive Linguistics (3) Field linguistics, dialect study; its practical use in learning languages and in language teaching. Introduction to transformational grammar. Prereq: 9 hrs of upper division English or 9 hrs of upper division courses in a modern or ancient language (exclusive of German and French 3010-20-30, courses in literature, in translation, and general courses in Latin and Greek requiring no knowledge of these languages), or consent of department. (Same as German, Spanish, and Linguistics 4260.) F

4260 Introduction to Historical and Comparative Linguistics (3) (Same as German, Russian, Spanish, and Linguistics 4260.) W

4270 Introduction to Romance Linguistics (3) Development of Classical Latin through Vulgar Latin into the major Romance languages. (Same as Spanish and Linguistics 4270.) Sp

4310-20-30 French Literature of the Eighteenth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A

4350-60-70 Medieval French Literature (3, 3, 3) Medieval works in modern French texts. Prereq: Intermediate French or equivalent. A

4410-20-30 French Civilization (3, 3, 3) Prereq: Intermediate French or equivalent. A

4510-20-30 French Literature of the Nineteenth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A

4710-20-30 French Literature of the Twentieth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A

5000 Thesis (1-15) F/P only. E

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

5011 Techniques in Literary Analysis (3) Required for either Plan A or Plan B of M.A. program. Intensive course in explication de texte. F

5101 Foreign Study (1-12) See page 96. E

5102 Off-campus Study (1-12) See page 96. E

5103 Independent Study (1-12) See page 96. E

5150-20-30 Old French (3, 3, 3) Medieval French language and literature. A

5121 College Teaching of Romance Languages (3) Seminars, demonstrations, and practical applications of techniques and procedures for teaching and evaluating basic language skills, cultural aspects and beginning literature. Required of all M.A. and Ph.D. students holding Graduate Teaching Assistantships except those whose previous training or experience warrants their being excused by department. F

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

5210 French Literature of the Sixteenth Century (3, 3, 3) A


5241 French Theatre of the 18th and 19th Centuries (3) Development of new dramatic forms and evolution of traditional forms in serious and comic theatre of eighteenth and nineteenth century France. A

5310-20 French Directed Readings (3, 3, 3) A

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

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

5450-60 Lyric Poetry of the Nineteenth Century (3, 3) (Same as German—5450—German and English influences on French Romanticism and generation of the poets of "le mait du siecle." 5460—Victor Hugo; the Parnassians. A

5470 Baudelaire and the Symbolists (3) Les Fleurs du mal et Petits poèmes en prose with emphasis on theories of color and "correspondances" and their influence on Symbolist school. A

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

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

5570 Problems in Linguistics: Romance Languages (3) Topics vary. Prereq: 4250 or consent of instructor. May be repeated. Maximum 6 hrs with consent of department. (Same as Spanish 5670.)

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

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

Italian

3310 Italian Literature in English Translation (3-4) Sicilian School. Dante, Petrarch. Boccaccio, Machiavelli, Ariosto, Tasso. No change in credit hours after add deadline. Option of 4 hrs credit must present appropriate amount of extra work above that required for 3 hrs. A

3510-20 Aspects of Italian Literature (4, 4) Prereq: Intermediate Italian or equivalent. Recommended for literature majors. F; W

4010-20 Italian Drama in English Translation (3-4, 3-4) 4010—La commedia dell'arte and major works of Machiavelli, Metastasio, Alfieri, Goldoni. 4020—Twentieth-century theatre; operatic drama, the Grottesco, Pirandello, De Filippo, Frati. No change in credit hours after add deadline. Option of 4 hrs credit must present appropriate amount of extra work above that required for 3 hrs. A

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

4220 Petrarch (3) Prereq: 3130, 3520 or equivalent. A

4230 Boccaccio (3) Prereq: 3130, 3520 or equivalent. A

4330 History of Italian Language (3) Prereq: 3130, 3520 or equivalent. A

4410-20-30 Literature of the Rinascimento (3, 3, 3) From Pulci to Tasso, the Quattrocento and the Cinquecento. Prereq: 3130, 3520 or equivalent. A

4530 The Modern Novel (3) Prereq: Intermediate Italian or equivalent. A

4540 The Modern Theatre (3) Prereq: Intermediate Italian or equivalent. A

4610 Contemporary Theatre (3) Prereq: Intermediate Italian or equivalent. A

4620 Contemporary Poetry (3) Prereq: Intermediate Italian or equivalent. A

4630 Contemporary Prose (3) Prereq: Intermediate Italian or equivalent. A

4780 Italian Folklore (3) Folk arts, music, traditions, rituals and lore of Italy from Middle Ages to present. (Same as Anthropology 4760.)
5011 Techniques in Literary Analysis (2) Intensive course in explication de texte. A
5101 Foreign Study (1-12) See page 96. E
5102 Off-campus Study (1-12) See page 96. E
5103 Independent Study (1-12) See page 96. E

Portuguese
3510-20 Aspects of Portuguese Literature (4, 4) Prereq: Intermediate Portuguese or equivalent. Recommended for literature majors. F, W
4310-20-30 Directed Readings in Brazilian and Portuguese Literature (3, 3, 3) Prerequisites: May be repeated with consent of department. A
4510 Special Topics in Nineteenth Century Spanish Literature (3, 3, 3) May be repeated with consent of department. A

Spanish
4030 Masterpieces of Spanish Literature In English Translation (3) No foreign language credit. A
4050-50-70 Hispano-Arabic Literature and Culture (3, 3, 3) A
4110-20-30 Spanish Literature of the Golden Age (3, 3, 3) The picaresque novel; Cervantes; the Comedia. A
4140 Theatrical Spanish (1-3) Performance in one or more Spanish plays. Prereq: Intermediate Spanish or equivalent and consent of instructor. May be repeated with consent of department. Maximum 6 hrs.
4160-70-80 Advanced Conversation (2, 2, 2) Intensive training in prepared and spontaneous conversations. Subjects range from travel and current events to literature and aspects of national culture. Prerequisite: Completion of 9 hrs of courses on 3000 level. F, W, Sp
4210 Phonetics (3) Prereq: 2130, 2520, or equivalent. F
4220-30 Advanced Grammar (3, 3) Prereq: 2130, 2520, or equivalent. W, Sp
4250 Introduction to Descriptive Linguistics (3) (Same as French, German, Russian, Linguistics 4250.) A
4260 Introduction to Historical and Comparative Linguistics (3) (Same as French, German, Russian, and Linguistics 4260.) W
4270 Introduction to Romance Linguistics (3) (Same as French and Linguistics 4270.) Sp
4410 Spanish Civilization (3) Prereq: Intermediate Spanish or equivalent. F
4420-30 Latin American Civilization (3, 3) Prereq: Intermediate Spanish or equivalent. W, Sp
4456 Studies in Modern Spanish Style (3) Prereq: 3410-20 or consent of instructor. A
4510 Special Topics in Nineteenth Century Spanish Literature (3) Prereq: poetry and theatre of Spain in the nineteenth century. Genre, movement, or combination of literary aspects. Prereq: Intermediate Spanish or equivalent. May be repeated with consent of department. Maximum 9 hrs. A
4710-20-30 Spanish Literature of the Twentieth Century (3, 3, 3) 4710—Non-dramatic prose fiction. 4720—Drama. 4730—Lyric poetry. Prereq: Intermediate Spanish or equivalent. A
4810-20-30 Topical Survey of Spanish American Literature (3, 3, 3) 4810—Prose fiction: major examples of the short story and novel. 4820—Poetry: landmark figures of past and present. 4830—Drama and essay: the modern period. A
5000 Thesis (1-15) P/NP only. E
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
5110 Techniques in Literary Analysis (3) Required for either Plan A or Plan B of M.A. program. An intensive course in explication de texte. F
5200-50-70 Hispanic-Arabic Literature and Culture (3, 3, 3) May be repeated. S/NC only. E
5210 College Teaching of Romance Languages (3) Seminars, demonstrations, and practical applications of techniques and procedures for teaching and evaluating basic language skills, cultural aspects, and beginning literature. Required of all M.A. and Ph.D. students holding Graduate Teaching Assistantships except those whose previous training or experience warrants their being excused by department. F
5151-61-71 Bibliography and Methods of Research (1, 1, 1) (Same as French and Italian 5151-61-71.) S/NC only. A
5211-21 Don Quijote (3, 3) Must be taken in sequence. A
5212-22 Golden Age Prose (3, 3) 5212—La Celestina: critical study of Fernando de Rojas’ life and work. Celestinesque genre; Feliciano de Silva’s Segunda Celestina, 5223—Guzmán de Alfarache and Spanish picaresque genre. A
5250-60 The Generation of ‘98 (3, 3) Angel Ganivet, Giner de los Rios, Baroja, Unamuno, Valle Inclan, Benavente, Azorin, Perez de Ayala. A
5270 The Contemporary Novel (3) Civil War and post-Civil War period. A
5310-30 Directed Readings (3, 3) E
5311-21 Special Topics in Spanish or Spanish American Literature (3, 3, 3) May be repeated. A
5340 Problems in Hispanic Culture (3) Prevailing social, political, artistic, literary and ideological conditions and patterns of any area or period within Spanish or Latin American culture. May be repeated with consent of department. Maximum 9 hrs. A
5510 Special Topics in the Spanish Theatre after the Golden Age (3) Spanish theatre from eighteenth century to present. May be repeated with departmental consent. Maximum 9 hrs. A
5550-60 The Golden Age Theatre (3, 3) 5550—Introduction to Spanish Theatre, Lope and Tirso. 5560—Castro, Alarcón, Moreto and Calderón. A
5610 Spanish American Prose to 1900 (3) Novel, chronicle, essay. A
5611-21 Spanish American Lyric Poetry (3, 3) A
5620-30 The Modern Novel in Spanish America (3, 3) A
5631 Spanish American Essay (3) A
5632 The Spanish American Short Story (3) Short story as major literary genre in Spanish America. Reading and criticism of works of authors such as Dario, Quiroga, Borges, Arenas, and Rulfo. A
5633 Twentieth-century Latin American Theatre and Film (3) Readings from works of Carlos, Solorzano, Rodolfo Usigli, Conrado Nale Roxlo, Roberto Coss, Rene Marques and Sebasitan Salazar Bondy. Presentation of films as adaptations of classics such as Doña Bárbara, Los de abajo and Don Segundo Sombra as well as exponents of experimental cinema of today. A
5640 Latin American Women Writers (3) Feminine point of view, modern image of woman, female relationships and society as context for women’s destiny. Readings from poetry and fiction, including such authors as Alfonsina Storni, Delmira Agustini, Gabriela Mistral, Silvina Buñich, Silvina Ocampo and Rosario Castellanos. A
5650-60 Advanced Syntax and Stylistics (3, 3) Readings and written imitations of modern literary styles in compositions, sketches, and original stories. A
5670 Problems in Linguistics: Romance Languages (3) (Same as French 5670.) A
5810-20-30 Spanish Lyric Poetry (3, 3) A
5910 Literary Criticism: The Foundations of Romance Criticism (3) A
6000 Doctoral Research and Dissertation (3-15) P/NP only. E
6210-20-30 Seminar in Spanish Literature (3, 3, 3) Topics vary in field of Peninsular Literature. May be repeated with consent of department. A
6310-20-30 Seminar in Latin American Literature (3, 3, 3) Topics vary. May be repeated with consent of department. A

Russian
See German

Sociology
MAJOR DEGREES
Sociology
M.A., Ph.D.
Professors: D. K. Robb (Head), Ph.D. North Carolina; J. A. Black, Ph.D. Iowa; D. J. Champion, Ph.D. Purdue; L. Ebersole, Ph.D. Pennsylvania; D. Hastings, Ph.D. Massachusetts; N. Shover, Ph.D. Illinois; S. Wallace, Ph.D. Minnesota.
Associate Professors: D. M. Betz, Ph.D. Michigan State; D. Clelland, Ph.D. Michigan State; C. C. Hoot, Ph.D. Duke; R. G. Perrin, Ph.D. British Columbia.
For a full statement of departmental requirements, students are referred to the Departmental Graduate Manual.
All registration for 3000- and 4000-level courses require the consent of the instructor.
THE MASTER'S PROGRAM
The department offers both a thesis and non-thesis option for a Master's degree. For information concerning the Master's degree with thesis, see the General Requirements on page 18. Those interested in the non-thesis option should obtain details from the Departmental Graduate Manual.
THE DOCTORAL PROGRAM

General requirements for the degree of Doctor of Philosophy in Sociology include:
1. A minimum of 108 credit hours following the Bachelor's degree, exclusive of credits for the Master's thesis, is required. Of this number, 36 hours shall be allocated to doctoral research and dissertation. A maximum of 12 hours credit outside the major may be taken in related fields, with the approval of the student's committee. Exclusive of doctoral research and dissertation at least one-half of all credits shall be in courses numbered 5000 or 6000.
2. A written 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.
3. No later than one month before granting of the degree, the candidate will be required to pass an oral examination on the doctoral dissertation. At the oral examination the candidate will be expected to show a thorough knowledge of sociological theory and methodology related to the research.

4030 Society and Law (4) General treatment of social science computing packages.
4160 Theory of Attitudes and Values (4) Organizational analysis of social science computing packages.
510 Professional Seminar (1) Limited to sociology graduate teaching assistants to graduate assistants. May be repeated. Maximum 4 hrs. S/NC only. W, Sp
5210 Social Theory (3)
5230 Seminar in Sociology of Medicine (3) May be repeated with consent of instructors. Maximum 6 hrs.
5300 Methods of Sociological Research I (3) Assumptions and foundations of sociological research techniques.
5470 Foundations of Social Psychology (3) Current and classical theoretical perspectives in social psychology. May be used for credit in psychology.
5480 Foundations of Social Conflict and Change (3)
5510 Delinquency and the Social Structure (3) Critical assessment of contemporary theories of delinquency, research findings related to them, and their implications for formal strategies of control and rehabilitation.
5650 Demographic Techniques (3) Life, table, standard rates, and survey techniques of population analysis. A
5660 Seminar in Community (3)
5860 Historical Demography (3) Family reconstitution, aggregate analysis, strategies for examining documents containing information on population. Research findings on historical patterns of change in fertility, mortality, migration and different types of family structure. A
5710 Seminar in Collective Behavior and Social Movements (3)
5720 Social Interaction (3) Critical assessment, through reading and actual research, of contemporary theoretical orientations to study of small groups. Research designed to test selected theoretical problems. May be repeated. Maximum 6 hrs.
5740 Seminar in Social Attitudes (3)
5810 Seminar in Race and Culture (3) Critical examination of theoretical and conceptual approaches in study of intergroup relations. A

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 individual and society; technology and occupations; unequal rewards and occupations; social organization and occupations.
5850 Seminar in Occupations (3) Continuation of 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 Inter-group Relations (3) Research techniques and problems as encountered in race and intergroup relations are explored; actual field research projects are performed.
5890 Social 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
6050 Seminar on Methods of Social Research (3) Experimental research projects. (Same as Psychology 6070.)
6220 Advanced Social Theory (I) (3) Prereq: 5410 or consent of instructor.
6230 Advanced Social Theory II (3) Prereq: 5410 or consent of instructor.
6330-40 Survey Design and Analysis (3, 3) Application of general methodological principles to particular operating context of survey. Systematic exploration of survey problems through student participation in design and analysis of survey (2 qtrs). Prereq: 5300-10 or consent of instructor.
6350 Field Research (3) Prereq: 5300-10 or consent of instructor.
6360 Field Research Practicum (3)
6410 Tutorials in Advanced Topics (3) Individual instruction. Prereq: Consent of department. 6410 and 6420 may be repeated in any combination for a maximum of 16 hrs.
6420 Special Topics (3) Topic of special interest or student selected courses which will not be regularly offered. Prereq: Consent of instructor. 6410 and 6420 may be repeated in any combination for a maximum of 16 hrs.
6520 Sociology of Deviance (3) Advanced studies in deviant behavior. Theories and findings regarding causes and procedures and programs for social control. Prereq: 4310 and 5520.
6530 Sociology of Law (3) Analysis of social and cultural factors influencing emergence and maintenance of law as social institution and affecting relations between law and deviant behavior; appraisal of theoretical and methodological issues encountered in studying law.
6540 Seminar in Environmental Sociology (3)
6550 Urban and Regional Sociology (3) Prereq: Consent of instructor.
6660 Human Fertility (3) Historical, topical, regional, and methodological approaches to human fertility and demographic problems. Consideration of relations obtained between socioeconomic and demographic change in various parts of world; fertility rates and national power; controversies on control of vital rates of growth. Prereq: 5650 or consent of instructor.
6670 Theory and Methods of Human Ecology (3) Theoretical perspective and research techniques of
human ecology applied to selected research sites. Prereq: Consent of instructor.

6860 Theory and Research in Human Migration (3) Prereq: 5560 or consent of instructor.

6860 Population Theory (3) Mathis, Marx, optimum population, and selected variables. Prereq: 5650 or consent of instructor. A

6730 Advanced Studies in Social Psychology (3) Social interaction and personality; genetics and functioning of self; interplay of social structures and individual actions; theories of social psychology related to these problems and recent research are discussed. May be repeated. Prereq: 5470 or consent of instructor.

6740 Formal Organization (3) Major formal organizational theories; bureaucracy; functions of theoretical models of organizations; major organizational variables; organizational authority patterns; communication in formal organizations. Prereq: 5470 or consent of instructor.

6750 Formal Organization (3) Organizations, organizational change and effect of technology; social consequences of automation; unionization and organization; organizations and community relatedness. Prereq: 5470 or consent of instructor.

6780 Mass Behavior (3) Prereq: 5470 or consent of instructor.

6790 Socialization (3) Process to learn cognitive systems and forms of behavior of social world. Examination of main currents in socialization theory and research. Prereq: 5470 or consent of instructor. May be repeated with different instructors. Maximum 6 hrs.

6820 Political Sociology (3) Political system from societal, organizational, and group perspectives.

6830 Seminar in Class and Status (3) Classic and recent studies of class and status. Methods used in research and current position of theory. Prereq: 5480 or consent of instructor.

6840-50 Social Change (3, 3) Major theories, methods and research.

6860 Seminar on Community Power (3) Analysis of theories and methods used in studying social power in communities. Prereq: 5480 or consent of instructor.

Spanish

See Romance Languages

Speech and Hearing Sciences

See Audiology and Speech Pathology

Speech and Theatre

MAJOR

Speech and Theatre

Theatre

DEGREES

M.A.

M.F.A.

Assistant Professors:

R. S. Ambler, Ohio State; B. V. Daniels, Ph.D. Cornell; L. J. DeCuir, M.F.A. Tulane; M. E. Hampton, Ph.D. International College (Los Angeles).

The Department of Speech and Theatre offers the Master of Arts degree in Speech and Theatre with area concentrations in speech communication and theatre and the Master of Fine Arts in Theatre with area concentrations in directing and acting, playwriting, and design and technical theatre. In their prospective concentrations at the Master's level, i.e., speech or theatre, applicants must have completed undergraduate degrees approximately equivalent in requirements to those specified for degrees conferred by The University of Tennessee, Knoxville.

The Graduate Record Examination is required of all applicants. All M.F.A. applicants must submit two letters of recommendation. Auditions before appropriate faculty are required of M.F.A. acting/directing applicants. Applicants for admission to M.F.A. design/technical theatre and playwriting programs must submit samples of their work.

For detailed information about the graduate program, contact the Director of Graduate Studies, Department of Speech and Theatre.

MASTER OF ARTS DEGREE CURRICULUM

The departmental requirement for the M.A. degree in Speech and Theatre is 45 quarter hours (inclusive of hours taken toward a minor), at least 30 hours of which must be earned in courses numbered 5000 or above. Only 9 hours of thesis credit (Speech and Theatre 5000) may be included in the 45-hour minimum for the degree. Speech and Theatre 5110 is required of all M.A. students. Area concentration requirements are as follows:

Speech Communication

(1) Enrollment in Speech 4999 during each quarter of full-time graduate study.
(2) 12 hours in rhetorical and communication theory.
(3) 9 hours in public and interpersonal communication.
(4) 3 hours (inclusive of Speech and Theatre 5110 and Speech 4999) in methods and materials in speech communication.

Theatre

(1) 15 hours in theatrical history and criticism.
(2) At least 9 hours (and no more than 12 hours) in performance and production courses may be included in the 45-hour minimum for the degree.
(3) No more than 6 hours in projects courses.

M.SCHOOL OF FINE ARTS DEGREE CURRICULUM

At least 60 quarter hours, 40 of which must be at the 5000 level or above, are required for the Master of Fine Arts degree in Theatre. The number of hours each student will carry per quarter will vary with the student's concentration. The distribution of courses within the department may necessitate some students' accumulating more than 60 hours in order to earn the degree, but no student should require more than two years to finish the program. Ten to twelve hours of theatre history during the first year of residence are mandatory for all students unless appropriate undergraduate coursework is evidenced.

Theatre 5011-12-13 is required of all except acting students. Students will be admitted to the directing concentration only by petition after the first year of the acting/directing program is completed.

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 for Graduate Studies and/or the Vice Chancellor for Graduate Studies and Research.

Any such credits applied from a previous graduate program would be from courses that are directly relevant to the student's MFA curriculum, and must have been earned within the time limits (5 years) established for completion of the MFA degree.

Speech

4222 Advanced Argumentation and Debate (4) Prereq: 2331 or consent of instructor. Sp

4461 Quantitative Research Methods in Speech Communication (4) Designing experiments; planning field studies; using statistical analysis.

4541 Rhetorical Theory and Criticism (4) Survey of Western rhetorical theory; contemporary approaches to criticism of public address. Recommended: 1211.

4560 Rhetoric of the Women's Rights Movement (4) Historical and critical study of public addresses in campaign for women's rights from the 1830s to present.

4571 British Oratory (4) Historical and critical study of British public address. Sp, A

4591 Persuasive Uses of Imaginative Literature (4) Topics in social and political uses of novels, plays, and poems. W

4811 Advanced Phonetics (4) Phonetic aspects of contemporary dialects of the English language. Prereq: Consent of instructor. Sp, A

4930 Studies in American Public Address (4) May be repeated. Maximum 12 hrs.

4999 Colloquium in Speech Communication (1) May be repeated. E

5140 Communications Theory (3) Analysis of contemporary theories of human communication, emphasizing similarities and differences of communication processes in interpersonal, intrapersonal, and mass communications systems. F

5210 Topics in Group and Interpersonal Communication (3) May be repeated. Maximum 9 hrs. Sp

5220 Quantitative Projects in Speech Communication (3) May be repeated. Maximum 9 hrs. E

5440 Organizational Communication (3) May be repeated. Maximum 9 hrs. F

5550-60-70 Studies in Persuasion (3, 3, 3) W

5750-60-70 Studies in Rhetoric (3, 3, 3) F

5911 Directing the Forensic Program (4) Philosophical and method of directing cocurricular and extra-curricular forensic activities in high schools and colleges: competitive and noncompetitive approaches to directing debate, oral interpretation and public speaking teams. (Same as Curriculum and Instruction 5911) Sp
Speech and Theatre

4640 Group Performances of Literature (4) Oral interpretation of literature, reading, theatre and chamber theatre. F, W

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

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses continuous registration of 12 quarter hours plus and/or faculty line hours. May not be used toward degree requirements. May be repeated. S/NC only. E

5110 Introduction to Graduate Research In Speech and Theatre (3) F

5120 Directed Reading and Research (3) May be repeated. Maximum 9 hrs. E

5160 Theory and Technique in Oral Interpretation (4) Emphasis on 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 in scenery and property construction; stage management; problems in basic technical theatre practice. Prereq: 2211-21, or consent of instructor. Must be taken in sequence. Graduate credit available to Theatre MFA students only.

3221-22 Introduction to Scene Design (4, 4) 3222—Problems in design with reference to space and form, movement, scale, and style; rudiments of rendering and graphic preparation, set design for scenic means; setting as environment for dramatic action; rudiments of model-making. Must be taken in sequence. Graduate credit available to Theatre MFA students only.

3252-53-54 History of the Theatre (4, 4, 4) Drama from its beginnings to 1900. 3263—from its beginnings to 1900. 3262—from 1900 to present. Graduate credit available to Theatre MFA students only.

3262-63 History of American Theatre (3, 3) Development of theatre as social institution in American life. 3262—from its beginnings to 1900. 3263—from 1900 to present. Graduate credit available to Theatre MFA students only.

3270-71-72 Lighting Design (4, 4, 4) Advanced technical theatre management; advanced scenic and property execution; special problems in technical theatre. W, Sp

3321-22 Introduction to Lighting Design (4, 4) 3322—Mechanics of stage lighting; elementary theory; problems in basic lighting practice. Prereq: 2211-21 and consent of instructor. Must be taken in sequence. Graduate credit available to Theatre MFA students only.

3451-42 Advanced Theatre Costume Design (4, 4) Advanced problems in costume design and construction. Term drafting; draping. Prereq: 3511 or 3512. W, Sp

4751-52 Dramatic Theory and Criticism (3, 3) W, Sp

4951-52 Playwriting (4, 4) Prereq: Consent of Instructor. F, W

5011-12-13 Projects in Lieu of Thesis (3, 3, 3) Available to Theatre M.F.A. students only. S/NC only.

5250 Seminar in Playwriting (3) Sp

5310 Studies in European Theatre History (3) May be repeated. Maximum 9 hrs. F, W

5320 Studies in American Theatre History (3) May be repeated. Maximum 9 hrs. F, W

5620 Projects in Lighting Design (3) May be repeated. Maximum 9 hrs. E

5630 Projects in Play Designing (3) May be repeated. Maximum 9 hrs. E

5640 Projects in Scene Design (3) May be repeated. Maximum 9 hrs. E

5650 Projects in Costume Design (3) Problems of play interpretation and theatrical costume design centralizing around individual projects. Students will design costumes for complex play for public performance. May be repeated. Maximum 9 hrs. E

5660 Projects in Technical Theatre (3) Problems of set design, interpretation, and execution. E

5670-71-72-74-75 Master Class In Acting (5, 5, 5, 5, 5) Available to Theatre M.F.A. students only. May be repeated. Maximum 6 hrs.

5800 Studies in Theatrical Production (3) May be repeated. Maximum 9 hrs. Sp

5912 Play Production in Secondary Schools (4) Principles and methods for directing high school dramatic programs. (Same as Curriculum and Instruction 5912.) Su

5950-60-70 Studies in Dramatic Theory and Criticism (3, 3, 3) F, W, Sp

Speech Pathology

See Audiology and Speech Pathology

University Studies

(Non-Departmental)

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

4100 Energy Needs and Our Environment (3) Problems of present and projected energy resources and demands; economic, behavioral, legal, technical and environmental opportunities and constraints; regional impacts of energy production and consumption. Topical focus will change from quarter to quarter. May be repeated with consent of instructor. Must not be taken for graduate credit by Ecology majors.

4441-42 Advanced Play Directing (4, 4) Problems of play interpretation; directing period plays; preparation of a play for public performance. Prereq: 3451-52 and consent of instructor. Must be taken in sequence. F, W

4451-42 Advanced Theatre Costume Design (4, 4) Advanced problems in costume design and construction. Term drafting; draping. Prereq: 3511 or 3512. W, Sp

4541-42 Advanced Theatre Costume Design (4, 4) Advanced problems in costume design and construction. Term drafting; draping. Prereq: 3511 or 3512. W, Sp

Zoology

MAJOR

DEGREES

M.S., Ph.D.

Professors:

J. H. Alger (Head), Ph.D. Brown; R. M. Bagby, Ph.D. Illinois; D. L. Bunting, Ph.D. Pennsylvania; J. G. Carlson (Emeritus), Ph.D. Pennsylvania; A. C. Cowe, Jr. (Emeritus), Ph.D. Ohio; J. C. Daniel, Ph.D. Colorado; D. A. Elmer, Ph.D. Minnesota; R. C. Fraser, Ph.D. Minnesota; B. Hochman, Ph.D. California (Berkeley); J. C. Howell (Emeritus), Ph.D. Cornell; E. T. Howley, Ph.D. Wisconsin; K. W. Jeon, Ph.D. London (England); A. W. Jones (Emeritus), Ph.D. Iowa; R. Kennedy, Ph.D. Iowa; J. N. Litke, Ph.D. Ohio State; L. E. Roth, Ph.D. Chicago; C. A. Shivers, Ph.D. Michigan State; J. T. Tanner (Emeritus), Ph.D. Cornell; S. R. Tipton (Emeritus), Ph.D. Duke; H. G. Welch, Ph.D. Florida; G. L. Whinston, Ph.D. Iowa

Associate Professors:

K. D. Burnham, Ph.D. Iowa; A. C. Echtenacht, Ph.D. Kansas; A. A. El-Banna, Ph.D. Washington State; D. J. Fox, Ph.D. Johns Hopkins; M. A. Handel, Ph.D. Kansas State; J. A. MacCabe, Ph.D. California (Davis); M. L. Pan, Ph.D. Pennsylvania State; S. L. Pirtn, Ph.D. New Mexico State; S. E. Riachter, Ph.D. Wisconsin; G. A. Vaughan, Ph.D. Duke; M. C. Whiteside, Ph.D. Indiana

Assistant Professors:

T. T. Chens, Ph.D. Florida; L. D. Etkin, Ph.D. Indiana; N. Greenberg, Ph.D. Rutgers; G. F. McCracken, Ph.D. Cornell.

The Department of Zoology offers the Master of Science and Doctor of Philosophy degrees with concentrations in aquatic zoology, comparative zoology, cell biology and molecular biology, ecology, cell biology and molecular biology, physiology, genetics, ethology, and reproductive and developmental biology.

Requirements for admission: Applicants for graduate study are expected to have a background no less extensive than that required of undergraduate majors in this department. This includes a knowledge of the basic principles of cell biology, genetics, and ecology. Other requirements for admission are: (1) general zoology or general biology, 12 quarter 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) Graduate Record Examination scores (Verbal, Quantitative and Advanced Biology); and (7) a grade point average of 3.0 out of 4.0. Otherwise superior students, deficient in one or more of the above requirements, may be admitted at the discretion of the Graduate Affairs Committee.

A course in biostatistics is required of all candidates for an advanced degree in Zoology. All aspirants for advanced degrees in Zoology must exhibit competency in six areas of biology 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 this two-year period for a student to continue in the program.

Preparation for the doctoral dissertation: During the first year a written examination and a special research problem in each of two faculty members' laboratories will determine the student's preparation for thesis or dissertation study.

*Alumni Distinguished Service Professor.
other topics. Coreq: 5380. Prereq: Graduate standing and one upper division laboratory course in either biochemistry, physiology, microbiology or consent of instructor. Chemistry 3810 highly recommended. F

5410 Advanced Parasitology (4) Life cycles, techniques of collection, preservation, and identification of parasitic worms and protozoa. Prereq: Consent of instructor.

5430 Advanced Medical Entomology (3) Prereq: 4430.

5510-20 Advanced Animal Physiology (5, 5) Primarily mammalian physiology; 5510—membrane, neuron, central nervous system, muscle, cardiovascular system, and control mechanisms; 5520—respiratory, renal, gastrointestinal, and reproductive physiology, acid-base mechanisms, and metabolism. Should be taken in sequence if both courses are taken. Prereq: General undergraduate anatomy and physiology and Biochemistry 4110 or equivalent of consent of instructor. Biochemistry 4120 also recommended. (Same as Animal Science 5510-20.) 4 hrs and 1 lab. W; Sp

5550 Advanced Ornithology (4) Classification, distribution, and anatomy of birds. Prereq: 4300.

5570 Animal Populations (3) Characteristics and methods of study of animal populations.

5610-20 Foundations of Radiation Biology (4, 4) Physical, chemical, and biological mechanisms involved in actions of different kinds of raditions on living cell and its components. Recommended prereq: 1 yr biological science, general physics, biochemistry; calculus. (Same as Radiation Biology 5610-20.) 3 hrs and 1 lab.

5630 Methods of Experimentation with Laboratory Mammals (3) Designed to give competence in handling research mammals. Techniques of anesthesia, drug administration, radiography and surgery. Prereq: 4060, or 4410, or consent of instructor.

5660 Physiology of Development (3) Chemical aspects of growth, morphogenesis, and cytodifferentiation. Recommended prereq: Biochemistry 4110-20. F

5670 Cellular Immunology (4) Laboratory course with emphasis on immunological phenomena at cellular level. Preparation and use of immunofluorescent reagents, macrophage migration inhibition, skin allograft reactions, diffusion chamber cultures, and antibody formation at cellular level. 4 hrs and 2 labs.

5740 Physiological Ecology of Animals (2) Adaptive physiological responses of animals to natural changes in or extremes of physical and biotic environment. Emphasis on terrestrial vertebrates. Term paper including review of assigned topic with emphasis on creative development of special aspect. 1-2 hr. lec. W

5750 Physiological Ethology (3) Behavioral endocrinology and neurology from ethological perspective; reciprocal relationships of physiology and behavior in natural context. Prereq: Consent of instructor, or Psychology/Zoology 4720, or undergraduate course in physiology. W

5760 General Vertebrate Neuroanatomy (3) (Same as Psychology 5760.)

5780 Radiation Physiology (4) Effects of different kinds of radiations on functions of cells, tissues, and organ systems of animals. Recommended prereq: 5610. (Same as Radiation Biology 5780.)

5790 Transport of Ions Across Epithelia (4) Operational principles and methods needed to study electrical and kinetic properties of epithelia and electrically excitable tissues. Quantitative methods of measuring ion fluxes and flux ratios. Prereq: Two upper-division physiology courses, graduate standing, or consent of instructor. Recommended prereq: Chemistry 3810.

5820 Methods of Taxonomy (4) Classification of animals; rules of nomenclature; problems in priority; preparation of keys, descriptions, and figures. Prereq: Consent of instructor. W

5840 Aquatic Insects (4) Taxonomy and biology of aquatic insects, emphasis on immature forms. 2 hrs and 2 labs. Sp

5850 Geographic Distribution of Animals (4) Distribution patterns of vertebrate and invertebrate animals in all major habitats. Prereq: Consent of instructor.

5870 Insect Synecology (4) Ecology of insect communities.

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

6110 Advanced Topics In Cell and Molecular Biology (1-3) Readings and discussions of recent advances in cell biology. Prereq: Biology 3120 and consent of instructor. May be repeated with consent of department. Maximum 12 hrs.

6140 Seminar in Immunobiology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

6210 Seminar in Physiology (2) Prereq: Two physiology courses or consent of instructor. May be repeated. Maximum 6 hrs.

6310 Seminar in Cytology (2) May be repeated. Maximum 6 hrs.

6350 Seminar in Developmental Biology (2) Internal regulation in differentiating cell. Prereq: 3050, 4050; Biochemistry 4110-20. W

6410 Seminar in Parasitology (2) Prereq: 5410. May be repeated. Maximum 6 hrs.

6510 Seminar in Genetics (2) Prereq: General genetics. May be repeated. Maximum 6 hrs. F

6610 Seminar in Ornithology (2) Prereq: 4300. May be repeated. Maximum 6 hrs.

6650 Seminar in Aquatic Biology (2) Prereq: Any 2 of 4200, 4660, Botany 5061, or consent of instructor. May be repeated. Maximum 6 hrs. F, W, Sp

6710 Seminar in Ecology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. W

6810 Seminar in Entomology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. Sp

6910 Seminar in Radiation Biology (2) Prereq: 5610. Coreq: 5620. May be repeated. Maximum 6 hrs. (Same as Radiation Biology 6910.)
Robert L. Summitt, Dean
Joseph C. Parker, Jr., Associate Dean, Knoxville

The major campus of the College of Medicine is located in Memphis, Tennessee. The College, however, is a statewide organization with other units in Chattanooga, Jackson, and Knoxville.

In addition to Department of Medical Biology faculty listed here, the Knoxville campus has other College of Medicine faculty and students in undergraduate and graduate medical education.

The College of Medicine traces its origin to the establishment of the Medical Department of the University of Nashville in 1851. Later, through a merger of four medical schools, it became The University of Tennessee College of Medicine and moved to Memphis in 1911.

Department of Medical Biology/Memorial Research Center

Professors:
- W. R. Farkas (Acting Chairman), Ph.D. Duke; J. E. Fuhr (Director), Ph.D. St. John’s; C. C. Congdon, M.D. Michigan; J. B. Jones, D.V.M. Illinois; R. D. Lange, M.D. Washington (St. Louis); C. B. Lozzio, M.D. Buenos Aires (Argentina); T. P. McDonald, Ph.D. Tennessee; E. A. Machado, M.D. Buenos Aires (Argentina); P. W. Wigler, Ph.D. California (Berkeley).

Associate Professors:
- J. P. Chen, Ph.D. Pennsylvania State;
- P. B. Coulson, Ph.D. Illinois; E. W. Fuson. Ph.D. Tennessee;
- A. T. Ichiki, Ph.D. California (Los Angeles);
- C. Congdon, D.V.M. Michigan State.

Assistant Professors:
- W. T. Hanna, M.D. Ain-Shams (Egypt); K. D. Lin, M.D. National Taiwan (Taiwan); F. J. Miller, A.B. Alabama.

The Department of Medical Biology of The University of Tennessee College of Medicine-Knoxville was formed from the faculty of The University of Tennessee Memorial Research Center and Hospital in 1978. The Research Center was established in 1956. Its faculty has education, research, and service interests in cancer, blood diseases, birth defects and clinical genetics, and biochemistry of disease. Courses in these areas are offered to students at the graduate and undergraduate levels. Elective courses are also available to students in the College of Medicine by special arrangement.

The faculty with the College of Veterinary Medicine participates in the graduate program leading to M.S. and Ph.D. degrees in Comparative and Experimental Medicine. Other advanced degree students can do thesis research in the department by arrangement with other life science departments at the University.

Courses

4210 Introduction to the Study of Cancer (3) Lectures, classroom discussion, and case reports surveying the major topics of oncology. Prereq: Biology 3110-20 or consent of instructor.

4310 Introduction to Hematology (4) Pathophysiology of blood and blood forming systems. Lectures, class discussions and demonstrations. Prereq: Upper division biology background to include histology and/or general anatomy.

4430 Clinical Genetics (3) Human genetic disorders, case presentations. Prereq: General biology and general genetics background or consent of instructor.

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

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

6110 Advanced Topics in Medical Biology (2) New developments in biologic research applicable to clinical medicine. Primarily for doctoral candidates in Comparative and Experimental Medicine. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

6520 Special Topics in Pathology (1-3) Pathologic anatomy, biochemical pathology, and related areas. Primarily for doctoral candidates in Comparative and Experimental Medicine. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

metabolism, toxic reactions, and deficiency states. Clinical and pathologic correlations. Prereq: Biochemistry 4110-20 or equivalent.

5420 Special Topics in Metabolic Disease (1-3) Biochemical and physiological basis of selected diseases of humans and animals. Clinical-pathological correlations. Prereq: 5410 and consent of instructor. May be repeated. Maximum 9 hrs.

5430 Metabolism of Drugs (2) Drug mechanisms of action: membrane transport, enzyme reactions, drug receptors, ionization, stereochemistry and metabolic pathways. For students interested in biochemical pharmacology. Prereq: Biochemistry 4110-20.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E
The Bachelor's degree is not in Nursing, the
GENERAL REQUIREMENTS for referral to nurse researchers.
analysis, and by generating research topics
by means of data collection, tabulation, and
care;
responsibilities;
discharge of one's professional
administrative and clinical practice skills in the
groups in agency and community settings;
evaluation of health care delivery to large
groups in a variety of settings;
comprehensive nursing care to individuals and
graduates will be able to:
1. Provide advanced high quality,
comprehensive nursing care to individuals and
groups in a variety of settings;
2. Collaborate with other health
professionals in systematic implementation
and evaluation of health care delivery to large
groups in agency and community settings;
3. Utilize appropriate advanced teaching,
administrative and clinical practice skills in the
discharge of one's professional
responsibilities;
4. Utilize appropriate research findings in the
implementation and evaluation of nursing
care;
5. Participate in clinical research activities
by means of data collection, tabulation, and
analysis, and by generating research topics
for referral to nurse researchers.
GENERAL REQUIREMENTS
FOR ADMISSION
1. Meet requirements for admission to The
Graduate School.
2. Hold a Bachelor's degree in Nursing. If
the Bachelor's degree is not in Nursing, the
applicant must successfully complete the
equivalent of an upper division major in
Nursing as part of the M.S.N. program.
3. If the number of qualified applicants
exceeds the number that can be
accommodated, preference will be given to
applicants:
   a. whose undergraduate GPA is 3.0 or
      higher;
   b. who have had at least two years of
      full-time clinical practice experience following
      completion of a baccalaureate nursing
      program;
   c. who are Tennessee residents;
   d. who are currently employed in
      underserved health service areas and who
      can demonstrate their commitment to return to
      those areas following completion of the
      program;
   e. who are currently employed as nurse
      educators in programs preparing registered
      nurses;
   f. who are currently employed as directors
      of nursing service.
4. Ordinarily one year of full-time clinical
practice experience should be completed prior
to applying for admission to the program.
DEGREE REQUIREMENTS
1. Students must complete 60 quarter
hours of graduate level course work with a
cumulative GPA of 3.0 or better.
2. The 60 credit hours must include the
following components:
   a. Core requirement
   b. Clinical concentration option
   c. Functional concentration option
   d. Role preparation option
   e. Electives

<table>
<thead>
<tr>
<th>Component</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core requirement</td>
<td>23 hrs</td>
</tr>
<tr>
<td>Clinical concentration</td>
<td>20 hrs</td>
</tr>
<tr>
<td>Functional concentration</td>
<td>11 hrs</td>
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<tr>
<td>Role preparation option</td>
<td>11 hrs</td>
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<tr>
<td>Electives</td>
<td>6 hrs</td>
</tr>
<tr>
<td>Total</td>
<td>60 hrs</td>
</tr>
</tbody>
</table>

3. A Master's thesis is not required, but
those students who wish to complete a thesis
as a part of their program may substitute the
thesis for the 6 elective hours.
4. Those students who do not choose the
thesis option must successfully complete a
comprehensive final examination.
5. Students may choose either primary care
nursing, secondary/tertiary care nursing or
community mental health nursing as their
clinical concentration option. Students
selecting the primary care nursing option must
complete 5450, 5460, 5550. Students
selecting the secondary/tertiary care nursing
option must complete 5120-30 and 5310.
Students selecting the community health
nursing option must complete 5410, 5460,
5490, 5500 and 5510.
6. The core requirement that must be
completed by all students regardless of
clinical option includes the following courses;
5010, 5020, 5030, 5070, 5210, 5680 and a
graduate level statistics course that must be
approved in advance by the student's faculty
advisor.
7. Students may select a role preparation
option in teaching or advanced clinical
practice. Students selecting the teaching
option must complete 6 hours of graduate
level courses in education and 5630. Students
selecting the advanced clinical practice
functional option must complete 5560 and
5660 if their clinical option is primary care,
5320 and 5340 if their clinical option is
secondary care or 5520 and 5540 if their
clinical option is community mental health.
Except for electives, all courses taken in other
colleges must be approved in advance by the
student's faculty advisor.
8. Students whose baccalaureate degrees
are not in nursing must complete the
equivalent of a baccalaureate nursing major
by taking or challenging a series of
undergraduate nursing courses as determined
by each student's major advisor.

REQUIREMENTS FOR SECOND MASTER'S
DEGREE
1. Students must complete 60 hours at the
graduate level (with a cumulative GPA of 3.0)
unless they already have Master's or doctoral
degrees. For the latter up to 15 hours may be
applied to the second Master's degree, with
approval of the student's committee. Dean of
the College, Dean for Graduate Studies and/or
Vice Chancellor for Graduate Studies and/or
Research.

Any hours so applied would be from courses
in the first degree program that are directly
relevant to the second. Hours from the first
program to be applied to the second shall
have been earned within the time limits (six
years) established for the second.

Reduction of hour requirements, when
appropriate, will not be used to reduce the
residency requirements of the second
Master's degree.
2. The 45 to 60 hours must include the
following components:

143
Courses

4330 Nursing in the Specialties (2-4) Application of principles from behavioral, physical, social and nursing sciences to solution of nursing problems. Exploration of nursing intervention needed to maintain or restore homeostasis in clients experiencing selected episodes of normal and abnormal body function with particular emphasis on those processes which, when altered, are most commonly encountered in acute and chronic disease states. Prereq: 3210-20 or 4010 or consent of instructor. 3 hrs and 1 lab. W, Sp.

5103 Independent Study in Nursing (1-15) Exploration of nursing topic of special interest to student. Prereq: Consent of instructor. May be repeated. Maximum 15 hrs.

5120 Secondary/Tertiary Nursing of Adults II (6) Continuation of role of clinical nurse specialist; application of theories and concepts to nursing care of hospitalized adults with emphasis on analysis and utilization of clinical and health related research findings in delivery of health and nursing care. Prereq: 5020, 5120. Prereq or coreq: 5210. 3 hrs and 3 labs. Sp.

5680 Advanced Nursing Seminar (3) Theories and principles related to the provision of health care for mentally ill and mentally disordered patients. Prereq: 5680. Coreq: 5520. F

5550 Community Mental Health Nursing Seminar (2) Continuation of 5550 with further emphasis on acquisition of knowledge and skills necessary to function more autonomously. Prereq: 5550. F

5770 Special Topics (3) In-depth study of selected nursing topics, problems, or issues not covered in other courses. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5900 Graduate Seminar in Public Health (1-2) (Same as Public Health 5900, Nutrition and Food Science 5910, Physical Education 5900, and Social Work 5900.) S/NC only.
Roy F. Knight, Dean
William J. Lau, Associate Dean

Professors:

Associate Professors:

Assistant Professors:
R. M. Kelso, M.S. Tennessee; W. E. Martella, B.Arch. California (Berkeley); M. S. Moffett, Ph.D. Massachusetts Institute of Technology; V. Narancic, J. Meder, M.Arch. Harvard; J. S. Rabun, M.A. Missouri; M. C. Martin.

Lecturers:
A. G. Anderson, M.A. Missouri; M. C. Martin.

4430 Architecture and Preservation (6) Rehabilitation, restoration, and adaptive uses of existing buildings.


4833 Preservation Law (3) Legal aspects of contemporary preservation activity.

4850 Elementary Structural Matrix Methods (4) Introduction to generalized matrix methods of analysis of structures. Review of matrix algebra and vectors; development of member stiffness and flexibility matrices; assembly of structure stiffness and flexibility matrices. Prereq: Consent of instructor. (Same as Civil Engineering 4850 and Engineering Science and Mechanics 4850.) Su

4870 Architectural Photography (3) Photography as a design, research and presentation medium. Emphasis on architectural photography using black and white media. E

4871 Advanced Architectural Photography (3) Application of special photographic techniques with emphasis on color printing and processing. Prereq: Consent of instructor. F, W, Sp

4887 Structural Design for Protection Against Extreme Hazards (3) Probability, risk, human values, insurance. Survey of possible hazards: floods, fire, hurricanes, and tornadoes, earthquakes, nuclear effects, internal and external explosions. Building code and engineered design of steel, masonry, concrete, and wood structures to resist extreme effects. Protective construction for human and system needs. Fire protection engineering, fire phenomena, life safety and analysis, high-rise building fires.


4940 Proxemics (4) Seminar for graduate students and upper division students. Introduction to proxemic research. Definition of proxemic variables. Proxemic notation exercises. Analysis of ethno data and the identification of emic categories. Observer bias and methods of bias reduction. Members of seminar required to design, conduct, and present original proxemic research. Prereq: 2000 or consent of instructor.

4950 Environment as Code (4) Advanced lecture of graduate students and upper division students. Advanced lecture course of theoretical issues involved in considering environment as a medium of human communication. Codes and nature of coding behavior in animals and humans. Relationship between coding behavior and the organization of the central nervous system. Coding and social behavior. Communication process as a generic model of human environment relations. Hierarchical aspects of environmental communications. Prereq: 2000 or consent of instructor.
Graduate School of Biomedical Sciences

W. E. Barnett, Director

MAJOR Biomedical Sciences DEGREES M.S., Ph.D.

The University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, located within the Biology Division of Oak Ridge National Laboratory, offers programs leading to the Master of Science and Doctor of Philosophy degrees. The National Laboratory, one of three installations operated at Oak Ridge by Union Carbide Corporation for the Department of Energy, is a well-known center of basic research. The school utilizes the staff and facilities of this laboratory, and thus brings directly into the mainstream of full-time graduate study in the life sciences the talent and experience of that staff, as well as the most advanced research methods and technology.

The program of study, which incorporates a high faculty-to-student ratio, is based on intensive graduate courses supplemented by tutorial instruction, participation in a wide variety of seminars, and a heavy emphasis on communication skills, research training and independent study. The program encourages students to pursue graduate studies to the limits of their abilities.

The School is not departmentalized, and, apart from certain basic requirements, each student's curriculum is planned to meet individual needs, with the aim of giving: (1) strength in the basic sciences; (2) perception of the biomedical sciences as a whole; and (3) experience and training in a chosen specialty.

The research areas available for Master's thesis and Ph.D. dissertation work are biochemistry, biophysics, carcinogenesis, genetics, cellular, developmental and mammalian biology, and radiation biology. Included are such subjects as immunology, protein and enzyme chemistry, nucleic acid chemistry, cytology, radiation and environmental biology, virology, developmental biology, experimental pathology, microbial and mammalian genetics, mutagenesis, and problems of aging.

ADMISSION REQUIREMENTS

A Bachelor's degree or its equivalent is required. Students with M.S., D.V.M., or M.D. degrees are also encouraged to apply. Completed applications, Graduate Record Examination scores and letters of reference should be sent to the address below. The student will need previous training in biology, calculus, physics, and organic and physical chemistry. However, a course in physical chemistry is offered by the School in order to meet this requirement. It is recommended that deficiencies in meeting entrance requirements be eliminated prior to entrance.

Requests for application forms, information on admission, financial support, and housing should be sent to:

Director, University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, Biology Division, ORNL, Box Y, Oak Ridge, Tennessee 37830.

THE DOCTORAL PROGRAM

Requirements for the Ph.D. degree are:
1. Satisfactory (B grade or better) completion of the following core courses or their equivalent: Biochemistry (5110-20); Biophysics (5140); Genetics (5160); Molecular Genetics (5170); Cell Biology (5180-90); Mammalian Physiology (5200); and Statistics for Biologists (5740).
2. Three quarters of Biomedical Sciences Laboratory (5310-20-30-40).
3. Participation in at least one of the seminars during each quarter of residence after the first year is strongly recommended.
4. Satisfactory completion of formal advanced courses in the areas of the student's interests. The number and nature of the required advanced courses will vary depending upon the student's background and area of specialization.
5. Pass both written and oral comprehensive examinations.
6. A dissertation reporting the results of original and significant scientific research. A minimum of 36 quarter hours of course 6000 is required.
7. A final oral examination on the dissertation.
8. A formal seminar presentation of the dissertation research.

SPECIAL MASTER OF SCIENCE DEGREE PROGRAM

The graduate faculty has designed a Master of Science program in Biomedical Sciences primarily to fill the need for such a degree within the Oak Ridge National Laboratories; however a limited number of students from other institutions may be accepted if qualified and as space is available.

Requirements for the M.S. degree are:
1. Graduate credit or a proficiency in the following core courses: Biochemistry (5110-20); Cell Biology I (5180); Cell Biology II (5190); plus any three of the following four courses: Biophysics (5140); Genetics (5160); Molecular Genetics (5170); and Mammalian Physiology (5200). Additional credits may be obtained (6 to 15 credit hours) with electives. The student will need previous training in biology, calculus, physics, organic and physical chemistry.
2. Forty-five credit hours of approved graduate courses including a minimum of 9 quarter hours for thesis (maximum 18 quarter hours of credit for course 5000).
3. For admission to candidacy: Completion of any required prerequisite courses and one quarter of graduate course work with a B average. Admission to candidacy forms must be filed at least one full quarter prior to receipt of degree.
4. A Master's Committee of three approved faculty members upon admission to candidacy.
5. A thesis reporting results of original and significant scientific research.
6. Pass a final oral (or oral and written) examination as determined by the student's committee.
Full-Time Faculty
Professors: E. Allen, Ph.D. Tennessee; D. E. Olins, Ph.D. Rockefeller.

Assistant Professor: M. D. Mamrack, Ph.D. Baylor.


Research Assistant Professor: E. A. Hiss, Ph.D. Notre Dame.

Shared Faculty
Not all faculty listed are necessarily available in teaching and/or research roles in every academic year.

W. E. Barnett (Director), Ph.D. Florida State; H. I. Adler, Ph.D. Cornell; D. P. Allison, M.S. Tennessee; G. Braslawsky, Ph.D. Notre Dame; J. L. Epler, Ph.D. Florida State; J. R. My Fry, M.D. Delaware; C. W. Gehra, Ph.D. Oklahoma; W. M. Generoso, Ph.D. Missouri; D. G. Goselee, Ph.D. North Carolina; G. J. Greif, Ph.D. California Institute of Technology; R. F. Greif, Ph.D. Tennessee; R. M. Riddell, Ph.D. Ohio State; W. D. Gude, M.S. Tennessee; F. C. Hartman, Ph.D. Pennsylvania Medical Units; B. Hingerty, Ph.D. Princeton; A. Hollander, Ph.D. Wisconsin; J. M. Holland, D.V.M. Kansas State; A. W. Haie, Ph.D. Indiana; C. T. Jacobson, Ph.D. Johns Hopkins; S. Kenne, Ph.D. California (San Diego); F. T. Kenney, Ph.D. Johns Hopkins; P. A. Laney, Ph.D. New York.

Courses
The courses below are not necessarily taught every year.

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

5070-80 Physical Chemistry (3, 3) Thermodynamics: states of chemical equilibria; chemical equilibria; electromotive force; surface chemistry; electrolyte solutions, kinetics, conductance, viscosity, diffusion.


5140 Biochemistry (3) Energy levels and excited states of large molecules; optical instrumentation; adaptations to system perturbations; properties of macromolecules in solutions; molecular conformations; inter- and intramolecular forces; physical principles of microscopy. Prereq: 5070-80.

5150 General Genetics (3) Mendelian genetics, mitosis, and meiosis. Transmission genetics, mapping, and linkage.


5170 Molecular Genetics (3) Molecular biology of genetic processes. Gene regulation; coding; protein synthesis; suppression of missense and nonsense mutations; mutagen mechanisms; complementation; recombination. Prereq: 5110-20, 5160.

5180 Cell Biology I (3) Structure and composition of major nuclear and cytoplasmic organelles of eucaryotic cells. Pertinent instruments and techniques; meiosis and mitosis; cell cycle; chromosome structure; nuclear RNA metabolism; nucleoli and ribosomes; structure of genetic transcription and translation in bacteria. Coreq: 5110.

5190 Cell Biology II (3) Comparative biochemical approaches to cell structure and function. Membrane systems and metabolism; development and function of mitochondria, chloroplasts, peroxisomes and other organelles; membrane biochemistry; and transport phenomena; cell cycle. Prereq: 5110, 5180. Coreq: 5120.

5200 Mammalian Physiology (4) Mammalian organ systems and their functions. Nervous, muscular, endocrine, respiratory, circulatory, reproductive, and excretory systems. Interrelationships of these systems and fundamental importance of interactions in contemporary biological research. Prereq: 5190.

5230 Biochemical Concepts in Medical Sciences (3) Biochemical mechanisms involved in physiological conditions and pathological processes of human body. Dynamic functions of organ systems; biochemical pharmacology; hormone actions; neurobiochemistry. Current biochemical advances in basic and clinical medicine. Prereq: 5200, 5110-20.

5310-20-30-40 Biomedical Sciences Laboratory (3, 3, 3, 3) To acquaint students with both approaches and technologies in various areas of modern biology. Students study a quarter in each of three or four laboratories conducting research in different areas of biomedical science. Required of all first-year students.

5350-60 Biomedical Sciences Seminar (1, 1) Critical analyses of current journal publications in selected area of modern biology. Written evaluation of papers and weekly oral presentations by each student.

5370 Biomedical Sciences Seminar (1) Basic principles of scientific writing. Research articles, and thesis proposals, abstracts, review articles, progress reports.

5430-60-90 Advanced Graduate Research Participation (3, 6, 9) Special advanced research project covering area not related to dissertation research. Topics chosen with consent of instructor. May be repeated.

5510-20-30-40 Special Topics in Biomedical Sciences (3, 3, 3, 3) Tutorials or formal lectures. Potential topics include x-ray diffraction and crystallography; x-ray crystallography; intermediary metabolism of carbohydrates; computer science; pathology; cytology and cyogenetics; mammalian genetics; human genetics; cancer research; plant physiology; radiation biology; aging research. Additional courses developed on any subject of mutual interest to individual students and staff members. May be repeated.


5740 Statistics for Biologists (3) Application and interpretation of statistical methods in data analysis. Random variables; normal, binomial, and Poisson distributions, statistical presentation of data; estimating means and variance; confidence intervals; tests of significance for comparing samples; analysis of variance; contingency tables; chi-square tests; correlation and association; linear regression. Prereq: Introductory statistics or consent of instructor.

5784 Bioorganic Reaction Mechanisms (3) Nature of chemical bonds; nucleophile and electrophile reactions, molecular rearrangements, oxidation-reduction, solvolysis, protein and nucleic acid modifications, reagents involving proteins and nucleic acids on polymer supports.

5800 Cryobiology (3) Physical and chemical responses of cells and bacteriophage to low temperatures and ice formation. Relation of these processes to permeability, structure of semipermeable membranes, conformation of macromolecules, and nature and state of water in cells; and how they bear on other fields of biology and medicine—including electron microscopy, photobiology, cell physiology, exobiology, and tissue and organ cryosurgery. Prereq: 5070-80 or equivalent, and 5190.

5940 Classic Experiments in Genetics (3) Original papers presenting new and lasting concepts in genetics. Prereq: 5170.

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

6200 Nucleic Acid Chemistry (3) Chemistry of nucleotide-derived materials including alkylation, solvolysis, oxidation-reduction, polymerization, synthesis, degradation, and other structural properties of nucleic acids. Reaction of nucleic acids in above systems with emphasis on relationship of structure and reactivity. Prereq: 5110-20.

6210 Protein Chemistry and Enzyme Mechanisms (3) Theoretical and practical aspects of protein chemistry including chemical and physical characterization of proteins, chemical modification of proteins, and structure-function relationships. Latter emphasizes enzymes, includes approximation of substrates, catalytic mechanisms, enzyme kinetics, and strain and distortion of substrates. Prereq: 5110-20.

6220 Enzyme Regulation and Kinetics (3) Kinetics of catalysis; inhibition by product, substrate and dead-end inhibitors; stimulation and inhibition of allosteric enzymes, types of feedback regulation; role of aubinids in enzyme regulation; multifunctional enzymes and structure-function relations. Prereq: 5110-20.

6234 Chemistry and Metabolism of Lipids (3) Nomenclature, chromatographic isolation, chemistry, physical properties, and enzymology of lipids. Hormonal action of prostaglandins and role of lipids in membranes, enzymic expression, and nervous tissue. Lipid biochemistry of mammals; comparative aspects, particularly lipid pathways in bacteria and yeast. Prereq: 5110-20.

6251 Molecular Biology of DNA (3) RNA synthesis and metabolism in prokaryotes, eukaryotes, and their viruses. Prereq: 5110-20 or consent of instructor.

6252 Molecular Biology of DNA (3) DNA replication, repair, and recombination. Advanced mechanisms at molecular level using biochemical and genetic techniques. Prereq: 5110-20 or consent of instructor.

6270 Viral Carcinogenesis (3) History of viral oncology and descriptive catalog of tumor viruses. Biological properties and natural history. DNA tumor viruses; replication cycle; transformation; genetics; natural history. RNA tumor viruses; endogenous and exogenous states of genetics; induction; transformation; natural history.

Graduate School of Biomedical Sciences

6290 Cancer Biology and Biochemistry (3) Pathology and nomenclature of cancer. Tumor immunology and immunotherapy. Biochemistry of tumor cells; enzymes, metabolism, membranes, DNA repair; regulation; strategies in chemotherapy.

6300 Mutagenesis (3) Basic mechanisms in chemical and radiation mutagenesis and dosimetry in variety of systems including bacteria, fungi, Drosophila, and mice.

6400 Membrane Biology (2) Transport kinetics, membrane biogenesis and turnover, endocytosis and exocytosis, receptor regulation, hormone-membrane biogenesis interactions. Prereq: 5110-20 and 5180-90 or consent of instructor.

6410 Techniques in Cell Biology (3) Application to specific research problems, kind of data they yield, and cautions in data interpretation. Laboratory demonstrations may be arranged where appropriate. Prereq: 5180-90 or consent of instructor.

6450 Immunology (3) Structured lectures in modern immunology and emphasis on concepts and mechanisms at the cellular level. Topics: T-B cell interaction, soluble mediators, tolerance, surveillance, transportation genetics, immunoglobulin structure. Selected laboratory exercises. Prereq: 5180-90 or consent of instructor.

6510-20-30-40 Advanced Topics in Biomedical Sciences (3, 3, 3, 3) Current and future research developments. Topics listed under Special Topics Courses, can be taken either as tutorials or as literature survey courses requiring substantial student participation. May be repeated.

6600 Mammalian Genetics (3) Orderly presentation of known genetics variants affecting each organ system of experimental mammals, especially laboratory mouse. Prereq: 5160.

6610 Mammalian Biochemical Genetics (3) Combined biochemical and genetic approaches to problems of immunology, globin synthesis, and control of enzyme synthesis. Prereq: 5110-20 and 5160 or consent of instructor.

6650 Microbial Genetics (3) Basic phenomena in microbial genetics: transduction, transformation, conjugation, and mutation. Genetics of bacteriophage. Prereq: 5160 or consent of instructor.

6750 Regulation of Intermediary Metabolism (3) Pathways involved in intermediary metabolism. Steady-state processes, "nonequilibrium" reactions, first enzymes, feedback inhibition, isozymes, multienzyme systems and compartmentation, covalent modification, positive and negative control, catabolite, repression, autoregulation, stringent control, attenuation, hormonal control, other selected topics. Prereq: 5110-20 or consent of instructor.
IN LIBRARY SCIENCE
MASTER OF SCIENCE

The goal of the program is to prepare graduates to function effectively in libraries and information centers. The program is designed to enable students to:

1. Examine critically the role and function of libraries and information centers in our society, and to define and redefine that role as the needs of society demand;
2. Understand and use the concepts and procedures related to the selection, acquisition, organization, and dissemination of knowledge;
3. Understand and apply the principles of management to the library and information center;
4. Assume individual and collective responsibility for the well-being and development of their profession and of professional service.

PROGRAMS OF INSTRUCTION

The program leading to the degree of Master of Science in Library Science involves a total of 51 quarter hours of graduate courses, 24 hours of which form a core curriculum required of all students. Either a thesis or a non-thesis option is available, with 9 hours allowed for thesis credit. At least 36 hours must be taken in the Graduate School of Library and Information Science, allowing up to 15 hours outside the School. Upon completion of the program, all students are subject to an examination. For students who elect the thesis option, the examination will be a defense of the thesis. Students who elect the non-thesis option will be given a written comprehensive examination. Programs are designed for persons interested in school libraries, public libraries, academic libraries, special libraries and information centers as well as a variety of library and information related activities.

The SREB Academic Common Market applies to applicants from Arkansas, Georgia, West Virginia, and Virginia.

ADMISSION REQUIREMENTS

The minimum grade point average for admission to The Graduate School is 2.5. Candidates who have at least a 3.0 average in the junior and senior years will receive first consideration. Applicants are required to take the aptitude test of the Graduate Record Examination. The test should be taken at least one quarter in advance of application for admission to The Graduate School.

Foreign applicants are required to take the Test of English as a Foreign Language.

APPLICATION PROCEDURE

Admission to the program in The Graduate School of Library and Information Science should be made in advance of the quarter for which admission is requested. Applicants should submit the "Application for Admission" form (printed as the first page of The Graduate School Catalog) and should request the registrars of all colleges and universities attended to send two official transcripts to The Graduate School. In addition, each applicant should make arrangements to take the GRE and TOEFL exams, if applicable. A personal data sheet and three recommendations (obtained from The Graduate School of Library and Information Science) should be returned to the Director of the School.

FINANCIAL ASSISTANCE OPPORTUNITIES

Employment with the University of Tennessee Libraries may provide a work-study opportunity for selected students who wish to obtain experience in academic librarianship while pursuing the degree. Such students usually work at least 20 hours each week and thus extend the period required for the degree up to two years.

Similar opportunities exist with some other libraries and information agencies in the Knoxville area.

A limited number of graduate assistantships are available through the School for the degree. Assistantships of this type carry a waiver of tuition and fees as well as a stipend, and require that recipients work 10 hours per week in the School.

Information on financial assistance is available from the Director of the Graduate School of Library and Information Science.

Faculty

Professors:

Associate Professors:

Assistant Professors:
M. H. Karrenbrock, M.L. South Carolina; J. M. Pemberton, Ph.D. Tennessee; M. S. Stephenson, M.L.S. North Texas State.

Courses

4140 Librarianship (3) Librarianship as an occupation: its organization, responsibilities, problems and prospects.
4150 School Library Administration (3) Objectives, functions, and place of school library; relationship to local and state services; cooperative planning for quarters and materials; evaluation. (Same as Curriculum and Instruction 4150.)
4270 Organization of Library Collections I (6) Acquisitions, cataloging and maintenance of library collections.
4330 Introduction to Reference Materials (3) Basic information sources and services for all libraries.
4750 Utilization of Instructional Media (3) (Same as Curriculum and Instruction 4750 and Vocational Technical Education 4750.)
5360 Seminar in Library and Information Science (3) Advanced study of varying topics. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5400 Library Facilities (3) Problems inherent in planning and construction of library quarters. Inter-relationship of staff, materials, and user space requirements.


5700 Information Retrieval Systems Laboratory (3) Comparative capabilities of various types of information retrieval systems: analyzing performance of systems to arrive at generalizations with respect to theory, design and operation of information retrieval systems.

5750 Information Technologies (3) Computer-based and non-computer related media and methods for information storage, retrieval, and transfer within and external to library environment; existing and prototype hardware and software and interfacing of these technologies. Prereq: 5700 or consent of instructor.

5999 Practicum (5 or 9 or 12) Opportunity to translate late library theory into practice under guidance of qualified librarians. Prereq: Completion of 21-credit curriculum plus approval of director.
The Graduate School of Planning offers a program of studies leading to the professional degree of Master of Science in Planning (M.S.P.). Students may elect concentrations in land use planning, community development, energy planning, environmental planning, quantitative methods, housing, historic preservation, or transportation planning.

MASTER OF SCIENCE IN PLANNING

The M.S.P. degree program prepares planners for a diversity of career opportunities in both the public and private sectors. Graduates are candidates for professional positions in regional, city, county, and metropolitan planning agencies; in local, state, and federal agencies concerned with physical, economic and administrative planning; in private business and organizations dealing with development problems; and in private consulting practice.

The degree program typically requires a minimum of six quarters, or 72 credit hours. A core curriculum of 40 hours is required of all candidates. Twenty-three or more additional hours of elective course work and 9 hours for the required thesis or major paper enable the student to pursue special interest areas or topics in the field of urban and regional planning. Elective courses may be selected from courses offered by the School of Planning or by related University departments and programs such as geography, civil engineering, environmental engineering, ecology, real estate and urban development, public administration, and public health. Elective courses are chosen with the advice and approval of the student's faculty advisor.

A work internship is recommended, but not required, during the summer between the first and second year of the program. Students who do not have prior experience in comprehensive plan preparation are advised to enroll in an intensive credit-hour synthesis project course. The required thesis or major paper option provides the student an opportunity to develop and apply research and analytical skills to a particular planning problem or topic.

Core planning courses are taught by the faculty of the Graduate School of Planning. Related courses are taught by other specialists drawn from the University faculty. In addition, experienced professional planners in TVA and other public and professional organizations frequently teach courses on a visiting basis. Each year a guest lecture series brings to the University and the School outstanding leaders in the fields of planning and development.

The Graduate School of Planning is accredited by the American Planning Association.

ADMISSION PROCEDURES

All applicants should submit two letters of recommendation with their applications. Reference letters should be from teachers familiar with the applicant's undergraduate or, where applicable, graduate academic record. If the applicant has had prior planning experience, a letter from the supervisor or other person familiar with the work of the applicant should also be provided.

Graduate Record Examination scores are not required but, if available, may be provided at the option of the applicant.

All applicants are also requested to submit a statement of career goals.

The M.S.P. degree is approved for SREB Academic Common Market participation in Arkansas, Georgia, Kentucky, and West Virginia.

All inquiries concerning admission should be addressed to: Director, Graduate School of Planning, The University of Tennessee, Knoxville, Tennessee 37996-1700.

FINANCIAL ASSISTANCE OPPORTUNITIES

Employment at the Graduate School of Planning Research Center, at local planning agencies, the Tennessee Valley Authority and Oak Ridge National Laboratory may provide an opportunity for selected students to obtain part-time experience while pursuing the degree. Such employment, however, usually extends the period required to complete the degree.

A limited number of graduate assistantships are available through the School. Assistantships carry a waiver of tuition and fees as well as a stipend, and require that recipients work 10 hours per week in School of Planning assignments. Applicants interested in being considered for assistantships and other forms of financial assistance available through the School should submit an application for financial aid to the Director.

DEGREE REQUIREMENTS

Each student will be required to complete a minimum of 72 hours credit of which 46 hours must be in courses offered in planning. The following courses are the required core curriculum for the M.S.P. degree: 5100, 5110, 5130, 5141, 5180, 5230, 5270, 5280, 5340, 5440, 5465. Students who have had previous academic work equivalent to any required core course may petition for a waiver, which can be granted upon demonstration of competence. A proficiency examination will be arranged for students wishing to receive academic credit for previous work.

Each student will be required to demonstrate competence in individual research. This may take either of two forms:

Plan I—Complete a thesis for 9 hours credit;

Plan II—Complete a major study with acceptable documentation. In order to be eligible for the major study plan the student must have completed at least 48 hours of graduate course work and have attained at least a 3.5 cumulative grade point average (at the time of approval of the major study proposal) in at least 24 hours of planning core curriculum courses. The student meeting these criteria may present a proposal to his/her committee for a major study which will include at least 9 hours of subsequent elective course work related to the study topic. The proposal shall justify the selection of topic, problem or issue and the approach to the study.

Students in the Graduate School of Planning must pass a comprehensive written examination after approximately five quarters of course work.

Faculty

Professors:
D. A. Johnson, Ph.D. Cornell; K. B. Kenney, Ph.D.
Courses

4100 Survey of Planning (3) History of city development and of planning with special attention to the U.S. experience in urban and other levels of planning. Prereq: 5110, 5130. W

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

5022 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student does not use university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S, NC only. E

5005 The Planning Process (3) Identification and examination of generic aspects of planning process and planning techniques applied in variety of settings. Not for credit for M.S.P. degree. F, Su

5040 Communications for Planners I (1) Introduction to basic communications, interpersonal and oral communications, graphic presentations, audiovisual equipment. W

5045 Communications for Planners II (1) Graphic communications in planning, Maps and mapping, computer graphics, models and presentation graphics. Prereq: 5040. W

5050 Communication for Planners III (1) Audio-visual equipment, programmed communications, and Photography used in planning. Prereq: 5045. E

5100 Theory of Planning (3) Analysis of nature and objectives of planning process; role of planner and planning function in public decision-making. Prereq: 5110. W

5110 Introduction to Planning (4) History of planning, familiarization with operations of contemporary planning, concept of systems, current trends and issues. Relationship between planning and society in which it occurs. Designed for GSP students. F, Su

5130 Planning Research Methods I (3) Research techniques in subject areas associated with city and regional planning. Research tools, data collection and analysis as basis for planning and decision-making. F, Su

5135 Planning Research Methods II (3) Application of rigorous investigative techniques in solving planning problems, including statistical analysis and mathematical models. Urban and regional information systems as resource and tool in problem identification and solution. Prereq: 5130. Sp

5141 Statistics for Planners (4) Applications of descriptive and inferential statistical and parametric techniques in planning research. Data organization and display; measures of location, dispersion and association; data transformations; some basic probability theory; selected one and two sample tests; correlation and regression analysis. Prereq: 5130 or consent of instructor. W

5145 Library Research for Planning (1) Survey of publications of interest to planners, including resources and research techniques. Use of facilities and collections of UTK library. F

5160 Planning and Utilities (3) Planning for adequate water supply and sewage waste disposal in the urban environment. Impact of utility patterns on area development, and problems of utility service policies. F

5170 Planning for Historic Preservation (3) Planning for preservation, restoration and conservation of historic buildings, areas and sites as related to communitywide planning process. National, state, and local government role in preservation, designation of sites, legislative needs, financing and administrative organizations.

5180 Planning Analysis and Forecasting (4) Methods of analysis and modeling in urban and regional studies. Population, employment, and economic base studies with emphasis on forecasting techniques. Prereq: 5130. Sp

5220 Urban and Site Design (3) Principles of design of residential, commercial, institutional, and industrial districts. Problems of reviewing alternative designs against each other or written regulations. Extensive laboratory experience. F, Sp, Su

5235 Advanced Urban and Site Design (3-4) Review of principles of urban design and laboratory application to selected project or projects involving three-dimensional integrated planning of movement systems, activity patterns and land use. Prereq: 5230 or consent of instructor.

5270 Planning and Transportation (3) (Same as Civil Engineering 5270) W

5280 Planning Methods (6) Tooling up studies; methods for preparation of land use and public facility elements of comprehensive development plans, including visual aspects. Prereq: 5180. Sp

5300 Regional Planning (3) Making planning process operative in intergovernmental context. Theories of regions and analysis of metro planning, area planning, regional planning by states, single-purpose agency planning, and TVA. Prereq: 5110 or consent of instructor.

5310 State Planning (3) Evolution of planning functions in state government, with emphasis on institutional environment in which planning occurs. Context and scope of state planning, and relationships with other branches and levels of government. Prereq: 5110 or consent of instructor.

5340 Implementation (3) Policy formulation, information systems, taxation, capital improvement programming, and other aspects of plan implementation. Programming public actions to affect development. Prereq: 5440. W

5360 New Towns (2) Historical development of new towns and implications for national urbanization policy in United States; process by which new towns are created, from establishment of objectives to administration of development process and provision of public services; organizational alternatives for new town planning, development and management in context of past experience and future objectives. Prereq: 5110 and consent of instructor.

5380 Housing (3) Nature and demand for housing in U.S. and abroad with emphasis on U.S. experience. Private market processes and public influences. Problems of change in housing supply, impact of new technology, and governmental programs to improve supply and quality of housing. Coreq: 5110 or consent of instructor.

5390 Futures (3) Alternative futures and their implications for future living patterns and community planning. Techniques of future research.

5410-30 Special Topics in Planning (1-3, 1-3, 1-3) Lecture, group discussion, and individual research and study on specialized topics in planning not covered in depth in other courses. May be repeated. Prereq: Consent of instructor. E

5425 Planning and Government (3) Governmental context within which planning occurs. Policy making as public process. Planning structures, powers, and policies. F

5440 Planning and Land Use Controls (4) Legal basis for planning and guiding community development. Exercise of police power and eminent domain. Development and administration of zoning, subdivision controls, and related devices. Prereq: 5435. F, Su

5455 Urban Revitalization (3) Goals, principles and strategies for restoring and revitalizing cities. Review and analysis of historic, current, and proposed public and private programs aimed at urban revitalization.
Graduate School of Social Work

Ben P. Granger, Dean
Lou M. Beasley,
Branch Director, Nashville
M. Kate Mullins,
Branch Director, Memphis
Roger M. Noee,
Branch Director, Knoxville
Ronald K. Green,
Director, Office of Continuing Social Work

THE MASTER'S PROGRAM
The University of Tennessee School of Social Work is a fully accredited two-year graduate professional school, with a program (thesis or non-thesis option) leading to the degree of Master of Science in Social Work. The full two-year curriculum is offered in all three branch locations.

GRADUATE PROFESSIONAL EDUCATION
The School of Social Work has as its primary objective the education and training of persons for leadership in the social welfare profession and the social work practice community. Leadership roles include positions in social welfare administration, social planning and policy development, and positions as treatment team leaders, supervisors, consultants, and expert practitioners.

Central to professional leadership are a commitment to the values and goals of the profession and a developed capacity for self-awareness and self-discipline. The experience of a graduate professional education builds commitment, and the School’s program guides students into independent, analytical thought and prepares them to use their skills and knowledge to effective purpose.

The School of Social Work recognizes and enjoys the challenge of cultural pluralism in society and encourages applications for admission from minority group members. Through the planned inclusion of significant and pertinent racial and ethnic content in the curriculum, the School provides students with the educational background needed to take creative roles in the social work profession’s efforts toward the elimination of racism and such other social ills as poverty, crime, neglect, and social injustice.

A special bulletin describing the facilities, admission, fees, and degree requirements is obtainable from The School of Social Work, 2014 Lake Avenue, Knoxville, Tennessee 37996-3910.

AREAS OF PROFESSIONAL PRACTICE
Specializations within the School’s curriculum prepare students for social work careers in such practice fields as criminal and juvenile justice systems; family and child welfare services in public and voluntary agencies; group services in neighborhood and community centers; health services; mental retardation; public welfare services; mental health services; rehabilitation services; school social work; and social gerontology.

THE PROFESSIONAL CURRICULUM
The School of Social Work's curriculum is designed to provide the student with the basic components of professional competence through a progression of course work and supervised practice experience. Students may elect a thesis or non-thesis option. The two-year, six-quarter program includes a core curriculum, a specialization in one of two areas—social work treatment or social welfare administration and planning—and concurrent field practice.

THE CORE CURRICULUM
The core curriculum is offered during the first two quarters of the first year and is required of all students. It is a 30-quarter-hour sequence of five basic courses. As the initial phase of the School’s educational program, the core curriculum contributes to the process of socialization and professional identification, and presents students with a comprehensive and broad knowledge base from which to operate in the future as practitioners and administrators.

AREAS OF SPECIALIZATION
Social Work Treatment
Social work treatment deals with those individual, family, and group problems utilized to enhance the social functioning of individuals and effectively ameliorate problems of social dysfunction. The specialization attempts to develop a thorough knowledge of the theory and methodology basic to varied individual, family, and group methods applicable in the treatment of diverse client problems.

Credit Hours

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Social Welfare Administration and Planning

Social welfare administration and planning deals with the design, implementation, and continued operation of effective programs for client service. Specifically, the method deals with assessment of client characteristics, development of environmental resources, design of effective organizational structures, management, staff development, program evaluation, social planning, neighborhood and community development, financing, and coordination of services.

FIELD PRACTICE

Field practice is a critical component of the student's first- and second-year program. Because the UT School of Social Work cooperates with a wide range of social agencies and human service programs in the principal cities in Tennessee and areas in Georgia and Alabama, the School is able to provide field placements in a variety of social work practice areas. The faculty works closely with the placement agency and the field instructor to ensure that the student has a quality field practice experience which meets the objectives of the core curriculum and the specialization.

The first-year curriculum is on a concurrent class and field plan, with students engaged in classroom study two or three days per week and in field practice the remainder of the week. First-year agency placements are selected to provide the student with practice experiences related to the content and beginning specialization. Within the placement, each student's experiences are planned and designed according to the educational needs.

In the second year, students are engaged full time in classroom courses during the fall quarter. The winter and spring quarter plan consists of a block field placement of four days per week and at least one concurrent classroom course each quarter. Second-year placements are selected according to the student's area of specialization, individual career interests, and educational needs. The student actively participates with the field practice coordinator and the specialization committee in selection of the second-year placement. The second-year field practice experience focuses on the integration of social work knowledge and values, and emphasizes the acquisition and development of full practice skills.

Students are responsible for meeting the requirements of their placement agencies in terms of office hours and workload coverage. This responsibility takes precedence over scheduled University breaks and may result in variations in holidays and office hours for the student.

DEGREE REQUIREMENTS

1. Satisfactory completion of the curriculum.
2. All courses taken as part of the degree programs, whether taken within the School of Social Work or outside, must be acceptable for graduate credit, relevant to social work and to the student's career objectives, and have the approval of the student's faculty advisor.
3. Achievement of a B average on all work presented for the Master's degree.
4. Completion of each required course at a satisfactory level (a grade of C or above).

Graduate courses may not be repeated to raise a grade.

5. Students who elect a thesis must pass an oral examination conducted by a faculty committee.
6. Students who elect a non-thesis option must pass a comprehensive examination.
7. Credits to be counted toward the degree must be earned within six years from the beginning date of the earliest course applied toward the degree, except in cases where permission to update courses has been granted.
8. The minimum number of credit hours required for a degree shall be 72 hours including a maximum of 36 S/NC hours.
9. Performance at a satisfactory level in field practicum, which is designed to teach professional practice skills.

ADMISSION REQUIREMENTS

Admission to the professional curriculum is based on the following requirements:

1. A Bachelor's degree from an accredited college or university with some preparation in the social sciences. At least three-fourths of the applicant's undergraduate work should be in the social sciences, humanities, physical sciences, and other liberal arts subjects. Those with other academic backgrounds may request consultation regarding ways in which they might be admitted.
2. A grade point average of 2.5 on a 4.0 scale, with those falling below the average to be admitted on supplemental evidence of ability to perform at a satisfactory level.
3. Personal qualifications acceptable for entrance into the professional practice of social work.
4. Preference is given to applicants with a B average in undergraduate work and substantial preparation in the social sciences. Applications should be filed no later than March 1 for the year in which admission is desired.

THE ADMISSIONS PROCESS

Individuals who wish to be considered for admission should obtain the required application materials from the Office of Admissions, UT School of Social Work, 2014 Lake Avenue, Knoxville, TN 37996-3910, (telephone: (615) 974-3175, or one of the Branch offices. Beginning students are admitted only in the fall quarter. Applications for first-year admission should be filed as early as possible. Minimum of 20 weeks should be allowed for consideration of the application.

Students intending to apply for financial aid are encouraged to apply for admission to the School as early as possible. By doing so, students should be able to meet financial aid application deadlines, many of which are April 1 for September funding.

To apply for admission, applicants should forward the completed Graduate School Application and payment of a nonrefundable $10 application fee to The Graduate School, The University of Tennessee, Knoxville. Two official transcripts of all undergraduate, graduate, and extension work (except work taken at The University of Tennessee, Knoxville) should be sent to The Graduate School immediately after filing the Graduate School Application.

The completed University of Tennessee School of Social Work Application for Admission and three reference forms should be returned to the Admissions Office of the School of Social Work.

If a personal interview is required by the School, the applicant will be contacted by a representative of the School and arrangements made to concord a time and place. Applicants may request a personal interview with a faculty member if they wish.

ACCELERATED PROGRAM

The University of Tennessee School of Social Work has a special accelerated program which will allow candidates to complete the M.S.S.W. degree in four quarters. This Accelerated Program is approved by the Council on Social Work Education.

Students who qualify for the Accelerated Program must:

1. Have achieved a 3.0 or above grade point average on a 4.0 scale in undergraduate work.
2. Have completed an undergraduate major in social work from a program accredited by the Council on Social Work Education, or an undergraduate major in a related area which included a supervised field practice component, or have completed at least two years of full-time employment in social work practice.
3. Pass a qualifying examination administered by the School of Social Work faculty in early spring.

The accelerated programs begin in the Knoxville and Memphis branches in March and in the Nashville Branch in June, with an intensive ten-week term from which students proceed in the fall into the regular second-year curriculum. Application for admission to the accelerated program is through the regular admission process. Applications should be filed not later than December 31 for the Memphis and Knoxville programs, and not later than January 31 for the Nashville program.

PART-TIME PROGRAM

Planned part-time programs are available in all three branches of the School. Admission requirements are the same as for full-time study. Courses will be offered over a three- or four-year period. Applications should be made to the School as outlined above.

TRANSFER CREDITS

Courses completed in another accredited graduate school of social work are usually accepted for the University of Tennessee School of Social Work degree requirement providing the applicants meet the admittance requirements of The Graduate School and The University of Tennessee School of Social Work. If previous courses are equivalent to required or elective courses offered here, the University of Tennessee School of Social Work allows a maximum of 45 credit hours of graduate course work taken at another accredited institution to be transferred into the student's Master's program. Such work must have been taken for graduate resident credit and passed with a B or better. In addition, it must be part of a complete satisfactory graduate program (B average) and be approved by the branch director and the dean. This course work must be completed within the six-year period prior to the receipt of the degree. In addition, Social Work credit earned for the field practicum is also accepted.
THE DOCTORAL PROGRAM

The UT School of Social Work offers a Doctoral Program which is a major in Social Work. This newly approved Ph.D. program will begin Fall Quarter, 1983. The focus of social work education at the doctoral level is to foster the development within students of an attitude of scientific inquiry, competence in applying scientific method to improve and extend the knowledge base of social work practice and commitment to a value system attuned to and engaged in leadership roles in social work education, research, and practice.

The character of the UT School of Social Work doctoral program will be derived from its focus upon:

—Analysis and evaluation of the interrelationships between direct intervention and practice, and planning practice and between each of them and their social policy, programmatic, organizational and community context.

—Development, within this interrelational framework, or research-based knowledge to inform and guide social work practice, social policy, planning and social welfare program development.

The core courses will be offered in four quarters on the Knoxville campus. After this, students will be assigned to one of the three branches for an internship and to complete dissertation research under the supervision of qualified faculty. For example, students interested in health care could be assigned to the Memphis Branch where there are opportunities for internships and for research in health care.

Requirements for admission to the doctoral program are being developed. Inquiries and requests for admission should be sent to: Program Admissions, UT School of Social Work, 1404 Lake Avenue, Knoxville, Tennessee 37916.

Graduate students majoring in fields other than social work are admitted to certain social work courses with the approval of the School of Social Work and the student’s major professor.

Faculty

Professors:

B. P. Granger (Dean), Ph.D., Brandeis; M. H. Bloch, M.S., Ohio State; R. B. Bonovich, D.S.W., Washington; G. C. Fryer, Ed.D., Columbia; M. S. Ohio State; R. C. Bonovich, D.S.W.

Assistant Professors:

G. W. Ayers, M.S.W. Ohio State; M. P. Strong, M.S.W. Tulane; D. C. Johnston, J.D.; P. G. Zarbock, M.S.W. Brandeis; H. H. Vaughn, M.S.S.W.

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Courses

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

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time beyond degree requirements as stated in the catalog. Degree may be completed. S/N only. E

5070-80 Social Work Research I, II (3, 3) Research methodology as applied to problems in social welfare. Prereq: Completion of research methods course. May be taken 5 times. F; W

5081 Advanced Research in Social Work (2-3) Advanced research course. Topics include sociopolitical and organizational context of evaluative research, research design and methodology appropriate to evaluative research, and utilization of research findings. Prereq: Completion of core or consent of instructor.

5082 Practicum in Social Work Research (3-9) Supervised practice in application of research methods and tools to practical problems in the macro environment. Prereq: Completion of research methods course. May be repeated. S/N only. S

5083 Directed Readings in Research (2-4) May be repeated with approval of instructor. Maximum 4 hrs. F, W, Sp

5090 Special Problems in Social Work (2-9) Individual study or research on problems of special significance to student's program, under supervision of major professor. May be repeated. F, W, Sp

5110 Social Welfare Policy and Services I (3) Introduction to the components and sources of contemporary social policy at local, state, national, and international levels of organization. Contribution social work policies can make to formal policy-making process through which macrosocial change is effected, and through which aggregate social welfare services are proposed, authorized, financed, and programmed. Policy lab may be used to focus on beginning skill development. F

5120 Social Welfare Policy and Services II (3) Examination of complexes of organizations applied to social welfare delivery settings. Transformation of collective social welfare resources into divisible and indivisible social welfare benefits through organized instrumental action of professional nature. W

5130 Social Policy Analysis (2-3) "Policy science" techniques are considered for appropriateness in assessing social, political, and economic implications of social policy proposals. Prereq: Completion of core or consent of instructor.

5161 Social Welfare Seminar (2-3) Problem area or field of practice seminar focusing on substantive knowledge base and interrelationships among problem definition, social policy, social welfare program, and social work practice. Prereq: Field such as health, mental health, child and family welfare, mental retardation, education, corrections, housing, labor force development, income maintenance, and aging. Prereq: Completion of core or consent of instructor. May be repeated. Maximum 5 hrs. F, W

5210-20 Human Behavior and Social Environment I and II (3, 3) Examination of theories pertaining to individual, family, and small group within context of functions, structures, roles and processes. Behavior conceptualized along functional-functional and normal-deviant continuum. Organizing themes, development and maintenance, adaptation, and defense mechanisms. Open system approach used to understand interrelations of biological, psychological, and social variables with emphasis on implications of culture and ethnicity. F, W

5290 Special Accelerated Program in Social Work (15) Ten-week program providing qualified students with intensive academic and field practice experience that qualifies them to enter second year of graduate study upon successful completion of this term. S only.

5310 Human Behavior and Social Environment (2-3) Explores the concepts and ethical issues involved in human behavior and social environment. Prereq: Second-year status. May be repeated.

5311 Imaginative Perspectives on the Human Condition (2-3) Examination of usefulness to social work students of prose, drama, and poetry, which illuminate and expand knowledge and appreciation of every person's humanness. Adaptable and maladaptive response to ordinary and extraordinary life situations and events, portrayed by creative writers. Artistic representation of molding of human personality and spirit through interaction of persons with one another and with society. Prereq: Completion of core or consent of instructor.

5312 Psychopathology and Social Deviance (2-3) Theories of and recent research in etiology of psychopathological and social variance. Categorical approach to psychopathology examined and differentiated from other approaches to human behavior. Prereq: Completion of core or consent of instructor.

5313 Deviant Behavior of Children and Youth (2-3) Explores the nature and context of deviant behavior and conduct disorders in children and youth. Prereq: Second-year status. May be repeated.

5314 Comparative Theories of Personality (2-3) Explores the nature and context of deviant behavior and conduct disorders in children and youth. Prereq: Second-year status. May be repeated.

5315 Mental Health and Employment (2-3) Work as major task and attitude toward work. Prereq: Completion of core or consent of instructor.

5316 Mental Health and Employment (2-3) Work as major task and attitude toward work. Prereq: Completion of core or consent of instructor.

5317 Social Work and Black Families (2-3) Historical and contemporary theories regarding Black families, emphasis on the family as a system. Framework to assess and plan for Black families within service delivery systems. Prereq: Completion of core or consent of instructor.

5410 Social Work Practice I (3) Basic theory, values and beginning skills development generic to social work practice at various system levels. Combines classroom skills and laboratory experiences.

5420 Social Work Practice II (3) Assessment, planning, methodology and skills development fundamental to social work intervention. Combines classroom skills and laboratory experiences.

5440 Family Therapy in Social Work Practice (2-3) Application of practice theory to assist in acquisition of skills in treatment of family as unit. Prereq: Completion of core and value, attitudes toward ways of approaching family therapy using transactional analysis as treatment modality. Prereq: Completion of core or consent of instructor.
assignment of students to offices of elected or appointed proximate policy makers. Limited social welfare policy research activities. Seminar to present normative and descriptive theory about policy-making process, and models of policy analysis. Pre-req: 5110 and consent of instructor. May be repeated.
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