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 Director for Affirmative Action, 405E Andy Holt Tower, Knoxville, TN 37996-0144, phone: 974-2498. Charges of violation of the above policy should also be directed to the Office of the Director for Affirmative Action.
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June 1, 1991

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Sixth
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June 1, 1988

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*Graduate School of Social Work became the
### University Calendar for 1986-87

#### Summer Quarter, 1986
- June 18-19 (Wednesday-Thursday)
- June 20 (Friday)
- June 30-July 3 (Monday-Thursday)
- July 4 (Friday)
- July 8 (Tuesday)
- July 22-24 (Tuesday-Thursday)
- July 24 (Thursday)
- July 24 (Thursday)
- July 25 (Friday)
- July 21-25 (Monday-Friday)
- August 12 (Tuesday)
- August 27 (Wednesday)
- August 29 (Friday)

Registration - First or All Terms
Classes Begin
Advance Registration for Fall 1986
Independence Day (No Classes)
Change of Registration Deadline, First Term
Registration, Second Term
Classes End, First Term
Change of Registration Deadline, Full Term
Classes Begin, Second Term
Advance Registration for Fall 1986
Change of Registration Deadline, Second Term
Classes End
Commencement

#### Fall Quarter, 1986
- September 22-24 (Monday-Wednesday)
- September 25 (Thursday)
- October 27-31 (Monday-Friday)
- October 29 (Wednesday)
- November 8 (Saturday)
- November 27-29 (Thursday-Saturday)
- December 4 (Thursday)
- December 12 (Friday)

Registration
Classes Begin
Advance Registration for Winter 1987
Change of Registration Deadline
Homecoming (No Classes)
Thanksgiving (No Classes)
Classes End
Commencement

#### Winter Quarter, 1987
- January 5-6 (Monday-Tuesday)
- January 7 (Wednesday)
- January 19 (Monday)
- February 2-6 (Monday-Friday)
- February 10 (Tuesday)
- March 13 (Friday)
- March 21 (Saturday)

Registration
Classes Begin
Martin Luther King's Birthday (No Classes)
Advance Registration for Spring 1987
Change of Registration Deadline
Classes End
Commencement

#### Spring Quarter, 1987
- March 26-27 (Thursday-Friday)
- March 28 (Saturday)
- April 17-18 (Friday-Saturday)
- April 24-25 (Friday-Saturday)
- April 30 (Friday)
- May 4-6 (Monday-Tuesday)
- May 25-29 (Monday-Friday)
- June 3 (Wednesday)
- June 12 (Friday)

Registration
Classes Begin
No Classes
Advance Registration for Summer 1987
Advance Registration for Fall 1987
Classes End
Commencement

#### Summer Quarter, 1987
- June 17-18 (Wednesday-Thursday)
- June 19 (Friday)
- June 29-July 2 (Monday-Thursday)
- July 3 (Friday)
- July 7 (Tuesday)
- July 20-24 (Monday-Friday)
- July 21-23 (Tuesday-Thursday)
- July 23 (Thursday)
- July 23 (Thursday)
- July 24 (Friday)
- August 11 (Tuesday)
- August 26 (Wednesday)
- August 28 (Friday)

Registration, First or All Terms
Classes Begin
Advance Registration for Fall 1987
Independence Day (No Classes)
Change of Registration Deadline, First Term
Advance Registration for Fall 1987
Registration, Second Term
Classes End, First Term
Change of Registration Deadline, Full Term
Classes Begin, Second Term
Advance Registration for Fall 1986
Change of Registration Deadline, Second Term
Classes End
Commencement

NOTE: Deadlines for degree requirements described on pp. 24-25.

**NOTICE:** Beginning in the fall of 1988, the University of Tennessee, Knoxville's academic programs will be conducted under a semester calendar. Students entering under this catalog, or previous quarter calendar catalogs, will not graduate under the same curriculum. However, the University is committed to intensive academic advising such that no student's program will be delayed due to the change to the semester calendar.
NOTE: Deadlines for degree requirements on pp. 24-25.
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*Non-degree and provisional students must obtain permission from the department/program head to register for courses in these fields.

All documents required for admission are submitted to the Office of Graduate Admissions & Records unless noted otherwise.

a International applicants only.
b American applicants only.
c G.S. Rating Form submitted to Department.
d Forms obtained from & returned to Department.
The Graduate School Administration

C.W. Minkel, B.A., M.A., Ph.D., Vice Provost and Dean of The Graduate School
Linda R. Painter, B.S., M.S., Ph.D., Assistant Dean of The Graduate School
Wayne T. Davis, B.S., M.S., Ph.D., Assistant Dean of The Graduate School
Alan D. Finnegan, B.S., M.Ed., Director, Graduate Admissions and Records
Rose Ann Trantham, Assistant Director, Graduate Admissions and Records
S. Kay Reed, B.S., M.S., M.A., Ph.D., Graduate Recruitment Coordinator
Ann L. Lacava, Thesis/Dissertation Coordinator
A.A. Mason, B.S., Ph.D., Associate Dean, UT Space Institute
Marvin Goodman, B.S., M.S., Director, Kingsport Graduate Program
Jerry D. Westbrook, B.E., M.S., Ph.D., Director, Nashville Graduate Engineering Program

The Graduate Council

Membership January 1, 1986

Ex Officio Members
C.W. Minkel, Vice Provost and Dean
Max S. Wortman, Chairman of the Research Council
Wayne T. Davis, Assistant Dean
Linda R. Painter, Assistant Dean

Appointed Members
Dr. Robert S. Garfinkel
Dr. Malcolm McInnis
Dr. Kenneth B. Kenney
Dr. Richard J. Courtney
Dr. Sam Bills

Elected Members
Dr. J.B. McLaren
Dr. Ralph O'Brien
Dr. William C. Goolsby
Dr. Mark Miller
Dr. Laurence J. Coleman
Dr. John R. Ray
Dr. Janet R. Handler
Dr. Michael J. Patton
Dr. Donald J. Desart
Dr. Jeffrey W. Hodgson
Dr. Edwin G. Burdette
Mr. Leon Binder
Mr. Andy S. Methven
Dr. Sandra L. Twardosz
Dr. Dewey L. Bunting
Dr. Cheryl B. Travis
Dr. Dorothy Habel
Dr. Raymond W. Beck
Dr. Mildred M. Fenske
Dr. Gideon W. Fryer
Dr. Frank G. Collins
Dr. J.B. Jones

Expiration
Dec. 31, 1986
Dec. 31, 1987
Sept. 1, 1988
Sept. 1, 1988
Dec. 31, 1986
Dec. 31, 1987
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Dec. 31, 1986
Dec. 31, 1987
Sept. 1, 1988
Apr. 30, 1986
Apr. 30, 1986
Dec. 31, 1986
Dec. 31, 1986
Dec. 31, 1987
Sept. 1, 1988
Dec. 31, 1986
Sept. 1, 1988
Dec. 31, 1986

Proxy
Dr. Luther H. Keller
Dr. Ernest R. Cadotte
Dr. Geroge C. Philippatos
Dr. Michael Singletary
Dr. Patricia A. Beitel
To be Determined
Dr. Ken L. Krick
Dr. Naomi M. Meara
Dr. James H. Miller
Dr. Thomas G. Carley
Dr. John F. Fellers

College or Unit
Agriculture
Business Administration
Communications
Education
Engineering
Graduate Student Council
Human Ecology
Liberal Arts
Nursing
School of Social Work
UT Space Institute
Veterinary Medicine

Appointed Members
Dec. 31, 1984
Dec. 31, 1984
Dec. 31, 1985
Dec. 31, 1985
Dec. 31, 1985
Dec. 31, 1984
Dec. 31, 1984
Dec. 31, 1984
Dec. 31, 1984
Sept. 1, 1988
Dec. 31, 1987
Dec. 31, 1987
Dec. 31, 1986
Sept. 1, 1988
Dec. 31, 1986
Dec. 31, 1986
Dec. 31, 1986
Dec. 31, 1986

Appointed Members
Dr. Pat L. Fisher
Dr. Nancy M. Goslee
Dr. J. Michael Pemberton
Dr. Sam C. Bills
Dec. 31, 1986
Dec. 31, 1986
Dec. 31, 1986
Sept. 1, 1988
Rules, policies, fees, and courses described in this catalog are subject to change without notice.
The University of Tennessee, Knoxville is the official land-grant institution for the State of Tennessee. It offers a wide range of graduate programs leading to the Master’s and Doctoral degrees. The University offers Master’s programs in 104 fields of specialization and doctoral work in 51. Approximately 5,600 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 of The Graduate School. Much of the day-to-day administration of the 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 throughout 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. 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 developed by the Graduate Council, a body composed of elected representatives from each college, the Space Institute, and the Graduate Student Council. Ex-officio members include the Dean, Assistant Deans of The Graduate School, the Chair of the Research Council, the Director of Libraries, and the Dean of Continuing Education. The Graduate Office develops procedures to carry out the policies formulated by the Council, and has primary responsibility for Graduate School admissions and records.

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 before the date of first registration in The Graduate School. If a student does not enroll within one year after the requested admission, the application process must be repeated.

Types of Admissions

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

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 of undergraduate study. However, many departments require a higher average. The equivalent of a minimum B average is required for international students. The graduate application, $15 fee, and one (1) official transcript from each institution previously attended are required for consideration as a degree student.

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 other evidence of scholarly achievement.

Refer to pages 8-9 and to descriptions 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 already 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, before accumulating 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. 21, for instructions); or
   2. file a Plan of Study form with the Office of Graduate Admissions and Records for approval to continue taking courses in non-degree status. The plan of study must include a stated educational objective and a...
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 program must fall within the time limit specified for the degree.

The graduate application, $15 application fee, and one (1) official transcript 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 non-degree students to register for graduate courses (see pages 8-9 for, for example, restricted programs). Every graduate student must meet with an academic advisor at least once a quarter to discuss his/her program. If no advisor has been assigned, the department head or designee is the advisor. For a non-degree student who has no declared major, the Assistant Dean of The Graduate School or designee is the advisor if the program is unrestricted. For restricted programs, the student must have an advisor from the academic unit. Admission to non-degree status does not assure admission to a degree program. The student who seeks 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 non-degree status.

An international student on a non-immigrant visa may not enroll in the non-degree status.

 Provisional Admission: Applicants may be admitted as provisional students for one quarter (or, for one course in each of two quarters) provided:
1. desire graduate credit for a limited number of courses;
2. do not meet the minimum grade point average requirements;
3. register for graduate courses while meeting any additional requirements for non-degree admission.

The graduate application, $15 application fee, and proof of a Bachelor's degree from a college or university accredited by the appropriate regional accrediting agency 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). Every graduate student must meet with an academic advisor at least once a quarter to discuss his/her program. If no advisor has been assigned, the department head or designee is the advisor. For a provisional student who has no declared major, the Assistant Dean of The Graduate School or designee is the advisor. If the program is unrestricted. For restricted programs, the student must have an advisor from the academic unit.

Any student admitted to the provisional status must receive permission from The Graduate School to register for a second or succeeding quarter if admission to the non-degree or degree 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 Office of Graduate Admissions and Records will process the change to non-degree status if all requirements are met. To apply for a specific degree program, the student must submit the Request for Change of Graduate Program form to the Office of Graduate Admissions and Records.

Provisional admission does not assure admission to a 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 provisional admission within seven weeks after registration will NOT be permitted to register again. Provisional admission is revoked if the student proceeds with course work and is not registered for the course work at the beginning of the next quarter.

An international student on a non-immigrant visa may not enroll in the provisional status.

Admission of International Students: The Graduate School accepts only students who have successfully completed a Bachelor's degree with at least a B average on undergraduate course work and a B+ on all previous graduate work. On various grading scales, this would indicate:

a. 3.0 and 3.5 on 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 systems.

Other grading systems will be evaluated upon receipt of transcripts. An international student may apply for admission any quarter, but normally enters the summer or fall quarter. Deadlines for submission of applications are:

- Summer: Dec. 1
- Fall: March 15
- Winter: July 1
- Spring: Sept. 15

The Office of Graduate Admissions and Records must be notified of any change in entering date after admission has been granted. Individual departments and colleges may have further restrictions on admission dates. For this information, students should contact the department whose program they wish to enter.

The following items must be received before admission will be considered:

1. A completed application form with a $15 non-refundable processing fee.
2. Official or attested university records, with certified translations if the records are not in English (Notarized copies are not acceptable).
4. Results of the Graduate Record Examination (GRE) or Graduate Management Admission Test (GMAT), if required.
5. Letters of recommendation or rating forms, if required. Admission must be granted and financial documentation and degree certification must be received prior to issuance of an I-20 or IAP-66 form needed to obtain a visa. The Graduate School will not issue these forms after the following dates:

- Summer: Apr. 1
- Fall: July 15
- Winter: Nov. 1
- Spring: Jan. 15

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 an English proficiency examination after arrival at UTK. Refer to section on English Proficiency, page 21.

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 has at least a B average (3.0) may enroll in graduate courses for graduate credit provided the combined total of undergraduate and graduate course work does not exceed 15 credit hours per quarter. Approval must be obtained each quarter at the Office of Graduate Admissions and Records during registration. A maximum of 18 hours of graduate credit can be obtained in this status.

Enrollment of Veterinary Medicine Students in Graduate Courses: A student in good standing in the College of Veterinary Medicine may enroll in UTK graduate courses 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 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 Office of Graduate Admissions and Records. 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
and/or faculty time. The minimum number of hours for registration is 3. Registration allows use of services such as library checkout, laboratories, and recreation facilities not open to the public.

Dates of registration are listed in the University Calendar (front of Catalog). To register, students must:
1. Report to the Office of Graduate Admissions and Records to obtain registration materials (scan form and Timetable of Classes).
2. Confer with an advisor assigned by the department to obtain approval of a schedule of courses, if not done previously.
3. Sign the scan form certifying approval of the advisor and return it to the Office of Graduate Admissions and Records or alternate location designated in Timetable.
4. Consult Timetable to complete registration.
Non-degree or provisional students in unrestricted programs (see pages 8-9) may obtain permission to register from the Office of Graduate Admissions and Records.
A preregistration period is scheduled each quarter for a subsequent quarter (see University Calendar). Any graduate student who has applied for admission can preregister. Information can be obtained from the Office of Graduate Admissions and Records. A student who participates in preregistration should obtain the computerized class schedule and pay fees on the first day of registration.
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
The Family Educational Rights and Privacy 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, degrees and awards, most recent 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 will be given in advance. 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, federal law allows continued use of this number. However, if a student does not desire to use the social security number, notification to the University must be made at the time of application for admission. A student identification number will then 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 social security numbers or assigned numbers, are used administratively within the University only and are not given to third parties without expressed consent of the student.

Registration Procedures
Registration is required of all graduate students when using University facilities
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 or before the schedule for this purpose will be charged a late registration fee of $2 up to $70. See the University Undergraduate Catalog for application of this fee. Doctoral students who must register retroactively for dissertation credit will be charged a late fee of $35 for each quarter of retroactive registration. 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 $30
One-hour lesson per week per quarter $60
Payable at registration by students receiving individual instruction in music.

GRADUATION FEE:
Master's degree candidates $30
Doctoral degree candidates $70
Hood rental optional $5

There are no additional charges for diploma, 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...$10

This fee is applicable when the payment of a portion of a student's account is deferred, including accounts which must be billed to outside agencies, organizations, 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-half courses.

REFUND OF FEES FOR WITHDRAWAL:
Once a schedule has been received by the student, withdrawal for the quarter must be by official notification to the Withdrawal Office, Student Counseling Services Center, 900 Volunteer Boulevard, whether or not fees have been paid. The withdrawal of courses dropped during the first 5 calendar days following regular registration will permit a 90 percent fee refund. Withdrawal between 6 and 21 calendar days following regular registration permits 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 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 the drop becomes effective, on the date that the change of registration form is processed on a drop/add terminal. Any 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 on the basis of the terms of the housing agreement or contract.

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

Although the summer quarter is divided into terms of varying lengths, tuition and fees are assessed at the 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 complete their registration with 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.

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 and (1) resides in Tennessee, (2) works full-time in the state or at Fort Campbell, Kentucky, and (3) desires to attend UTK 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 a waiver prior to the date of registration for each quarter. Forms are available from the Graduate Admissions and Records.

A student wishing to appeal a residency classification should contact the Graduate Admissions and Records.

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 are fully admitted to 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. Eighteen doctoral, one Specialist in Education, eighteen Master's programs at UTK are approved by the Academic Common Market for residents of these states to enroll at in-state tuition rates.

Residents of one of the member states who seek further information should contact the Academic Common Market office in the Office of Graduate Admissions and Records.

Financial Aid

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

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

The Hiltz A. Smith and The National Alumni Association 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 monthly stipends, tuition, and maintenance fees.

Application packets are available from the Office of Graduate Admissions and Records after November. Completed applications, including all supporting materials, must be submitted to the Staff Assistant, Office of Graduate Admissions and Records, by February 15. Offers of awards are announced by March 15.

Employment: Three sources of student employment are coordinated by the Financial Aid Office: (1) The federally-sponsored College Work-Study Program provides part-time jobs for U.S. citizens or permanent residents who have demonstrated financial need by the Financial Aid Form (FAF) or Family Financial Statement (FFS); (2) Job Location and Development 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. Off-campus jobs are limited to U.S. citizens or permanent residents; (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 summer employment are urged to contact the Financial Aid Office.

Loans: Three types of loans are administered by the Financial Aid Office: (1) National Direct Student Loans (FAF or FFS must be filed); (2) The University of Tennessee Student Loans; (3) Guaranteed Student Loans, financed by certain lending institutions. The student should allow six to eight weeks total processing time when applying for a loan.

Students must apply through the Financial Aid Office for all loan programs. Loans are limited to U.S. citizens or permanent residents.

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 Financial Aid Office, 115 Student Services Building.

Veterans' Benefits: Veterans, and widows or children of 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.

**Student Services**

**Housing**

Single Men and Women: Single graduate students are offered 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 often prefer accommodations offered in Melrose and the Apartment Residence Halls. Melrose Hall offers community living units for groups of six to ten students with personal responsibility emphasized. The Holt 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.

A limited number of assistant head resident positions are available for the graduate students. The assistant head resident aids the head resident in coordinating and supervising operation of the hall. This is a live-in position with part-time responsibilities on a nine-and-a-half month appointment. 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 Married Student Housing Units 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 are coordinated by the Office of the Dean of Admissions and Records, 305 Student Services Building. In conjunction with the Physical Plant Office, the UT Bookstore, the Student Activities Office, and academic departments, the office seeks to assure that attendance at UTK is as convenient as possible for such students.

These services include assistance during registration (preregistration, collection of class schedules, payment of fees, drop and add); acquisition of special parking permits, elevator keys, tickets for special events; and similar efforts to relieve 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 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), offers academic support services and functions in an advocacy capacity for disabled students. The services include counseling for all disabled students, interpretation for hearing-impaired students, Braille or large print course materials and auditory aids for sight and other print-impaired students. The office also assists with ordering recorded textbooks. As the needs of disabled students vary, the office seeks to individualize assistance to accommodate them. Further information is available in the Handicapped Student Services brochure.

**The University Library**

The University of Tennessee, Knoxville Library owns approximately 1,500,000 volumes, more than 100,000 references, 68,000 microfilm reels and 1,400,000 items of other microtext, plus recordings, tapes, United States and United Nations documents, and more than 16,000 periodicals and other serial titles received annually. The library’s membership in the Association of Research Libraries reflects the University’s emphasis on graduate instruction and research 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 branch libraries for agriculture, veterinary medicine and music. Undergraduate library holdings are temporarily housed in Dunford Hall and Humanities & Social Sciences while the John C. Hodges Library undergoes extensive expansion.

The Special Collections section in the Main Library is a repository of regional and local materials, Tennesseeana, 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 offered 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 at 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 offices and principal computing facilities are located on the first two floors of the Stokely Management Center (SMC) and on the P2 level and first floor of Andy Holt Tower.

Located at SMC are an IBM 3081-D and IBM 4381/3, 2 VAX-11/785, 2 VAX 8600, and a DEC PDP 11/55. A CalComp 1051 plotter is used to produce graphics output from jobs run on the IBM and VAX computers.

The IBM 3081-D and the IBM 4381/3 have 16 million bytes of memory each. The IBM 3081-D runs under MVS with JES2. The 2 VAX-11/785 can run up to 10,000 VAX 8600 run VMS. Time-sharing features, in addition to the VAX cluster, include VM/CMS on the IBM 4381/3 and Coursewriter III on the IBM 3081-D. Software includes most of the commonly used compilers and interpreters, as well as a large number of programs for statistical, mathematical, engineering, operations research, and graphics applications.

UTCC maintains eight remote job entry stations for batch work and fifteen sites for interactive computer work on the Knoxville campus, and supplies computing services to the other campuses in the UT System through remote job entry facilities. A graphics center with ten Tektronix graphics terminals, five storage and five refresh, two digitizing tablets, and a graphics plotter, is located in Ferry Hall. Additional graphics equipment, including three terminals, a large digitizing tablet, and a plotter, is located in the user work area in the Art and Architecture Building. UTCC publishes in-house programming language IBM User’s Guides, which describes the use of the IBM computers, and the VAX system User’s Guide, which describes the use of the VAX cluster. Both guides are available at the UT Book & Supply Store. The monthly UTCC Newsletter announces systems, equipment, and procedural changes and contains other items of interest to users. Program writeups and special user's guides are also available.

UTCC periodically offers intensive training seminars on the utilization of the IBM and VAX computers for faculty, staff and graduate students. UTCC also 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 Context, a publication announcing campus events.

Forms to request computing services are available from the receptionist, 200 Stokely Management Center. All users of UTCC facilities are assigned a consultant for assistance in the effective use of computing resources.

**Center for International Education**

The Center for International Education provides services both for international students enrolled at UTK and UTK students planning study, work, or travel abroad. The Center for International Education serves as the official University representative in all matters involving immigration authorities, international educational organizations, and foreign governments.

The Center is composed of three units: The General Office, located at 201 Alumni Hall, which maintains students’ official immigration records and handles questions regarding immigration regulations. The office staff serve as advisors on personal and related problems. Orientation programs are held at the beginning of each term to facilitate adjustment to the campus and the community.

The Division of International Education, located at 205 Alumni Hall, offers advice and counseling on fellowship, scholarships/travel and work abroad, including the DAAD (German Academic Exchange Service), Fulbright, Marshall, Rhodes, and Rotary programs. It has resources on most other grants and scholarships that are offered for U.S. students interested in study and/or research abroad.

The International House, located at campus on 1515 Cumberland Ave., serves as a social, recreational, and programming center where domestic and international students, faculty and staff meet. It is open 365 days a year, 100 hours a week.

International students applying for admission should write to The Office of Graduate Admissions and Records.

**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 day 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: E. W. Colgate, Jr., Ph.D. California Institute of Technology

Associate Directors:
- D. R. Alvic, Ph.D. Tennessee
- R. A. Bohm, Ph.D. Washington
- L. A. Clinard, Ph.D. Tennessee
- J. L. Finney, MSLS Tennessee
- H. Halford, Ed.D. Tennessee

Assistant Directors:
- S. H. Jones, Ed.D. Tennessee
- B. McGraw, B.S. Tennessee

Research Associates:
- M. English, M.S. Tennessee
- R. Kraemer, M.S. Tennessee

The Energy, Environment, and Resources Center was created to encourage interdisciplinary research 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. The Center has a close working relationship with researchers at the Oak Ridge National Laboratory and the Tennessee Valley Authority.

Current research includes hazardous waste management policy, industrial fuel use trends, energy conservation in buildings and industry, electric utility modeling, environmental research needs, energy education and information, probabilistic risk assessment, and ethical and value issues in technology policy.

**Transportation Center**

Director: M. S. Bronzini, Ph.D. Pennsylvania State, P.E.

Assistant Directors:

The Transportation Center was created in 1970 to foster and facilitate interdisciplinary research and public service in the field of transportation at The University of Tennessee. It began operating full-time in 1972 and since then has contributed greatly to the overall research program of the University.

Assistant Directors: M. S. Bronzini, Ph.D. Pennsylvania State, P.E.; S. H. Richards, M.E. Texas A & M, P.E.
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 a graduate education and research institution established in 1964 on a 365 acre lakeshore campus in Middle Tennessee. UTSI has evolved into an international institution for graduate study and research in engineering, physics, mathematics, and computer science. The accredited academic programs and educational policies of the Space Institute have their origins in appropriate departments of The University of Tennessee, Knoxville. The more than 40 faculty members of the Institute carry out these accredited academic programs through classroom teaching, informal seminars, active research, and directing the research of their students in an environment of creative work and advance study. Programs are available to students devoting full-time effort toward M.S. and Ph.D. degrees or those interested in continuing education for updating and broadening knowledge and those who wish to pursue post-doctoral research. Graduate degree programs are available with majors in Aerospace Engineering, Aviation Systems, Computer Science, Electrical Engineering, Engineering Science, Industrial Engineering (Engineering Management Concentration), Mathematics, Mechanical Engineering, and Physics. In addition to the fundamental studies characteristic of each discipline, research opportunities are available in many areas including aerodynamics, atmospheric science, fluid mechanics, computer graphics, knowledge engineering, energy conversion processes, thermal sciences, space systems, remote sensing, propulsion, computational fluid dynamics, and other areas of atmospheric and space flight.

The Institute has recently established a Center of Excellence in Laser Applications and offers graduate studies and research opportunities in laser diagnostics, laser materials interactions, pico second processes, and coherent and non-linear optics. 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 significant research in these areas. Students who enroll at UTSI 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

E. W. Colglazier, Acting Director, Ph.D. California Institute of Technology
T. R. Gangaware, Assistant Director, M.S. Tennessee.

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 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 education in fields relating to water resources and to encourage the entry of promising students into careers in these fields.

Off-campus Graduate Centers

Kingsport University Center: UTK offers at Kingsport resident graduate programs in science and engineering at both the Master's and doctoral levels. The program is operated within the policies formulated 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 Marvin K. Goodman, Director, Kingsport University Center, The University of Tennessee, University Boulevard, Kingsport, Tennessee 37660.

Oak Ridge Resident Graduate Program: UTK offers graduate study programs at Oak Ridge, with work leading to Master's degrees in Business Administration with a concentration in management, Industrial Education, and Statistics. The Master's and doctoral degrees are available in engineering, mathematics, and physical and biological sciences. Courses are given in late afternoons, evenings, and Saturdays, with research facilities provided by and used in cooperation with the Oak Ridge Associated Universities (ORAU). This program is supported under a subcontract with ORAU with principal support coming from the Martin Marietta Corporation. 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, Nashville Graduate Engineering Program, Tenth and Charlotte, Nashville, Tennessee 37203.

Chattanooga Graduate Education Program: UTK offers a graduate program in education leading to the Specialist in Education and the Doctor of Education degrees with major in Educational Administration and Supervision and Vocational-Technical Education. Students who enroll in this program must be admitted to The Graduate School of UTK.

Information and appropriate forms may be obtained from the Dean, c/o College of Education, UTC, Chattanooga, Tennessee 37403.

The University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences: The University provides programs leading to the M.S. and Ph.D. degrees in various areas of biomedical sciences. Graduate students have the opportunity to study and do research in conjunction with the Biology Division of the Oak Ridge National Laboratory.

For complete information concerning the programs see page 165.

School of Social Work: UTK offers a fully accredited two-year program leading to the degree of Master of Science in Social Work through the School of Social Work, with programs in Knoxville, Nashville, and Memphis. The UTK School of Social Work also offers a Doctor of Philosophy degree with a major in Social Work.

For complete information concerning the programs, see page 171.

General Regulations/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 facilitates communication within the major department, to other departments and to The Graduate School. The advisor must approve the student's program each term. Many departments assign a temporary advisor 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. The advisor in which the department is forming a judgment concerning the candidate's prom-
ise as a scholar. As early as appropriate the student requests a professor in the major department to serve as the advisor. 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 areas 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.

Course Listings
Each course listing in the Graduate Catalog contains information in 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 upper division 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 boldfaced type following the course number. Numbers in parentheses following the course title indicate the quarter hours credit. If the credit is variable, to be determined in consultation with the instructor, the minimum and maximum are shown (e.g. 2-3). The credit hours 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 are limited to 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 indicated by a parenthetical statement (Same as Psychology 5432). The course 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.

At the end of most course descriptions is a symbol indicating the quarter or frequency that the course normally is offered:
F=Fall
W-Winter
S=Summer
SP-Spring
E=Every quarter
A=Alternate years

These codes are indicated only for Knoxville campus classes and are subject to change without notice. The Timetable of Classes, published several weeks prior to each quarter, is the official notification of courses offered for a specific quarter. Students should contact the appropriate department/program head concerning courses to be offered in future quarters.

Course Loads
The maximum load for a graduate student is 15 hours, and 9 to 12 hours is considered a full load. Students receiving financial aid should consult with the department/program head concerning appropriate course loads. Courses audited do not count toward minimum graduate hour requirements. Registration for more than 15 hours during any quarter is not permissible without prior approval of The Graduate School, which may allow registration of up to 18 hours if the student has achieved an average of 3.6 or better in at least 9 hours of graduate work. Students may enroll in only one course in a September or December mini-term.

Change of Registration
The permanent record will show all courses for which the student has registered except those audited; and those from which the student has withdrawn during the first 5 consecutive instructional days after the beginning of classes.

Students who fail to attend the first class meeting without prior arrangement with the department may be dropped from the course to make space available to other students. Students have the responsibility to assure that they have been dropped. Otherwise they may receive a grade of F in the course.

The deadline for change of registration (e.g. from graduate to undergraduate, undergraduate to graduate, withdrawal) is set at mid-term, approximately 35 calendar days after the first day of classes each quarter. A student may change registration for a course at any time prior to and including this date by executing a change of registration form and submitting it to the Office of Graduate Admissions and Records. The student must sign the form certifying approval of the advisor. The instructor's signature is required if the course is closed and/or after the first two weeks of classes. If the student withdraws from the course or from the University after the first 5 days of classes and before the change of registration deadline, he/she will receive a grade of W on the permanent record.

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

After the change of registration deadline, a student withdrawing from a course or from the University will receive a grade of F unless it can be demonstrated that the request for withdrawal is based on circumstances beyond the student's control. In the latter case, a grade of W will be entered on the permanent record.

To change registration in any way after the deadline, a student must present the request, together with documentary evidence of extenuating circumstances, to the Office of Graduate Admissions and Records. In addition, the student must complete a change of registration form and questionnaire signed by the instructor(s) and as evidence of their knowledge of the request. If the request is approved, the Office of Graduate Admissions and Records 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), better than satisfactory 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), credit may be administratively withdrawn 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 indicating 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 supplementary grade report has not been received in the Office of Graduate Admissions and Records at the end of 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. Grades 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-third of the total credit hours required.
P/NP (carries credit hours, but no quality points), P indicates progress toward completion of a thesis or dissertation. NP indicates no progress or inadequate progress.
W (carries no credit hours or quality points), indicates that the student withdrew from the course.

No graduate student may repeat a course for the purpose of raising a grade already received, with the exception of NC. A graduate student may not do additional work to raise a final grade.

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. A student requesting for this program 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, 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 $22 per credit hour 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 transferrable.

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 degree from an accredited institution in the United States. Some departments 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 cannot 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
A graduate student may take up to 6 semester hours of law courses and apply them toward a graduate 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 as law courses do not carry graduate credit.

Different rules apply to students enrolled in the Dual J.D.-MBA program. Grades must be earned according to the grading system of the respective colleges, e.g., numerical grades for law courses, letter grades for graduate courses. No grades acceptable to meet degree requirements. Only one cumulative GPA (law or graduate) will be carried on the student's transcript until graduation, at which time both the graduate and law cumulatives will be added to the permanent record.

A student enrolled in the Ph.D. in Business Administration program may use 8 semester hours or more of law courses for the supporting area under the arrangement described on p. 41.

Auditors and Audited Courses
Persons who wish to attend certain classes regularly, without taking examinations or receiving grades or credit, may do so by completing a graduate application, paying the application fee, registering as an auditor, and paying regular fees. Graduate students paying regular fees also are entitled to audit courses.

The names of all auditors properly registered will appear on the intermediate class rolls, but will be removed from the final grade report. No record of audited coursework will appear on the permanent record.

Correspondence Study
No graduate credit is accepted at UTK for work done by correspondence study at any university.

Transfer Credits
Official transcripts must be sent directly to the Office of Graduate Admissions and Records from all institutions previously attended before any transfer of credit will be considered.

To be transferred into a graduate program at UTK, 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 Graduate School on the Admission to Candidacy form.

Courses transferred to 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) taken from other institutions is not transferable, nor is credit for any course taken at an unaccredited and/or foreign institution.

Ed.S. degree: A maximum of 9 quarter hours (or 6 semester hours) taken from institutions outside The University of Tennessee system may be transferred to 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 degree. They will be placed on the student's UTK transcript only after admission to candidacy.

Ed.D. degree: A maximum of 9 quarter hours of course work beyond the Master's degree may be transferred to an Ed.D. 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 to 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 Office of Graduate Admissions and Records. 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 Master's degree or to another within the same department. Acceptance into a new degree program is contingent upon a review and approval by that department. If the student is not accepted, his/her currently held status will remain unaffected. If the student is accepted, 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.

Doctoral degree: minimum of three consecutive quarters of residence. Individual doctoral 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 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 UTK Guide to the Preparation of Theses and Dissertations provides the correct format for theses or dissertations. Thesis Workshops are held periodically throughout the academic year. The date for each Workshop will be announced in the Graduate School News. The thesis should be written in English. Under exceptional circumstances, however,
Approved by the student's Master's committee. In thesis programs, a minimum of 8 quarter hours of credit in the major subject must be completed by the student preparing the thesis. Hours applied to the Master's degree may be entirely from one major subject or may be distributed to include minor subject areas. In a 45-hour program, the major subject must include at least 18 hours of graduate course work, exclusive of course 5000, and a minor must include not fewer than 9 nor more than 18 hours of graduate credit.

At least two-thirds of the minimally required hours in a Master's degree program must be taken in courses numbered at or above the 5000 level. Only 9 thesis hours may be counted toward this requirement.

Master's Committee: A committee composed of the major professor and at least two faculty members at the rank of assistant professor or above should be formed as early as possible in a student's program and must be formed by the time a student applies for admission to candidacy (refer to Advisor/Major Professor, page 19). The responsibility of this committee is to assist the student in planning a course of study and research and to assure fulfillment of the degree requirements. If the student has a minor, one member of the committee must be from the minor department.

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 coursework, the student must submit the Admission to Candidacy form, with appropriate signatures, to the Office of the Graduate School. In any event, courses taken within six calendar years of the quarter preceding the quarter in which the student plans to graduate. 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 Office of Graduate Admissions and Records 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. Students taking the final examination but not otherwise using University facilities may pay a fee of $115 instead of registering. Students finishing incomplete courses, however, must register for a minimum of 3 quarter hours. In case of failure, the candidate may not apply for reexamination until the following quarter. The result of the second examination is final.

Time Limit: Candidates have six calendar years from the time of enrollment in The Graduate School to complete the degree. Students who change degree programs during this six-year period may be granted an extension after review and approval by The Graduate School. In any event, courses used toward a Master's degree must have been taken within six calendar years of graduation.

Requirements for Advanced Degrees

Master's Degrees

Master's degree programs are available with thesis and non-thesis options. These programs require 45 or more graduate hours of course work. In addition to the M.A. and M.S. degrees, a number of other degrees are offered, including the MBA, and the M.S.S.W. A complete list is found under "Majors and Degree Programs," on pages 8-9. For specific degree requirements, consult individual program descriptions listed by college and department in this Catalog. See also the chart, page 24, for a summary of procedures for the degrees.

Course Requirements: A candidate for a Master's degree must complete a minimum of 45 hours of graduate credit in courses approved by the student's Master's committee. In thesis programs, a minimum of 8 quarter hours of credit in the major subject must be completed by the student preparing the thesis. Hours applied to the Master's degree may be entirely from one major subject or may be distributed to include minor subject areas. In a 45-hour program, the major subject must include at least 18 hours of graduate course work, exclusive of course 5000, and a minor must include not fewer than 9 nor more than 18 hours of graduate credit.

At least two-thirds of the minimally required hours in a Master's degree program must be taken in courses numbered at or above the 5000 level. Only 9 thesis hours may be counted toward this requirement.

Master's Committee: A committee composed of the major professor and at least two faculty members at the rank of assistant professor or above should be formed as early as possible in a student's program and must be formed by the time a student applies for admission to candidacy (refer to Advisor/Major Professor, page 19). The responsibility of this committee is to assist the student in planning a course of study and research and to assure fulfillment of the degree requirements. If the student has a minor, one member of the committee must be from the minor department.

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 coursework, the student must submit the Admission to Candidacy form, with appropriate signatures, to the Office of the Graduate School. In any event, courses taken within six calendar years of the quarter preceding the quarter in which the student plans to graduate. 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 Office of Graduate Admissions and Records 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. Students taking the final examination but not otherwise using University facilities may pay a fee of $115 instead of registering. Students finishing incomplete courses, however, must register for a minimum of 3 quarter hours. In case of failure, the candidate may not apply for reexamination until the following quarter. The result of the second examination is final.

Time Limit: Candidates have six calendar years from the time of enrollment in The Graduate School to complete the degree. Students who change degree programs during this six-year period may be granted an extension after review and approval by The Graduate School. In any event, courses used toward a Master's degree must have been taken within six calendar years of graduation.

Specialist in Education Degree

The Specialist in Education (Ed.S.) degree is offered with majors in Curriculum 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 departments offering the degree. Also see the chart, page 24, for a summary of procedures for this degree. All deadlines are published quarterly in the Graduate School News.
Ed.S. Committee: A committee of at least three faculty members is assigned to each student. A minimum of two members of this committee must represent the department or area of specialization. Its responsibilities include formulating the student’s program of course work, supervising progress, recommending admission to candidacy, directing research, and conducting the qualifying and final examinations.

Course Requirements: The student’s program involves a minimum of six quarters of study totaling not fewer than 90 quarter hours of graduate credit beyond the baccalaureate degree. A minimum of 9 hours is required outside the major department or area.

A student admitted to the program with a Master’s degree, or with accepted work beyond the Master’s degree, may have program requirements modified upon recommendation of the student’s committee. However, no modifications will be permitted in the course work, nor in the minimum 9 graduate hours required outside the major. All prior course work accepted toward the degree must be related to the student’s program objectives. A minimum of 9 quarter hours of graduate credit beyond the Master’s degree may be transferred from another institution to an Ed.S. program. See Transfer Credits, page 21.

Courses numbered at the 3000 and 4000 levels are for certification through UTK may not be taken for graduate credit and used as part of the course work in the major. At least one-half of the last 45 quarter hours of work, exclusive of thesis courses, must be in 5000- or 6000-level courses.

Admission to Candidacy: The Admission to Candidacy form, signed by the student’s committee, is submitted to the Office of Graduate Admissions and Records before the student has completed 18 hours of course work in the Ed.S. program. A qualifying examination may be required for Admission to Candidacy if the student has a Master’s degree earned six years or more prior to admission to the program. This examination may be written and/or oral.


a. In the non-thesis program, a candidate will study research methods and findings and will demonstrate skill in adapting them to professional needs as defined by the major department.

b. In the thesis program, or problems in lieu of thesis, 8 hours of research credit (5180-90, and 5200) must be earned in the preparation of an acceptable piece of work. The student must continue to register for 5200 until the research project, including the quarter it is accepted by The Graduate School. The thesis must be prepared according to instructions in the UTK Guide to the Preparation of Theses and Dissertations, and approved by the student’s committee prior to submission to The Graduate School for final approval and acceptance.

Final Examination: A candidate presenting a thesis, or problems in lieu of thesis, must pass an oral examination covering the student’s research and program of study. A non-thesis student must pass a final written, or written and oral examination, on all work offered for the degree. 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 office of graduate admissions and records. 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 promoted 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 coursework programs to complete the Ed.S. degree.

Doctoral Degrees

Three doctoral degree programs are available:

1. Doctor of Philosophy (Ph.D.), Doctor of Education (Ed.D.), and Doctor of Business Administration (DBA). Programs are listed under “Majors and Degree Programs,” pages 9-10. For specific degree requirements, consult individual program descriptions listed by college and department in this Catalog. See also the chart, page 25, for a summary of procedures for doctoral degrees.

2. Doctoral programs include a major field or area of specialization and, frequently, one or more collateral fields. The latter 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 involves 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/NC grading may comprise up to one-fourth of the student’s total graduate hours.

Doctoral Committees: The student and the major field direct the research, and recommend the dissertation. The department, as a group, establishes the dissertation committee comprised of at least four faculty members, holding the rank of Assistant Professor or above, three of whom, including the chair, must be approved by the Graduate Council to direct doctoral research. At least one must be a department head or college dean, and approved by The Graduate School.

The committee should be formed during the student’s first year of doctoral study. Subject to Graduate Council policies and individual program requirements, the committee may include up to two faculty members from another department or college, provided the committee has the necessary qualifications to direct the research. The student’s doctoral committee will determine the content, nature and timing of the comprehensive examination and certify its successful completion. The student’s doctoral committee may at its discretion subdivide the examination, administering portions of the examination at several times during the student’s course of study. A written examination is required and an oral examination is encouraged. Students should review carefully the written statement from each doctoral degree program which details the timing, areas covered, grading procedures, and provisions for repeating a failed examination.

Final Examinations: The student must register continuously for course 6000 (minimum of 3 hours) from the time the doctoral research proposal is approved. Admission to candidacy is accepted, or registration for course 6000 is begun, whichever comes first, including 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 final oral examination may request an eight-week extension of the seven-week period of leave of absence from dissertation research up to a maximum of eight quarters. The request will be considered by The Graduate School upon recommendation of the department and college.

Doctoral Examinations: Departments may, at their option, administer diagnostic and/or qualifying examinations in the early stages of the student’s doctoral program. Successful completion of these examinations is required for all doctoral degrees. Registration is required in the term in which examinations are taken.

1. Diagnostic examination, which may be written and/or oral, may be given to students on admission to the doctoral program to determine the student’s level of preparation, areas of strength and weakness, and formulas for repeating a failed examination. A written examination and a final examination is required for all doctoral degrees. Registration is required in the term in which examinations are taken.

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 test the student’s progress, general knowledge of fundamentals of the field, and fitness to continue with the more specialized aspects of the doctoral program.

3. The comprehensive examination (or the final part of this examination, when parts are given at different times) is normally taken when the student’s program 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 mastered the body of knowledge in the field and the specialty, knows how to use academic resources, and is deemed capable of completing the dissertation. The comprehensive examination must be passed prior to admission to candidacy.

The faculty of the graduate program and/or the student’s doctoral committee will determine the content, nature and timing of the comprehensive examination and certify its successful completion. The department or committee may at its discretion subdivide the examination, administering portions of the examination at several times during the student’s course of study. A written examination is required and an oral examination is encouraged. Students should review carefully the written statement from each doctoral degree program which details the timing, areas covered, grading procedures, and provisions for repeating a failed examination.

A final examination (oral, oral and written) on the student’s dissertation, major field, and such topics as novelty and generalization, 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 the major field of study. Please 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 Office of Graduate Admissions and Records in accordance with the dates and times for the examinations printed in the Graduate School News.

**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.

**Summary of Procedures for Master’s and Specialists in Education Degrees**

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<td>Approval of admission to candidacy</td>
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**GRADUATION REQUIREMENTS FOR NON-THESIS OPTION**

| Placement of name on graduation list           | Student                                     | Indicate on registration materials |
| Application for diploma                       | Office of Graduate Admissions and Records    | Deadline available at registration* |
| Payment of graduation fee                     | Bursar’s Office                              | Deadline available at registration |
| Scheduling of final examination               | Student and Office of Graduate Admissions and Records | 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 OPTIONS**

| Placement of name on graduation list           | Student                                     | Indicate on registration materials |
| Application for diploma                       | Office of Graduate Admissions and Records    | Deadline available at registration* |
| Payment of graduation fee                     | Bursar’s Office                              | Deadline available at registration |
| Submission of thesis/problems to Master’s/Ed.S. committee | Student                        | At least two weeks prior to final oral examination |
| Scheduling of final oral examination          | Student and Office of Graduate Admissions and Records | Not later than one week prior to final oral 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.*
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 form, which must be signed by the doctoral committee and approved by The Graduate School.

**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 *UTK Guide to the Preparation of Theses and Dissertations*) 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 Graduate School 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.

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### Summary of Procedures for Doctoral Degrees

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<tr>
<td>Submission of dissertation to doctoral committee</td>
<td>Student</td>
<td>At least two weeks prior to final oral examination</td>
</tr>
<tr>
<td>Scheduling of final examination</td>
<td>Student and Office of Graduate Admissions and Records</td>
<td>Not later than one week prior to final oral examination***</td>
</tr>
<tr>
<td>Final oral examination(s)</td>
<td>Doctoral committee</td>
<td>Not later than three weeks prior to dissertation deadline***</td>
</tr>
<tr>
<td>Approval and acceptance of final copy of dissertation, doctoral forms, and thesis card</td>
<td>Doctoral committee and The Graduate School</td>
<td>After final oral examination and not later than two weeks prior to Commencement***</td>
</tr>
<tr>
<td>Removal of incomplete(s)</td>
<td>Instructor of course</td>
<td>Not later than one week prior to Commencement***</td>
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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.*
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

Professors:
B. N. Duck, Ph.D., Auburn; C. R. Graves, M.S., Tennessee; C. A. Mullins, Ph.D., Tennessee.

Associate Professors:
B. R. Hathcock, Ph.D., Texas A&M; R. M. Hayes, Ph.D., Illinois; P. E. Hoskinson, M.S., Tennessee; D. D. Howard, Ph.D., Auburn; R. D. Miller, Ph.D., Kentucky; D. D. Tyler, Ph.D., Kentucky; J. E. Wyatt, Ph.D., Florida.

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 consumer health 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 crop 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. Downer, Dean
T. W. Hinton, Associate Dean
M. F. Clarke, Associate Dean
B. G. Hicks, Associate 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 95 counties of the state. Educational emphasis includes work in four major program areas: agricultural 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
Gary Schneider, Assistant 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, emphasi-
sis 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.

MASTER 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 Gradu-
ate 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 Engi-
neering, Agricultural Extension, Agricultural Mechanization, Animal Science, Emotionology and Plant Pathology, Food Technology and Science, Ornamental Horticulture and Land-
scape 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 Agri-
culture requires 18 hours of course work. A complete listing of majors is shown on pages 6-7.

DOCTORAL PROGRAMS
Graduate study programs leading to the Doctor of Philosophy degree in Agricultural Sci-
ence, Agricultural Economics, Agricultural Engineering, Food Technology and Science, and Plant and Soil Science are offered in the college.

Departments of
Instruction

Agricultural Economics
and Rural Sociology

MAJOR DEGREES
Agricultural Economics

M.S., Ph.D.

Professors:
J. A. Martin (head), Ph.D. Minnesota;
M. B. Badenhop, Ph.D. Purdue; J. R. Brooker,
Ph.D. Florida; C. L. Clelan, Ph.D. Wisconsin;
L. Dubov, Ph.D. California (Berkeley); L. H. Keller,
Ph.D. Kentucky; T. H. Klinkt, Ph.D. Kentucky;
F. O. Leuthold, Ph.D. Wisconsin; D. L. McMire;
Ph.D. Clemson; E. R. McManus, Ph.D. Purdue;
S. D. Mundy, Ph.D. Tennessee; C. B. Sappington,
Ph.D. Illinois.

Associate Professors:
C. M. Czechkara, Ph.D. Michigan State; R. H. Orr,
Ph.D. Illinois; W. M. Park, Ph.D. Virginia
Polytechnic Institute; R. W. Todd; J. D. Tennessee.

Assistant Professor:
D. M. Marley, Ph.D. Virginia Polytechnic Institute.

The Department of Agricultural Economics and Rural Sociology offers programs of graduate study leading to the Ph.D. and M.S. The doctoral program includes concen-
trations in agricultural marketing and price analysis, agricultural policy, farm manage-
ment and production economics, natural resource economics, and rural development. The M.S. program may be completed under a thesis or non-thesis option and may
include a concentration in Rural Sociology for the M.S. program with a major in Agri-
cultural Economics. For more information, contact the Department Head.

THE MASTER'S PROGRAM

Thesis Option: A minimum of 45 hours of graduate coursework is required. In the agri-
cultural economics emphasis, 18 hours of agricultural economics and 6 hours of quantitative methods are required. In the rural sociology empha-
sis, 6 hours of sociological theory and 3 hours of statistics are required. Each stu-
dent must successfully complete a final oral examination.

Non-Thesis Option: A minimum of 48 hours of graduate coursework is required. Minimum coursework in theory, quantitative methods and statistics are the same as for the thesis option. Each student must suc-
cessfully complete both written and oral comprehensive exams.

THE DOCTORAL PROGRAM
A minimum of 108 hours of graduate coursework is required. A minimum of 6 hours of dissertation research, but excluding any master's research credit, is required. A minimum of 15 hours of economic theory, 9 hours of quantitative methods and 21 hours in agri-
cultural economics are required. Comprehensive exams consist of four writ-
ten exams and one oral exam. The written exams are in general agricultural economics, economic theory, quantitative methods and the area of concentration. Provisions exist for waiving the economic theory exam with a sufficient academic record in specific eco-
nomic theory courses.

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 tech-
niques for planning, field trips arranged. Prereq: Agriculture 1110 and Economics 2120. 2 hrs and 1 lab. F, W

4140 Agricultural Production Economics I (3) Applied principles of microeconomic theory to problem of resource allocation, product selection, scale of operation of agricultural firms; economic interpretation of techni-
cal, agricultural and economic factors. 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 Eco-
nomics 2120, or consent of instructor. F

4250 Agricultural and Rural Planning (3) Decision-
making concepts applied to design and implementa-
tion 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. Prereq: Agriculture 1110 and Economics 2120. F

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

4330 Land Economics (3) Problems and policies of land use, conservation, development, taxation, and tenure; popular conceptions of land principles and theories of rent, property, value, and income. Prereq: Agriculture 1110 and Economics 2120. Sp

4610 Management of Farm Supply and Marketing

Firms (3) Operation of firms selling farm supplies and marketing agricultural products. Emphasis on accounting data and economic theories for decision-
making. Prereq: Agriculture 1110 and Economics 2120. F

4830 Advanced Agricultural Marketing (3) Econom-
ics of market location and market structure model; spatial equilibrium analysis; production and market location and transfer costs; processing and storage costs; maximizing returns, institutions and market flows; measuring efficiency. Prereq: 3120 or 3220 or consent of instructor. W

5000 Thesis (1-15) P/NP. 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

5130 Agricultural Production Economics II (3) Theo-
retical and empirical concepts of agricultural allocation problems under various knowledge situations with emphasis on uncertainty. Aggregate external effects of decisions made by individual agriculture firms. Decision theory with application to agriculture. Prereq: 4140 or equivalent. W

5210 Seminar: Agricultural Policy (3) Sp

5220 Research Methodology (3) Nature of scientific method, logic, philosophy, assumptions, potential and limitations of science; methodological problems of social sciences, establishment of research priorities. Prereq: Consent of Instructor. W

5310 Research (3) Special research problems in agri-
cultural economics and rural sociology. Gathering, tabulating and interpreting data and report writing. May be repeated. Maximum 9 hrs. S/N/C only. E

5410 Agricultural Marketing Analysis (3) Analysis of structure, conduct, and performance of agricultural marketing system; application of price theory con-
cepts to real-world industries; methods used to examine industry conduct and pricing behavior. Prereq: Econom-
ics 3110 or consent of instructor.

5420 Advanced Land and Natural Resource Economics (3) Economic efficiency in natural resource alloca-
tion; 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, develop-
ment; natural and human resources for food production; technology and change; national and inter-
national food policy. Prereq: 4240 or consent of instructor. W

5610 Quantitative Methods in Agricultural Econom-
ics (3) Analytical and statistical tools for evaluation of functions—supply, demand and production—and pre-
diction of economic variables. Emphasis on application of multiple regression; model specification, estima-
tion technique using computer and interpretation of results. Prereq: Statistics 4310 or Economics 5510 or consent of instructor. W

5710 Linear Programming (3) Techniques with empir-
ical applications to problems of firm and region; maximizing firm profit, minimizing firm costs, trans-
portation, risk, allocation of scarce resources and time. Prereq: Consent of Instructor. W

5820 Agricultural Price Analysis (3) Application of various research methods to analysis of price struc-
tures; specification and estimation of price determination models and integration of results. Prereq: 5130 and 5610 or Statistics 4310 or consent of instructor. W

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

6120 Seminar in Agricultural Economics (3) Topics selected from the areas of economics of production, consumption or distribution in agriculture and related industries, and public policies concerned with agri-
culture and related industries. A
6410 Agricultural Supply analysis (3) Estimating agricultural supply relationships using aggregative time series regression, program functional form linear programming, simulation and firm growth models with emphasis on correspondence between theoretical concepts and model attributes. Prereq: 5130 or consent of instructor. A

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. A

6430 Consumer Demand and Food Consumption (3) Interrelationships among consumer purchase decisions are analyzed. Complete demand system models are examined in terms of the constraints which must hold in order to maximize utility. Emphasis is given to food purchase decisions. Prereq: 5111-12 or consent of instructor. A

3420 Rural Sociology (3) Nature of rural society; social systems concept; rural-urban differences; nature of social relations; population characteristics and movement; census and surveys of rural life; tenure, farm labor, health, services, educational facilities, churches, local government; impact of industrialization. F, W

4450 Diffusion of Agricultural Technology (3) Analysis of diffusion patterns whereby new technology spreads from scientists to final adopters. Adoption process, communication behavior, mass media, role of professional change agents, opinion leadership, and two-step flow hypothesis. Prereq: 3420 or consent of instructor.

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

5450 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. A

5470 Research Problems in Rural Communities (3) Emphasis on problems that arise in survey research in rural areas. Sampling procedures, questionnaire construction, interviewee selection, training, control, and legitimization needs. Prereq: Undergraduate course in statistics.

5490 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. A

Agricultural Engineering

MAJORS

DEGREES

Agricultural Engineering M.S., Ph.D. Agricultural Mechanization M.S.


Associate Professors: R. W. Clay, Ph.D. Nebraska, P.E.; C. R. Mote, Ph.D. Ohio State, P.E.

Assistant Professor: D. O. Baxter, M.S. Missouri.

Graduate programs leading to the degrees of Master of Science and Doctor of Philosophy with a major in Agricultural Engineering are available to graduates of a recognized curriculum in engineering, mathematics, or one of the physical or biological sciences. A graduate program leading to the Master of Science degree in Agricultural Mechanization is available to graduates in a recognized curriculum in agriculture or other related fields. Each applicant will be advised about any prerequisite courses before entering a program. The student's program of study must be approved by his/her advisory committee and must comply with the requirements of The Graduate School.

A departmental application and three completed Graduate School rating forms are required in addition to the Graduate School application.

THE MASTER'S PROGRAMS

The Master's programs in Agricultural Engineering and Agricultural Mechanization can be entirely in the major subject or may include subject matter areas related to the major. A minor in another subject area requires 15 hrs. Both programs require a thesis and the final oral exam covers coursework and the thesis.

THE DOCTORAL PROGRAM

Program concentrations for the doctoral program include agricultural power and machinery, soil and water conservation, agricultural structures and electric power and processing.

The program of each candidate consists of a major and supporting studies in one or more additional areas. The major consists of a minimum of 24 quarter hours exclusive of research and dissertation. A minimum of 24 hours must be taken outside the Department of Agricultural Engineering. Supporting courses are required in biological, physical and engineering sciences and mathematics fundamentals related to the candidate's program.

A comprehensive examination (written and oral) will be given when the student has completed all or nearly all of the prescribed coursework. The comprehensive exam must be passed prior to admission to candidacy. A final oral examination on the student's dissertation will be given after completion of the dissertation and all course requirements.

Agricultural Engineering

6420 Selected Topics in Agricultural Engineering (3) Develop new topics as required by current trends and problems in agricultural engineering. A

4610 Design of Water Control and Waste Utilization Systems (3) Earth dams, irrigation, drainage, land grading, hydraulic transport of wastes, and application of wastes on non-critical land. Prereq: 3610 or consent of instructor. 1 hr and 2 labs. W

4620 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

4630 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 costs, raw material storage, handling and economic merit. Prereq: 3630. 1 hr and 2 labs. F

4640 Design of Agricultural Machinery (3) Functional design of agricultural machinery. Elements of machine component design; synthesis of mechanisms; mechanical and hydraulic drives. Team effort in designing machinery. 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 analysis of factors related to processes of animal and plant life; basis for development and design of facilities and structures for confined housing of animals, maintaining crop production, crop growth, and storage facilities for plant and animal products. Prereq: Agricultural Mechanization 3220, Mechanical Engineering 3110 or consent of instructor. 2 hrs and 1 lab. Sp, A

5340 Computer Modeling Applications in Agricultural Physical Systems (3) Introduction to principles, techniques, and algorithms in computer modeling and control of agricultural physical systems: water supply, deficiency and time distribution as related to agricultural and forest purposes. Flow charting and program documentation. Prereq: Competency in advanced computer programming and consent of instructor. 2 hrs and 1 lab. W, A

5440 Instrumentation in Agricultural Systems (3) Analysis of specific instrumentation needs in agricultural systems and industry research problems; principles and design in utilization of specialized instrumentation. Prereq: Engineering electronics or consent of instructor. 2 hrs and 1 lab. Sp, A

5540 Engineering Properties of Agricultural Materials and Products (3) Fundamental engineering properties of agricultural products and materials related to handling, processing, and storage. Analysis of basic properties and materials handling systems and Engineering Science and Mechanics 3511, 2 hrs and 1 lab. SF, A

5640 Research Problems in Agricultural Engineering (3) Theoretical and experimental studies relating to current problems in agricultural engineering. May be repeated. Maximum 9 hrs. E

5710-20 Similitude in Design and Research (3, 3) Dimensional analysis in development of models; theory and types of models, prediction equations; interpretation of data; applications to machinery, soil and water structures, agricultural buildings, and other agricultural engineering-related problems. Prereq: Engineering Science and Mechanics 3310 and 3310, 2 hrs and 1 lab. F, W-A

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

6110 Seminar (1) Current research and literature related to engineering in agriculture. May be repeated. Maximum 3 hrs. E

6310 Engineering Systems Analysis in Agriculture (3) Systems approach to design of engineering experiments and applications to include linear programming, computer applications, statistical evaluations, and feedback control in agricultural problems. Prereq: Mathematics 4550 or 4710. Coreq: 5710 or equivalent. 2 hrs and 1 lab. F

6510 Selected Topics in Agricultural Engineering (3) Lecture, group discussion, and individual study on specialized developments in power and machinery, soil and water, structures, and processing. Prereq: 3640. Maximum 3 hrs. F

6540 Research Problems in Agricultural Engineering (3) Research and manuscript writing for technical meeting presentation and submission to refereed journals. Manuscript content may include papers, theses or dissertation and other reports. Student first author. E

Agricultural Mechanization

4160 Agricultural Waste Utilization and Disposal (3) Techniques, equipment, and structures for utilizing, treating, and disposing of agricultural wastes by land spreading, lagooning, and processing. 2 hrs and 1 lab. F

4170 Small Engines (3) Concepts and mechanics of small gasoline engines; selection, operation, adjust-
ment, and repair of single cylinder engines. 2 hrs and 1 lab. W

4100 Equipment and Techniques for application of Agricultural Chemicals (3) Equipment for application of liquid, solid, and gaseous chemicals; system components; operational characteristics; safety considerations; calibration; selection and management; materials handling and disposal methods. 2 hrs and 1 lab. Sp

4210 Agricultural Machinery and Tractors (4) Agricultural machinery and power units; adaptation to agricultural practices; field efficiencies, capabilities; adjustment and servicing. Prereq; Mathematics 1550. 3 hrs and 1 lab. W

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

5110 Research problems in Agricultural Mechanization (3) Research problems related to recent developments and current practices in agricultural mechanization. May be repeated. Maximum 9 hrs. E

5210 Electromechanical Systems in Agriculture (3) Integration of electric power, mechanical equipment, structures, and environmental systems to plant and animal production, crop processing, and materials handling. Prereq; 3220 and 3510. 2 hrs and 1 lab. F, A

5410 Agricultural Machinery Systems Analysis (3) Analysis of current field machinery; adaptation planning for sequential operations; machinery for unique and alternate production and harvesting systems; operational management. Prereq; 4210. 2 hrs and 1 lab. Sp, A

5510 Selected Topics in Agricultural Mechanization (3) Lecture, group discussion, and individual study on specialized agricultural mechanization developments. May be repeated. Maximum 9 hrs. F

Agricultural Extension Education

MAJOR DEGREE

Agricultural Extension M.S.

Professors:
Lewis H. Dickson (Acting Head), Ed.D. Cornell; C. E. Carter, Jr., Ph.D. Ohio State.

The Department of Agricultural Extension Education offers the Master of Science degree with a major in Agricultural Extension. For further information, contact the Department Head.

THE MASTER’S PROGRAM

1. A thesis is required for the Master’s program. Prior to research for the thesis, the student is required to develop a detailed written research plan. Registration for a minimum of 9 hours of Thesis 5000 is required.

2. In addition to the thesis requirement, a minimum of 36 hours of graduate coursework is required. This work must be approved by the student’s committee and not more than 15 hours of the minimum 45 can be below the 5000 level. The committee may require additional coursework if the student’s progress or background indicates such. Students may select from a wide variety of offerings in communications, economics, sociology, psychology, statistics and research methodology, supervision and administration as well as technical subject matter fields or agriculture and home economics.

3. An oral examination covering the thesis and coursework is required.

3110 Introduction to Agricultural Extension (3) History; philosophy; organization; teaching methods; relationships with other educational agencies. Graduate credit for non-majors. Sp only.

4110-20 Field Studies (3, 3) Supervised work experience with county in a designated county. Prereq; 3110 and consent of instructor. Requires living off-campus for a specified time. Su

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

5100 Special Problems in Agricultural Extension (1-6) May be repeated. Maximum 9 hrs. E

5210 Long-range Extension Program Planning (3) Development of county extension program based on effective interdepartmental programs and economic characteristics of areas. Prereq; 3110 or consent of instructor. F

5220 Seminar (3) Review of literature and developments in agricultural extension methods. Prereq; 3110 or consent of instructor. Sp

5230 Evaluation in Programs of Agricultural Extension (3) Principles, instruments, and techniques of identifying, gathering, analyzing and using data to appraise planning and teaching and to determine progress of clientele. Prereq; 5210 or consent of instructor. W, A

5310 History, Philosophy and Objectives (3) Historical and philosophical foundation of informal adult education in American agriculture form the agricultural societies (1785 to present). Key figures, issues, legislative movements, farmer organizations and programs. Emphasis on agricultural extension service, its origin, legislation and growth and nature of present day objectives and programs. Prereq; 3110 or consent of instructor. W, A

5320 Volunteer Leadership in Agricultural Extension Programs (3) Theory, principles and procedures in development of volunteer leadership for small groups in rural communities through agricultural extension programs. Emphasis on analysis of place and importance of volunteer leadership function, techniques of effective leadership in small groups and methods of developing volunteer leadership in agricultural extension work. Prereq; 3110 or consent of instructor. W, A

5330 Supervision of Agricultural Extension Programs and Personnel (3) Theories of human effectiveness, principles of successful supervision applied to various parts of county, district and other extension programs: and planning for effective office management. Prereq; 5210 or 5220 or consent of instructor. W, A

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 DEGREE

Animal Science M.S., Ph.D.

Professors:
D. O. Richardson, (Head), Ph.D. Ohio State; K. M. Barth, Ph.D. Rutgers; M. C. Bell, Ph.D. Oklahoma State; J. K. Bleiter (emeritus), Ph.D. Ohio State; C. C. Chamberlain (Emeritus), Ph.D. Iowa State; B. H. Erickson, Ph.D. Kansas State; O. G. Hall (Emeritus), Ph.D. Iowa State; S. L. Hansard (Emeritus), Ph.D. Florida; E. R. Liddell, M.S. Tennessee; T. P. McDonald, Ph.D. Tennessee; J. B. McLaren, Ph.D. Auburn; G. M. Merriman (Emeritus), D.V.M. Iowa State; D. Y. Miller, D.V.M. Michigan State; J. K. Miller, Ph.D. Georgia State; M. S. Pines, Ph.D. Wisconsin; R. L. Murphy, (Emeritus), Ph.D. Wisconsin; H. V. Shirley, Ph.D. Illinois; R. R. Shrode, Ph.D. Iowa State; R. T. Tugwell (Emeritus), Ph.D. Kansas State.

Associate Professors:

Assistant Professors:
G. A. Baumbach, Ph.D. Florida; B. R. Bell, Ph.D. North Carolina State; W. Cullen, Ph.D. Minnesota; J. D. Godkin (Emeritus), Ph.D. Maine; R. N. Heitmann, Ph.D. Mans; S. F. Oliver, Ph.D. Ohio State; T. W. Schultz, Ph.D. Tennessee; J. D. Smalling, Ph.D. Texas A & M.

The Department of Animal Science offers graduate programs leading to the degree of Master of Science and Doctor of Philosophy with a major in Animal Science. At the M.S. level, the department offers areas of specialization in nutrition, breeding and genetics, physiology and management with orientation towards beef cattle, dairy cattle, swine and poultry. Since the department is also a part of the College of Veterinary Medicine, the areas of anatomy, general physiology and histology are also available. The Ph.D. program offers concentrations in animal nutrition, animal breeding and animal physiology and animal anatomy.

THE MASTER’S PROGRAM

For admission to the M.S. program, a student must have a satisfactory grade point average in a completed undergraduate major in one of the animal sciences or closely related area, and must show promise that he/she can successfully pursue a Master of Science program. Prerequisite courses may be taken by the student if he has insufficient undergraduate background or less than satisfactory grade point average.

The program requires the writing of a thesis based on original research and the completion of a maximum of 36 hours of graduate coursework, at least two-thirds of which must be taken at UTK in courses numbered at or above the 5000 level. Included in the course requirement are 3 hours of Animal Science 5510 (Seminar) and 2 hours of Agriculture 5120 (Teaching Internship). The remainder of the coursework will be selected jointly by the student and the major professor depending on the student’s area of specialization and professional objectives.

The advisory committee will consist of the major professor, a faculty member of Animal Science, who will act as chair of the committee, and a minimum of two faculty members, one of whom may be outside of the Animal Science Department. The advisory committee approves the student’s research problem and conducts the final oral examination which consists of a comprehensive examination and a defense of the thesis.

THE DOCTORAL PROGRAM

The doctoral program requires a minimum of 72 quarter hours of coursework and a minimum of 36 hours of dissertation research (Animal Science 6000). Additional requirements are:

1. A minimum of 24 quarter hours in related fields outside of animal science.

2. At least 36 quarter hours credit at the 5000 and 6000 level, exclusive of Doctoral Research and Dissertation. Of these, a minimum of 9 hours must be at the 6000 level.

3. Three seminars carrying 1 credit hour (Animal Science 5910) not related to the dissertation research and one seminar each on the student’s M.S. thesis research, on his/her dissertation research proposal and on the completed dissertation research.

4. A minimum of 2 hours of Agriculture 5120 (Teaching Internship) in addition to that required on the M.S. level.
A minimum of 5 faculty members constitutes the student's advisory committee, of which at least one must be outside animal science. The major professor will be the chairperson. The student and the major professor select a program of study depending on the student's area of concentration and professional goal. The advisory committee approves the student's dissertation research proposal and determines if there should be a foreign language requirement. The advisory committee conducts the comprehensive examination and the final exam.

3210 Anatomy and Physiology of Farm Animals (4) Skeletal system, nervous system, cardiovascular, pulmonary, and gastrointestinal systems. Prereq: Biology 1210 or Agriculture 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 lactation of ruminants, endocrine regulation of reproduction in nonruminants. Prereq: 3210 or consent of instructor. (Same as Zoology 3220). 2 hrs and 1 lab. F, W, Sp.


3330 Feeds and Ration Formulation (4) Feedstuffs, nutritive value determinations and their use. Prereq: 3210 or consent of instructor. (Same as Zoology 3230). 2 hrs and 1 lab. F, W, Sp.


3410 Heredity in Animals (3) Basic principles of heredity, 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 differences such as those in genetic makeup and environment. Selection and its consequences. Making mating systems and their effects on populations. Prereq. and permission of instructor. Planning breeding programs. Prereq: 3410 or equivalent. 2 hrs and 1 lab. F, Sp.


3520 Avian Diseases (3) Major disease; characteristics, prevention, control and eradication; laboratory techniques. Prereq: Microbiology 2910-11 or 2910-19 or consent of instructor. 3 hrs and 1 lab. W, Sp.

3525 Avian Diseases (3) Major disease; characteristics, prevention, control and eradication; laboratory techniques. Prereq: 3302. 2 hrs and 1 lab. Sp.

3810 Nutrition and Management of Laboratory Animals (3) Principles of feeding, breeding, and handling of animals in scientific investigations; specific species and breeds and research for which best suited; laws governing use and handling of laboratory animals. Prereq: Agriculture 1130 and consent of instructor. 2 hrs and 1 lab. W.

4210 Physiology of Lactation (3) Development, anatomy, and function of mammary glands; endocrine interactions for mammary development and milk secretion; factors affecting yield and composition of milk. Prereq: 3210. W.

4220 Avian Physiology (3) Anatomy and physiology of the avian species with emphasis on poultry. Prereq: 3210. 2 hrs and 1 lab. Sp.

4230 Applied Reproduction in Farm Animals (3) Application of methods and techniques in collecting, evaluating, processing and marketing semen; anatomic and physiologic assessment of females; pregnancy determination; gestation and parturition. Male and female infertility. Prereq: 3220 and consent of instructor. 1 hr and 2 labs. F, Sp.

4330 Feeding Applications for Farm Animals (3) Detailed application of feeding principles designed to allow student to discover and exploit feeding potential available to producers through problem solving. Prereq: 3330. 1 hr and 2 labs. Sp.

4340 Experimental Animal Nutrition Laboratory (2) Laboratory techniques and some basic animal nutrition concepts including preparation and feeding of experimental diets. Prereq: 3330. W.

4810 Beef Cattle Production and Management (4) Principles of nutrition, physiology, and breeding in a complete beef cattle management program. Structure of industry, enterprise establishment, systems of production, production practices and herd improvement programs. Alternatives in terms of production responses and economic returns. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. F, W, Sp.

4820 Dairy Cattle Production and Management (4) Principles of nutrition, physiology and breeding in a complete dairy cattle management program. Structure of industry, enterprise establishment, systems of production, production practices and herd improvement programs. Alternatives in terms of production responses and economic returns. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. F, W, Sp.

4830 Pork Production and Management (4) Integration of principles of selection, nutrition, breeding, physiology, and management in a complete pork production and management program. Structure of industry, enterprise establishment, systems of production, production practices and herd improvement programs. Alternatives in terms of production responses and economic returns. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. F, W, Sp.

4840 Poultry Production and Management (4) Structure of poultry industry, organization and management of poultry enterprises including rearing, housing, feeding, processing and marketing. Prereq: 3330 or consent of instructor. 3 hrs and 1 lab. W.

4850 Light Horse Production and Management (4) Integration of principles of nutrition, physiology and breeding in a light horse management program. Structure of industry, systems and practices of production; individual animal and herd improvement programs; tax considerations; market channels and commercial producers. Prereq: Consent of instructor. 3 hrs and 1 lab. W.

4860 Lamb and Wool Production and Management (4) Integration of principles of production, nutrition, breeding, physiology and management in a complete lamb and wool production and management program. Structure of industry, enterprise establishment, systems of production, production responses and economic returns. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. W.

5000 Thesis (1015) P/NP only. E.


5110 Special Problems in Animal Science (1-4) May be repeated. Maximum 6 hrs. E.

5210 Endocrine Relations in Animal Production (4) Endocrine glands related to growth and reproduction; hormone preparation for altering growth and reproductive rate of farm animals. Prereq: 3210 or consent of instructor. 2 hrs and 1 lab. W.

5230 Advances in Mammalian Reproduction (3) Germ cell development, maturation, transport metabolism, and preservation of gametes in vitro and in vivo. Prereq: 3210 or 4230. 2 hrs and 1 lab. W.

5240 Advanced Studies of the Secretion of Milk (3) Effect of endocrine and nutritional factors on mammary gland development; initiation and maintenance of lactation. Prereq: 4210. 2 hrs and 1 lab. Sp.

5311 Analytical Techniques in Animal Nutrition (3) Physical and chemical analyses of feeds, ingredients and biological fluids associated with nutrition research. 1 hr and 2 labs. F, Su.


5333 Nonruminant Animal Nutrition (4) Physiological development and changes in digestive system of nonruminant animal during the life cycle. Concepts and models associated with concerning nutrient requirements, inter- relationships, availabilities and deficiencies of nutrients. Nonnutritive additives, toxins, poisons, and disease effects; nutritional science based up on principles of animal nutrition. Prereq: 3330 or consent of instructor. 3 hrs and 1 lab. W.

5344 Ruminant Animal Nutrition (3) Digestive physiology of the ruminant stomach, rumen fermentation, determination of nutrient requirement and feed intake regulations of ruminant animals. Prereq: 3330. F.

5410 Genetics of Animal Populations (3) Population and individual, gene and zygotic frequencies; statistical descriptions of populations; forces influencing genetic changes, application to domestic and wild species. Prereq: 3420 or consent of instructor. 2 hrs and 1 lab. F, W.

5510-20 Advanced Animal Physiology (5, 5) Advanced animal physiology (primarily mammalian physiology): 5510—Membrane neuron, central nervous system, muscles, connective tissues, endocrine organs, endo- crinisms. 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 or consent of instructor. Biochemistry 4120 also recommended. (Same as Zoology 5510-20). 4 hrs and 1 lab. W, Sp.

5710 Methods of Evaluating Experimental Data in Animal Science (3) Interpretation of data from experiments involving data from experiments involving nonparametric methods. Prereq: Statistics 5211 or equivalent. 2 hrs and 1 lab. W.

5720 Design and Interpretation of Experiments in Animal Science (3) Review of principles of experimental design and application to research in animal sciences analyzing data from experiments with unequal and disproportionate subclass frequencies; situations and procedures for use of computers in statistical analysis. Prereq: 5710. 2 hrs and 1 lab. Sp.

5730 Intermediate Statistical Computing (3) Application of statistical procedures to analysis of data using computers; analytical capabilities of existing software and hardware; statistical analysis methods to be performed only with high-speed digital computers. Prereq: 5710 or equivalent.


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

6211 Advanced Topics in Animal Physiology (1-6) Recent advances and concepts, research techniques, current problems. May be repeated. Maximum 6 hours. E.

6212 Advanced Topics in Animal Anatomy (1-6) Recent advances and concepts, research techniques, current problems. May be repeated. Maximum 6 hrs. E.

6220 Environmental Physiology of Farm Animals (3) Environmental factors and measurement; physiological mechanisms of response to environmental factors and measurement; interrelationships of animals and environment in terms of productivity and health. Prereq: Consent of instructor. 2 hrs and 1 lab. W.

6230 Animal Growth and Development (3) Physiologic, biochemical, and metabolic mechanisms of growth and development; effects of growth rates on physiological and produc-
degree in the field or of a special qualifying

2. In addition to the thesis requirement, a

3. All students are required to include 3

4. An oral examination covering the thesis

5. The Department of Food Technology and Science

5100 Seminar (1-15) P/NP only. E

5010 Research Methods and Instrumentation in Plant Pathology (3) Techniques for laboratory, field, and greenhouse research in plant pathology and entomology. 1 hr and 2 labs. F

5100 Plant Disease Diagnosis (3) Diagnosis of plant diseases, disease symptoms, causal agents and control measures. Prereq: 3130 or 5100. 3 hrs and 1 lab. F

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: 5110 or SoilT 3060. 2 hrs and 1 lab. F

5130 Plant Pathogenic Fungi (4) Morphology, taxonomy, biochemistry, and genetics of plant pathogenic fungi. Isolation and identification of plant pathogenic fungi will be emphasized. Prereq: 3130 or consent of instructor. 2 hrs and 2 labs.

5210 Plant Parasitic Nematodes (4) Morphology, taxonomy, and ecology of plant parasitic nematodes. Prerequisite: basic knowledge of host-parasite relationships. Prereq: 8 hrs biological science or consent of instructor. Same as Zoology 5210. 2 hrs and 2 labs. F, W, A

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: 3130 or equivalent course in applied entomology. 2 hrs and 1 lab. F, A

5240 Plant Virology (4) Symptomatology, cytopathology, and epidemiology of virus infection; structure, morphology, replication, transmission, purification, characterization, and classification of plant viruses; serology; plant pathogenic viroids, mycoplasmas and viroids. 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: 3210, general entomology, or consent of instructor. 3 hrs and 1 lab. W, 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 pathology and economic entomology. May be repeated. Maximum 3 hrs. F, W, Sp

Food Technology and Science

MAJOR

DEGREES

Food Technology and Science

M.S., Ph.D.

Philip E. Miller, Ph.D. California State; H. H. Page, Ph.D. Ohio State; W. P. Winstead, Ph.D. Texas A&M University; W. G. Schorpp, Ph.D. Idaho State.

Associate Professors:

P. G. Smith, Ph.D. Iowa State; R. A. Bergland, Ph.D. Washington State; M. L. Lambdin, Ph.D. Virginia Polytechnic Institute; R. S. F. Press, Ph.D. Clemson.

Associate Professor:

E. C. Bernard, Ph.D. Georgia.

Assistant Professors:

J. F. Grant, Ph.D. Clemson; B. B. Reddick, Ph.D. Clemson; M. T. Windham, Ph.D. North Carolina State.

The Department of Entomology and Plant Pathology offers concentrations in economic entomology and plant pathology. Students in economic entomology may further specialize in the research areas of crop entomology, medical and veterinary entomology, insect biology, insect pest management, and biological control. Students in plant pathology may further specialize in the research areas of foliar fungus diseases, soil-borne diseases, nematology, and virology. For further information, contact the Department Head.

ADMISSION REQUIREMENTS

The department requires completion of three rating forms from academic or professional persons, a written statement of interest in entomology or plant pathology, and career goals. It is required that applicants for the Master's program have completed (1) general botany or biology, 12 quarter hours; (2) advanced biological sciences, 12 quarter hours; (3) general inorganic chemistry, 9-12 quarter hours; organic chemistry, 4 quarter hours minimum.

DEGREE REQUIREMENTS

Completion of a satisfactory thesis is required. A minimum of 45 quarter hours of graduate credit in courses approved by the student. In addition to the thesis, requiring 9 hours for a thesis, is required including at least 18 hours of graduate credit in the major exclusive of Thesis 5000. If the student elects a minor, there must be no fewer than 9 nor more than 18 hours of graduate credit in the minor field. Presentation of three acceptable seminars for 1 hour credit each is required prior to completion of program. An oral final exam must be completed to the satisfaction of the committee after the thesis is completed.

4010 Biology of Soil Microorganisms (4) Morphology and physiology of soil organisms, decomposition of organic matter, chemical transformations, and interactions between soil organisms and higher plants. Prereq: Introductory microbiology or 3130. 3 hrs and 1 lab. Sp, A

4030 Forest and Shade Tree Entomology (3) Identification, biology, ecology, and control of forest and shade tree pests. Prereq: 3210 or equivalent. 2 hrs and 1 lab. F, A

4140 Forest Pathology (3) Symptomatology, etiology, epidemiology, and control of forest tree diseases, including wood decay and other diseases important to urban and woodland forestry. Prereq: 3130 or Forestry 3060. 2 hrs and 1 lab. F

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

5010 Research Methods and Instrumentation in Plant Pathology and Entomology (3) Techniques for laboratory, 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. Su, A

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. Su, A

5130 Plant Pathogenic Fungi (4) Morphology, taxonomy, biochemistry, and genetics of plant pathogenic fungi. Isolation and identification of plant pathogenic fungi will be emphasized. Prereq: 3130 or consent of instructor. 2 hrs and 2 labs.

5210 Plant Parasitic Nematodes (4) Morphology, taxonomy, and ecology of plant parasitic nematodes. Prerequisite: basic knowledge of host-parasite relationships. Prereq: 8 hrs biological science or consent of instructor. Same as Zoology 5210. 2 hrs and 2 labs. W, A

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: 3130 or equivalent course in applied entomology. 2 hrs and 1 lab. F, A

5240 Plant Virology (4) Symptomatology, cytopathology, and epidemiology of virus infection; structure, morphology, replication, transmission, purification, characterization, and classification of plant viruses; serology; plant pathogenic viroids, mycoplasmas and viroids. 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: 3210, general entomology, or consent of instructor. 3 hrs and 1 lab. W, 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 pathology and economic entomology. May be repeated. Maximum 3 hrs. F, W, Sp

Food Technology and Science

MAJOR

DEGREES

Food Technology and Science

M.S., Ph.D.

Philosophy, taxonomy, and ecology of plant parasitic nematodes. Prerequisite: basic knowledge of host-parasite relationships. Prereq: 8 hrs biological science or consent of instructor. Same as Zoology 5210. 2 hrs and 2 labs. W, A

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: 3130 or equivalent course in applied entomology. 2 hrs and 1 lab. F, A

5240 Plant Virology (4) Symptomatology, cytopathology, and epidemiology of virus infection; structure, morphology, replication, transmission, purification, characterization, and classification of plant viruses; serology; plant pathogenic viroids, mycoplasmas and viroids. 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: 3210, general entomology, or consent of instructor. 3 hrs and 1 lab. W, 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
Scores on the GRE aptitude test are also required.

2. A minimum of 108 quarter hours credit beyond the Bachelor's degree, exclusive of the credit for the Master's thesis, is required. Of this number, 36 quarter hours must be in 6000, Doctoral Research and Dissertation.

3. At least 36 quarter hours at the 5000 and 6000 level are required exclusive of Doctoral Research and Dissertation. At least 9 of the 36 hours must be in 6000-level courses.

4. A minimum of 9 hours of courses for graduate credit must be taken outside the Department of Food Technology and Science.

5. All candidates will complete the following courses or their equivalent: 5420, 5530, 5310, 5710, 5720; and Nutrition and Food Sciences 5100. All candidates must complete three hours in 6010 and 6410.

6. Each candidate will be required to pass both written and oral comprehensive examinations prior to admission to candidacy. A final oral examination is required which includes a defense of the dissertation and subject matter that the student's committee considers desirable.

3020 Dairy Products I (4) Procurement, processing and distribution of fluid milk. Manufacture of frozen and condensed dairy products. 3 hrs and 1 lab. W

3840 Meat Science (3) Processing methods, carcass characteristics of meat animals; slaughter, cutting, selection, curing, freezing and cookery. 2 hrs and 1 lab. W, Sp

4010 Food Technology and Science Seminar (1-3) Review of literature; oral and written reports. May be repeated. Maximum 3 hrs. F, W, Sp

4030 Dairy Products II (4) Principles in the manufacture of butter, cheese and special dairy products. Prereq: Agricultural Mechanization 3510. 3 hrs and 1 lab. Sp, A

4130 Food Chemistry I (3) Minerals, fats, oils, and vitamins in food as affected by processing and storage. Prereq: Nutrition and Food Sciences 3150 or equivalent. 2 hrs and 1 lab. Sp

4140 Food Chemistry II (3) Reactions of proteins, carbohydrates and non-colored pigments in food materials. Protein structure, food enzymology and browning reactions. Effects of storage and processing on processed foods. Prereq: 3840 or consent of instructor. Prereq: Nutrition and Food Sciences 3150 or equivalent. 2 hrs and 1 lab. F

4200 Food Processing I (4) Prevention of spoilage and deterioration of foods. Methods of preservation. Prereq: Agricultural Mechanization 3510. 3 hrs and 1 lab.

4210 Food Additives (3) Substances used in food manufacturing with emphasis on properties and functions. Prereq: Nutrition and Food Sciences 3140 or equivalent. F

4310 Food Packaging (3) Characteristics and applications of materials and containers to packaging requirements and methods of packaging foods. Prereq: 2300. 2 hrs and 1 lab.

4400 Food Processing II (5) Design of food quality assurance programs with emphasis on sanitation. Application of general analytical techniques, regulations and unit operations to quality control in food industry. Prereq: 3810. 3 hrs and 2 labs.

4410 Food Crop Products (3) Food products from crops with emphasis on types, manufacturing systems, quality attributes, and utility. Sp, A

4420 Bakery Products (3) Baking ingredients and their interactions during production and storage of bakery products. Prereq: 4130 and Chemistry 2230 or equivalent. 2 hrs and 1 lab. Sp, A

4810 Food Microbiology II (4) Standard methods for examination, cultivation, and identification of bacteria associated with food processing, food spoilage, and food poisoning. Prereq: 3810. 2 hrs and 2 labs. W

4840 Meat Products Manufacturing (3) Prepared meat products with emphasis on sensory evaluation, identification of raw material relating to cost controls, inspection, and meat science. Prereq: 3840 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, colooids, gels, foams, crystals, color. Quantitation and changes induced by processing. Prereq: 4200 and Agricultural Mechanization 3510 or consent of instructor. 3 hrs and 1 lab. W

4940 Advanced Meat Science (3) Qualitative and quantitative characteristics of meat and poultry as related to palatability, coloration, presentation, packaging and merchandising. Prereq: 3840, F, A

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

5100 Seminar (1) Reports and discussions of selected topics from research literature. May be repeated. Maximum 3 hrs. F, W, Sp

5120 Food Color (3) Chemistry of natural food pigments and measurement, notation, and preservation in food. Prereq: Nutrition and Food Sciences 3140 or equivalent. 2 hrs and 1 lab. Sp, A

5130 Food Enzymology (3) Commercial and native enzymes in manufacturing, processing, and spoilage of food. Prereq: Nutrition and Food Sciences 3150 or equivalent. Sp, A

5140 Food Flavors (3) Food flavor maintenance and improvement. Natural and synthetic compounds in manufacture of foods with predictable consumer acceptability. Technology of flavor manufacture and formulation. Techniques for flavor profile. Prereq: 4210. 2 hrs and 1 lab. W, A

5150 Fats and Oils (3) Application of scientific principles to commercial technology of fats and oils. Prereq: 4130. 2 hrs and 1 lab. W, A

5200 Research (1-5) Research in selected areas. Consent of department. Credits and hours to be arranged. May be repeated. Maximum 10 hrs. E

5310 Food Products Development (3) Fundamentals or art, science, and technology applied to research, development, and marketing of new food processes and products. Prereq: 4140. 2 hrs and 1 lab. F

5320 Food Thermobiology (3) Fundamentals of heat transfer as related to rate of destruction of microorganisms and rate of loss of food quality through calculation of minimal safe thermal processing of hermetically-sealed packages of foods. Prereq: 4200. 2 hrs and 1 lab. W, A

5420 Instrumental Analysis of Foods (3) Applications of current instrumental methods used to control food manufacturing processes. Prereq: 4140. 2 hrs and 1 lab. F

5510 Meat Technology (3) Physical and chemical changes that occur during conversion of muscle to meat; the influence these changes have on quality and composition; meat packaging, preservation, and quality control. Prereq: 3840. 2 hrs and 1 lab. Sp, A

5530 Advanced Food Microbiology (3) Identification of desirable and undesirable microorganisms in food processes and relationship to manufacturing operations. Isolation and characterization of microorganisms from food products and plant equipment. Prereq: 4810 or Microbiology 3810. 3 labs. Sp

6000 Doctoral Research and Dissertations (1-15) P/NP only. E

6010 Advanced Topics in Food Technology and Science (1-5) Selected readings, discussions and presentations of current topics; topics to be announced in advance must be repeated. Maximum 6 hrs. S/NP 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, A

6810 Food Toxicology (3) Basic and applied concepts in food toxicology; toxicological aspects of processed foods. Mode of action, prevention and control of food toxicants. Prereq: 4140, 5310, 5530 or consent of instructor.

Forestry, Wildlife and Fisheries

MAJORS

DEGREES

Forestry, Wildlife and Fisheries Science M.S.

M.S.

ASSOCIATE PROFESSORS:


ASSOCIATE PROFESSORS:

S. E. Schlueter, Ph. D. Colorado State.

Graduate study leading to the Master of Science degree with majors in Forestry and Wildlife and Fisheries Science is offered by the Department of Forestry, Wildlife, and Fisheries. The Master of Business Administration, with a concentration in Forest Industries Management, is available for qualified students. This degree program is offered by the College of Business Administration with participation by the Department of Forestry, Wildlife, and Fisheries. The Doctor of Philosophy with a major in Ecology and Resources can be achieved through optional arrangements with the University's Graduate Program in Ecology.

THE MASTER'S PROGRAMS

Both a thesis and non-thesis option are available for the major in Forestry; a thesis is required in Wildlife and Fisheries Science. For admission the student must have a Bachelor's degree from an accredited institution in forestry, wildlife and fisheries or another natural resource area. Applicants must also have taken the GRE exam. Graduate School rating forms or letters of recommendation from three individuals familiar with the applicants academic ability are required. The department head has the authority to determine if an application which must be submitted at the time of application to The Graduate School.

Thesis Option:

1. Prior to research for the thesis, the student is required to develop a detailed written research proposal. Registration for a minimum of 9 hours of Thesis 5000 is required.

2. A graduate committee of no fewer than 3 faculty members must be selected by the student and the thesis quarter of residence. In addition to the thesis requirement, a minimum of 36 hours of graduate coursework is required.
This work must be approved by the student's committee and no more than 15 hours of the minimum 45 can be below the 5000 level. The committee may require additional coursework if the student's progress or background indicates such need.

3. The student's committee must approve a study plan before Forestry or Wildlife and Fisheries 5310, Seminar, in their programs. This is required of each graduate student in residence Winter Quarter.

4. An oral examination covering the thesis and coursework is required.

Non-Thesis Option (Forestry only):
1. Fifty hours of graduate coursework of which 25 hours must be at the 5000 level or above is required.
2. An advisory committee of no fewer than 3 faculty members will be selected. At least one member in addition to the major professor will be from the department. The committee will meet and schedule the student's program during the first quarter in residence.
3. Three hours of Forestry 5011 is required.
4. Twelve hours of coursework in the department must be at the 5000 level or above, exclusive of Forestry 5011.
5. Final comprehensive written and oral examinations shall be taken upon completion of no fewer than 42 hours of approved study.

Forestry

3300 Forest Environments and Ecology (Environ) and of forests and associated lands; emphasis on the application of ecological principles to contemporary problems. Prereq: 8 hrs of biology, botany, or zoology. F

3305 Forests and Trees of Eastern North America (4) Dendrology and Silva of trees and shrubs. Identification, non-uniformity, and species-site relationships. Weekly field trips during scheduled labs plus one weekend field trip. Prereq: 8 hrs basic biology or botany. 3 hrs and 1 lab. F

3310 Forest Measures and Biometry (4) Measurements of individuals in animal and plant populations; linear regression; sampling of forest populations; growth and potential production. Prereq: Plant and Soil Science 3610. 3 hrs and 1 lab. W

3312 Wood Technology (2) Fundamental structure, properties and uses of wood. Prereq: 3040 and 3050. (3050 may be taken concurrently.) 2 hrs and 2 labs. W

3319 Wood Identification (2) Macro and micro identification of important commercial softwoods, hardwoods, and foreign woods. Will include student use of microscopes and an interactive wood identification program on University computing system. W

3320 Forest Products and Utilization (3) Harvesting, processing, marketing factors in stand conversion, intermediate and harvest cuts. Prereq: 3120. Sp

3330 Principles of Silviculture (3) Influence of site factors on reproduction, growth, development, and character of forest vegetation; classification of forest structure; silvicultural laws. Prereq: 3020, 3040, Plant and Soil Science 2120. W

4000 Utilization (3) Wood-using industries; processing forest products—sawmills, tree-log grading; pulpwood operations, flooring plants, painting plants, plant layout, flow diagrams. Prereq: 3120 or consent of instructor. Sp

4003 Field Methods of Timber Inventory (4) Field measurement; identification of trees, determining appropriate sample design for specific purposes; trees and stand growth; site evaluation; field problems. Prereq: 3110 and Agriculture Mechnanization 3140. Sp

4004 Forest Practice (3) Management of forest lands by public and private organizations; "Multiple-use" concept as it influences management decisions; impact of public pressure on decision making; reforestation management decisions: management prescriptions. Prereq: 3260, 4006. S/N/C only. Sp

4008 Silvicultural Methods (4) Methods and application of intermediate and regeneration cuttings; site preparation, planting and seeding, modifications of cutting methods to obtain desired goods and benefits. Prereq: 3060, 3220, 4002, 4003. Sp

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 planning. Prereq: 3320 or 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 resources management. Prereq: Consent of instructor. 2 hrs and 1 lab. W

4220 Forest Resource Management (3) Decisionmaking principles, forestry as integration of resource uses. Models of forestry as system; concepts of forest finance and valuation; taxation of forest firm. Prereq: 4150. 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: 3260 or equivalent. 2 hrs and 1 lab. Sp

4300 Forest Policy (3) History of forestry in the United States with emphasis on development of forest resources policies; current policies influencing development and management of forest resources; 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 photography 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

4400 Wood 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; variation, selection of superior phenotypes and development of seed orchards; hybridization; seed production and seed certification. Prereq: 4005 or consent of instructor. 2 hrs and 1 lab. Sp

4430 Regional Silviculture of the United States (3) Factors that influence silviculture management of important tree species in North America. Importance of forests and forestry to a region; physiology, geology, soils, climate and weather; sites and site types, ecosystem, economic and socio-political characteristics of the more important species. Prereq: 4005 or consent of instructor. W

4440 Forest Recreation (3) Forest lands as a recreation resource; the interrelationships of forest recreation and multiple-use forestry management. Prereq: 3110. W/NC only.


4550 Wood Composites and Gluing (4) Fundamentals of plywood and composite product manufacturing. Wood adhesive technology. Application of gluing to manufacturing processes of plywood and composite products. 3 hrs and 1 lab. Overnight weekend plant trips may be required. W

4560 Forest Products Marketing and Measurement (3) Discussion of market structure for various sectors of forest products industry including sawing, timber, lumber, pulp and paper, wood composites, and treated products. Emphasis on the system of trade caused by industry for sale and transfer of products. Prereq: 3220, 4150 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 wishes to use 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 Problem Analysis in Forest Resources (3) Problem identification, analysis and solution in forest resources management. Identify, analyze, and 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. E

5110 Special Problems in Forestry (1-6) May be repeated. Maximum 9 hrs. E

5220 Seminar in Forest Tree Biology (3) Growth, reproduction, and physiology of forest trees; forest ecology; variability and taxonomy of forest trees. Prereq: 3220 or Botany 4310. F, A

5230 Seminar in Forest Management (3) Newly developed systems in forest management 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 fertility in forest trees; relationship of forest genetics to other fields of biology. Prereq: 4240, Biology 5110, and consent of instructor. W, 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. 1 hr and 2 labs. Sp

5260 Industrial Forestry (3) Structure 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 industrial forestry. Executive from public and private business sector (concerned with forest industries) to present selected topics. Prereq: 4230 or consent of instructor. F

5280 Seminar in Forestry Biometry (3) Theory and application of statistical methods and sampling techniques for forest and wildlife surveys. Prereq: 3110 or 3120.
log and lumber quality; volume estimation techniques; growth and yield prediction. Prereq: 4003 or consent of instructor. W, A

5810 Cyto genetics (4) Same as Botany 5810.

* Graduate course for non-forestry majors only.

Wildlife and Fisheries Science

3320 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: 3210 or 1 yr of zoology. 2 hrs and 2 labs. F

4460 Game Birds (4) Biology, classification, identification, distribution and management of game birds in North America. Prereq: 3230 or 1 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 equipment; population dynamics; age and growth. Prereq: Biology 3130, 8 hrs mathematics, or consent of instructor. 3 hrs and 1 lab or field period. W

4520 Fisheries Management (4) Methods of warm and cold water fisheries management including techniques of biological assessment, public relations, habitat manipulation, and stocking. Prereq: Biology 3130 or consent of instructor. 3 hrs and 1 lab or field period. Sp

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

5110 Special Problems in Wildlife and Fisheries Science (1-6) May be repeated. Maximum 9 hrs. E

5210 Seminar in Wildlife Conservation (3) Current studies, problems and issues in wildlife agencies and organizations and their programs. Prereq: 3230 or consent of instructor. W, A

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

5400 Advanced Topics in Wildlife Science (3) Recent advances and concepts, research techniques, and analysis of current problems. Prereq: 4450 and 4460 or consent of instructor. May be repeated. Maximum 6 hrs. Sp, A

5450 Wildlife Diseases (3) Necropsy of birds and mammals. Recognition of various diseases and methods of preparing pathological materials in the field and laboratory. Investigative procedures concerning wildlife diseases. Prereq: 1 yr zoology, 1 qtr microbiology, pathology or parasitology, 4450 or 4460, or consent of instructor. 2 hrs and 1 lab. Sp, A

5460 Predator Ecology (3) Dynamics of terrestrial vertebrate predator populations in human-altered and relatively unaltered environments. Principles of predator biology and management. Prereq: 4450 and 4460 or equivalent. W, A

5500 Advanced Topics in Fishery Science (3) Recent advances and concepts, research techniques and analysis of current problems. Prereq: 4520 or consent of instructor. May be repeated. Maximum 6 hrs. Sp, A

5550 Fish Physiology (3) Mechanisms of circulation, excretion, osmoregulation, and neural/hormonal control of these systems in fishes. Practical applications of fish physiology in water pollution assessment, fish culture, and fisheries management. Prereq: Consent of instructor. 2 hrs and 1 lab. W

*Graduate credit for non-forestry and non-wildlife sciences majors only.
Plant and Soil Science

MAJOR

Plant and Soil Science

M.S.; Ph.D.

Professors:
J. J. Zietz (Head) Ph.D. Minnesota; F. H. Bell (Emeritus) Ph.D. Iowa State; D. L. Coffey, Ph.D. Purdue; D. V. Conger, Ph.D. Washington State; H. L. Crane, Ph.D. Kansas State; J. M. Springhetti (Emeritus) Ph.D. Wisconsin; W. L. Parks, Ph.D. Purdue; J. H. Reynolds, Ph.D. Wisconsin; L. F. Shier (Emeritus) Ph.D. North Carolina State; L. N. Skold, (Emeritus) M.S. Kansas State; M. E. Springer (Emeritus) Ph.D. California (Berkeley); H. D. Swingle (Emeritus), Ph.D. Louisiana State.

Associate Professors:

Assistant Professors:

The Department of Plant and Soil Science offers graduate programs leading to the Master of Science and Doctor of Philosophy degrees. Concentrations for the doctoral program are offered in soils, plant breeding and genetics, and crop physiology and ecology. For further information, contact the Chairman of the Admissions Committee.

THE MASTER'S PROGRAM

A thesis is required for this M.S. program. Registration for a minimum of 9 hours of Thesis 5000 is required. An oral examination covering the thesis and coursework is required.

THE DOCTORAL PROGRAM

A minimum of 108 quarter hours beyond the Bachelor's degree, exclusive of credit for the Master's thesis, is required. A minimum of 39 quarter hours must be completed in courses numbered above 5000 exclusive of Doctoral Research and Dissertation, of which 9 must be in courses numbered above 6000.

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

*3120 Grain and Oil Crops (4) Distribution improvement, morphology, culture, harvesting, and utilizing of corn, small grains, grain sorghum, soybeans and related crops. Prereq: 2150, 8 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, 8 hrs biological science. 3 hrs and 1 lab. F

*3170 Vegetable Crops (4) Characteristics, economic importance, adaptability and production of vegetables for fresh and processing markets with emphasis on both warm and cool season crops. Prereq: 2130, 8 hrs biological sciences. 3 hrs and 1 lab. Sp

*3180 Fruit Crops Management (4) Soils, planting, cultural development of fruit crops plantations; pest control, harvesting, packing, storage, and pruning. Prereq: 2130, 8 hrs biological sciences. 3 hrs and 1 lab. W

*3220 Soil Management (4) Soil management for crop production including cropping systems, fertilizers use, and tillage operations for specified soil and farming conditions. Prereq: 2130, 3 hrs and 1 lab. Sp

*3250 Soils in Forestry (3) Soil as a medium for tree growth; relation of physical, chemical, and biological properties of soils to management problems of forest stands. Soil properties of importance in road location, recreational development, and watershed management. Prereq: 2130, Forestry 3220. 2 hrs and 1 lab. W

*3610 Statistics for Agricultural Sciences (3) Application of statistics to interpretation of agricultural research. Notation, descriptive statistics, probability distributions, confidence intervals, student's t and chi-square tests, analysis of variance, mean separation procedures, linear regression and correlation. Prereq: Math 1550 or 1580 or equivalent. 3 hrs and 1 rec. F, W

4110 Soil Chemistry (4) Colloidal systems; properties and behavior of colloidal soil materials; relations of colloidal properties to soil fertility. 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: Biology 3110 or equivalent. 3 hrs and 1 lab. W

4250 Agricultural Pesticides (4) Regulation of pesticide development, manufacture, transportation, marketing, and utilization; factors affecting action and degradation and environmental impact of pesticides used in agriculture, forestry and related areas. Prereq: 1 yr biological sciences and 1 yr chemistry. 3 hrs and 1 lab. F

4320 Soil Formation, Morphology and Classification (4) Soil parent materials, basic pedogenic processes, soil forming morphologies and interpretation of morphology, taxonomic classification of soils. Use of soil surveys. Prereq: 2130. 3 hrs and 1 lab. Sp

4350 Soil Survey (2) Techniques of mapping soils, development of soil survey map, soil unfamiliarization and testing of mapping unit descriptions and interpretations. Prereq or coreq: 4320, 1 hr and 1 lab. Sp

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

4410 Crop Physiology and Ecology (4) Application of principles of plant physiology and ecology to crop production. Effects of environmental factors (light, water, temperature, etc.) on physiological processes (respiration, photosynthesis, germination, flowering, etc.) Prereq: Botany 3210, 2130 and any Plant and Soil Science course at 3000-level except 3610. 3 hrs and 1 lab. W

4710 Principles of Weed Science (4) Principles of cultural, biological, and chemical control of weeds; effects on environment, principles of herbicide selectivity and activity, types of herbicides and specific recommendations for various crop and non-crop uses. Prereq: Agriculture 1140 or 1120; organic chemistry; 2130 and any Plant and Soil Science course at 3000-level except 3610. 3 hrs and 1 lab. Sp

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

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

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: 3220 and 4110 or consent of instructor. W

5250 Pedology (4) Factors and processes of formation as related to physical, chemical, and mineralogical 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; field plot techniques; analysis and interpretation of data from agricultural experiments; linear models and contrast statements; designs, randomization, complete block designs and latin squares; treatment arrangements; combined analyses; Prereq: 3610 or equivalent, a computer science course or UCC SAS short course. W

5340 Soil Physics (4) Physical and chemical relationships among soil, liquid, and gaseous phases of soil system and their relation to density, moisture, aeration and plant growth; basic thermodynamics, physical characterization of a soil. Prereq: 4110 or consent of instructor. 3 hrs and 1 lab. W, A

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

5390 Advanced Soil Chemistry (3) Structural properties of soil minerals determining physicochemical reactions, ion exchange. Donnan Equilibrium, double layer theory. Prereq: 4110 or consent of instructor. 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, polyploidy, tetrasomic inheritance, extrachromosomal inheritance, cytoplasmic genetic systems, and genetic engineering of higher plants. Prereq: Basic genetics or consent of instructor. F, A

5720 Quantitative Genetics (3) Genetic constitution of population and changes in gene frequency; recognition and measurement of continuous variations; estimation of variable components and genetic advance under different breeding procedures. Prereq: Biology 3110 or equivalent; 3610 or equivalent. W, A

5750 Advanced Plant Breeding (4) Developing breeding programs: objectives; historical and theoretical development of concepts of components of variation, heritability, selection intensity, methods of selection, linkage in relation to selection, genotype by environment interaction, and genetic resistance and vulnerability to pests. Prereq: 4129, 5310 or concurrent registration, or consent of instructor. 3 hrs and 1 lab. W, A

5760 Advanced Plant Breeding II (4) Concepts and utilization of heterosis, inbreeding, stability parameters, selection indices, methods of selection, and germplasm resources in breeding program for improvement of plant species. Prereq: 5750 or consent of instructor. 3 hrs and 1 lab. Sp, A

5810 Advanced Crop Climatology and Ecology (4) Quantification of climatic and meteorological factors affecting plant growth; world climates, crop distribution and productivity, and their interaction; general and specific relations among environmental factors, crop organisms and agricultural systems. Prereq: 3610 or equivalent; 4410, or Botany 3210 or 4310. 3 hrs and 1 lab. F, A

5820 Advanced Crop Physiology (4) Photosynthetic efficiency in field and relationship with evapotranspiration, hardness development and tolerance for field stresses: drought, cold, heat, flooding, Photoperiodism, flowering, and seed production. Nitrogen fixing relations of bacteria with legumes and grasses. Prereq: 4410. 3 hrs and 1 lab. W, A

5840 Postharvest Physiology (3) Preharvest and postharvest factors affecting quality of stored fruits and vegetables. Synthetic and degradation processes in maturation and ripening of plants. Indices of plant maturation and quality. Handling and storage techniques for fruits and vegetables. Prereq: 4410. F, A

5850 Mechanisms of Herbicide Action (3) Principles of herbicide action, translocation, persistence, degradation and action and basis of selectivity of herbicides. Effects of herbicides on plant morphology, metabolic systems and enzymatic activities. Prereq: 4410 or consent of instructor. 4 hr lecture and 1 hr lab. A

5855 Plant Growth Regulation and Control (1) Laboratory course in plant growth, regulation and
control under field, greenhouse, laboratory and storage environments. Prereq or coreq: 5840, 5850, or 5860. May be repeated. Maximum 4 hrs. E

5860 Growth Control with Chemicals (3) Character, theories of action and use of plant growth regulators with special emphasis on practical aspects of use for controlling plant growth, development and metabolism to increase efficiency and production of agricultural and horticultural crops. Special consideration to current commercial uses. Prereq: Botany 5210 or equivalent. W. A

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

6100 Topics in Soil Sciences (1-3) Student needs and interests determine course content. Thermodynamics of soil solutions, clay structure and surface chemistry, soil mineralogy, plant mineral nutrition, soil microbiology, water movement and use by plants, soil structure, soil thermal properties, interaction in the soil-plant environment. May be repeated. Maximum 9 hrs. E

6200 Topics in Plant Breeding and Genetics (1-3) Student needs and interests determine course content. Genotypes by environment interactions, estimation of quantitative parameters, mutations, chromosome dynamics, polyploidy, genetic engineering, interspecific hybridization, linkage, screening methods, genome organization. May be repeated. Maximum 9 hrs. E

6300 Topics in Crop Physiology and Ecology (1-3) Student needs and interests determine course content. Microclimate of agroecosystems, crop dormancy and responses to stress, physiology of crop growth and reproduction, interactions of physiology and germplasm in crop production, theory and application of quantitative methods in crop physiology and ecology research. May be repeated. Maximum 9 hrs. E

6410 Experimental Designs (3) Principles of balanced and unbalanced designs used in agricultural research; use of linear models, dummy variables, simple multivariate linear models, response surfaces, discriminant analysis, multiple regression, heterogeneity of slopes, and other techniques. Prereq; 5310 and Statistics 4310 or equivalent. F.A

*Graduate credit for non-majors only.

College of Veterinary Medicine

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

The College of Veterinary Medicine, established in 1974, offers a professional curriculum leading to the degree Doctor of Veterinary Medicine (D.V.M.). The college offers graduate studies leading to the degrees Master of Science (M.S.) and Doctor of Philosophy (Ph.D.). Residency training programs in the various clinical specialties are also offered.

The college is organized into six academic departments; Animal Science (jointly with the College of Agriculture), Environmental Practice, Microbiology (jointly with the College of Liberal Arts), Pathobiology, Rural Practice, and Urban Practice.

Primary objective of the college is to educate veterinarians for private practice. However, the professional curriculum provides an excellent basic medical education, in addition to training in diagnosis, disease prevention, medical treatment, and surgery. Graduates are qualified to pursue careers in many facets of veterinary medicine and related health professions.

Most veterinarians are engaged in private practice. The majority of these are in general practices which deal with the diseases of all kinds of animals. About one-fourth of the veterinarians in the United States are engaged exclusively in pet or companion animal practice. A growing number are concerned with the health problems of zoo animals, laboratory animals, wildlife, and aquatic species.

Veterinarians also find rewarding careers in the U.S. Public Health Service, the U.S. Army and Air Force, and in state, county, or local health agencies. A large number of veterinarians are employed by the U.S. Department of Agriculture and by state departments of agriculture for important work in livestock disease control, meat and poultry inspection, serum and vaccine production, and the protection of our country against the importation of foreign animal diseases.

Excellent opportunities exist for veterinarians interested in research, both research for the direct benefit of animals and research conducted with animals but for the benefit of humans. Such opportunities are available at colleges and universities and with governmental agencies, private research institutions, and biological and pharmaceutical companies.

FACILITIES

Administrative offices of the College of Veterinary Medicine are located in Morgan Hall on the agricultural campus. The Department of Animal Science is housed in Brehm Animal Science Building, also on the agricultural campus, and the Department of Microbiology is located in Walters Life Sciences Building on "The Hill" of The University of Tennessee, Knoxville.

The Veterinary Medicine Building on the agricultural campus houses the departments of Environmental Practice, Rural Practice, Urban Practice, and Pathobiology. Additionally, the Veterinary Teaching Hospital, clinics, and the Agriculture/Veterinary Medicine Library are contained within this modern structure of 245,000 gross square feet.

The college has research facilities on Cherokee Farm adjacent to the UT Hospital. Satellite teaching-research facilities are located in Middle and West Tennessee.

ADMISSION REQUIREMENTS

Admission to the professional program of the College of Veterinary Medicine is limited to that number for which an education of high quality can be provided with the resources available to the college.

To qualify for admission, a candidate must have completed at least the following minimum pre-veterinary requirements:

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Minimum Credits</th>
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<tbody>
<tr>
<td>English, including speech</td>
<td>12</td>
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<tr>
<td>Humanities</td>
<td>12</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>12</td>
</tr>
<tr>
<td>Mathematics through introductory calculus</td>
<td>8</td>
</tr>
<tr>
<td>Chemistry: general</td>
<td>12</td>
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<tr>
<td>Organic</td>
<td>12</td>
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<tr>
<td>Biochemistry</td>
<td>8</td>
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<td>Physics</td>
<td>12</td>
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<tr>
<td>Biology or zoology</td>
<td>12</td>
</tr>
<tr>
<td>Microbiology</td>
<td>4</td>
</tr>
<tr>
<td>Animal science, including nutrition and genetics</td>
<td>13</td>
</tr>
</tbody>
</table>

1Includes history, literature, music or art appreciation, philosophy, religion, or foreign language.

2Includes economics, anthropology, political science, psychology, sociology, and geography.

3Excluding laboratory.

Pre-veterinary requirements may be completed in any accredited college or university which offers courses equivalent to those at The University of Tennessee.

The Colleges of Agriculture and Liberal Arts of The University of Tennessee offer a three-year pre-veterinary curriculum which satisfies all the course requirements for admission to the College of Veterinary Medicine. Students who are admitted to the College of Veterinary Medicine following completion of this pre-veterinary curriculum will receive a bachelor's degree upon completion of the first year (three quarters) of the professional veterinary medicine curriculum.

ADMISSION PROCEDURE

Admission of new students will be for the fall quarter of each year. Applicants will be screened carefully by a faculty committee to determine those best qualified for admission within the college enrollment quota.

Applicants will be considered in the following order of priority: (1) residents of Tennessee; (2) residents of other states.

Forms and instructions for making application for admission may be obtained from:

Director of Admissions
202 Student Services Building
University of Tennessee
Knoxville, Tennessee 37996-0200

Applications must be completed and mailed so as to reach the Director of Admissions by January 15 each year. All pre-veterinary requirements must be completed by the end of the spring term of the year in which the student plans to enroll in the College of Veterinary Medicine.

COURSE LOAD

The professional curriculum of the College of Veterinary Medicine requires a specific number of hours each quarter. A student may enroll for fewer or more than that number only with the permission of the dean. Because of the sequential and highly integrated character of the professional curriculum, all courses in a given quarter are considered prerequisite to those in the succeeding quarter.
EXTRAMURAL PROGRAMS
The opportunity to participate in off-campus learning experiences may be available for a limited number of students during the latter half of the final year of the professional curriculum. Selection of an extramural learning experience will require approval by the department concerned and the College of Veterinary Medicine Curriculum Committee. The extramural program identified by the student must represent a learning experience not available within The University of Tennessee, Knoxville.

PROFESSIONAL CURRICULUM
The professional curriculum in veterinary medicine is an 11-academic quarter, year-round program, including summers. The first year (three quarters) consists mostly of pre-clinical subjects such as anatomy, physiology, microbiology, parasitology, and general pathology. The second year (four quarters) includes the study of diseases, their causes, diagnosis, treatment, and prevention. The final calendar year is devoted to intensive clinical training in the solving of animal disease problems, including extensive clinical experience in the teaching hospital. The curriculum also provides for education in the science and art of veterinary medicine and in paramedical subjects such as animal behavior, medical communication, professional ethics, jurisprudence, economics, and practice management.

Only students officially enrolled in the professional veterinary curriculum may register for 8000-level courses.

### Fall Quarter, FIRST YEAR
- **Hours**
- **Credit**
- Vet. Animal Science 8510 4
- Vet. Animal Science 8540 5
- Vet. Medicine 8310 2
- Microbiology 8101 5
- Vet. Animal Science 8240 5

### Winter Quarter, FIRST YEAR
- **Hours**
- **Credit**
- Vet. Animal Science 8520 5
- Vet. Microbiology 8102 4
- Vet. Animal Science 8250 5
- Environmental Practice 8611 2

### Spring Quarter, FIRST YEAR
- **Hours**
- **Credit**
- Vet. Microbiology 8103 4
- Pathobiology 8730 4
- Pathobiology 8710 5
- Vet. Medicine 8360 3
- Vet. Medicine 8311 2
- Environmental Practice 8612 5

### Summer Quarter, SECOND YEAR
- **Hours**
- **Credit**
- Vet. Medicine 8341 4
- Vet. Medicine 8362 3
- Vet. Medicine 8343 5
- Vet. Medicine 8352 3
- Vet. Medicine 8320 3
- Vet. Medicine 8363 2

### Fall Quarter, SECOND YEAR
- **Hours**
- **Credit**
- Vet. Medicine 8350 4
- Vet. Medicine 8340 4
- Vet. Medicine 8342 4
- Vet. Medicine 8353 4
- Vet. Medicine 8366 4
- Vet. Medicine 8346 4
- Vet. Medicine 8344 4

### Winter Quarter, SECOND YEAR
- **Hours**
- **Credit**
- Vet. Medicine 8360 5
- Vet. Medicine 8381 5
- Vet. Medicine 8351 4
- Vet. Medicine 8365 4
- Vet. Medicine 8345 4
- Vet. Medicine 8344 4

### Spring Quarter, SECOND YEAR
- **Hours**
- **Credit**
- Vet. Medicine 8370 9
- Vet. Medicine 8371 3
- Vet. Medicine 8386 1
- Vet. Medicine 8375 3
- Vet. Medicine 8344 1
- Vet. Medicine 8372 4

### Third Year
- **Hours**
- **Credit**
- **Basic Sequence roughly equivalent to**
- **Courses**
- **Hours**
- **Credit**
- Core Block—9 weeks
- Environmental Practice 8600-2 weeks
- Pathobiology 8760—2 weeks
- Radiology 8401—2 weeks
- Special Services 8402—2 weeks
- Rural Practice—8 weeks
- Urban Practice—8 weeks
- Seminars 0-8

### Advanced Sequence (roughly equivalent to Winter and Spring Quarters)
- **Hours**
- **Credit**
- Core Block—9 weeks
- Pathobiology 8760—2 weeks
- Radiology 8401—2 weeks
- Free Time—5 weeks
- Rural Practice—9 weeks
- Urban Practice—9 weeks

### Third Year Credits 82

### TOTAL: 232 hours

### Fall Quarter, SECOND YEAR
- **Hours**
- **Credit**
- Vet. Medicine 8350 4
- Vet. Medicine 8340 4
- Vet. Medicine 8342 4
- Vet. Medicine 8353 4
- Vet. Medicine 8366 4
- Vet. Medicine 8346 4
- Vet. Medicine 8344 4

### Winter Quarter, SECOND YEAR
- **Hours**
- **Credit**
- Vet. Medicine 8360 5
- Vet. Medicine 8381 5
- Vet. Medicine 8351 4
- Vet. Medicine 8365 4
- Vet. Medicine 8345 4
- Vet. Medicine 8344 4

### Spring Quarter, SECOND YEAR
- **Hours**
- **Credit**
- Vet. Medicine 8370 9
- Vet. Medicine 8371 3
- Vet. Medicine 8386 1
- Vet. Medicine 8375 3
- Vet. Medicine 8344 1
- Vet. Medicine 8372 4

### TOTAL: 87 hours

### THIRD YEAR

### TOTAL: 232 hours

### Biomedical environments and in teaching or research capacities involving humans or animals.

### Departments of Instruction

### Animal Science—Veterinary Medicine

### Professors:
- D. O. Richardson (Head), Ph.D., Ohio State
- K. M. Barth, Ph.D., Rutgers
- J. C. Bell, Ph.D., Oklahoma State
- J. K. Biecher (Emeritus), Ph.D., Ohio State
- C. C. Chamberlain (Emeritus), Ph.D., Iowa State
- B. H. Erickson, Ph.D., Kansas State
- G. G. Hall (Dean), Ph.D., Iowa State
- S. L. Hansard (Emeritus), Ph.D., Florida
- E. R. Lidvall, M.S., Tennessee
- G. M. Merriman (Emeritus), D.V.M., Michigan State
- T. P. McDonald, Ph.D., Tennessee
- J. B. McElrath, Ph.D., Auburn
- K. Miller, Ph.D., Georgia
- M. J. Montgomery Ph.D., Wisconsin
- R. L. Murphy (Emeritus), Ph.D., Wisconsin
- H. V. Shirley, Ph.D., Illinois
- R. R. Shrode, Ph.D., Iowa State
- R. L. Tugwell (Emeritus), Ph.D., Kansas State

### Associate Professors:
- W. R. Backus, Ph.D., Pennsylvania
- H. Eller, D.V.M., Virginia
- J. D. Flaherty, Ph.D., Ohio State
- J. P. Hitchcock, Ph.D., Michigan State
- H. G. Kattree, Ph.D., Virginia Polytechnic Institute
- F. D. Magnuson, Ph.D., Kansas State
- K. R. Robbins, Ph.D., Illinois
- M. H. Sims, Ph.D., Auburn
- J. C. Walter, Ph.D., Nebraska

### Assistant Professors:
- B. R. Bell, Ph.D., North Carolina State
- W. C. Cullen, Ph.D., Minnesota
- J. D. Godkin, Ph.D., Massachusetts
- R. W. Heitmann, Ph.D., Maine
- S. P. Oliver, Ph.D., Ohio State
- T. W. Schultz, Ph.D., Tennessee
- J. D. Smalling, Ph.D., Texas

In addition, academic expertise of staff members at CARL and Oak Ridge is used on appropriate occasions.

### PROFESSIONAL COURSES

### 8240-50 Veterinary Physiology (5,5) Introduction to concepts and problems in physiology which form a base for clinical applications and formal training in pharmacology, medicine, pathology, and surgery. Order of sequence: Cellular, cardiovascular, digestive, renal, respiratory, and endocrine physiology.

### 8510-20 Veterinary Histology (4,5) An introduction to the microanatomy of cells and the fundamental tissue types of common domestic animals. Techniques of microscopic study, technique of sectioning, and evaluation of acute toxicity.

### 8540-50 Veterinary Gross Anatomy (5,5) Lab covering gross and applied anatomy of common domestic animals (dog, cat, horse, cow). Dissection of embalmed specimens; projections, slides, models, and living animals. Sequence of organ system study correlated with 8540-50.

### 8570 Special Problems in Animal Science (2-20) Certain topics in anatomy, histology, and physiology. May be repeated. W, Sp

### 8575 Advanced Seminar in Animal Science (1-4) Applied anatomy, histology and physiology. F, Su

### GRADUATE COURSES

### Additional courses listed in College of Agriculture: Department of Animal Science

### 5350 Mammalian Organology (5) Microscopic study of structure of organs of major organ systems. Prereq: Zoology 3320 or equivalent. 3 hrs and 5 labs.

### 5540 In vitro Evaluation of Toxicity (3) Principles and techniques of in vitro evaluation of acute toxicity, mutagenesis, carcinogenesis, and teratogenesis. Prereq: Biochemistry 5610. 2 hrs and 3 labs.
Environmental Practice


Resident: P. J. Morris, D.V.M. California (Davis).

PROFESSIONAL COURSES

8600 Basic Clinical Rotation in Environmental Practice (3) Introductory clinical experience in laboratory animal and zoo animal medicine, epidemiology, other related disciplines. Su, W, Sp

8611-12 Pharmacology (2,5) Principles of pharmacokinetics as well as pharmacodynamic properties of veterinary drugs; mode of action, pharmacokinefects, and physical properties, metabolism, toxicities, important idiosyncrasies, clinical application. Correlated with 8240, 8250, and 8311. W, Sp

8650 Environmental Clerkships (2-30) Advanced clinical experience and training in practice of veterinary medicine. Prereq: 8600, Pathobiology 8700, Rural Practice 8900, and urban Practice 8900. May be repeated. W, Sp

8670 Special Problems in Environmental Practice (2-10) Public Health and epidemiology. May be repeated. W, Sp

8675 Advanced Seminar in Environmental Practice (1-4) Comparative medicine, public health, epidemiology, and pharmacology. Su

GRADUATE COURSES

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

5010 Comparative Pathology (5) Lectures and lab. Pathogenic mechanisms, comparative aspects. Prereq: laboratory examination and clinical pathologic, parasitologic, and physiological techniques. W, Sp

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

Microbiology—Veterinary Medicine

Professors: A. Brown (Head), Ph.D. Chicago; R. W. Beck, Ph.D. Wisconsin; J. M. Becker, Ph.D. Cincinnati; R. J. Courhey, Ph.D. Syracuse; P. C. N. Abell, Ph.D. Maryland; W. S. Syed, Ph.D. Yale; B. T. Rouse, B.V.S. University of Bristol (England); Ph.D. University of Guelph (Canada); J. M. Woodward (Emeritus), Ph.D. Kansas; C. J. Wust, Ph.D. Indiana.

Associate Professors: D. A. Bramis, Ph.D. Cornell; D. A. Brian, D.V.M., Ph.D. Michigan State; G. S. Sayler, Ph.D. Idaho.

Assistant Professors: R. M. Moore, Ph.D. Texas-Austin; K. M. Srotkin, Ph.D. Michigan State; G. Stacey, Ph.D. Texas-Austin.

PROFESSIONAL COURSES

8101 Veterinary Bacteriology and Mycology (5) Pathogenesis of bacterial and fungal diseases. Taxonomic study relating microbial structure, metabolism and genetics to patterns of disease and mode of action of antimicrobials. 3 hrs and 2 labs. F

8102 Veterinary Virology (4) Structure and replication of animal viruses, classification of viruses, mechanisms of viral pathogenesis. Techniques for quantitating viruses, viral antigens, and antiviral antibodies. Fundamental understanding best approach to viral diagnosis and immunopathology. 2 hrs and 2 labs. W

8103 Veterinary Immunology (4) Immunobiology, mechanisms of immune reaction, diagnostic immunology, role of immune response in preserving integrity of body as well as in causing disease. 2 hrs and 2 labs. Sp

8175 Advanced Seminar in Microbiology (1-4) Applied microbiology such as serologic diagnosis, clinical immunology. Su

GRADUATE COURSES

For specific course listings please see College of Agriculture, Department of Animal Science, and College of Liberal Arts, Department of Microbiology.

Pathobiology

Professors: R. L. Michel (Head), V.M.D. Pennsylvania, Ph.D. Michigan State; M. D. McGavin, M.V.Sc. Queensland (Australia); Ph.D. Michigan State; L. N. D. Polglieber, B.V.Sc., Pretoria (South Africa), Ph.D. Iowa State; H. M. Schuller, D.V.M. Justus Leibig (Germany); Ph.D. Hannover (Germany).


Assistant Professors: M. A. Breider, D.V.M. Oklahoma State, Ph.D. Texas A & M.


PROFESSIONAL COURSES

8700 Basic Pathobiology Rotation (3) Practice and demonstrations in laboratory diagnosis, postmortem examination and clinical pathology, parasitology, and microbiologic techniques. Su, F

8710 Veterinary Pathology (5) Causes of disease, disturbances of cell growth, inflammation, and neoplasia. 3 hrs and 2 labs. Sp

8730 Veterinary Parasitology (4) Parasitology (protozoology, helminthology, and entomology) and relation to disease in animals. 3 hrs and 1 lab. Sp

8760 Advanced Pathobiology (3) Further training in clinical laboratory diagnostic procedures, and in postmortem examinations. W, Sp

8770 Special Problems in Pathobiology (2-10) Opportunity to design and execute research problems. May be repeated. W, Sp

8775 Advanced Seminar in Pathobiology (1-4) Diagnostic methods, electron microscopy, histologic techniques. Su, F

GRADUATE COURSES

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

5010 Comparative Pathology (5) Lectures and lab. Pathogenic mechanisms, comparative aspects. Prereq: laboratory examination and clinical pathologic, parasitologic, and physiological techniques. W, Sp

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

6010 Special Topics in Pathology (1-3) E

6020 Special Problems in Pathobiology (1-5) Necropsy, histopathology, clinical pathology, comparative pathology, clinical bacteriology, clinical virology, and medical virology. May be repeated. Maximum 20 hrs. E

6030 Veterinary Biopsy (1-2) Examination of biopsy specimens and interpretation of observations. Preparation of specimens for sectioning. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. E

6035 Correlative Post-Mortem Pathology (1-3) Gross and microscopic post-mortem examination of animals. Correlative interpretation of clinical diseases and lesions. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

6040 Veterinary Pathology Seminar (1) Microscopic slides and transparencies of lesions from cases examined by pathologists, residents, and graduate students. Interpretation of observations. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

6045 Pathobiology Seminar (1) Subjects of current interest in biomedical science. Students present one seminar per term enrolled. Prereq: Consent of instructor. May be repeated. Maximum 2 hrs. Class meets once monthly. E

6050 Ultrastructural Pathology (1) Ultrastructural changes in diseased states. Interpretation of observations. Prereq: Professional medical degree or consent of instructor. F, A

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. W

6055 Techniques in Pathology (3) Fixation, processing and staining of tissue specimens; specialized gross dissection techniques; photography of gross specimens and photomicrography. Prereq: Consent of instructor. 2 hrs and 1 lab. F, A

6060 Principles of Pathology (3) Advanced topics in pathology and mechanisms of disease: pathophysiology, cellular degeneration, inflammation, immunopathology, hemostasis. Principal biochemical and morphologic responses of various cells, tissues, and organs to injury and other metabolic derangements. Principal current seminars on selected topics from current literature and textbooks. Prereq: Consent of instructor. F, A

Rural Practice

Professors: G. M. H. Shires (Head), B.V.Sc., Pretoria (South Africa).
**GRADUATE COURSES**

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>5000</td>
<td>Thesis (1-15) P/NP only. E</td>
</tr>
<tr>
<td>6000</td>
<td>Doctoral Research and Dissertation (3-15) P/NP only. E</td>
</tr>
</tbody>
</table>

**Interdepartmental Offerings**

**Veterinary Medicine**

**PROFESSIONAL COURSES**

<table>
<thead>
<tr>
<th>Course Code</th>
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</thead>
<tbody>
<tr>
<td>8010</td>
<td>Client Relations and Communication Skills (1) Interpersonal skills as they apply to client relations and communication with colleagues, employees, general public. 1 lab S/NC only. Sp</td>
</tr>
<tr>
<td>8310</td>
<td>Introduction to Veterinary Medical Practice (2) Animal species, breed identification, basic care, feeding, restraint, handling. Introduction to physical diagnosis, intravenous techniques, blood sampling, etc. 1 hr and 1 lab. F</td>
</tr>
<tr>
<td>8311</td>
<td>Introduction to Veterinary Medical Practice (2) Physical diagnosis, history taking, and client relations, anesthetic principles, agents, and techniques. 1 hr and 1 lab. F</td>
</tr>
<tr>
<td>8320</td>
<td>Medical Science Interaction Laboratory (3) Multidisciplinary, lab and discussions to consider integrating learning and understanding of physiologic, pharmacologic, and pathologic principles. 3 hrs and 1 lab. F</td>
</tr>
<tr>
<td>8340</td>
<td>Integumentary System (4) Diseases of integumentary system of animals with emphasis on laboratory examination, interpretation of pathologic features, diagnosis, and treatment. 3 hrs and 1 lab. F</td>
</tr>
<tr>
<td>8341</td>
<td>Hematology and Introductory Clinical Pathology (3) Anatomic, physiologic, and pharmacologic and surgical concepts. Anesthetic techniques and in interpretation of radiographs as part of the diagnostic process. May be repeated. E</td>
</tr>
<tr>
<td>8342</td>
<td>Alimentary Tract I (5) Physiologic basis, pathology, diagnosis, and treatment of diseases of alimentary tract and digestive organs of dogs and cats. F</td>
</tr>
<tr>
<td>8343</td>
<td>Patterns of Disease (5) Host-agent relationship mechanisms and pathologic and clinical features of animal populations. Prereq: Consent of instructor and College of Veterinary Medicine Curriculum Committee. W, Sp</td>
</tr>
<tr>
<td>8344</td>
<td>The Art of Veterinary Medicine (1) Specific diagnostic problems or paramedical subjects important to veterinary medical practice: differential etiology, diagnosis, and treatment of certain disease signs or symptoms; implications for veterinarian of medical jurisprudence and ethics, practice economics, veterinary history. May be repeated. S/NC only. F, W</td>
</tr>
<tr>
<td>8345</td>
<td>Alimentary Tract II (4) Physiologic basis, pathology, diagnosis, and treatment of diseases of alimentary tract and digestive organs of swine, sheep, goats, cows, and horses. W</td>
</tr>
<tr>
<td>8350</td>
<td>Reproductive System (6) Diagnosis, therapy and prevention of conditions causing reduction of the reproductive efficiency of domestic animals. Abnormal conditions of the mammary gland, diagnosis and prevention of mastitis. 4 hrs and 2 labs. F</td>
</tr>
<tr>
<td>8351</td>
<td>Urinary System (4) Understanding of urinary renal system of animals in health and disease. 3 hrs and 1 lab. W</td>
</tr>
<tr>
<td>8352</td>
<td>Cardiovascular System (3) Pathology, diagnosis, and management of cardiovascular diseases of animals. Anatomic, physiologic, and pharmacologic principles which provide basis for medical and surgical treatment. 2 hrs and 1 lab. F</td>
</tr>
<tr>
<td>8353</td>
<td>Endocrine, Metabolic and Nutritional Diseases (4) Biochemical and pathophysiologic mechanisms of endocrine, metabolic and nutritional diseases of animals; diagnosis, therapy and prevention. F</td>
</tr>
<tr>
<td>8360</td>
<td>Musculoskeletal System I (5) Pathology, diagnosis, and treatment of muscular and skeletal diseases of small animals; pathologic changes, interpretation of radiographs and surgical procedures. 4 hrs and 1 lab. W</td>
</tr>
<tr>
<td>8361</td>
<td>Musculoskeletal System II (5) Pathology, diagnosis, and treatment of muscular and skeletal diseases of large animals. Functional anatomy, radiographic interpretation, surgical procedures and medical therapy applicable to equines and ruminants. 4 hrs and 1 lab. W</td>
</tr>
<tr>
<td>8362</td>
<td>Veterinary Toxicology (3) Molecular mechanisms and pathologic and clinical features of animal diseases caused by common toxic agents. Su</td>
</tr>
<tr>
<td>8363</td>
<td>Public Health (2) Public health aspects of veterinary medicine and nature of related laws, ordinances, and regulations. Veterinarian’s role in the protection of environment, ecology, and quantity and quality of food. Su</td>
</tr>
<tr>
<td>8364</td>
<td>Animal Diets (2) Applied nutrition of cattle, swine, horses, dogs and cats for the veterinarian. Diets and methods of feeding for both normal and special situations. Sp</td>
</tr>
<tr>
<td>8365</td>
<td>Radiology (4) Basic radiologic technology, radiation safety, special procedures and radiographic interpretation in diagnosis of clinical cases. 3 hrs and 1 lab. W</td>
</tr>
<tr>
<td>8366</td>
<td>Respiratory System (4) Detection and diagnosis of upper and lower respiratory diseases of domestic animals. Pathophysiology and pathology of infectious and noninfectious diseases. Lectures and lab with live and simulated case studies. 3 hrs and 2 lab. W</td>
</tr>
<tr>
<td>8370</td>
<td>Neurosciences (5) Normal and abnormal neural structure and function in animals; clinical neurology and neuropathology. 6 hrs and 3 labs. Sp</td>
</tr>
<tr>
<td>8371</td>
<td>Visual and Auditory Systems (3) Diseases involving eyes and ears of animals, with emphasis on anatomic, physiologic, and pathologic features. 2 hrs and 1 lab. Sp</td>
</tr>
<tr>
<td>8372</td>
<td>Comparative Medicine (4) Diagnosis, prevention, and treatment of diseases of laboratory animals, avian species, and marine mammals seen most commonly by practicing veterinarians. Sp</td>
</tr>
<tr>
<td>8375</td>
<td>Principles of Medicine (3) Physiologic and pathologic principles underlying mechanisms of disease. Selected examples of human and animal diseases, recent scientific advances and effects on veterinary medicine. Sp</td>
</tr>
<tr>
<td>8401</td>
<td>Clinical Radiology (3) Training in radiographic technology and interpretation of radiographs as part of the diagnostic process. May be repeated. E</td>
</tr>
<tr>
<td>8402</td>
<td>Special Medical Services (3) Clinical training in specialty areas such as anesthesiology and ophthalmology, with casework in both urban and rural animal clinics. Su, F</td>
</tr>
<tr>
<td>8460</td>
<td>Extramural Programs (3-20) Supervised off-campus educational program with an approved institution; limited enrollment. Prereq: Consent of department and College of Veterinary Medicine Curriculum Committee. W, Sp</td>
</tr>
</tbody>
</table>

**GRADUATE COURSES**

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<tr>
<td>5343</td>
<td>Patterns of Disease (5) Host-agent relationship in disease of animals. Pathogenesis, laboratory diagnosis, control, and public health significance. Epidemiology and public health significance in study of diseases in animal populations. Prereq: Consent of instructor and Director. Comparative and Experimental Medicine Graduate Program.</td>
</tr>
<tr>
<td>5362</td>
<td>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. Sp</td>
</tr>
<tr>
<td>5363</td>
<td>Public Health (2) Public health aspects of veterinary medicine in urban and rural animal populations. Prereq: Consent of instructor and Director. Comparative and Experimental Medicine Graduate Program. Sp</td>
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</table>
Institute of Agriculture/Interdepartmental Offerings

inary medicine and nature of related laws, ordinances and regulations. Veterinarian's role in protection of environment, ecology, and quantity and quality of food. Prereq: Consent of instructor and Director, Comparative and Experimental Medicine Graduate Program. Su

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. Sp

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. Sp
The College of Business Administration

C. Warren Neel, Dean
John R. Moore, Associate Dean
Roger L. Jenkins, Associate Dean for Graduate Programs
Richard C. Reizenstein, Associate Dean for Undergraduate Programs
Clyde Keller, Associate Dean for External Affairs
John E. Riblett, Director of Management Development Programs
David A. Hake, Director, Center for Business Economics Research

Graduate programs of the College of Business Administration are designed to prepare men and women to assume positions in the increasingly complex world of business and industry, teaching and research, and government.

Viewing the business firm as operating in dynamic social, political, and economic environments which demand leaders capable of dealing with innovation and rapid change, the College places central importance on development of students' thought processes. Emphasis is focused on flexibility of mind, receptivity to new ideas, and capacity to adapt one's reasoning powers. Our objective is to encourage the student to develop the ability to reason analytically and logically. Above all else, we strive to instill the irrepressible desire to continue to learn and grow in knowledge throughout the student's life.

Graduate Programs

The College of Business Administration offers programs leading to five advanced degrees: the Doctor of Philosophy with majors in Business Administration, Economics, and 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 97). Also, the Department of Management Science offers an intercollegiate program leading to the Master of Science degree. (See page 98).

The two College-wide programs, the MBA and the Ph.D. in Business Administration 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 UT Knoxville on an in-state tuition basis. Programs in the College of Business Administration available to residents of the states indicated include: Ph.D. (Business Administration) 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. For full-time students, the MBA program is a two-year lock-step program with students beginning in the fall of each year and graduating in the spring, two years hence. Those students not having the equivalent of two quarters of undergraduate coursework in accounting, business law, and economics must either attend special UTK MBA classes summer quarter or complete courses in these areas at another accredited institution prior to enrolling in the MBA program. During the summer between the first and second year, students must complete an internship or equivalent experience. The complete MBA program with a concentration in management or entrepreneurship and new venture analysis is offered for part-time students by the regular faculty of the College. Part-time students enter in the fall quarter and take approximately 4 years to complete the program. Part-time students are required to successfully complete six hours of graduate credit per quarter. Internships are not required of part-time students.

The program consists of 17 MBA core courses and concentrations /electives of 7 courses. Each course is 3 quarter hours of graduate credit.

Application and Admission: Applications are accepted for Fall Quarter only. The application deadline for Fall quarter is April 1. Any applications received after that date will be considered as space allows. To obtain application materials, write or call: Associate Dean for Graduate Business Programs Suite 527, Stokely Management Center College of Business Administration The University of Tennessee Knoxville, TN 37996-0550 Telephone: (615) 974-5033

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. 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 elective the management science or statistics concentration must have com-
plicated two years of college level calculus. MBA Core: The following courses are required in each student’s program. All courses are 3 credit hours. The core courses are: Accounting 5020, 50301-Business Administration 5100, 5310, 5600; Economics 5010, 5020, 5030; Finance 5010, 5020, 5030, 5040; Management 5010, 5020, 5030; Management Science 50102; Marketing 5010, 5020; Mathematics 5052; 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 courses. In some cases, Analysis 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 Office of Graduate Business Programs. Among the 7 courses in the concentration/electives block, at least 4 but not more than 5 must be in one of the following concentration areas (for specific courses required in each concentration area, see departmental sections on following pages): Controllship Economics Entrepreneurship and New Venture Analysis Finance Forest Industries Management Marketing Science Marketing Statistics Transportation and Logistics2 The MBA Center of Excellence: Entrepreneurship and New Venture Analysis is an interdisciplinary concentration comprised of three specifically designed courses (one each in finance, management, and marketing). As the MBA Center of Excellence, this concentration strives to build a strong academic foundation for both entrepreneurial and intrapreneurial activities. The Entrepreneurship and New Venture Analysis concentration will be offered to both the full- and part-time student in recognition of the growing trend in American business today towards new product/venture development.

The remaining elective courses (2 to 3) must be in fields outside the concentration area, normally selected from MBA courses offered in other departments of the College. 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 7-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 Graduate Business Programs.

Transfer Credits: Graduate level courses taken at other AACSB accredited institutions that otherwise conform to University policy (page 21) 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 23) must be approved by two faculty members in the student's area(s) of concentration and the Associate Dean for Graduate Programs in the College of Business Administration, signed by the department head, and submitted to the Graduate Office. 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 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.

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 the 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 studies be started prior to entry into the last 25 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 graduation 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 for 9 courses qualify for credit without regard to the dual program.

The College of Law will award up to 8 semester hours of credit toward the J.D. degree for at least 3 hours 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 5950—Legal Accounting.

The College of Business Administration will award up to 12 quarter hours of credit toward the MBA degree for acceptable performance in a maximum of 8 semester hours of approved courses offered in the College of Law.

Except while completing the first year courses in the College of Law, students are encouraged to maximize the integrative facets of the dual program by taking courses in both colleges each quarter.

Awarding of Grades: In the College of Law, for grade recording purposes for graduate business courses and in the College of Business Administration for law school courses, grades awarded will be converted to either Satisfactory or No Credit and will not be included in the computation of the student’s grade average or class standing in the college where such grades are so converted. The College of Law will award a grade of Satisfactory for a graduate business course in which the student has earned a B grade or higher and a No Credit for any lower grade. The College of Business Administration will award a grade of Satisfactory for a Law School course in which the student has earned a 2.3 grade or higher and a No Credit for any lower grade. Grades earned in courses of either college may be used on a regular graded basis for any appropriate purpose in the college offering the course.

THE PH.D. IN BUSINESS ADMINISTRATION

The primary objective of the Ph.D. in Business Administration degree is to prepare a select number of qualified students for careers in university-level teaching and research, and for responsible positions in business and government.

Students seeking a Ph.D. degree must be recommended for acceptance by the College of Business Administration to The Graduate School. Actual admission is based on the applicant's overall standing compared with other applicants and with the number of vacancies in each department. The college requires the Ph.D. application, scores from the GMAT, and 4 recommendations. All materials should be received by the College of Business Administration not later than March 1. Late applications are considered only if space is available.

Program of Study: The Ph.D. normally requires at least three years of intensive study and research beyond the MBA degree. Typically, the first two years of a student's program consist of coursework, writing and research. The third year usually focuses on completion of the dissertation research and writing. It is emphasized that the Ph.D. program of study is individualized for the student only. Upon acceptance of a student by a particular departmental faculty, the student is expected to remain in residence until the dissertation has been completed and all requirements are met for completion of the Ph.D. degree.

Since the program focuses on the development of competent scholars, heavy emphasis is placed on both teaching and research skills. As part of the doctoral program, each student is required to serve as a teaching assistant to an undergraduate busi-
ness class, or as a research assistant to a senior faculty member. Typically, the College of Business Administration offers financial support for doctoral students during their tenure in the program.

The Tennessee Ph.D. program is highly flexible, allowing students to tailor their major and collateral options. Moreover, heavy emphasis is placed on individualization and close student-faculty interaction. Instruction takes the form of regular classes, doctoral seminars, and independent study and research. Students are also encouraged to attend lectures and discussions by visiting scholars throughout the year.

There are five areas of concentration offered in the Ph.D. program:

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

More detailed information concerning these specific areas is available by writing directly to each department chairperson.

**Degree Requirements:** Doctoral students must file a program of study that has been approved by their temporary doctoral advisory committee and the Associate Dean for Graduate Business Programs by the end of the second quarter of coursework after entry into the program. This committee is nominated by the department chairperson in a student's intended area of concentration, subject to the Graduate Council's policies and procedures. Following are specific degree requirements:

1. Students must complete at least three years of full-time coursework beyond the baccalaureate degree, with two years of residence on the Knoxville campus.

2. Students must complete appropriate courses at the graduate level, or other approved concentrations of coursework, in the following areas:
   - Accounting
   - Behavioral Science
   - Business Policy
   - Calculus
   - Computer Science
   - Economics
   - Finance
   - Legal Environment
   - Management
   - Marketing
   - Statistics

   All work in the above areas is subject to approval by the temporary doctoral advisory committee and the Associate Dean for Graduate Business Programs. Specific majors may have prerequisites not listed above.

3. Economics 5110-20 (or equivalent) is required, except that Management 5610-20 (or equivalent) may be substituted with prior approval.

4. A minimum of 15 quarter hours of graduate research methods must be completed. At least 6 quarter hours in statistics courses beyond the Statistical Computing courses. The remaining 9 quarter hours can be completed in additional statistics (not to include Statistics 5050) courses or in other areas such as research methodology, management science, computer science, econometrics, and psychometrics.

5. The major area of concentration is the focal point of the Ph.D. program. Students are expected to master the literature, research techniques in their concentration area, and to do quality research as evidenced by the preparation of an acceptable dissertation. A minimum of 18 quarter hours of coursework is required, including at least 9 hours of doctoral seminars. Graduate work in the major field taken at other institutions is considered by the temporary doctoral advisory committee in approving the specific coursework. Available major areas are: accounting, finance, management, marketing, and transportation/logistics.

6. A minimum of 12 quarter hours of graduate coursework is required in an area outside, but complementary to, the major area. The student may choose the collateral area from one of the following: one of the five major business areas listed above, economics, statistics, or other areas such as another school or college of the University.

- **Comprehensive Examinations:** Comprehensive written examinations over the major and collateral areas are required of each person seeking candidacy for the Ph.D. degree. The major area examination is administered in two sessions of approximately four hours each and the collateral area examination in one session of approximately four hours. Examinations may be supplemented with oral examinations. For a doctoral student having a collateral area in the College of Law, the results of only an oral examination may be determined and accepted. At least two comprehensive examinations is coordinated through the Office of Graduate Business Programs.

   - When either the major or collateral area examination is passed, the remaining examination must occur no later than four years after the student enters the program.
   - When both examinations have been passed, the student may submit an application for admission to candidacy.

- **Admission to Candidacy:** Students may apply for admission to candidacy for the Ph.D. degree after maintaining at least a "B" average in coursework, successful completion of comprehensive examinations and acceptance of a research proposal for the dissertation by the student's doctoral committee.

   - Doctoral students are advised to give serious attention early in their program to the composition of their doctoral committee. In accordance with the College of Business Administration policy, the student and the major professor identify a doctoral committee composed of at least four faculty members, three of whom, including the chairperson, are on the Graduate Council to direct doctoral research. When the doctoral committee has been formed, the temporary doctoral advisory committee ceases to exist.

   - Application to candidacy must be approved at least two full quarters prior to the date the degree is conferred (admission in the fall quarter permits graduation in the following spring quarter). Advancement to candidacy must occur no later than five years after the student enters the program.

   - 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 collateral area). Graduate courses accepted from other institutions must be included. Under "Other Requirements," the date of acceptance of the research proposal by the doctoral committee should be indicated. The application must be approved by the student's doctoral committee and the Associate Dean for Graduate Business Programs before submission to the Graduate School.

- **Dissertation (minimum of 36 quarter hours):** The student must complete a dissertation embodying the results of original research. The dissertation must be approved by the candidate's doctoral committee, which must certify its completion and acceptability after oral defense of the candidate's research.

   - The dissertation normally must be completed within three years of the student's advancement to candidacy.

- **Grade-Point Average:** A student must maintain a cumulative GPA of 3.0 or higher in graduate courses. However, maintaining a 3.0 GPA does not guarantee the student will be allowed to continue in the doctoral program if there is overriding evidence that the student does not show promise and should be terminated from the program.

- **Other Requirements:** For information concerning program admission requirements, academic performance standards, fellowships and assistantships, and general rules and regulations, consult the Graduate School Catalog, and see other parts of the College of Business Administration section and the first section of the catalog, "The Graduate School." Also see "Academic Common Market," page 41.

**MINIMUM ACADEMIC PERFORMANCE STANDARDS:** A graduate student in the College of Business Administration whose grade point average at any point is below 3.0 will be placed on probation. A student on probation will be dropped from the program unless his/her cumulative 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. Full-time students must take 12 hours per quarter while on probation and part-time students must take 6 hours per quarter for each consecutive quarter of probation. 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 advisor.

**ADMISSION REQUIREMENTS**

General admission requirements for The Graduate School are stated beginning on page 13. M.Acc., MBA, and Ph.D. in Business Administration 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) or the Advanced Placement Examination (for management science and statistics programs). Applicants 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.
Management Development Programs Department

The College’s continuing education efforts are coordinated through the Department of Management Development Programs. A major objective is to develop executives for increasingly higher levels of management responsibility and to sharpen existing executive skills needed for comprehensive decision-making and leadership. The Management Development Program, designed for mid-level managers, is more operational in scope. It is appropriate for both the experienced manager who has not had advanced management training and the individual being developed for a mid-level position. Other programs include: (1) The Institute for Productivity Through Quality, which teaches the techniques of statistical process control in an intensive 130-contact-hour program for both managers and executives; (2) the Senior Institute for Productivity Through Quality, a one-week program which provides a strategic overview of statistical management; (3) The Administrative Services Institute for Productivity Through Quality, a two-week program which applies the philosophy and tools of statistical management to non-manufacturing environments; (4) the Executive Development Program for Distribution Managers, which focuses on providing the distribution manager with an intensive exposure to contemporary management approaches; and other programs designed to meet the continuing education needs of business and industry.

Departments of Instruction

Accounting and Business Law

J. R. Williams (Head), Ph.D. Arkansas, C.P.A.

Accounting

MAJOR

DEGREE

Accounting

M.Acc.

Professors:

Associate Professors:

C.P.A., C.M.A.; W. L. Siegel, M.S. Tennessee, C.P.A.; M. G. Tiller, Ph.D., Indiana; R. L. Townsend, Ph.D. Texas, C.P.A.

Assistant Professors:

Distinguished Lecturer:
S. B. Wolfe, B.S. Virginia Polytechnic Institute.

The objective of the Master of Accountancy (M.Acc.) program is to provide persons having an undergraduate accounting background and a minimum of three year's accounting experience a total of 42 hours of graduate credit.

Other Requirements: To qualify for the degree, the student must achieve a B average (3.0) in the business core courses and 3.0 in accounting courses.

*Prior course work will be considered in determining the Business Core courses.

*An exemption may be granted for Mathematics 5052 if student has recently completed undergraduate course 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 three to four years of matriculation.

*Selected courses from other disciplines may be substituted for accounting electives upon approval of the M.Acc. program advisor.
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: Controllership

DBA Concentration: Accounting

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

The MBA Controllership concentration will provide the student with a comprehensive exposure to issues in financial management and control. The program is designed for students without an undergraduate background in accounting. Controllership concentrations include Accounting 5220, 5350, 5360, and 5620. Accounting 5350 and 5360 are available for MBA students only. Students electing the Controllership option may not take courses in the M. Acc. curriculum other than Accounting 5220 and 5620.

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 faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E

5010 Financial Accounting (3) Introduction to accounting model of firm and accounting information system. Not available to students with credit for 2110-20 or equivalent. F, Su

5020 Corporate Reporting Problems (3) Analysis of uses and limitations of accounting model of firm. Emphasis on internal and external reporting. General purpose financial statements, present and future financial reporting. Prereq: 5010 or equivalent. F, W

5030 Managerial Accounting (3) Analysis of accounting model of firm as vehicle for planning and controlling activities. Attention to development of cost data appropriate to cost-volume-profit analysis models. Prereq: 5020: Economics 5010. W, Sp

5110 Seminar in Accounting Theory (3) Evolution of accounting theory, concepts underlying financial reporting models, and authoritative accounting literature as each relates to measurement of periodic performance and financial position. Prereq: Consent of department head. May not be taken by students with credit for 4990.

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) Critical in-depth consideration of current issues in the financial accounting literature. Prereq: 5110.

5160 Graduate Internship in Accounting (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 concepts under conditions of uncertainty, and responsibility accounting concepts. Prereq: 4230 or consent of instructor.

5220 Budgetary Planning and Control Systems (3) Application of planning and control systems to meet organizations 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 special purpose financial statements, revenue and expense accounts. Emphasis on reporting, data processing, statistical sampling, and internal auditing. Prereq: 4110 with C or higher; students who do not have credit for 4120.

5330 Advanced Income Tax (3) Federal income taxation with emphasis on 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) Theory and practice of accounting for interrelated business entities—mergers, life insurance, annuities for persons who have credit for a course with a similar content. Prereq: 3130.

5350 Financial Accounting Issues in Business (3) A comprehensive investigation of various financial reporting and auditing issues relating to decision making in financial management. Emphasis is upon the market role of accounting information. Available to MBA students only. Prereq: 5000.

5360 Taxation for Business Decisions (3) A conceptual foundation and analysis of current issues in taxation impacting on the use and management of financial and investment information applied to individual, corporate, partnership, estate, gift, and other types of taxpayers. Prereq: 5030. Available to MBA students only.

5420 Tax Research (3) Development of expertise in tax research utilizing tax service, tax periodicals, legal cases and other available sources. Includes individual research projects. Prereq: 4430 or equivalent.

5430 Tax Planning (3) Advanced study of income tax problems emphasizing alternatives available to minimize tax liability compatible with achieving taxpayer objectives. Prereq: 5420.

5440 Taxation of Estates and Gifts (3) Transfers at death, gifts, charitable contributions, planning for donations, approval of charitable donations, valuation of gifts and transfers, and estate and gift tax returns. Prereq: 4430. (Not available 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 including Subchapter S Corporations and Personal Holding Companies. Prereq: 5420.

5490 Tax Policy (3) Current policies explored through tax research utilizing tax service, tax periodicals, legal cases and other available sources. Includes individual research projects. Prereq: 4430 or equivalent.

5510 Administrative Regulation of Business (3) Federal Register System and Administrative Procedure Act and their relationship to business. How a regulation is made and how it operates. Other legal controls of administrative agencies. Not available to students with credit for 4130 or equivalent. Prereq: 4120 or 5010 or consent of instructor.

Business Administration

MAJOR

DEGREES

Business Administration

MBA, Ph.D.

5060 Data Processing in Business (3) Fundamentals of data processing, computer programming and applications, systems design. F, Sp

5100 Business Communications (3) Theory and practice of effective communication. Analysis of business problems, organization and presentation of results. Written analyses and oral presentations.

5130 Business Policy (3) Case studies covering policy formulation and administration; point of departure—the company objectives and organizational structure and departmental policies and activities coordinated; sizing up company’s situation, determining objectives, developing sound policies, organizing and administering personnel to reach company objectives, continuous administrative reappraisals. Enrollment priority given MBA students in last quarter of their program. Prereq: All MBA core courses. E

5410 Business and its Societal Environment (3) Analysis of current forces and changes in society and interrelationship of plans and actions in business firms with environmental factors. Prereq: Consent of instructor.

5600 Management Information Systems (3) Design of computer-based business information system; decision support systems for business problems.

5610 Seminar in Applied Business Analysis (3) Application of business concepts and analytical skills
to problems of small businesses in community. Students work under the supervision of participating faculty. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

Business Education

See College of Education

Economics

MAJOR

ECONOMICS

Economics

M.A., Ph.D.

Professors:

W. B. Cole (Head), Ph.D. Texas; R. A. Bohm, Ph.D. Washington (St. Louis); R. L. Bowley, Ph.D. Texas; S. L. Carroll, Ph.D. Harvard; H. S. Chang, Ph.D. Vanderbilt; G. J. Farrell*; Ph.D. M.C.F.; C. G. Garrison, Ph.D. Kentucky; H. W. Herzog, Ph.D. Maryland; H. J. Jensen, Ph.D. Texas; F. Y. Lee, Ph.D. Michigan State; A. Mayhew, Ph.D. Texas; J. R. Moore, Ph.D. Cornell; W. C. Neal, Ph.D. School of Economics; K. E. Quindry (Emeritus); Ph.D. Kentucky; A. M. Schottman, Ph.D. Washington (St. Louis); G. A. Spiva, Ph.D. Texas.

Associate Professors:

D. P. Clark, Ph.D. Michigan State; W. F. Fox, Ph.D. Ohio State; E. Glatworth, Ph.D. Stanford; D. L. Kaserman, Ph.D. Florida; E. Phillips, Ph.D. Washington (Seattle); A. M. Schottman, Ph.D. Washington (St. Louis).

Assistant Professors:

J. A. Gauger, Ph.D. Iowa State; R. A. Hoffer, Ph.D. North Carolina; J. W. Mayo, Ph.D. Washington (St. Louis); H. Thompson, Ph.D. Houston.

*Alumni Distinguished Service Professor

The Department of Economics offers graduate programs leading to the M.A. and Ph.D. degrees. The M.A. degree may be completed by either a thesis or non-thesis option, while the Ph.D. degree requires successful completion of a dissertation. Applicants to these programs should contact the Director of Graduate Studies, Department of Economics for further information. The Department also offers an area of concentration for the MBA degree. Students interested in the MBA program should contact the Associate Dean for Graduate Programs, College of Business Administration.

THE MASTERS PROGRAM

Admission to the M.A. program is based on undergraduate academic performance and on scores from the general portion of the GRE or GMAT. The degree requires a minimum of 45 quarter hours. The non-thesis option requires Economics 5111-12 and 5121-22 and an additional 18 hours of coursework at the 5000 level or above, with 9 hours to be concentrated in one field of economics. Students electing the non-thesis option are required to pass a final written comprehensive examination. The thesis option requires Economics 5111-12 and 5121-22 and an additional 9 hours of coursework at the 5000 level or above in the thesis option, the thesis gives 9 hours of credit.

The requirements for a graduate minor in economics are as follows: Either (1) 5111-12 and 5120, or (2) 5110 and 5121-22, or (3) with the consent of the head of the economics department, an alternative sequence of 9 hours to meet unusual conditions.

THE DOCTORAL PROGRAM

Admission to the Ph.D. program is based on promise of scholarship, as demonstrated by previous academic performance and by scores achieved on the general portion of the GRE or GMAT. Requirements for successful completion of the program consist of the four components listed below:

1. A. Economic theory: microeconomic theory by comprehensive examination or by completion of Economics 5111-12 with a B+ average or higher and successful completion of 6111; macroeconomic theory by comprehensive examination or by completion of 5121-22 with a B+ average or higher and successful completion of 6211.

b. Economic history: Economics 5250 and 5260.

c. History of economics: Economics 5150 and 3 hours at the 6000 level.

d. Mathematical and quantitative economics: 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 over the courses offered to fulfill requirements in subparagraphs a, 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 written examination.

2. Students are required to demonstrate their competence by comprehensive examination in two fields of specialization with the approval of the department, at least one 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, public finance, and regional and urban economics.

3. Students are required to take two elective economics courses at the 5000 level or above, outside the core subject areas and the two fields of specialization.

4. Successful completion of the dissertation, including an oral defense, to give at least 36 hours of credit (6000).

Economic Fluctuations, Forecasting, and Stabilization

5120 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise required of outstanding scholarship, to give at least 36 hours of credit (6000).

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 contents determined by students 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 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 Workshop in Economics (1-3) 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 3 hrs.

5100-20-30 Economics Seminar (1, 1, 1) Research in progress and subject of selected topics. May be repeated. S/NC only. E

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

ECONOMIC THEORY

4130 Business Cycles (3) Fluctuations in income, employment, prices, and output in the economics system; effects of changes in real GDP. Prereq: consent of instructor. May not be repeated. Maximum 6 hrs.

4150 History of Economic Thought (3) Development of economic thought, tools of analysis, and economics as a social science, together with an analysis of socioeconomic conditions which influenced this development. Coordinated with 2150 through 2156. Prereq: 1 yr of principles of economics and consent of instructor.

4170-80 Introduction to Mathematical Economics (3, 3) Application of mathematical methods in theoretical study of micro- and macroeconomic phenomena. Designed for beginning graduate students who have limited training in analytic geometry and calculus. Must be taken in sequence. Prereq: 3110 and college algebra, calculus, and analytic geometry or the equivalent.

4750 Public Expenditure Evaluation (3) Benefit-cost analysis, public sector investment criteria, and the social cost of capital. Not available for credit in graduate programs in Economics.

4770 State and Local Finance (3) Emphasis on revenue systems and division of fiscal responsibilities. Not available for credit in graduate programs in Economics.

5010 Introduction to Economic Analysis (3) Analytical tools of macro- and microeconomics for students without prior training in economics. Price determination, national income accounting, and determination of output and employment. Not available for credit in graduate programs in Economics.


5030 Economic Fluctuations, Forecasting, and Stabilization (3) Determination of level of output, employment and prices for economy as a whole. Implications of aggregate fluctuations for individuals. Role of forecasting techniques and stabilization policies. Prereq: 5010 or equivalent. F, Sp, Su

5110 Fundamentals of Microeconomics (3) Verbal arguments and geometric and algebraic techniques. Theory of consumer demand and market demand; theory of production and cost; long and short run theories of profit maximizing firm in both perfectly competitive and monopolistic environments; theory of long run supply. For students whose major is other than economics. Not available for credit 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 costs; 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, and quantity of money, and aggregate saving and liquidity preference. For students whose major is other than economics. Not available for credit with credit for 5111. Prereq: 3120 or equivalent. W

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.
6460 Seminar in Labor Economics (4) Theory of labor markets and union behavior, including wage determination, employment and unemployment. Wage differentials, economic discrimination, and impact of unionization. Prereq: 3110 and 3120, or equivalent.

6470 Public Policy in the Labor Field (4) Governmental regulation of wages, hours, and other aspects of industrial relations. Public policy in areas of income, human resource development, equal employment opportunity, occupational safety and health, Social Security, and immigration policy. Prereq: 6450 and 6460.

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 economics and economic development. 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.

4232 The Political Economy of Asian Development (3) Description, analysis, and comparison of major economic problems and policies of India, China, and Southeast Asia.

4260 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 impacts of growth on environment. Prereq: 2510.

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.

5260 Economic History of the U.S. (3) Interpretation of American economic structure and policies from colonial times.

5610 Location and Regional Development Theory (3) Theory of industrial, agricultural, and residential location; economic basis for land use patterns and central places; examination of regional inequalities and national assistance for regional economic development.

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 analysis, economic base studies, and regional input-output, linear programming, and econometric models. Prereq: 5180-90 and 5510 or equivalent. W.

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.

6331 Theory and Practice of Economic Planning (3) Leading issues in imperialist and in socialist planning. Prereq: Consent of instructor. May be repeated with consent of department.

ECONOMICS OF LABOR AND HUMAN RESOURCES

4420 Economics of Human Resources (3) Analysis of current problems in human resource development and current trends in the labor market. Prereq: 3420, 4440. W.

4430-40 Labor Legislation (3, 3) 4430—Economic background and effects of governmental regulation of labor relations; detailed examination of National Labor Relations Act and related state laws. Prereq: 3420, 4440. W.


6460 Seminar in Labor Economics (4) Theory of labor markets and union behavior, including wage determination, employment and unemployment. Wage differentials, economic discrimination, and impact of unionization. Prereq: 3110 and 3120, or equivalent.
MBA Concentration: Finance. The curriculum offers courses for those interested in careers in corporate financial management, security analysis and investments, banking and financial institutions, real estate investment and development, business risk management, and financial planning services.

Minimum Course Requirements for MBA Concentration: At least four and not more than six courses from the following:

- 4700 Business and Public Risk Management (3) Identification and measurement of pure risks facing businesses, groups of businesses, and individuals associated with property, liability, and personal exposures. Implementation of most economical methods of dealing with risks at lowest cost consistent with good financial management practices. F, W, Sp

- 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


- 5020 Financial Management II (3) Development of theories of capital budgeting, capital structure, and dividend policy under conditions of uncertainty. Various tools and techniques used to incorporate risk analysis into financial decision making process. Prereq: 5010, Economics 5020. Prereq or coreq: Statistics 5020. W, Sp, Su

- 5130 problems in Financial Management (3) Application of decision making procedures to problems in financial management, emphasizing case approach. Managerial statistical analysis, short-term financial management requirements. May be repeated. S/NC only. E

- 5420 Investment Analysis (3) Principles and techniques for evaluation of investment desirability of marketable securities, with emphasis on common stocks and corporate bonds. Financial statement analysis, price-earnings ratios, and recent mathematical valuation models. Prereq: 5020 or consent of instructor. F, W

- 5430 Portfolio Analysis and Management (3) Development of portfolio analysis and selection process. Factor analysis, statistical methods, capital asset pricing model, risk-adjusted return measures, principles of diversification. Correlation analysis, mean-variance portfolio construction, determination of beta, and similar topics. Prereq: 5420 or consent of instructor. E

- 5510 International Financial Management (3) Analysis of international financial aspects of the financial management in journal literature: informational asymmetry, international capital market imperfections, and international financial dynamics. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F

Management

Assistant Professors:
- P. G. Campbell, M.S., Austin Peay State;
- D. J. Clayton, Ph.D., Georgia;
- H. D. Dewhurst (Head), Ph.D., Texas;
- R. W. Bolling, Ph.D., Stanford, Calif.;
- R. D. Stanfield, Ph.D., California;
- A. H. Kesly (Emeritus), MBA Pennsylvania;
- J. M. Larsen, Jr., Ph.D., Purdue;
- J. H. Keally (Emeritus), Ph.D., Pennsylvania;
- S. C. Vance, Ph.D., Iowa;
- D. J. Starrf (Emeritus), Ph.D., Iowa;
- G. A. Wagoner (Emeritus), M.S., Indiana;
- G. H. Whitlock (Emeritus), Ph.D., Tennessee;
- M. S. Wortman, Jr., Ph.D., Minnesota;
- R. J. Clayton, Ph.D., Georgia;
- R. C. Maddox, Ph.D., Texas;
- C. W. Neel, Ph.D., Alabama;
- M. C. Rush, Ph.D., Akron.

Associate Professors:
- O. S. Fowler, Ph.D., Georgia;
- J. W. Smith, Ph.D., Texas;
- M. J. Campbell, Ph.D., Pennsylvania;
- J. L. Davis, Ph.D., North Carolina;
- J. K. McDonald, Ph.D., Illinois;
- R. W. Bolling, Ph.D., Stanford, Calif.;
- R. D. Stanfield, Ph.D., California;
- A. H. Kesly (Emeritus), MBA Pennsylvania;
- J. M. Larsen, Jr., Ph.D., Purdue;
- J. H. Keally (Emeritus), Ph.D., Pennsylvania;
- S. C. Vance, Ph.D., Iowa;
- D. J. Starr (Emeritus), Ph.D., Iowa;
- G. A. Wagoner (Emeritus), M.S., Indiana;
- G. H. Whitlock (Emeritus), Ph.D., Tennessee;
- M. S. Wortman, Jr., Ph.D., Minnesota;
- R. J. Clayton, Ph.D., Georgia;
- R. C. Maddox, Ph.D., Texas;
- C. W. Neel, Ph.D., Alabama;
- M. C. Rush, Ph.D., Akron.

William B. Stockey Professor of Strategic Management.

Alumni Distinguished Service Professor.
Management Science/College of Business Administration

5630 Research Methods in Management (3) Methodology of research, design and conduct of experiments. Credit will not be awarded in addition to 5760. Prereq: Graduate standing or consent of instructor. S/NC only. Sp

5710 International Business Management (3) Analysis of conditions, problems, and opportunities for management of multinationals. Credit will not be awarded in addition to 5760. Prereq: Graduate standing or consent of instructor. S/NC only. Sp

5810 Energy Management: Theory and Practice (3) Management of energy resources in operating systems. Credit will not be awarded in addition to 5760. Prereq: Graduate standing or consent of instructor. S/NC only. Sp

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

6120 Advanced Organizational Theory (3) Analysis 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 (A, 3, 3) Advanced problems in organizational psychology. Area includes performance evaluation, executive development, group process, and morale. (Same as Psychology 6250, 6260, and 6270.)

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

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

Management Science

MAJOR

DEGREE Management Science Ph.D.

Professors: R. S. Garfinkel (Chairperson), Ph.D. Johns Hopkins, J. K. Ho, Ph.D. Stanford, Bruce Ralston, Ph.D. Stanford.

Assistant Professor: D. R. Fox, Ph.D. Purdue University.

Management Science Committee: Robert S. Garfinkel, Chairperson; John Bradley, Ph.D. & Assistant, Mathematics; Dale R. Fox, Assistant Professor, Management Science; Kenneth C. Golbert, Assistant Professor, Management Science; Bruce Ralston, Ph.D. & Assistant, Professor, Department of Economics; James K. Ho, Ph.D. & Assistant Professor, Management Science; Mary G. Leitner, Ph.D. & Assistant Professor, Department of Statistics; Bruce Railean, Associate Professor, Geography Department; Ronald E. Shreve, Ph.D. & Assistant Professor, Department of Finance; William Sullivan, Ph.D. & Assistant Professor, Industrial Engineering; Gary Thomson, Ph.D. & Computer Science Department.

MBA CONCENTRATIONS

For students whose MBA concentration area is Management Science, the MBA Core is revised as follows: substitute Management Science 5310 for 5010, Statistics 5310 for 5020, Management Science 5330 and 5340. The concentration area must include Management Science 5330 and 5340.

MASTER OF SCIENCE PROGRAM

See page 106 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 research, and teaching related to the application of mathematical tools to complex decision making. Three primary objectives of the program are:

(1) to provide, through management science course work, 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, 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 sophistication which will serve the graduate well throughout a life-long career, whether in management, research, or teaching.

Admission Requirements: The doctoral exam requires three Graduate School Rating Forms and the GRE. The GMAT is acceptable in lieu of the GRE.

Degree Requirements: General University requirements for the doctoral degree are stated on pages 23-24.

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 studies in applicable fields will be granted course credits for work which is equivalent to required courses in the program.

The program includes approximately 24 to 30 quarter hours of course work in the applied core in which the student will write the dissertation.

Qualifying Examinations: The student must demonstrate mastery of probability theory and statistical inference (Statistics 5110-20-30) by passing a written qualifying examination.

Master of 18 to 21 quarter hours in mathematics course work must be demonstrated by passing a written qualifying examination. Topics normally include numerical analysis (either Math 4225, 4245, 4080, or Math 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.

These requirements generally are completed by the end of the first year of the program.

There is no foreign language requirement, 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 36 quarter hours of Management Science 6000, Doctoral Research and
problems that have many constraints, many variables or extremely sparse constraint matrices. Prereq: 5310 or equivalent A.

6510 Nonlinear Optimization (3) Solution of constraint 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 solution through policy iteration. Stochastic dynamic programming models in continuous time. Prereq: 5330 F.

6620 Queuing Models (3) Application and mathematical analysis of models of congestion. Basic birth-death process models, other Markovian models; non-Markovian models for systems with general service or arrival patterns, priority customers or other complicating assumptions; queues in series. Prereq: 5330 or Mathematics 4750-60. Sp.

6710 Location Models (3) Application of linear, nonlinear and network optimization techniques to problems of optimal location of new facilities. Prereq: 5310 or equivalent A.

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


Marketing and Transportation

D. J. Barnaby (Chairman), Ph.D. Purdue.

Marketing


Associate Professors: E. R. Cadotte, Ph.D. Ohio State; R. L. Jenkins, Ph.D. Ohio State; J. R. McMillan, Ph.D. Ohio State; R. C. Reizenstein, Ph.D. Cornell.

Assistant Professors: J. A. Rentz, Ph.D. Georgia; P. S. Speck, Ph.D. Texas Tech; D. W. Schumann, Ph.D. Missouri (Columbia); S. F. Gardial, Ph.D. Houston.

MBA 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. May be repeated. S/N/C only. E.


5220 Promotion Management (3) Management of promotional activities within firm: advertising, publicity, and sales promotion. Emphasis on advertising, setting objectives, budgeting, segmentation, media selection, and evaluation of effectiveness. Prereq: 5300. F.


5300 Marketing Research (3) Investigation and solution of problems: application of research methods to functional areas of marketing. Research concepts, methods, and techniques. Prereq: 5302; Statistics 5010. F.

5350 Buyer Behavior Analysis for Marketing (3) Buyer behavior patterns with emphasis on implications for marketing analysis and executive action. Marketing and behavioral sciences. Prereq: 5302. F.

5400 Analyzing Marketing Opportunity for Marketing Decisions (3) Basic determinants of opportunity within markets, framework for identifying and organizing information required to assess market opportunity. Approaches to analyzing buyers in markets, forecasting demand, analyzing industry/channel/competitor service. Emphasis on applying market opportunity analysis results to marketing decisions. Prereq: 5302 W.


5450 International Marketing Management (3) Development and management of international marketing programs. Problems involved in marketing goods and services in foreign markets. Political, cultural, and economic conditions in different countries. Prereq: 5350. Sp.

5990 Research in Marketing (3) Directed research on subject of mutual interest to student and staff member. Prereq: 5300 and 5350. May be repeated. Maximum 8 hrs. E.

6000 Doctoral Research and Dissertation (3-15) Probationary minimum 6 hrs. E.

6050 Macroe/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 pollution and dimensionality of the decision making. 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 techniques, and 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.

6300 Marketing Decision Models (3) Model building process including application of variety of models to marketing decision making. Buyers' analysis, simulation models, brand switching models, stochastic models, dynamic models, and mathematical models. 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, macroenvironment, consumer attitudes, children's television advertising, international marketing issues, marketing channels, and related issues. Prereq: Consent of instructor. A.

Transportation and Logistics


Associate Professors: E. R. Cadotte, Ph.D. Ohio State; J. H. Foggin, DBA Indiana.

MBA Concentration: Transportation and Logistics. DBA Concentration: Transportation and Logistics. Minimum Course Requirements for MBA Concentration: 18 credit hours required including 5010, 5110, 5310, 5220. Transportation 5010 is prerequisite to all other graduate courses in this area.

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

5010 Survey of Transportation and Logistics (3) Intensive survey of logistical demands made by society and specific users on nation's transportation system; problem solving in case studies. Prereq: 5300. Sp.

5120 Management and the Pricing Problem (3) Critical analysis of application of economic theory and regulatory restraints to pricing of carrier services. Sp.

5130 Carrier Transportation Management (3) Analysis of major transportation modes and their management strategies. Consideration of U.S. legal, and environmental issues affecting the cost and decision-making process. Application of general business, marketing, finance, and statistical decision processes to transportation decision making in uncertain environment. F.

5220 Logistics Systems Management (3) Development of strategy for management of logistical systems. Emphasis on executive level integration of logistical operations with marketing, production, and other decision areas. Practical applications through a case approach and simulation game. Prereq. Management 5020. W.

5510 Urban Transportation Policy (3) Movement of people, goods and information in urbanized areas with special emphasis on formulation of national, state and local policy. Emphasis on evolving new urban transportation concepts. W.


5610 Advanced Law and Regulation (3) Legal rights and responsibilities of shippers and carriers. Analysis of decisions of regulatory commissions, courts, and principles of law arising from these decisions. Sp.

5990 Independent Study in Transportation/Logistics (3) Directed study in subject of air and air transport, national transportation policy, transportation/logistics research development, or subject of particular interest to student and faculty. May be repeated. Maximum 8 hrs. E.

6000 Doctoral Research and Dissertation (3-15) Probationary minimum 6 hrs. E.

6110 Seminar in National Policy (3) Critical analysis of contemporary national transportation policy issues. Prereq: 5310. E.

6120 Seminar in Transportation and Logistics Models (3) Analysis of contemporary models and methodologies in transportation and logistics research. Relative strengths and limitations of analytical models. Prereq: Management Science 5010; Statistics 5010 or equivalent.

6220 Research Methodology in Transportation and Logistics (3) Philosophy and design of research in transportation and logistics.
Statistics

MAJOR

Statistics

M.S.

Professors: D. J. MacMartin (Chairman), Ph.D. Stanford; D. S. Chambers (Emeritus), MBA Texas; R. A. McLean, Ph.D. Purdue; J. W. Philpot, Ph.D. Virginia Polytechnic Institute; C. C. Thigpen, Ph.D. Virginia Polytechnic Institute.

Associate Professors: G. B. Ranney, Ph.D. North Carolina State; R. C. Shier, Ph.D. North Carolina; R. D. Sanders, Ph.D. Texas; M. S. Younger, Ph.D. Virginia Polytechnic Institute.

Assistant Professors: M. G. Lethnakar, Ph.D. Kentucky; J. L. Schmithammer, Ph.D. Pittsburgh.

THE MASTER'S PROGRAM

The Master of Science program in Statistics is designed to provide students with a basic foundation in theoretical and applied statistics for careers as consulting and practicing statisticians. A special industrial statistics concentration is available for students wishing to focus on industrial applications of statistics.

A candidate should possess an undergraduate degree with a background in calculus, but no restrictions are imposed regarding the undergraduate major.

The department offers both thesis and non-thesis options for work towards the degree. With Options I and II, two-thirds of the total hours in each program must be at or above the 5000 level. Option I or II must be approved by the department.

Option I: The student must present a minimum of 48 quarter hours of approved coursework to include:

(1) a minimum of 27 hours in graduate statistics courses,
(2) a minimum of 9 hours in collateral work outside the department, and
(3) a minimum of 3 hours credit for a directed study project.

Option II: The student may be approved for a thesis option consisting of a minimum of 45 quarter hours to include:

(1) a minimum of 24 hours in graduate statistics courses, and
(2) 9 hours credit for master's thesis.

Option I or II must be approved by the department. An industrial statistics concentration is available within the framework of either option.

MBA CONCENTRATION

For students whose concentration area is Statistics, the MBA Core is revised to substitute Statistics 5110 for 5100. The concentration area must include 5120 and 5130. Normally, Statistics 5250-60-70 are also included which require 3450 as a prerequisite.

Course Prerequisites: Statistics courses numbered 4000 and above presuppose familiarity with the basic probability distributions in statistics and with the general concepts of statistical estimation and hypothesis testing. Students unfamiliar with these concepts should seek advice from a statistics advisor concerning prerequisite course work.


4310 Regression Analysis (3) Linear regression and correlation, multiple regression, stepwise methods, polynomial regression, use of dummy variables. Use of statistical regression computer programs. Elementary theory and applications. Prereq: 6 hrs. in statistics. E

4415 Sampling Techniques and Theory (3) Procedures used in probability sampling for a variety of arrangements of statistical universes and development of estimators and standard errors associated with the sampling schemes. Some properties of estimators. Determination of sample size. Not available for credit to students with credit for 3410. Prereq: 6 hrs in statistics. 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

5010 Probability and Statistical Inference (3) Fundamentals of probability, discrete and continuous probability models, mathematical expectation, and inference concerning means. Prereq: Mathematics 5625 or equivalent and a computer programming course. May not be taken for credit by students who receive credit for 5110. 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. Sp

5050-60-70 Statistical Analysis for the Behavioral Sciences (3, 3, 3) 5050—Probability distributions, sampling distributions, estimation and hypothesis testing. Parametric and nonparametric procedures. Prereq: 1 yr college mathematics and one course in statistics. 5060—Linear and multiple correlation methods, correlation for ranked and grouped data. Continuation of 5050. 5070—Analysis of variance and covariance, design of experiments. Parametric procedures. A continuation of 5050. F; 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) Introduction to the theory underlying statistical procedures of hypothesis testing and estimation. Prereq: 5110. W; Sp

5150-60-70 Statistics for Researchers in the Behavioral and Biological Sciences (3, 3, 3) Principles and applications of statistical methodology, integrated with interactive use of major data analysis systems. 5150—Probability and probability distributions; forming and testing hypotheses using parametric and nonparametric methods. 5160—General linear model: regression methods using matrix algebra. Least-square estimation and general-normal-theory testing; simple, multiple, and partial correlation; model selection and diagnostic techniques. 5170—General linear model: analysis of variance methods. One-way, factorial, and nested designs; preplanned and post-hoc tests of contrasts; blocking factors and covariates; random-effects and repeated-measures designs. Must be taken in sequence. Intended primarily for doctoral students. Credit not available to students with credit for 5050-60-70. Prereq: One year undergraduate mathematics and one undergraduate course in statistics. F, W, Sp

5211 Elementary Statistics (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

5250 Parametric and Nonparametric Statistics (3) Methods for inference about one or more populations, and measures of association. Prereq: 3450. F

5260 Applied Regression Analysis (3) Simple linear and multiple regression, polynomial models, use of dummy variables, variable selection procedures, and nonlinear least squares estimation. Prereq: Matrix algebra, 3450, and statistical computing experience. W

5270 Design of Experiments (3) One-way ANOVA, multiple range tests, equal and unequal variances, transformations, factorial experiments, completely randomized designs, split-plots, and nested designs. Prereq: 5260. Sp

5310 Statistical Techniques in Industrial Processes (3) Control charts for attributes and variables, capability analysis, parametric and nonparametric tolerance intervals, tool wear, and problems of measurement. Prereq: 3450. W

5320 Statistical Techniques in Industrial Processes II (3) Special control chart techniques, transformations, statistical tolerancing, acceptance sampling, sequential analysis, and analysis of variability. Prereq: 5310. Sp

5610 Special Topics in Statistics (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

6060 Applied Multivariate Analysis (3) Applications of multivariate general linear model, analysis of covariance, discriminant analysis and classification, multivariate analysis of variance and covariance, multivariate approach to repeated-measure analysis. Prereq: Graduate level coursework in multiple regression and analysis of variance; experience using SAS or SPSS via interactive terminals. F, 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

6250 Linear Models (3) Linear statistical models for analysis of variance with disproportionate and unequal subcell numbers using generalized inverses, concepts of estimability, and hypothesis testing. Prereq: Matrix algebra and either 4310 and Animal Science 5720, or 5720. W
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 adviser and an adviser from the College of Undergraduate Studies.

The M.S. program is accredited by the Accrediting Council on Education in Journalism and Mass Communication. The College is a member of the Association of Schools of Journalism and Mass Communication and the Broadcast Education Association. The doctoral program in Communications is listed in the Academic Common Market of the Southern Regional Education Board. Students residing in Alabama, Arkansas, Georgia, South Carolina, Virginia, and West Virginia can normally qualify for in-state fee status by applying to the Academic Common Market coordinators in their state capitals.

**MASTER OF SCIENCE**

The Master of Science degree in Communications is intended for students who desire a career in the mass media with an emphasis on communications management, and a deeper understanding of the communication process and social role of the mass media. The program follows a broad-based multi-media approach, while also allowing the student to concentrate in one of four fields: advertising, broadcasting, journalism or public relations.

The prospective student who is interested only in acquiring basic skills in one of the areas listed above is advised to enroll for a second baccalaureate rather than an advanced degree.

**Admission Requirements:** Applicants must meet admission requirements of The Graduate School. In addition they must complete the Graduate Record Examination and application form as required by the College of Communications. Minimal requirements for admission to full potential candidate status normally include (1) a 3.0 (4.0 system) grade-point average in undergraduate studies and (2) scores above the fiftieth percentile in verbal and quantitative aptitude on the Graduate Record Examination. All application material will be screened by an admissions committee authorized by the faculty of the College of Communications.

New students normally are admitted to the program only at the beginning of fall quarter. However, under special circumstances, a student may be admitted at the beginning of another quarter in a temporary non-degree status. Applications for fall admission must be received by May 1.

A baccalaureate degree in communications or a related field is recommended. Admission is possible with other baccalaureate degrees; however, all applicants without the appropriate background shall be required to take up to 26 quarter hours of prerequisite and co-requisite courses. The appropriate background includes the undergraduate introductory courses in advertising, broadcasting, public relations, and newswriting, and up to four additional courses, suitable to the student's interest, as assigned by the major adviser. Students may take a proficiency test on any prerequisite course, subject to review by the Master's Committee of the College of Communications.

Students who have had no courses in their major area of concentration may expect to spend six or more full-time quarters in the program, including a media internship.

**Degree Requirements:** The M.S. program emphasizes communications management in the areas of advertising, broadcasting, journalism (publications), and public relations. A minimum of 45 hours of approved graduate work is required:

- 12 hours of core courses:
  - Communications 5100, 5121, 5140, and 5470, 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.
  - 12 hours of Communications elective courses consisting of one graduate-level law course from the Communications, Business Administration, or Law Colleges, and one course each from Advertising, Broadcasting, and Journalism from the following lists:
    - Advertising 5310 or 5340, Broadcasting 4670 or 5610, Journalism 4420, 5210, or 5710.
  - 12 hours in a major area within the College, including at least 6 hours at the 5000 level. An internship, if needed, is included.
  - 9 hours of thesis (Communications 5000), including 3 hours of thesis seminar.

Students interested in subsequent entry into a doctoral program are advised to take additional courses in communications theory and research, subject to adviser's approval. All students in the Master's program without an undergraduate background or professional experience in communications will normally complete an internship that involves professional experience in the communications field. The student's internship experience requires approval by his/her adviser. Credit will be given through Advertising 5980, Broadcasting 5980, or Journalism 5980 on the basis of 3 hours credit for the equivalent of 10 weeks of full-time professional experience. This credit is to be included in the student's 45-hour M.S. program. Previous professional experience will be evaluated by the student's committee.

After completion of the formal program of coursework and thesis research, 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 mass 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 two or more years of full-time study for completion of the Ph.D. Degree.

The following are normally minimal requirements for admission to full potential candidate status: (1) 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; (2) above the fifteenth percentile in verbal and quantitative aptitude on the Graduate Record Examination; (3) endorsement by at least three former teachers or professional colleagues; and (4) a statement of the applicant's goals and reasons for pursuing the doctorate. Personal interviews with members of the Ph.D. Admissions Committee are recommended and 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 Courses: 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; and a course in data analysis.

2. Primary Concentration 21 hrs (advertising, broadcasting, journalism, public relations, or special communication)

3. Secondary Concentration 18 hrs (Outside the College of Communications or a second concentration in Communications)

4. Dissertation 36 hrs

Total 132 hrs

Admission to candidacy must be attained at least three quarters prior to graduation and requires successful completion of a comprehensive examination. A diagnostic exam also must be taken about two quarters after entering the doctoral program. This exam covers Communications 6100, 5120-21, 5140, 6140, and one statistics course.

REQUIRED SCHOLASTIC AVERAGE

A student in the College of Communications whose graduate grade point average, not including incomplete grades, is below 3.0 at any time after the end of 12 hours of graduate credit will be placed on probation.

A student on probation will be dropped from the program unless his or her cumulative 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 graduate course work attempted that is specified in the student's degree program. Exceptions to this policy may be made only with the approval of the Assistant Dean for Graduate Studies of the College of Communications upon the recommendation of the student's faculty committee.

Communications Research Center

The Communications Research Center is an adjunct to the communications graduate program. Objectives of the Center are: (a) to conduct original research in mass and public communication; (b) to disseminate research-generated information; and (c) to provide research services to faculty and students, professional communicators, and others interested in improving the quality of human communications.

Departments of Instruction

Planned course offerings in the College of Communications for a full calendar year are published in the College newsletter the preceding November. This information is available from the Dean's Office, 302 Communications Building, 974-3031.

Communications Courses

MAJOR DEGREES

Professors:

P. G. Ashdown, Ph.D. Bowling Green; J. A. Crook, Ph.D. Iowa State; G. A. Everett, Ph.D. Iowa; J. B. Haskins, Ph.D. Minnesota; D. W. Holt, Ph.D. Northwestern; H. H. Howard, Ph.D. Ohio; B. K. Lester, Ph.D. Southern Illinois; N. R. Swan, Ph.D. Missouri.

Associate Professors:

M. M. Miller, Ph.D. Michigan State; M. W. Singletary, Ph.D. Southern Illinois; R. E. Taylor, Ph.D. Illinois.

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

5100 Introduction to Graduate Studies (3) Scope and procedures of advanced study in communications. Information sources, literature review methods, scholarly style, thesis and degree requirements and procedure, overview of traditional and behavioral research methods and informational sources. S/NC only. F

5120 Seminar in Historical Research Methods in Communications (3) Historical, descriptive, and legal research in communications. Conceptualization of communication processes. Prereq: 5100, or 6100. F

5140 Mass Communication Theory (11) Application of theory to contemporary mass communication problems. Topical approach; literature reviews and analytical reports, and papers in fields of interest. Prereq: 5120 or consent of instructor. W

5150 Seminar in Communications Issues (3) Controversial topics in communications. Prereq: 5100 and 5140, or consent of instructor. May be repeated. Maximum 6 hrs.

5200 Seminar in Communications Education (3) Principles and historical perspectives of education for journalism, broadcasting, and advertising. Su

5410 Seminar in Communications Law (3) Legal limitations and responsibilities of institutions affecting mass media; law of libel and invasion of privacy, development of obscenity law, free press and fair trial, contempt of court, federal regulation of broadcasting, advertising and public relations industries, copyright and access to information. W

5420 Seminar in Communications History (3) Major trends in media history, development of major concepts and issues. Prereq: Survey courses in communications history or consent of instructor. F

5470 Seminar in Media Economics (3) Electronic and print media ownership and finance, role of new technologies and marketing techniques, corporate personnel policy, budgeting and expansion. Sp

5970 Independent Study (3) Reading, research, or projects on special topics in communication. On individual basis, under faculty direction, with consent. May be repeated.

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

6100 Introduction to Doctoral Studies (1) Doctoral degrees and dissertation requirements. Committee formation and program planning. Overview of research methods and informational sources. S/NCG only. F

6140 Mass Communication Theory II (3) Application of theory to contemporary mass communication problems. Optional approach; literature reviews and analytical papers. Prereq: 5120, 5140, 6100. W

6141 Mass Communication Theory III (3) Continuation of 6140, detailed analysis of selected topics in theory and research. Tutorials, readings, reviews, reports, and papers in fields of interest. Prereq: 6140. Sp

6200 Seminar in Communication Topics (3) Identification, presentation and analysis of special issues and problems in communication. Organization and strategy in writing research proposals. Prereq: 5100, 5120, 5140. Recommended prereq: 6100 or consent of instructor. Sp

6300 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. W

6310 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 experiment situations. Prereq: 5120 or consent of instructor. Prereq or coreq. Basic statistics.

6320 Seminar in Historical Research Methods in Communications (3) Materials and methods in historical, descriptive, and legal research in communications theory and behavior. Prereq: 5100, 5120. Recommended prereq: 5140, 6100. Su

6330 Content Analysis (3) Content analysis as mass media, media research techniques, conceptual foundations. Research design, categorization, sampling procedures, data gathering, and analysis. Sp

Advertising

Professors:

J. B. Haskins, Ph.D. Minnesota.
4020 Radio Production (3) Study of radio productions, past and present. Familiarization with production tools and techniques. Group and individual production activities. Prereq: 2750 or consent of instructor. Cannot be taken for graduate credit by communication majors.

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 mind. Prereq: 4020 or consent of instructor. Cannot be taken for graduate credit by communications majors. F, W, Sp

4040 Advanced Television Production (3) A semi-independent course in program origination, producing, directing and performing with orientation to the professional broadcast student. Prereq: 4030 or consent of instructor. F, W, Sp

4100 Broadcast News Operation (3) Theory and practice in covering local news and public affairs events for radio and television. Gathering and production of news broadcasts, using tools of broadcast newsperson. Prereq: 3160 and 3670 or consent of instructor. 2 hrs. and 1 lab. F, W, Sp

4670 Radio-Television Management (3) Business policies and practices of networks and stations. Departmental functions, cost and income figures, sales, promotion, advertising agencies, and governmental regulations. Lectures by commercial broadcasters. Prereq: 2750 or consent of instructor. F, W, Sp, Su

4680 Broadcast Sales Management (3) Problems and practices of television and radio sales. Case studies in sales development, pricing, promotion, and other areas of sales management. Prereq: 2750 or consent of instructor. F, W, Sp

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

5510 Creative Projects (3) For students having specialized broadcast interests or those who wish extensive directed study in creative writing or production projects. May be repeated. E

5610 Investigative Reporting (3) Investigative and interpretative reporting of complex or specialized subjects. May be repeated. Maximum 6 hrs.

5700 Independent Study (3) E

5980 Internship (3) E

School of Journalism

Professors: J. A. Crook (Director), Ph.D. Iowa State; P. G. Ashdown, Ph.D. Bowling Green; G. A. Everett, Ph.D. Iowa; J. B. Haslam, Ph.D. Minnesota; B. K. Leiter, Ph.D. Southern Illinois.

Associate Professors: J. H. Carr, M.S. Tennessee; D. Zeigler, Ph.D. Southern Illinois

Adjunct Professors: Alex Haley

5120 Writing Feature Articles (3) Selection of topics and practice in writing feature articles for newspapers, magazines, and book publications. Prereq: 2220 or consent of instructor. E

5410 Communications Law (3) Statutory and judicial precedents affecting mass communications media. Sources, content, broadcast regulations, information, copyright, broadcasting, advertising and postal regulations. E

5720 Advanced Public Relations (3) Preparation of communications materials to gain support from various publics. Prereq: 3710. F, W, Sp

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

3990 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.

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

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


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


4560 Investigative Reporting (3) Investigative and interpretative reporting of complex or specialized subjects. May be repeated. Maximum 6 hrs.

4710 Public Relations Cases (3) Case studies and application of public relations principles to problems in business and industry, government, institutions, trades and professions; solving problems in public relations situations. Prereq: 3710. F, W, 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 photography. Emphasis on news and feature photographs, and picture stories. Prereq: 3810 or consent of instructor.

4950 International Communications (3) Communication of news and opinion among nations under varied 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. Sp.

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.

5310 Reporting Issues in Science (3) Reporting and writing about scientific issues: microbiology/medicine,
biology/nutrition, chemistry/environment, physics/astronomy/engineering. Prereq: Basic reporting course or consent of instructor.

5510 Writing and Editing Projects (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.

5550 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.

5710 Studies in Public Relations Communications (3) Problems of communication between institutions and organizations and their publics. Case histories and evaluations of programs. Prereq: 2710 or consent of instructor. F

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.

5910 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)

5980 Internship (3)
The faculty of the College of Education is committed to performing three major functions: (1) to provide professional preparation for teachers, administrators, school service personnel, and selected other professionals such as health and recreation personnel at the undergraduate and graduate levels; (2) to collaborate with school personnel, educational agencies, professional groups, and others interested in the evaluation and improvement of educational opportunities, programs, and services; and (3) to promote and conduct research and development in education and other areas of responsibility.

The College of Education holds membership in the American Association of Colleges for Teacher Education. All certification and degree programs through the doctoral level are fully accredited by the National Council for Accreditation of Teacher Education, the Southern Association of Colleges and Schools, and the Tennessee State Department of Education.

The College of Education, through the Graduate School, offers programs leading to the Master of Science degree, the Specialist in Education degree, the Doctor of Education degree in the major areas listed on page 8.

The Ph.D. program with a major in Education provides six options for study in the departments of Curriculum and Instruction, Educational Administration and Supervision, Educational and Counseling Psychology, Special Education and Rehabilitation, Technological and Adult Education, and Physical Education. The program requirements and the concentrations and emphases are:

**The Program**

<table>
<thead>
<tr>
<th>Concentration</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Area</td>
<td>21</td>
</tr>
<tr>
<td>Foreign or Computer Language</td>
<td>0-9</td>
</tr>
<tr>
<td>General Core Requirements</td>
<td>6</td>
</tr>
<tr>
<td>Courses in history of education, philosophy of education (two areas must be represented)</td>
<td>Minimum</td>
</tr>
<tr>
<td>Courses in learning theory, curriculum theory, and administrative theory (three areas must be represented)</td>
<td>9</td>
</tr>
<tr>
<td>Trans-college seminar—four consecutive quarters</td>
<td>Minimum</td>
</tr>
<tr>
<td>Alternative Core Requirements</td>
<td>4</td>
</tr>
<tr>
<td>Courses in philosophy of science</td>
<td>Minimum</td>
</tr>
<tr>
<td>Transcollege Seminar—four consecutive quarters</td>
<td>4</td>
</tr>
<tr>
<td>Seminar in area of emphasis</td>
<td>Minimum</td>
</tr>
</tbody>
</table>

**Courses in learning theory/group or independent study**

<table>
<thead>
<tr>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Specialization</td>
</tr>
<tr>
<td>Major Option—a minimum of 24 hours normally selected from one or two emphases within the major option</td>
</tr>
<tr>
<td>Supporting Emphasis—a minimum of 12 hours selected from an emphasis other than those emphases selected in the major option. (May be selected from any of the five options but not a combination of options.)</td>
</tr>
<tr>
<td>Cognate—a minimum of 9 hours selected from outside the College in addition to the designated research courses.</td>
</tr>
<tr>
<td>Dissertation</td>
</tr>
<tr>
<td>Minimum</td>
</tr>
</tbody>
</table>

**Concentrations and Emphases**

**Option I**—Emphases in Administrative Theory and Practice

<table>
<thead>
<tr>
<th>Major Options and Emphases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. School Administration</td>
</tr>
<tr>
<td>2. Higher Education Administration</td>
</tr>
<tr>
<td>3. Organizational Leadership and Policy Studies</td>
</tr>
</tbody>
</table>

**Option II**—Emphases in Theories of Curriculum Development and Foundations of Education

| Bases for educational Planning and Curriculum: Anthropological, Historical, Philosophical, and Sociological. |
| 2. Principles and Models for Planning, Developing, and Evaluating Educational Programs. |
| 3. Research Design for Educational Programs. |

**Option III**—Emphases in Instructional Theory and Practice

<table>
<thead>
<tr>
<th>Principles and Models for Instructional Improvement.</th>
</tr>
</thead>
</table>
2. Elementary and Early Childhood Instruction and Practices. 
5. Reading Education. 
6. Instructional Media and Technology. 
7. Vocational-Technical Fields of Instruction and Practice. 
8. Special Education and Rehabilitation.

Option IV*: Emphases in Theories and Practice of Educational and Personal Adjustment.

Major Options and Emphases: 
1. Counselor Education. 
2. Counseling Psychology. 
3. Educational Psychology.

Option V*: Emphases in Foundations of Human Movement.

1. Adapted Physical Education. 
2. Philosophical Foundations of Sport. 
5. Metabolic and Cardiovascular Adaptations to Acute and Chronic Exercise. 
6. Motor Behavior: 
   a. Motor Control. 
   b. Motor Learning. 
   c. Psychology of Sport. 

Option VI*: Emphasis in Health Education

Public Health (up to 12 hours) 
Safety (up to 12 hours)

*Ph.D. in Education guidelines available in College of Education.

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 Addition. The research activities relate to the development of research proposals, conducting and/or assisting in 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 technical assistance 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 
DEGREE

Art Education 
M.S.

Professors: 
J. W. Robertson, Ed.D. Columbia, (Emeritus); 
H. N. Hull, Ed.S. Peabody.

Associate 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 program.

The thesis option requires 45 quarter hours as follows:

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Art Education 5310, 5320 and electives</td>
<td>18</td>
</tr>
<tr>
<td>2. Curriculum and Instruction 5710, and electives</td>
<td>9</td>
</tr>
<tr>
<td>3. Minor (selected with committee)</td>
<td>9</td>
</tr>
<tr>
<td>4. Thesis (Art Education 5000)</td>
<td>9</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Art Education 5210, 5310, 5320, and electives</td>
<td>21</td>
</tr>
<tr>
<td>2. Curriculum and Instruction 5800, and electives</td>
<td>9</td>
</tr>
<tr>
<td>3. Minor (selected with committee)</td>
<td>9</td>
</tr>
<tr>
<td>4. Electives</td>
<td>6</td>
</tr>
</tbody>
</table>

The thesis option requires satisfactory completion of an oral examination prior to awarding the degree, while the non-thesis option requires satisfactory completion of a final written comprehensive examination. Both the oral and written exams are conducted by the student's Master's degree committee.

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.

4350-46-70 Problems in Art Teaching (3, 3, 3) Prereq: Consent of instructor. E

5000 Thesis (1-15) PNP 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 growth; leadership and community relationships; art for special student. Sp.
three faculty members—the advisor from music education, one member from music education, one member from education.

4411-42-43 Teaching Class Piano (1, 1, 1) For majors in music, music education, or elementary education. Prereq: Consent of instructor. F, W, Sp

5710 Research in Music Education (3) Prereq: Consent of instructor. Su

5810 Seminar (3) Music teaching in primary and intermediate grades. Prereq: Consent of instructor. Su

5820 Seminar (3) Music teaching in vocal and general music areas of junior high school curriculum. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program. Su, A

5840 Seminar (3) Music teaching in vocal, theoretical, historical, and appreciation area of the secondary school curriculum. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program. Su, A

Curriculum and Instruction

MAJORS

DEGREES

Curricular

Elementary Education

M.S.

English Education

M.S.

Foreign Language Education

M.S.

Instructional Media and Technology

M.S.

Mathematics Education

M.S.

Reading Education

M.S.

Science Education

M.S.

Social Science Education

M.S.

Professors:


Teaching Assistants:


Assistant Professors:

R. A. Austin, Ph.D. Florida; State; D. A. Hendricks, Ph.D. Alabama; A. M. Rutherford, M.A. Virginia.

Graduate programs are designed to improve scholarship and educational competence in a number of areas leading to the Master of Arts in Education degree, the Doctor of Education degree, and the Doctor of Philosophy in Education degree.

THE MASTER'S PROGRAM

For the Master of Science degree, thesis and non-thesis options are available in the Curriculum and Instruction major with concentration in the following areas: Curriculum, Elementary Education, Foreign Language Education, Instructional Media and Technology, Mathematics Education, Reading Education, Science Education, and Social Science Education. The non-thesis option requires the completion of 51 quarter hours of course work.

THE SPECIALIST PROGRAM

The Educational Specialist degree program with a major in Curriculum and Instruction encompasses concentrations in the following areas: curriculum, elementary education, English education, foreign language education, instructional media and technology, mathematics education, science education, social science education.

THE DOCTORAL PROGRAM

The Ed.D. program in Curriculum and Instruction may be taken in the following fields: curriculum, social foundations, educational research, educational English education, English education, foreign language education, mathematics education, science education, and social science education.

The Doctor of Philosophy degree with a major in Education includes concentrations and emphases as listed on page 55.

For further information, write the Department of Curriculum and Instruction.

4150 School Library Administration (3) (Same as Library and Information Science 4150.)

4240 Classroom Instructional Organization (3) Developing understandings and skills relating to grouping, individualization, skill utilization, organization, grading, integration, and achieving an effective social environment. For elementary classroom teacher. Prereq: Senior standing.

4292 History and Philosophy of Afro-Amercian Education (4) (Same as Cultural Studies and History 4292.)

4300 Developmental Reading in Secondary School and Community College (3) Approaches and techniques for teaching reading classrooms and/or laboratories at middle school, secondary school, and community college level. Prereq: Consent of instructor.

4304 Developing Reading Skills in Content Fields (3) Approaches and techniques for teaching reading skills in content areas of school programs. Emphasis on middle school and secondary school programs. Prereq: Consent of instructor.

4400 Problems in Improvement of Instruction (1-3) Special conferences, workshops, or in-service programs designed for improvement of instruction. May be repeated. Maximum 9 hrs. S/NCO only.

4410 Educational Sociology (3) (Same as Sociology 4410.)

4460 Teaching in Kindergarten and Head Start (3) Emphasis on kindergarten and Head Start level instruction. Prereq: Consent of instructor.

4564 Methods and Materials in Environmental and Science Education (3) Instructional methods, materials and curriculum practices for teaching science and environmental science for elementary school children.


4750 Utilization of Instructional Media (3) Introduces

THE SPECIALIST PROGRAM

The Educational Specialist degree program with a major in Curriculum and Instruction encompasses concentrations in the following areas: curriculum, elementary education, English education, foreign language education, instructional media and technology, mathematics education, science education, social science education.

THE DOCTORAL PROGRAM

The Ed.D. program in Curriculum and Instruction may be taken in the following fields: curriculum, social foundations, educational research, educational English education, English education, foreign language education, mathematics education, science education, and social science education.

The Doctor of Philosophy degree with a major in Education includes concentrations and emphases as listed on page 55.

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4150 School Library Administration (3) (Same as Library and Information Science 4150.)

4240 Classroom Instructional Organization (3) Developing understandings and skills relating to grouping, individualization, skill utilization, organization, grading, integration, and achieving an effective social environment. For elementary classroom teacher. Prereq: Senior standing.

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4300 Developmental Reading in Secondary School and Community College (3) Approaches and techniques for teaching reading classrooms and/or laboratories at middle school, secondary school, and community college level. Prereq: Consent of instructor.

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4564 Methods and Materials in Environmental and Science Education (3) Instructional methods, materials and curriculum practices for teaching science and environmental science for elementary school children.


4750 Utilization of Instructional Media (3) Introduces
5203 Programs and Methods for Teaching Critical Thinking (3) Instructional designs and materials for development of higher level comprehension, concepts, and attitudes for creative (or productive) and critical (or evaluative) reading. Prereq: Course in reading education or consent of instructor.

5204 Programs and Materials for Teaching Instruction (3) Examination, 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.

5205 Trends and Issues in Teaching Reading (3) Differentiation of issues and trends through analysis of reading materials, context and function of programs across the academic curriculum of elementary school. Prereq: Consent of instructor. Sp, Su

5206 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.

5207 Assessment and Correction of Classroom Language Arts Difficulties (3) Classroom considerations for assessing and correcting language arts (other than reading) difficulties. Prereq: One graduate level course in elementary school language arts or consent of instructor.

5230 Reading Education (1-15) P/NP only. E

5231 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.

5232 Programs and Materials for Teaching Inclusion (1-3) Application of principles of learning and teaching instructional problems in secondary schools. Su

5233 Reading Remediation (3) Procedures, methodologies and materials for reading diagnostic instruments; testing of elementary school language arts courses. Prereq: Course in diagnosis and correction of reading diagnostic instruments; testing of elementary school language arts courses. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5234 Seminar in Teaching Elementary Science (3) Analysis of new and innovative science program materials, methods of diversifying teaching, using materials, and analyses of program structure. Prereq: 3720 or equivalent, or consent of instructor.

5235 Curriculum Evaluation and Development (3) Examination of alternative approaches to improve current practice. Prereq: 5580 or consent or instructor.

5236 Curriculum Development at the State and National Levels (3) Critical considerations and development of curricula and materials for college and university level courses. Prereq: Consent of instructor. Sp, Su

5237 Diagnosis and Correction of Classroom Reading Problems (3) Procedures, methodologies and materials for diagnosis and correction of reading problems pertaining to linguistically different learners. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5238 Practicum in Diagnosis of Reading Problems (3) Procedures, methodologies and materials for diagnosis and correction of reading problems pertaining to linguistically different learners. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5239 Practicum in Remediation of Reading Problems (1-3) Methods and materials, basic approaches, examination of reading skills, development of functional relationship with other curriculum areas. Not available for credit to persons completing recent course in reading education. Prereq: Consent of instructor.

5240 Creative Thinking and Expression in the Elementary School (3) Analysis of innovative social studies program materials with attention to methodology of teaching, using materials, and to analyses of program structure. Prereq: 3270 or equivalent or consent of instructor.

5299 Introduction to Diagnosis and Correction of Classroom Arithmetic Difficulties (3) Classroom strategies for diagnosis and correcting arithmetic difficulties grades 1-8. Prereq: 3350 or 3751 or equivalent.

5300 Contemporary Philosophies of Education (3) Existentialism, phenomenology, Marxism, structuralism, psychoanalysis, and behaviorism. 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 relationship with other curriculum areas. Not available for credit to persons completing recent course in reading education. Prereq: Consent of instructor.

5302 Psychology of Reading (3) The reading act, relationship between 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 Thinking (3) Instructional designs and materials for development of higher level comprehension, 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 Teaching Instruction (3) Examination, 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 reading materials, context and function of programs across the academic curriculum of elementary school. Prereq: Consent of instructor. Sp, Su

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 considerations for assessing and correcting language arts (other than reading) difficulties. Prereq: One graduate level course in elementary school language arts or consent of instructor.

5308 Teaching Language Arts in the Elementary School (3) Recent trends in methods, materials and content. Not available for credit to persons completing recent elementary language arts methods course. Prereq: 12 hrs English or related courses or consent of instructor.

5309 Teaching Social Studies in the Elementary School (3) Trends in methods, materials and content. Not available for credit to persons completing recent elementary social studies course. Prereq: 12 hrs in science or related courses or consent of instructor.

5310 History of European Education (3) Education in ancient civilizations. Prereq: Consent of instructor.

5311 History of European Education (3) Education in ancient civilizations. Prereq: Consent of instructor.


5313 Comparative Philosophies of Education (3) Educational theory and policy proposals of major philosophical schools of thought. Prereq: Consent of instructor.

5314 Pragmatism in Education (3) Effects of American pragmatist tradition on educational policy and practice. Prereq: At least one course in history of philosophy of education.

5315 Psychology of Reading (3) The reading act, relationship between learning theory and reading, role of reading in child's overall intellectual development. Prereq: Undergraduate reading course or consent of instructor. May be repeated. Maximum 6 hrs.

5316 Practicum in Diagnosis of Reading Problems (3) Procedures, methodologies and materials for diagnosis and correction of reading problems pertaining to linguistically different learners. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5317 Practicum in Remediation of Reading Problems (1-3) Methods and materials, basic approaches, examination of reading skills, development of functional relationship with other curriculum areas. Not available for credit to persons completing recent course in reading education. Prereq: Consent of instructor.

5318 Practicum in Diagnosis of Reading Problems (3) Theoretical and practical applications of specific reading diagnostic instruments; testing of elementary and/or secondary school students, preparing case study reports, and conducting parent conferences. Prereq: Consent of diagnosis and correction of reading problems or consent of instructor. May be repeated. Maximum 6 hrs.

5319 Practicum in Remediation of Reading Problems (1-3) Methods and materials, basic approaches, examination of reading skills, development of functional relationship with other curriculum areas. Not available for credit to persons completing recent course in reading education. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5320 Developmental Reading Pracicum (3) Diagnosis and teaching children having developmental and corrective reading needs. Prereq: Course in diagnosis and correction of reading problems or consent of instructor. May be repeated. Maximum 6 hrs.

5321 Seminar in International Education: Asia and Africa (3) Historical, philosophical, and sociological foundations; special reference to Japan, China, India, and Nigeria.

5210 Seminar in International Education: Asia and Africa (3) Historical, philosophical, and sociological foundations; special reference to Japan, China, India, and Nigeria.

5211 Instructional Strategies in Elementary School Social Studies (3) Specific teaching methods and instructional procedures for organizing social studies learnings. Prereq: Undergraduate social studies course or equivalent.

5212 Programs and Materials in Teaching Elementary School Social Studies (3) Analysis of new and innovative social studies program materials with attention to methodology of teaching, using materials, and to analyses of program structure. Prereq: 3270 or equivalent or consent of instructor.

5229 Introduction to Diagnosis and Correction of Classroom Arithmetic Difficulties (3) Classroom strategies for diagnosis and correcting arithmetic difficulties grades 1-8. Prereq: 3350 or 3751 or equivalent.

5230 Advanced Study and Practicum in Diagnosis and Remediation of Arithmetic Difficulties (3) Assessment and practicum experience with students having corrective and remedial arithmetic needs. Prereq: 4330 or equivalent. F, Su

5240 Creative Thinking and Expression in the Elementary School (3) Gives students opportunity to examine development of human thought across the academic curriculum of elementary school. Prereq: Consent of instructor. Sp, Su

5250 Secondary School Instruction (3) Persistent instructional problems in secondary schools. Su

5380 Externship in Reading (6-12) Methods and materials of reading program, distinguishing between approaches and materials. Prereq: Graduate course in reading education or consent of instructor.

5381 Practicum in Remediation of Reading Problems (3) Prereq: Course in diagnosis and correction of reading problems pertaining to linguistically different learner. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5382 Practicum in remediation of Reading Problems (3) Examination of alternative approaches to improve current practice. Prereq: 5580 or consent or instructor.

5383 Mathematics Laboratories in Elementary School (3-9) Systematic approach to planning and development of curriculum at local school or system level. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/N only.

5385 Mathematics Laboratories in Elementary School (1-9) (3) For elementary school teachers dealing with activity-oriented mathematics laboratory materials and pedagogical strategies. Not available for credit to persons completing recent elementary mathematics course. Prereq: Undergraduate social studies course or equivalent. F, Su

5386 Mathematics Laboratories in Elementary School (3) Analysis of new and innovative science program materials, methods of diversifying teaching, using materials, and analyses of program structure. Prereq: 3720 or equivalent, or consent of instructor.

5387 Assessment and Correction of Classroom Language Arts Difficulties (3) Classroom considerations for assessing and correcting language arts (other than reading) difficulties. Prereq: One graduate level course in elementary school language arts or consent of instructor.

5400 Problems in Improvement of Instruction (1-3)
5702 Observation and Analysis of Instruction (3) Classroom observation, analysis procedures, development of objective observation and analysis skills, examination of existing observation systems.

5790 Career Development: Workshop (1-4) (Same as Educational Psychology 5790).

5800 Seminar in Cooperative Curriculum Research (2) 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, administration, 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.

5825 Teaching Mathematics in the Middle and Junior High School (3) Problems related to teaching mathematics in middle and junior high schools. Emphasis on structure of mathematics methods, and materials for teaching. Prerequisites: 5570 and 5909 or consent of instructor.

5830 Seminar in Mathematics Education (3) Current curricular issues. Emphasis on individual student projects and investigation. W

5861 Trends and Issues in Early Childhood (3) Historical background; trends, and issues as basis for evaluating current programs; materials and techniques of teaching. F, Sp

5870 Curriculum for Early Childhood (K-3) (3) Sp, Su

5880 Teacher-Parent-Community Relations (3) Development of techniques for effective relations between parents and teachers. Prerequisites: 5590 or consent of instructor.

5901 Linguistics and the Teacher of English (3) Analysis of current activities in field of linguistic methodology. Emphasis on thorough understanding of American education and life. W

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

5904 Teaching the Mass Media in the English Classroom (3) Nature of mass media and importance to American education and life. Sp

5905 Teaching English in the Community/Junior College (3) Emphasis on thorough understanding of community needs by 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 speaking and listening. W

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.)

5940 The Function of the Thinking Process in Education (3) Analysis of thinking process for purposes 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.

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

5990 Projects, Programs, and Materials in Social Studies (3) Projects and aids associated with each social science discipline. W

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

6010 Studies in English Education (3) Reading and study in various areas of teaching of English composition, language, and literature. Su

6020 Seminar in Teaching the Social Studies (3) Problems associated with classroom instruction in junior and senior high schools. Su

6030 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

6031 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.

6032 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 (preferably 5379 and 5304) in reading education or consent of instructor.

6040 Seminar in Curriculum and Instruction (1) Required three quarters. S/NC only. E

6000 Advanced Studies in Elementary Education (3) Critical analysis of research as it applies to classroom practice. Prereq: 5710 or 5800, 12hrs at graduate level; or consent of instructor.

6080 Advanced Seminar in Philosophy of Education (3) Some selected philosophical issues in education. Prereq: At least 2 courses in history or philosophy of education.

6090 Special Topics (1-6) Topics to be assigned. May be repeated. May be offered for letter grade or S/NC. E

6091 Independent Study (1-6) Topics to be assigned. May be repeated. May be offered for letter grade or S/NC. E

6092 Supervised Readings (1-6) Topics to be assigned. May be repeated. May be offered for letter grade or S/NC. E

6150 Education as Social Policy (3) Education as instrument of national policy, topical problems faced by society in shaping educational problems. Prereq: Consent of instructor.

6210 Seminar in Elementary School Social Studies Research (3) Current research in elementary social studies, status of research in field, needed research-related research from other fields. Prereq: Undergraduate course and one graduate course in social studies, or equivalent. Su

6230 Programs for Curriculum Improvement (3) W

6240 Interpretation of Research in Curriculum and Instruction (3) Research studies and relation of findings to professional assignments. Prereq: 5800 or 5710 or equivalent.

6250 Seminar in History of Education (3) May be repeated with consent of instructor.

6282 Advanced Studies in Elementary School Science (3) Critical analysis of current research in elementary school science. Prereq: Undergraduate course and one graduate course in science, or equivalent.

6350 The Professional Education of Teachers (3) Principles and practices of preservice preparation of teachers for American elementary and secondary schools; current and historical trends and issues; innovations and directions for future.

6400 The Dynamics of Educational Change (3) Interrelations and the evaluation approach to change process in education. Prereq: Consent of instructor.

6500 Advanced Studies in Early Childhood Education (3) Prereq: 2 graduate level courses in early childhood education and consent of instructor. May be repeated. Maximum 6 hrs. S/NC only.

6510 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. Sp

6511 Advanced Studies in Educational Anthropology (3) Ethnographic methods applied to formal and nonformal educational settings. Prereq: 2 courses in cultural anthropology, educational anthropology, or consent of instructor.

6710 Advanced Educational Statistics (3)

6720 Interpretation of Data (3) Types of data in publishing, data interrelations 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 various educational settings. Prereq: 5580 and 5350, or equivalent.

6731 Advanced Studies in Curriculum (3) Analysis of influential curricular theories and approaches, structure and design of educational programs. 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 curricular problems and future trends. Prereq: 5830 or consent of instructor.

6850 Principles of Educational Leadership (3) Conceptual issues and applications of educational leadership in the school setting. Prereq: Consent of instructor.

6990 Internship (1-6) Advanced level experiences in application of principles and practices of curriculum 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

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 and Counseling Psychology MAJORS DEGREES

6930 Advanced Studies in Psychology (3) Concerned with test development and evaluation, with emphasis on test construction and development. Prereq: Consent of instructor.

6931 Advanced Studies in Counseling Psychology (3) Concerned with the application of psychological principles in the counseling process. Prereq: Consent of instructor.

6932 Advanced Studies in School Psychology (3) Concerned with the application of psychological principles in the school setting. Prereq: Consent of instructor.

6933 Advanced Studies in Community Psychology (3) Concerned with the application of psychological principles in the community setting. Prereq: Consent of instructor.

6934 Advanced Studies in Clinical Psychology (3) Concerned with the application of psychological principles in the clinical setting. Prereq: Consent of instructor.

6935 Advanced Studies in Industrial/Organizational Psychology (3) Concerned with the application of psychological principles in the industrial setting. Prereq: Consent of instructor.
5780 Career Development: Theory and Research (3)

5785 Career Development: Program Development Implementation and Evaluation (3) Career development and precocial programs and projects, K-Adult with emphasis on development, implementation, and evaluation. Prereq: 5780 or equivalent, or consent of instructor. Sp

5800 Cross-Cultural Counseling (3) Counseling individuals from various cultural, religious, and ethnic backgrounds. Issues in cross-cultural counseling use of tests and client expectancies. Prereq: Consent of instructor or admission to educational and counseling psychology. 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. Sp

5850-60-70 Special Topics and Problems (1-6, 1-6, 1-6) May be repeated. May be taken for letter grade or S/NC. E

5880 Career Development: Occupational and Educational Resources (3) Gathering, interpreting, and using educational, 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. Prereq: May be taken concurrently or separately: 5780, 5785, 5790, 5880, and/or consent of instructor. May be repeated. Maximum 6 hrs. E

5890 Counseling Theories and Techniques (3) Presentation, demonstration, and application. Open to students interested in counseling process. F, W, Su

5897 Prepracticum (3) Didactic experiences and counseling simulations in learning laboratory. Coreq.: 5930, F, W, Su

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.: May be repeated with consent of department. Maximum 6 hrs. E

5950-60 Theory and Practice of Consultation (3, 3) (Same as Psychology 5950-60.)

5959-5969 Practicum in Consultation (2, 2) (Same as Psychology 5959-60.)

5970 Internship in Community Agency Counseling (1-6) Supervised training at Departmentally-approved internship sites. Prereq.: Consent of instructor and admission to the community agency counseling program. May be repeated. Maximum 12 hrs. S/NC only. E

5975 Vocational Assessment (3) Use and interpretation of tests in vocational assessment. Prereq.: 4640 or Psychology 4640, and 5780, or consent of instructor. W

5980 Organization and Administration of Pupil Personnel Services (3) Basic principles, procedures, and policies. Prereq.: 4640 or 5040 or 5210, or consent of instructor. W

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

6040 Seminar in Educational and Counseling Psychology (1-3) Seminar required in fall quarter. Maximum 4 hrs. S/NC only. F (Formerly: Seminar (1))

5919 Internship in School Psychology (1-6) Supervised training at departmentally-approved internship sites. Prereq.: Consent of instructor and admission to the school psychology program. May be repeated. Maximum 12 hrs. S/NC only. E

6006 Internship in Counseling Psychology (1-6) Supervised training at departmentally-approved internship sites. Prereq.: Consent of instructor and admission to the doctoral program in counseling psychology. May be repeated. Maximum 12 hrs. S/NC only. E

6007 Internship in Educational Psychology (1-6) Supervised training at departmentally-approved internship sites. Prereq.: Consent of instructor and admission to the educational psychology program. May be repeated. Maximum 12 hrs. S/NC only. E

6008 Internship in Counselor Education (1-6) Supervised training at departmentally-approved internship sites. Prereq.: Consent of instructor and admission to the counselor education program. May be repeated. Maximum 12 hrs. S/NC only. E

6110 Application of Research Design (3) Research design and statistical analysis unique to educational psychology, counseling, and college student personnel. Emphasis on designs "experimental" in nature. Prereq.: 2 courses in statistics or consent of instructor. F

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

6510 Ethical and Professional Issues in Psychology (3) Professional, ethical, and legal issues related to research, human services, teaching and public policy. Prereq.: Admission to Psychology doctoral program or consent of instructor. (Same as Psychology 6510.) Sp

6520 Advanced Classroom Behavior Modification (3) Current research in psychology and its application to educational problems. W, Su

6530 Theory and Research in Human Learning (3) Contemporary learning theory, current research and its influence upon school practice. F, Su

6531 Current Developments in Human Learning (3) Sp, Su

6540 Group Dynamics (3) Principles of group dynamics as they apply to a variety of group settings. Group counseling, personal growth, and group leadership skills. F, W, Su

6550 Educational Applications of Cognitive Theories (3) Developmental theory of Jean Piaget and implications for education. Related theories such as Bruner and Ausubel. A

6560 Parent Consultation (3) Theory and practice of parent consultation on problems of children and home. Prereq.: 5310, or 5320, or consent of instructor. W

5660 The College Student (3) Nature, characteristics, and needs. W

5780 Career Development: Theory and Research (3) F, Su
Educational Administration Leadership

MAJORS DEGREES

College Student Personnel M.S.
Educational Administration M.S., Ed.S.
and Supervision Ed.D.

Education Ph.D.

Professors:
D. H. Steffar (Head), Ph.D. Ohio State;
C. M. Achilles, Ed.D. Rochester, W. H. Coffield,
Ph.D. Iowa; J. P. Goddard, Ed.D. Tennessee;
M. J. Monahan, Ph.D. Florida State;
C. M. Peccolo, Ph.D. Iowa; E. R. Ramer (Emeritus),
Ed.D. Columbia; R. K. Roney, Ed.D. Tennessee;
F. M. Kestly, Ed.D. Stanford; G. C. Udeos, Ph.D.
Minnesota; F. P. Venditt, Ed.D. Colorado State.

Associate Professors:
G. W. Harris, Jr., Ph.D. Michigan; P. M. Husen,
Ed.D. Stanford; R. T. Mertz, Ed.D Columbia;

Assistant Professors:
W. D. Barton, Ed.D. Tennessee; J. K. Bowles,
Ed.D. Tennessee (Adjunct); J. C. Caraway, Ph.D.
Emory Univ., Ed.D. Tennessee (Adjunct);
J. J. Grubb, M.S. Indiana State.

The Department of Educational Leadership offers graduate programs leading to the Master of Science in Educational Administration and Supervision and College Student Personnel, the Specialist in Education and the Doctor of Education with a major in Educational Administration and Supervision, and the Doctor of Philosophy with a major in Education. Emphases may be developed in research, major central office positions, the principalship, and in other educational and social agencies.

The Ed.D. program also offers a concentration in higher education. The instructional program combines theory and practice in an innovative demonstration of scholarly study and research. A blend of classroom instruction, individualized advising and supervised practice and internships allows students to develop an emphasis in academic administration, community-junior college administration, student personnel administration, financial management and college teaching.

For additional information, contact the Department Head.

Admission Requirements: General portion of the Graduate Record Examination; writing sample if GRE verbal is below 50th percentile; leadership potential judged by activities in organizations; and rating forms or letters of recommendation. The applicant must also interview with at least 3 faculty members on campus or elsewhere. Application deadlines are January 15, March 15, June 15, and October 15.

M.S. IN EDUCATIONAL ADMINISTRATION AND SUPERVISION

Thesis Option: A minimum of 45 credit hours including 9 hours of Thesis 5000 is required. A major consists of a minimum of 24 hours. An internship is highly recommended but not required. A final oral comprehensive examination is required at the option of the committee.

Non-Thesis Option: A minimum of 51 credit hours is required with a minimum of 24 hours in the major. An internship is highly recommended but not required. A final written comprehensive examination is required with an oral exam at the option of the committee.

M.S. IN COLLEGE STUDENT PERSONNEL

This program is designed for individuals interested in entering the field of student personnel administration in colleges and universities and in community or junior colleges. The program has both a thesis and non-thesis option. A minimum of 90 hours, including 9 hours of practicum experience, is required in either option.

THE EDUCATIONAL SPECIALIST PROGRAM

Thesis Option: A minimum of 90 credit hours beyond the baccalaureate degree including 9 hours of 5180-90-200 is required. Twelve hours must be in a collateral area within the college and 12 hours outside the college. An internship is highly recommended but not required. A written comprehensive examination is given as well as an oral exam over the thesis.

Non-Thesis Option: A minimum of 90 credit hours beyond the baccalaureate degree including 9 hours of 5910-20-30 is required. Twelve hours must be in a collateral area within the college and 12 hours outside the college. An internship is highly recommended but not required. A foreign language requirement is given as well as an oral exam over the process papers.

THE DOCTORAL PROGRAMS

For the Ed.D. program, the minimum credit hours are determined by the student's doctoral committee. Nine to 12 hours must be in a collateral area within the college and 9-12 hours outside the college unless the student has a Master's degree in a field outside the College of Education. Three consecutive quarters of 6040 must be taken during residency. An internship is highly recommended but not required. A foreign language requirement is at the discretion of the committee. A written comprehensive examination is given as well as an oral exam over the dissertation.

The Ph.D. degree with a major in Education includes concentrations and emphases as listed on page 58.

Educational Administration and Supervision

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

5003 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 the library, 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 with 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) Key behavioral science concepts and their application in administration such as human behavior models, leadership change process, organizations and organizational behavior, motivation and morale, roles. F, Sp, Su

5230 Seminar in the Behavioral Sciences in Educational Administration (3) Key behavioral science concepts and their application in administration such as human behavior models, leadership change process, organizations and organizational behavior, motivation and morale, role theory. 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 resolve 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 relate to behavior, roles, and competencies to develop an effective school organization. F

5430 Building Level Administration (3) For beginning school principals and administrators, and for those operating in elementary, secondary, or consolidated schools. W, Su

5440 Introduction to Law, Finance, and Business Management at the Building Level (3) Orientation for beginning principals for basic foundations of the American legal system; how case law effects 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. Sp, Su

5460 Personnel Administration at the Local School (3) Planning and managing personnel needs, job analysis, recruitment, selection, placement; orientation of new staff; fair employment and discrimination; 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. Sp, 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, 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


5560 Research for Educational Administrators (3) Descriptive, experimental, and quasi-experimental design and use of research to help students gain quantitative background 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 use of interpersonal and group related communication skills. Sp, Su

5711 Problems in Educational Administration and Supervision: School Operation (3) May be repeated. E

5712 Problems in Educational Administration and Supervision: Higher Education (3) May be repeated. 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) Independent study of administrative problems. 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 repeated. 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: 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
5760 Maintenance of School Plants (3) Skills in operating school custodial and maintenance programs. Sp
5810 Survey Research Methods (3) Overview of descriptive studies, data collection, analysis, and interpretation for survey studies and school surveys, strategies for designing effective studies. F
5850-60 Independent Study in Educational Administration (3, 3, 3) Prereq: Consent of instructor. E
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 administrators. Developments, programs, problems, 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 administrators. Developments, programs, problems, 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. Developments, 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 committee. 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 representative. 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
6340 Current Trends in School Law (3) Logical arrangement of case and statutory material for public school administration; in-depth examination of problems concerning the law and public education. W, Su
6380 Instructional Supervision—School District (3) Definition of administrative and instructional supervision at the school district level. Supervisory operations including goal development; curriculum development; instructional support, help, and service for teachers and administrators; personnel development; program evaluation. W, Su
6420 School Board—Superintendency Relationships (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) Emphasizes superintendency team concept, planning, procurement and utilization of fiscal resources. F, Su
6450 Grant and Contract Proposal Preparation (3) Grants and contracts processes in education. Basic concepts applicable to other special agencies. A
6480 School Personnel Administration (3) Personnel administration functions for professional and supporting staff in educational organizations. Recruitment, selection, placement, personnel policies, employee wage and salary administration, fringe benefits, collective negotiations, human relations, staff development, and staff evaluation. F, Su
6480 Special Topics in School Personnel Administration (3) Human problems in school personnel administration; staff planning, record systems, personnel policy development; collective bargaining in education; and staff evaluation. May be repeated. Maximum 12 hrs. W, Su
6530 Futuristic Educational Planning Methods (3) Methods for describing alternative futures. A
6540 Contemporary Economics and Educational Finance (3) Contemporary educational finance policies and their influence on educational service and program, national economy, welfare of individuals, and welfare of the community. 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 impinge on operation and maintenance 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
6800 Administration of Complex Educational Organizations (3) Concepts and theoretical formulations to understand, analyze, evaluate, and change complex educational organizations. W, Su
6870 Advanced Study in School Facility Planning (3) In-depth experiences in development of educational specifications; application of leadership in creation of quality educational facilities. A
6900 Special Topics (3) May be repeated. E
6981 Specialized Seminar: School Operation (3) E
6983 Specialized Seminar: State School Administration (3) E
6984 Specialized Seminar: Preparation Programs (3) E
6990 Specialized Doctoral Seminar in Politics of Education (3) Political theories and practices as they affect operation of public school system. Appropriate interdisciplinary discussion based on literature and research from education, sociology, and political science. One field inquiry. Prereq: 5290, 5810 or equivalent or consent of instructor. W
6991 Specialized Seminar: Theory (3) E
6992 Specialized Seminar: Finance (3) E
6994 Specialized Seminar: Business Management (3) E
6997 Specialized Seminar in Organization and Structure (3) Organizational theories in education including systematic review of status of organizational and leadership research in education and related disciplines; implications for further research; application of existing theory and research to known educational settings. Prereq: Consent of instructor. A
6998 Specialized Seminar: School Law (3) E
6999 Specialized Seminar: Supervision (3) A
Higher Education
4554-55-56 Student Leadership Workshops (1, 1, 1) Small group and individualized experiences to develop knowledge and skills in leadership roles; for resident assistants, student government leaders, student activities, other student organizations. Prereq: Consent of instructor. S/NC only.
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 Seminar in College Teaching (3) Effective college teaching; testing and measurement; recent research in college instruction; major problems and issues in higher education. Required of candidates for the MACT degree. S/NC only. Sp
5360-70-80 Problems in Continuing and Higher Education (1-1, 1-3, 1-3) Independent study of problems and special institutes. S/NC only. E
5410 College and University Law—The Legal Environment (3) Legal precedent affecting organization, administration, and financing of public higher education. Academic freedom, faculty termination, taxation, private support, religion, tort liability, administrative law, academic due process, and affirmative action in employment. W
5420 College and University Law—Constitutional Rights and Responsibilities of Students (3) Legal precedent affecting student personnel services in public higher education. Student discipline, housing, dress, organizations, activities, fees, tuition, and related federal regulations.
5440 American Higher Education (3) Purposes, functions, organizations, and programs. F, Sp
5450 Instruction in Higher Education (3) Problems, procedures, and techniques. W
5470 The Curriculum of Undergraduate Higher Education (3) Background, content, and organization of instructional programs, trends and evaluation procedures, including accreditation activities.
5510 Governance of Colleges and Universities (3) Development, change, trends, process, and structure of collegiate governance. F
5580 Fiscal Problems in Higher Education (3) Revenue sources and fiscal management in public and private colleges and universities. Sp
5750 Student Personnel in Higher Education (3) Philosophy and scope.
5780 Seminar in College Student Personnel (3) Prereq: 5750 or consent of instructor.
5780 The Community-Junior College (3) History and role of the year college, major functions, organization and administration, problems, and issues. F, Sp
5855-65-75 Practicum in Continuing and Higher Education (1-3, 1-3, 1-3) Supervised practice in selected areas of instruction or administration of continuing or higher education programs. S/NC only. E
5960-70-80 Seminar in Continuing and Higher Education (1-3, 1-3, 1-3) Review of learning experiences of certificating professionals in fields of adult or higher education. E
5990 Practicum in College Student Personnel (3) Prereq: 5750, 5770, Educational Psychology 5560, or consent of instructor. May be repeated with consent of instructor. Maximum 9 hrs.
6190 Administration in Higher Education (3) Developing conceptual understanding of administrative theory and practice in higher education. F, Su
Special Education and Rehabilitation

MAJORS  DEGREES

Special Education  M.S.
Vocational Rehabilitation Counseling  M.S.
Education  Ph.D.


Mississippi State


Assistant Professors: W. Mulkey, Ph.D., Florida State.


Lecturers: H. L. Byrd, Jr., M.S., Tennessee.

The Department of Special Education and Rehabilitation offers graduate programs (thesis and non-thesis options) leading to the Master of Science degree with a major in Special Education or Vocational Rehabilitation Counseling. These are competency-based programs and experiences to prepare regular, special education, and rehabilitation personnel to work with exceptional persons: children and adults. Specialized courses may be distributed over the several areas of exceptionality with emphasis in 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 above areas.

The Doctor of Philosophy degree with a major in Education includes concentrations and emphases as listed on page 56. Under the sponsorship of the Office of Special Education and Rehabilitative 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.

For further information write the department head.

EDUCATION OF THE HEARING IMPAIRED

4230 Communication Processes for the Hearing Impaired I (3) Various communicative skills required by hearing impaired person; speech and language development; training in expressive and receptive language and its relation to other forms of communication. Observations and practicum. 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, 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 instruments for assessment of hearing level; interpretation of audiograms; selection and use of hearing aids; relation of audiologic services to medical and other hearing impaired disciplines. Observations and practicum. F

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.) F, W, Sp

4870 Student Teaching with Hearing Impaired Children (9) Supervised practicum with preschool, day school, and residential pupils. S/NC only. F, W, Sp

4871 Practicum with Hearing Impaired Children (6) S/NC only. F, W, Sp

5190 Speech Development of Hearing Impaired (3) Theories of speech development of hearing impaired. Prereq: Consent of instructor. E

5202 Practicum in Speech Development of Hearing Impaired (3) Application of theories and techniques in training perception and production of speech in hearing impaired persons. Prereq: Audiology and Speech Pathology 3650; Audiology and Speech Pathology 3710. W

5210 Language Development of Hearing Impaired I (3) Basic principles of transformational grammar, case grammar, and other formal systems as used to describe language and language development of hearing impaired. F

5220 Linguistics in the Education of the Hearing Impaired (3) Recent research and developments in linguistics related to hearing impaired. F

5221 Language Development of Hearing Impaired II (3) Techniques employing formal language systems to assess, teach, and remediate language of hearing impaired. Prereq: 5190. Sp

5240 Seminar in Language Remediation for the Hearing Impaired (3) Current and recent developments in educational methodologies and to research pertaining to teaching language to hearing impaired. Research and materials current in use of various sign language systems and adoptions. Emphasis on approaches which accommodate and assist integration of hearing impaired children in regular classrooms. W

5244 Orientation to Deaf-Blindness (3) Definition, types, etiology of deaf-blindness; impact of deaf-blindness on individuals and community resources for deaf-blind persons. F

5245 Rehabilitation of Deaf-Blind Persons (3) Aspects of deaf-blindness pertinent to vocational rehabilitation. Prereq: 5244 or consent of instructor. Sp

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 deficiency. Sp

5290 Teaching Reading to Hearing Impaired (3) Specific methods necessary to teach reading to prelingually hearing impaired student. Prereq: 5210. W

5310-20-30 Manual Communication (2, 2, 3) Basic and advanced skills in fingerspelled and signed forms of communication. Emphasis on ability to express and receive the manual forms. Prereq: Consent of instructor. Must be taken in sequence. F, Su; W, Su; F


5490 Educational and Vocational Guidance of the Deaf and the Hard of Hearing (3) Evaluation; test techniques for diagnosis and guidance; social and educational adjustment; occupational opportunities. F, Sp

5820 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

5821 Assessment of Hearing Impaired Learners (3) Types of diagnostic evaluations of hearing impaired children; screening, formal testing, continuous progress evaluation. Sp

EDUCATION OF THE MENTALLY RETARDED

4110 The Nature and Concept of Mental Retardation (3) Identification, description, and study. W, Sp

4120 Education of the Mentally Retarded Child (3) Philosophical and theoretical teaching and guidance of mentally retarded: methods and materials in special and regular classes. Prereq: 4110. Admission to Teacher Education. E

4440 High School Program for the Mentally Retarded (6) Trends, issues and research relating to core and work study programs. Prereq: Admission to Teacher Education.

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 Educable Mentally Retarded (3) Observation and supervised practicum. S/NC only. A

5111 Psychology of Mental Retardation (3) Intercultural thinking, 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. A

5113 Advanced Curriculum for the Mentally Retarded (3) Educational models, methodologies, and curriculum in education of mentally retarded children and adults. Emphasis on varied curriculum alternatives to retarded child's education. Sp, Su

MULTIPLE DISABILITIES

4130 Education of the Brain-Injured Child (3) Nature of brain-injured child; skills for identifying educational, physical, and emotional characteristics; special educational techniques. Prereq: Admission to Teacher Education. F, Sp

4150 Education of Children with Crippling and Special Health Conditions (3) Nature of multiple disabilities; appropriate educational modifications and associated services. Prereq or coreq: 3333 or consent of instructor. Admission to Teacher Education. F, W

4480 Educational Problems of the Cerebral Palsied Child at Home and School (3) Physical, social, and educational needs of cerebral palsied; evaluative techniques; related services. A
4291 Student Teaching in Crippling and Special Health Conditions (3-15) Observation and supervised practicum in home, hospital, and classroom. S/NC only. A

EDUCATION OF THE EMOTIONALLY DISTURBED

4610 Nature and Characteristics of Learning and Behavior Disorders (3) Forms of academic and social-emotional disorders of children, principles and causes, and relationships to each other. Relationships with respect to personality characteristics and development factors interpreted through behavioral and psychoanalytic theory as well as practical situations in which learning and behavior disorders may occur. F

4620 Education of the Emotionally Disturbed Child (3) Managing behaviors, models for instruction, teaching techniques and materials, and teacher-pupil family interpersonal relationships as basic to academic achievement for the pupil. Prereq: 4610. A

4630 Practicum in Residential Settings Serving Children with Disturbing Behavior (3) Practice in scientifically identifying, observing, and recording disturbing behaviors. Identifying behavior changes regarding academic and program performance. Perform in a residential facility within a residential classroom; and to take part in discussion and evaluation of relevant academic curricular and program performance improvement schedules. Prereq: 4610 and 4620 or consent of instructor. A

4640 Practicum in Public School Systems Serving Children with Learning and Behavior Problems (6) Acquisition of teaching skills and techniques within regular classrooms. Particular emphasis and practice in individualizing instruction for learning and behavior problems. Observation and performance within the regular classroom setting. 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 Child (3-15) Identifying, observing, and recording disturbing behaviors in regular classrooms. Particular emphasis and practice in identifying children with learning and behavior problems, observing and recording within the regular classroom setting. Prereq: 4610 and 4620 or consent of instructor. A

5130 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, and 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, 5142 and 5143, or consent of instructor. Su

5145 46-47 Practicum in Rehabilitation (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

5150-50 Internship in Rehabilitation (9) W

5170 Systematic Human Relations Training (3) Active listening, observing verbal and nonverbal behavior, empathetic understanding, and communicating with handicapped individuals. W

5180 Approaches to Rehabilitation Counseling (3) Approaches and techniques in individual and group counseling with 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

DISABILITY EVALUATION EDUCATION

5700 Evaluation and Mobilization of Community Resources (3) Issues, processes, and programs relating to community resources and service integration with emphasis on social and rehabilitation facilities and agencies. 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, neuroanatomical, circulatory, and respiratory diseases/disorders. Effect on structure and function of human body. Restorative measures utilized or administered to handicapped individuals; skills necessary to communicate effectively with lay persons and medical community on evaluation of impairments and administration of appropriate rehabilitation services. F

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 utilized or administered to handicapped individuals; skills necessary to communicate effectively with lay persons and medical community on evaluation of impairments and administration of appropriate rehabilitation services. F

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 innovation, 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 cases; identification, presentation of problems in achievement or acquisition of residual functional capacity assessments. Prereq: 5710-20 or consent of instructor. Su

5771 Current Problems in Disability Claims Evaluation (1-3) Current problems in process, content, or administration of disability claims evaluation; workshops in identification and proposal of alternative solutions. May be repeated with consent of instructor. S/NC only. A

SCHOOL SPEECH AND HEARING THERAPY

4030 Professional Aspects of Speech/Language/Hearing Programs in Schools (2) Organization and administration of school programs. Other settings, hospitals, institutions, private practice, professional certification levels, legislation, careers. W, Sp, Su

4040 Appraisal of Speech and Language Disorders (4) Prereq: 3200, 4330 or consent of instructor. (Same as Audiology & Speech Pathology 4040.) A

4310 Stuttering (3) (Same as Audiology and Speech Pathology 4310.) A

4320 Introduction to Clinical Practice in Speech Pathology (3) (Same as Audiology and Speech Pathology 4320.) S/NC only. A

4330 Clinical Practice in Speech Pathology I (6-3) (Same as Audiology and Speech Pathology 4330.) A

4340 Clinical Practice in Speech Pathology II (6-3) (Same as Audiology and Speech Pathology 4340.) Audiology and Speech Pathology is the primary department. A

4341 Clinical Practice in Communication Disorders in Schools (3) Prereq: 4300, 4320-30-40 and consent of instructor. F, W, Sp

4342 Seminar in Communication Disorders in Schools (3) Prereq: 4300, 4320-30-40 and consent of instructor. F, W, Sp

4400 Voice Disorders (4) (Same as Audiology and Speech Pathology 4400.) A

4720 Audiology II (4) (Same as Audiology and Speech Pathology 4720.) F

4930 Aural Rehabilitation: Speechreading and Audiory Training (3) (Same as Audiology and Speech Pathology 4930.) A

4940 Introduction to the Verb-Tonal System (4) (Same as Audiology and Speech Pathology 4940.) A

5040 Advanced Clinical Practice in Audiology Study and Practice (1-6) (Same as Audiology and Speech Pathology 5040.) A

5360 Cranial Palsy (3) (Same as Audiology and Speech Pathology 5360.) A

5390 Cleft Palate (3) (Same as Audiology and Speech Pathology 5390.) A

5540 Seminar in Language Pathology (3) (Same as Audiology and Speech Pathology 5540.) A

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
al-Technical Education is available with concentrations in agricultural education, business and office education, distributive education, general vocational-technical education, home economics education, industrial education, and technical education.

Requirements are:
- Concentration 1: 18 hrs
- Research: 6 hrs
- Electives: 12 hrs
- Thesis Option: 9 hrs
- Problems in Lieu of Thesis: 9 hrs
- Course Option: 15 hrs

Total 45-51 hrs

All course work must be approved by the student's committee.

1Student must meet the service area entrance requirements for the concentration selected. General vocational-technical education requires 6 hrs Technical and Adult Education 5010 and 5015.
2If work approved by graduate committee in area of emphasis outside of area of concentration.

The Master of Science degree in Adult Education is offered for teachers, administrators, counselors, and community education specialists. The degree program has two options: a thesis option requiring a minimum of 45 hours, and a non-thesis option requiring a minimum of 51 hours. For each option, 9 hours must be completed in the behavioral sciences.

Each vocational service area (agricultural education, business education, distributive education, industrial 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 SPECIALIST PROGRAM

The Ed.S. degree 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 and Adult Education.

The Technological and Adult Education doctoral curriculum consists of the following: professional education core, 9 hours; service area, 18 hours; vocational-technical education, 18-27 hours; research techniques, 15 hours (consultant 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 concentrations and emphases as listed on page 56.

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

5092 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.

5110 History and Organization of Vocational-Technical Education (3) General education and vocational education in public schools through analysis of social forces, legislation, and organization models.


5200 Placement, Follow-up, and Evaluation Procedures in Vocational Education (3) Methods and procedures in establishing placement programs, curriculum revision.

5320 Post-Secondary Education for Adults (3) Structure and functions of post-secondary, sub-university institutions, programs and clientele. Prereq: 5060 or consent of instructor. F, Sp

5400 Guidance and Pupil Personnel Services in Education (3) General education (3) Educational Psychology 5040.

5503 Supervision of Vocational-Technical Education (3) Program planning, coordination, instruction. Roles and functions of supervisors.

5505 Vocational School Administration and Management (3)

5700 Competency Based Vocational Education (3) Introductory, comparative, and practical approaches.

5803 Continuing Education in Vocational-Technical Education (3) Importance, objectives, historical development, psychological and sociological formulations, methods and techniques, research, evaluation.

5900 Occupational Program Development for Disadvantaged Persons (3) Academic, socioeconomic, cultural and/or other handicaps that prevent individuals from succeeding in regular vocational educational programs.

5910 Principles and Objectives of Vocational-Technical Education (9) Fundamental principles and contemporary objectives.


5940 Individual Study in Vocational-Technical Education (3, 3, 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.

5950 Microcomputer Operations and Educational Applications (3) Operating procedures and programming techniques. Hands-on experience in operating common microcomputers, writing, debugging, and running educational programs. Prereq: Teaching, administrative, or related experience in schools or special consent of instructor.

5955 Software Design for Microcomputers in Education (3) Advanced BASIC software design: operating System-CP/M, TRS-DOS and OSI, sequential and random I/O, analysis and operation of commercial educational programs, and teacher-designed programs. Prereq: 5150.

5960 Internship in Technological and Adult Education (3) Assignment in organization sponsoring programs in an area of technological or adult education. Prereq: Admission to Master's program and consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. F, W, Sp

5980-90-20 Educational Specialist Research and Thesis (3, 3, 3) Selection, analysis and completion of problems necessitating original investigation, beneficial to investigator and vocational-technical field. P/NP only.

5740 Continuing Professional Education (3) Theories and concepts supporting design and management of educational programs for adults in professions. Prereq: 5060 or consent of instructor. F

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 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) Required 3 consecutive quarters during residency. S/NC only.

6050 Administration of Vocational-Technical Education (3) Administrative principles and relationship to vocational and technical education.

6100 Research Development for Vocational-Technical Education (3) Advanced research methods for planning studies: proposal development, theoretical base development, research design, sampling and application of statistical techniques. Prereq: Two consecutive statistics courses, a research methods course and consent of instructor.

6111 Internship in Technological and Adult Education (3) May be repeated. Maximum 6 hrs.

6155 Advanced Programming for Educational Computing (3) Advanced programming and applications of program generating software for microcomputers in education. Transferability of software via networking and computer communication. Variability of commercial data base generating or managing software. Hands-on environment. Prereq: 5150, 5155 or equivalent.

6160 Special Topics in Technological and Adult Education (3) Emerging topics and contemporary trends in adult education. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

ADULT EDUCATION

5950 Adult Education: A General Survey (3) Historiography, development of adult education, agencies, programs, current issues, and literature of adult education. F, Sp

5460 Adult Development (3) Changes in characteristics of the adult over the life span and implications for adult education. F

5650 Program Planning in Continuing and Higher Education (3) Theory and method for planning adult education programs. W

6450 Advanced Seminar in Program Planning (3) Concepts and theories related to program planning in continuing and higher education. Prereq: 5660 or equivalent.

6700 Seminar in Adult Education (3) Issues in adult education, theories and concepts, philosophical positions, research trends and methodologies. Prereq: Admission to doctoral program and consent of instructor. Sp

6700 Seminar in Adult Education (3) Life cycle theories, research on adult development, designing research for studies of life cycle. Prereq: 5460 or consent of instructor. W

6780 Adult Problem Solving and Learning (3) Contemporary research and theories in areas of adult problem solving and learning. Prereq: 5460 and graduate-level research methods course, or consent of instructor. F
AGRICULTURAL EDUCATION

4230-31-32 Problems in Agriculture Education (1-6, 1-6, 1-6) May be repeated. Maximum 9 hrs.
4240-41-42 Seminar in Agricultural Education (1, 1, 1) Prereq: 4350 or consent of department head.
5210 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.
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 Teacher (3) Adjustment to situation in which employed; group meetings in selected centers, and visits by instructor. Prereq: 4350.
5270 Adult Education in Agriculture (3)
5290 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 in organizing, laboratory, and model office programs. Physical facilities, instructional aids, related instructional activities (clubs), enroll, instructor and advisory committees.
5307 Measurement in Business Education (3) Evaluate 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 Subjects (3) Principles of learning, 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.
5380-85 Problems and Projects in Business Education (3, 3) Required in the non-thesis option. S/N/NC only.
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)
6380 Higher Education for Business (3)

DISTRIBUTIVE EDUCATION

4440 Supervised Distributive Experience (3-9) Minimum 200 hours experience for each 3 credit hours in approved distributive business; concurrent academic 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 programs in the 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.
5418-26-36 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 Curriculum in Home Economics (3) Development of home economics educational programs, prereq: 4240 or equivalent.
5515 Evaluation in Home Economics Education (3) Purpose of evaluation in development of home economics programs; techniques used in evaluation. Techniques for determining progress of students; individual problems of evaluation.
5530-31-32 Problems in Home Economics Education (1-3, 1-3, 1-3) May be repeated. Maximum 3 hrs per course.
5540 Teaching Family Relationships and Parenthood Education (3) Content, materials and methods for teaching curricular objectives in family relationships and parenthood education. Prereq: Consent of instructor.
5545 Home Economics Related Occupational Programs (3) Advanced study in planning, establishing, implementing and evaluating home economics related occupational programs. Prereq: 4505 or consent of instructor.
5550 Home Economics Adult Education (3) Development and administration of community-based home economics program for adults. Prereq: Consent of instructor.
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 mechanics. 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 Foremanship 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 content, results of job analysis, checking sheets and individual job sheets in both trade and related subjects. Prereq: 4830.
4850-81-82 Seminar in Industrial Education (3, 3, 3) Educational innovations, current events, problems, and other topics associated with the field of industrial education.
4885 Organization and Development of Vocational 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.
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 health, physical education, public health, safety classes and recreation classes, leading recreational activities, supervising public health or 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
- M.S., Ed.D.

**Professors:**

- B. C. Wallace (Head), Ed.D., Colorado State
- G. Gorski, Dr. P. H. California (Los Angeles)

**Associate Professors:**

- A. M. Miliken (Emeritus), M.A., Yale; J. J. Neutens, Ph.D., Illinois; R. J. Purisle, Ph.D., Iowa
- A. F. Thompson, Ph.D., Michigan State.

**Assistants Professors:**


The Division of Health and Safety offers graduate programs leading to the Master of Science degree with majors in School Health Education and Safety Education and Service; the Specialist in Education degree with a major in Safety Education and Service; and the Doctor of Education degree with a major in Health Education. The Ph.D. in Education has a concentration in health education and choice of supporting emphases from public health or safety as listed on page 52. For additional information, contact the Chairperson of the Division.

**The Master's Programs**

**Thesis Option:**

<table>
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<th>Hours</th>
<th>Major</th>
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<tr>
<td>15</td>
<td>Research (5000-level courses in research, statistics, or computer programming)</td>
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<tr>
<td>9</td>
<td>Collateral</td>
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<tr>
<td>9</td>
<td>General electives</td>
</tr>
<tr>
<td>9</td>
<td>Thesis</td>
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**Non-Thesis Option:**

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<td>27</td>
<td>Research (5000-level courses in research, statistics, or computer programming)</td>
</tr>
<tr>
<td>9</td>
<td>Collateral</td>
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<td><strong>45</strong></td>
<td><strong>TOTAL</strong></td>
</tr>
</tbody>
</table>

**The Specialist Program**

The Educational Specialist degree requires 45 hours beyond the Master’s degree.

- **Major:** 21
- **Research (5330 plus minimum of 3 hours in statistics):** 6
- **Collateral:** 9
- **Internship and Research (6010-20-30):** 9

**Total:** 45

**The Doctor of Education Program**

- Foundations Research 9
- Behavioral Sciences 9
- Education 12
- Health Block 24
- Public Health 12
- Colloquial 18
- Dissertation 36

**Total:** 120

**Health**

- 3000 Foundation of Health Science (3) Personal health wellness and contemporary health problems; mood modifying products, consumer health, international health, personal health practices, reciprocal relationships involving man, 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.) E
- 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. 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. E
- 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
- 3620 Sex Education as it Relates to Human Sexuality (3) Exploration of science of human sexuality, trends, content, methodology and materials in sex education.
- 3650 Methods in Secondary Health Instruction (3) Preparation and presentation of health topics. Teaching method emphasized and student participation stressed. W
- 4120 Alcoholism and Alcohol Education (3) Emphasis on factors which make alcoholism a serious health and safety problem. Instructional and educational and intervention programs. F, W, Sp
- 4130 Suicide and Suicide Intervention (3) Emphasis on factors which make suicide a serious health problem. Instructional and educational and intervention programs. Sp
- 4140 Death, Dying and Bereavement (3) Theories of death and dying. Education and other programs to mitigate trauma of death and dying. F, W, Sp
- 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.) F, W, Sp
- 4411 Instructor’s Advanced First Aid and Emergen...
Division of Physical Education/College of Education

\textbf{MAJOR DEGREES}

\textbf{Physical Education}

M.S., Ed.D.

\textbf{Ph.D.}

\textbf{Professors:}


\textbf{Associate Professors:}

P. A. Beitel, Ed.D. North Carolina (Greensboro); R. E. Jones (Chairperson), Ph.D., Toledo; B. J. Mead, Ph.D., Purdue; W. J. Morgan, Ph.D., Minnesota.

\textbf{Assistant Professors:}


The Physical Education Division offers the Master of Science degree in Physical Education thesis and non-thesis programs. Both 45-hour programs require a minimum of 27 quarter hours of work in Physical Education including thesis credits.

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 concentrations and emphases as listed on page 56.

4000-level courses require a different level of performance of those registered for graduate credit.

4005 Advanced Ballet Technique (5) Styles and methods of advanced classical ballet technique: multiple pirouettes, batterie, epaulement and advanced pointe work. Prereq: 4000. Available to dance majors and minors or with consent of instructor. May be repeated. Maximum 6 hrs.

4010 Advanced Modern Technique (2) Development, integration, and synthesis of previous dance vocabulary; emphasis on advanced practice and principles. Prereq: 3030. May be repeated. Maximum 6 hrs. Available to dance majors and minors or with consent of instructor. F, W

4020 Practicum in Dance Production (2) Prereq: Consent of instructor. W, A

4050 Rhythmic Analysis (3) Nature and principles of music, rhythm, and rhythmic notation with emphasis on correlation with dance movement and composition. Prereq: Consent of instructor. W, A

4060 Advanced Composition (4) Application of compositional, production and administrative skills culminating in the construction of one complete choreographic work. Prereq: 3062, 4020 A

4080 History of Dance I (3) Survey of dance of various societies and cultures from pre-history through nineteenth century.

4090 History of Dance II (3) Survey of development of dance in theatre, recreation, and education during twentieth century.

4110 Adapted Physical Education (3) Classification of atypical students who require modified programs in physical education; activities and class organization suitable for required or special physical education classes.

Division of Physical Education/College of Education

\textbf{DEGREES}

\textbf{Physical Education}

M.S., Ed.D.

\textbf{Ph.D.}

Tasker, R. J. Croskey, M.F.A. Southern Methodist; P. A. Beitel, Ed.D. North Carolina (Greensboro); R. E. Jones (Chairperson), Ph.D., Toledo; B. J. Mead, Ph.D., Purdue; W. J. Morgan, Ph.D., Minnesota.

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4050 Rhythmic Analysis (3) Nature and principles of music, rhythm, and rhythmic notation with emphasis on correlation with dance movement and composition. Prereq: Consent of instructor. W, A

4060 Advanced Composition (4) Application of compositional, production and administrative skills culminating in the construction of one complete choreographic work. Prereq: 3062, 4020 A

4080 History of Dance I (3) Survey of dance of various societies and cultures from pre-history through nineteenth century.

4090 History of Dance II (3) Survey of development of dance in theatre, recreation, and education during twentieth century.

4110 Adapted Physical Education (3) Classification of atypical students who require modified programs in physical education; activities and class organization suitable for required or special physical education classes.
disciplinary or professional areas of physical education
and/or sport. May be repeated. Maximum 15 hrs.
5440 Theory of Movement Education (3) Theoretical
overview of movement education with selected oppor-
tunities to develop applied understandings and
competencies.
5500 Advanced Kinesiology (3) Action of muscles
involved in fundamental movements, calisthenics,
sports, and gymnastics. Prereq: 5320 or equivalent.
Sp
5510 Selected Topics in Anatomy (3) Intensive study
of various systems of human body. Prereq: 5580 or
equivalent. May be repeated with consent of instruc-
tor. S/NC only. Su
5550 Advanced Adapted Physical Education (3) Laws
and techniques, theoretical bases for remediation or
adaptation, programming implications. Prereq: 4110 or
equivalent. W
5580 Physical Activity and Health (5) Relationship
of physical exercise to longevity, weight control, car-
with emphasis on research. Prereq: Doctoral stu-
dent or consent of instructor. F
5610 Advanced Exercise Physiology (4) Principles
of energy transfer in humans with special emphasis
on integration of organ systems in adapting to require-
ments of muscular exercise. Prereq: Zoology 4940 or
equivalent. Recommended: 1 yr chemistry, physics,
and mathematics. 3 hrs and 1 lab. W
5620 Experimental Techniques in Applied Physiol-
ogy (3) Laboratory course in experimental methodology
and instrumentation. Respiratory and blood gas anal-
ysis, human calorimetry, blood chemistry, and pulmo-
ary function tests. May be repeated with consent of instruc-
tor. S/NC only.
5650 Social-Psychological Dimensions of Physical
Activity (3) Examination of social-psychological fac-
tors which influence performance in physical activity
with emphasis on research. Prereq: Psychology 3120 or
equivalent. F
5900 Graduate Seminar in Public Health (1-2)(Same
as Public Health 5900, Nutrition 5900, and Family
Science 5910, and Social Work 5900.) S/NC
5910 Directed Independent Studies (1-3) Independent
study of an area within the physical education and
sport. Prereq: 5320 or con-
sent of instructor. May be repeated. Maximum 15 hrs.
May be taken for letter grade or S/NC.
5940 Social Theories of Sport (3) Critical examina-
tion of sport in social and political context of modern
society. Prereq: 4940, Sociology 4050, equiv-
alent course in sociology of sport, or consent of
instructor. (Same as Sociology 5940.)
6000 Doctoral Research and Dissertation (3-15) P/ N
only. E
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 Directed Independent Research (3-6) Initiate
and conduct research study. Prereq: Doctoral stu-
dent or consent of instructor. May be repeated.
Maximum 9 hrs. May be taken for letter grade or S/NC.
6330 Advanced Motor Behavior (3) Theoretical issues
and research of contemporary significance in human
motor behavior. Prereq: 5340 or consent of instructor. Sp
6340 Advanced Psychology of Sport (3) Theoretical
issues and research of contemporary significance to
psychological and social-psychological explanations
of sport performance, research development: inde-
pendent student activity. Prereq: 5330 or 5860.
6410 Practicum in Kinesiology (3) Electromyography
laboratory and film analysis of sports skills. Prereq:
5310, 5560 and Physics 2210 or equivalent. May be
repeated with consent of instructor S/NC only.
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: 4510.
May be repeated with consent of instructor. S/NC
only. F, Sp
6640 Research Participation in Applied Physiology
(1-6) Advanced research techniques under supervi-
sion of faculty member whose research area coincides
with interests of student. Prereq: Consent of instruc-
tor. May be repeated with consent of instructor. S/NC
only. F
6810 Practicum (1-3) Intern experience in areas of
major interest. May be repeated. Maximum 8 hrs.
May be taken for letter grade or S/NC.
5420 Administration of Public Health (3) Administrative concepts and application of health care services, data management information systems and programs and public health practice. Governmental involvement in health, legal responsibilities, and managerial concepts and techniques. E

5440 Methods and Materials in Public Health Education (4) Theory and techniques in health education, including teaching methods and materials in community health education. 3 hrs and 2 labs. W

5540 Factors in Problem Solving for Community Health (4) Problem solving in medical and social health care setting. Prereq: Consent of instructor. F

5550 The Public Health Educator in Community Organization and Development (4) Overview of health organizations and agencies in the community, 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. W

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 and 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.)

5705 Introduction to Health Planning (4) Health planning concepts and methods emphasizing systems oriented health planning process. Major elements of planning; formulation and conceptualization of problem, plan design, evaluation and implementation. F

5710 Community Health Planning (4) Concept of community health as related to processes of community partnership, participation, cooperation and self reliance. Weekly seminars and community experiences; various methods for identifying and assessing health problems and capabilities of selected communities. Analyze health problems of community, arrive at community diagnosis and apply selected health planning methods to develop program for addressing identified community health problems. Prereq: 5705. W

5715 Advanced Health Planning (4) Advanced study of health planning functions affording opportunities for either simulated or actual application of planning concepts, techniques, and skills to specific situations. Exercises and projects in health plan development, project review, grant preparation, health economic analysis, and specification of facilities, community surveying, and resource inventorying. Prereq: 5705 or consent of instructor. W

5735 Emergency Medical Services (3) Planning, organizing, and coordinating emergency medical resources as systems. Comparison of service systems. EMS systems from accident or acute illness occurrence through critical care services. Applicable tours of local emergency facilities. Prereq: Consent of instructor. W

5750 Health Policy and Law (3) Development of public health policy in health arena: legislative process and implementation regulations by administrative agencies. Role for health professionals in influencing public policy. Opportunity to individually investigate specific health law of interest. Prereq: 5420 or consent of instructor. W

5760 Organization Theory for Health Services (3) Analysis of administrative and organizational theory related to health services systems. Functions of department heads and organizational structures. Concepts and techniques of management in health services organizations. Prereq: 5705 or consent of instructor. W

5765 Health Facilities Administration (3) Role of health facilities in U.S. health care delivery system: operation and management of hospital systems, administration related to government, legal, and public policies. Prereq: 5705 or consent of instructor. W

5770 Long-Term Care Administration (3) Concepts and methods necessary to an understanding of long-term care health administration. Prereq: Consent of instructor. Sp

5810 Financial Management of Health Programs (3) Financial management of programs and services related to health services programs. Fundamentals of budgeting, costing, financing, rate setting, financial reporting and control. Prereq: 5740 or consent of instructor. Su

5840-50 Directed Independent Studies (1-3, 1-3) Individual in-depth study of selected issues. Prereq: consent of instructor. May be repeated. Maximum 9 hrs. E

5900 Graduate Seminar in Public Health (1-2) Scope of public health as discipline and interrelatedness to other academic and professional disciplines. Speakers both internal and external to UT. Prereq: Baccalaureate degree in health-related field or consent of instructor. May be repeated. Maximum 6 hrs. (Same as Nursing 5950, Nutrition and Food Science 5910, Physical Education 5900, and Social Work 5900.) S/NC only. F, Sp

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

6210 Health Aspects of Gerontology (3) (Same as Health 6210.)

6220 Seminar on the Nation’s Health (3) (Same as Health 6220.)

6230 International Health (3) (Same as Health 6230.)

Division of Recreation

MAJOR

DEGREE

Recreation

M.S.

Professor: G. E. Hayes, (Chairperson) Ph.D. North Texas State.

Assistant Professor: M. D. Blanton, Re.D. Indiana.

The Recreation Division offers the Master of Science degree in Recreation (thesis and non-thesis programs) with concentrations in general recreation, leisure and sports administration, and therapeutic recreation.

4130 Recreation Administration (3) Introduction to recreation administration, including planning, personnel, facilities and programs, service delivery, finances, and public relations. Prereq: 3140, 3200, 3880, or consent of instructor. F, Sp

4200 Survey of Recreation for Special Populations (3) Responsibility of recreation profession to population groups whose leisure opportunities and needs may require special servicing. Prereq: 3140, 3200, 3880, or consent of instructor. F

4310 Camp Administration (3) Program planning and organization, personal management, camp site development and maintenance, camp operation for administrators and supervisors. W

4500 Specialized Study in a Selected Area of Recreation (1-9) 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
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Prerequisites</th>
<th>Term(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5130</td>
<td>Interpretations of Leisure (3)</td>
<td>Concepts of leisure including social, psychological, cultural, and philosophical, recreative uses of leisure. Prereq: 3140 or consent of instructor.</td>
<td>F</td>
<td>F</td>
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<tr>
<td>5140</td>
<td>Leisure Service Delivery Systems (3)</td>
<td>Various systems—public, private, and commercial—involved in provision of leisure services for community at large. Prereq: Consent of instructor.</td>
<td>F</td>
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</tr>
<tr>
<td>5150</td>
<td>Current Issues in Recreation (3)</td>
<td>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.</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>5160</td>
<td>Therapeutic Recreation (3)</td>
<td>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.</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>5240</td>
<td>Implementation of Recreation Services for the Ill or Disabled (3)</td>
<td>Policies and guidelines for organizing and implementing programs of recreation for ill or disabled in treatment centers and other community agencies. Prereq: 4200 or consent of instructor.</td>
<td>Sp</td>
<td>Sp</td>
</tr>
<tr>
<td>5250</td>
<td>Leisure and Mental Health (3)</td>
<td>Relationship between leisure activity and mental health, with emphasis on its use in therapeutic recreation. Prereq: Psychology 3650 or equivalent, and consent of instructor.</td>
<td>W</td>
<td>W</td>
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<tr>
<td>5300</td>
<td>Seminar in Recreation (1-6)</td>
<td>Application of research methodology and computer literacy in selected areas of recreation related research. Presentations of students’ research studies. May be repeated. Maximum 6 hrs.</td>
<td>S/NC only</td>
<td>F, W, Sp</td>
</tr>
<tr>
<td>5340</td>
<td>Administration of Recreation Funds (3)</td>
<td>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.</td>
<td>Sp</td>
<td>Sp</td>
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<tr>
<td>5350</td>
<td>Organizational Policies for Recreation (3)</td>
<td>Advanced study in the analysis of organizational policies and functions of management in recreation.</td>
<td>4130, W</td>
<td>W</td>
</tr>
<tr>
<td>5360</td>
<td>Management and Operation of Recreation Facilities (3)</td>
<td>Management process as it pertains to operation of recreation facilities.</td>
<td></td>
<td>F</td>
</tr>
<tr>
<td>5440</td>
<td>Problems and Projects in Recreation (1-9)</td>
<td>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.</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>5450</td>
<td>Specialized Study in Recreation (1-9)</td>
<td>Advanced comprehensive study in selected specialized area within leisure and recreation field. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.</td>
<td>E</td>
<td>E</td>
</tr>
</tbody>
</table>
College of Engineering

W. T. Snyder, Dean
W. A. Miller, Associate 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 pages 8-9.

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 courses 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 discussions with the on-campus classes and are played back at remote locations. Telephone contact is established periodically between the professor and the off-campus class to allow full discussion and questions. Occasional visits by the professor are made to each remote class and students visit the Knoxville campus at selected times.

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 local community colleges.

The remotely-taught courses offered by UT 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. T. Snyder, 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 Engineering

MAJORS

Chemical Engineering

DEGREES

M.S., Ph.D.

Professors:

J. J. Perona (Head), Ph.D., Northwestern, P.E.;
D. C. Bogue, Ph.D., Delaware; E. S. Clark, Ph.D.
California (Berkeley); L. W. Crawford, Ph.D.,
Cincinnati; O. L. Cuberson (Emeritus), Ph.D.
Texas; J. F. Fellers, Ph.D., Akron; G. C. Frazier, Jr.,
D. Eng.; Johns Hopkins; J. M. Holmes, Ph.D.
Tennessee; H. W. Hous, Ph.D., Wisconsin;
F. W. Johnson (Emeritus), Ph.D., Yale; C. F. Moore,
Ph.D., Louisiana State; J. W. Prados (Vice
President for Academic Affairs), Ph.D., Tennessee;
C. D. Scott, Ph.D., Tennessee; C. O. Thomas,
Ph.D., Tennessee; J. S. Watson, Ph.D., Tennessee.

Associate Professors:

P. R. Bienkowski, Ph.D., Purdue; D. D. Bruns, Ph.D.
Houston; C. H. Byers, Ph.D., California (Berkeley);
R. M. Counce, Ph.D., Tennessee; T. L. Donaldson,
Ph.D., Pennsylvania; A. C. Sheff, Ph.D.
Northwestern.

Assistant Professor:

F. Weber, Ph.D., Minnesota.

Lecturer:

D. W. Lan, Ph.D., Tennessee.

Graduate programs lead to the degrees of Master of Science and Doctor of Philosophy in Chemical Engineering with concentrations in chemical bioengineering, advanced control systems, and polymer science and engineering.

THE MASTER'S PROGRAM

Minimum departmental requirements include the satisfactory completion of:

1. A major consisting of 18 to 27 quarter hours of graduate courses in chemical engineering.
2. One or two minors or collateral work, 9 to 18 hours total in engineering, chemistry, mathematics, physics, or other related fields.
4. Active participation in graduate seminars conducted by the department. Resident students must register for 5010 every quarter offered.
5. Final examination covering thesis, related fields, and graduate course work.

THE DOCTORAL PROGRAM
Students applying for entrance into the doctoral program must present evidence of ability to perform and report independent research to the satisfaction of the department. The Master's thesis may be offered as such evidence.

Department requirements consist essentially of the satisfactory completion of:
1. Graduate courses in chemical engineering, amounting to approximately 36 quarter hours, at least 12 of which must be in 6000 series courses.
2. 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 may normally include chemistry, mathematics, physics, and engineering.
3. The comprehensive examination, usually given in two parts, and covering such materials as chemical, engineering operations, and processes; dynamics, technology, mathematics, physics, chemistry, and other related fields.
4. Active participation in graduate seminars conducted by the department. Resident students must register for 5010 every quarter offered.
5. Reading ability, by means of a written examination, in one foreign language of technical or commercial significance. Language must be selected from the following list, which is not intended to be comprehensive and may be amended from time to time by vote of the departmental faculty: Chinese, French, German, Japanese, Korean, Russian, and Spanish. Foreign students whose native language is one of those on the approved list will not be required to take an examination.

4110 Chemical Engineering Data Analysis (3) Random and stochastic processes; statistical properties of stationary systems: elements of probability; discrete and continuous distributions; statistical characterization of processes and products; empirical models and least-squares statistical process control. Prereq: 3420, Math 3150. F.W.Su.

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: Math 2840.


4250 Introduction to Chemical Process Economics (3) Methods of cost estimating; analysis of product pricing based upon debt and equity financing methods; use of extensively analyzed to deal with uncertainties; a detailed case study. Prereq: 4110.

4410 Design of Separation Processes (4) Design of multicomponent distillation systems, including layout of separation train, choice of operating variables; heat and mass balances, thermodynamic and peripheral equipment, including control systems. Selected problems emphasizing other separation methods, heat economy in complex systems, low temperature processes, equipment selection and optimization. Prereq: 3050, 3440-50, 3610. W.Su.


4430 Special Problems in Design and Economics (4) Extension of 4420 for student participation in the American Institute of Chemical Engineering student design 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 industrial energy, industrial raw material and chemical markets. Prereq: Chem 3430.

4480 Coating Processing to Liquid Fuels (3) Characterization of various methods; modeling of conversion processes and estimation of maximum yields; water and oxygen requirements; pyrolysis, catalytic hydrogenation; reactor design considerations; review and critique of selected articles from both the current literature and patents. Prereq: Consent of instructor.

4530 Chemical Reactor Fundamentals (3) Brief review of homogeneous reaction kinetics; idealized homogeneous reactor models, both for closed and flow systems; corrections for non-ideal residence times of material and energy; identification of scaling parameters; catalyst effectiveness factors and conversion in fixed bed catalytic reactors. Prereq: 3420, Chem 3430. W.Su.


4730 Mass and Energy Flow in Biological Systems (3) Basic physicochemical and organizational principles applied to microorgans. Derivation 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, membranes 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; continuous culture of microorganisms, food processing and pharmaceuticals. Prereq: 3440, 3450, or consent of instructor.

4760 Principles of Biocatalytic Separation (3) Fundamentals 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 Graduate Seminar (1) Prereq: Admission to graduate program. May be repeated. S/NC only. E

5050 Engineering Analysis (3) Analytical formulation and solution of differential, integral and polymer engineering problems involving deformation of solids, heat transfer and motion of fluids. (Same as Metallurgical Engineering 5050 and Polymer Engineering 5050.)


5120 Heat Convection (3) Analysis of heat convection in fluids under viscous and turbulent flow conditions, emphasizing analytical and approximate solutions of conduction of momentum and heat. Prereq: 5050.

5130 Methods of Optimization (3) Principles and applications of various mathematical programming techniques to chemical process design and control; variational method, maximum principle, dynamic programming, and geometric programming. Prereq: 4130.

5210 Process Dynamics (3) Analysis of recycle operation, steady state simulation and optimization of typical processes.


5310 Thermodynamics of Heterogeneous Equilibrium (3) Phase rule, equilibrium between phases; condensation relation for liquid and solid phases; ideal and nonideal solutions. Prereq: 3040.

5320 Statistical Thermodynamics (3) Basic concept of statistical mechanics and application to evaluation of thermophysical properties. Prereq: 5310.

5420 Applications in Fluid Mechanics (3) Numerical techniques for solving differential equations; applications in chemical engineering and polymer engineering: packed and fluidized beds, multi-phase flows, flow of polymer melts in simple geometries, basic principles in solid mechanics. Prereq: Undergraduate course in fluid mechanics or consent of instructor. (Same as Polymer Engineering 5420.)

5430 Rheology and Polymer Processing (3) (Same as Polymer Engineering 5430.)

5510 Chemical Reactor Design (3) Nonideal flow patterns in chemical reactors; diffusion and reaction in two phase systems; introduction to heterogeneous catalysis and reactor stability. Prereq: 4530.

5610 Stagewise Mass Transfer Operations (3) Equilibrium stage, concepts applied to mass transfer operations, emphasizing nonisothermal and multi-component systems.

5620 Differential Mass Transfer (3) Differential mass transfer operations, falling film, packed tower and heat exchange contactors. Exchanger design for multicomponent systems; current theories of mass transfer; heat mass and momentum transfer analysis. Prereq: Mathematics 2840.

5900 Special Topics in Chemical Engineering (3) Special topics of current interest to chemical engi-

5970 Measurement Science (3) (Same as Nuclear Engineering 5915.)

5925 Measurement Science II (3) (Same as Nuclear Engineering 5925.)

5935 Measurement Science III (3) (Same as Nuclear Engineering 5935.)

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

6130 Process Optimal Synthesis (3) Methods for sys-
tematic synthesis of chemical process flowsheets, optimal synthesis of multi-component separation sequences, heat exchanger networks and general process flowsheets for industrial applications. Prereq: 5130.

Advanced Diffusional Operations (3) Fixed and fluidized bed operations, stagewise and differential mass transfer bed concepts. Prereq: Consent of instruc-
tor.

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.

Thermodynamics of Irreversible Processes (3) Thermodynamic treatment of irreversible chemical processes, transport processes, coupling phenome-
na, with special emphasis on topics and methods of interest to engineering and bioengineering students. Prereq: 5310.


Applied Chemical Reaction Kinetics (3) Chem-
ical reactions in gas and liquid phases, heterogeneous catalysis, catalyst effectiveness and role of transport in kinetics. Emphasis on development of phenomeno-
nological description although mechanistic models are discussed. Prereq: 5510.

Catalytic Reactor Design (3) Principles of kinet-
ics, heat and mass transfer applied to design and analysis of heterogeneous catalytic reactors. Prereq: 6510.

Process Dynamics (3) Development of dynamic models of process equipment from conservation and rate, testing of models by frequency, step, and pulse response methods. Prereq: Consent of instruc-
tor.

Advanced Topics of Chemical Engineering (3) Advanced topics of current interest to chemical engi-
neers. May be repeated. Maximum 9 hrs.

Civil Engineering

MAJORS

Civil Engineering

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

Environmental Engineering

M.S.

Environmental Science

M.S.

Emeritus Professor: C. R. Walker, S.M. Massachusetts Institute of Technology, P.E.


Assistant Professors: R. M. Bennett, Ph.D. Illinois; E. C. Drum, Ph.D. Arizona, P.E.; R. B. Robinson, Ph.D. Iowa State, P.E.


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, transportation engineering; to the Master of Science in Environmental Engineering and the Master of Science in Environmental Science with concentrations in water quality, air quality, and solid waste.

Masters of Science Program

The Master of Science programs in Civil Engineering, Environmental Engineering, and Environmental Science are offered to gradu-
ates of recognized undergraduate curricula.

Departmental requirements to provide that for a major in Civil Engineering, the Bache-
lor's degree must be in civil engineering, or certain undergraduate requirements 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 culmi-
nate in a written report which must be approved by the student's major professor.

Environmental Engineering: For a Master of Science in Environmental Engineering, normally a bachelor's degree in a field of engineering is required. For a student who does not have an engineering background, the following minimum prerequisite courses will be required: 1310, 1320, 1330; Engineering Science and Mechanics 2720, 3110, 3311, Environmental Engineering 3120, 3330, 4520; and Mathematics through the equivalent of 2860. 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 mini-
um of 45 quarter hours of approved environmental engineering course work. A minor may be selected but is not necessarily required.

Option II: The student must present a mini-
um of 48 quarter hours of approved environmental engineering course work. A minor may be selected but is not necessarily required.

Ph.D. degree may be in fields other than engineering. In some cases prerequisite undergraduate courses may be indicated, and in general these must be taken before courses for graduate credit can be taken. Specifically, prerequisites include Mathemat-
s through 2860, Engineering Science and Mechanics 3110, Environmental Engineering 3120 and 3330.

The Department of Civil Engineering offers only a thesis program for work toward the Master of Science degree in Environmental Science.

The student must present a minimum of 45 quarter 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 in a program such as ecology or microbiology.

Normally, the graduate program of study will be adjusted by the head of the depart-
ment and the student's committee to suit the individual academic requirements.

Masters of Engineering Program

A graduate program in Civil Engineering leading to the degree of Master of Engineering is available to qualified graduates of EAC/A.B.E.T. accredited undergraduate cur-
ricula in civil engineering or environmental engineering. At least 36 quarter hours of study must be pursued to complete the program of study and the student's committee will certify that it includes the necessary design content. The thesis and non-thesis option noted under the Master of Science program is available under this program.

The Doctoral Program

A graduate program leading to the degree of Doctor of Philosophy is offered in Civil Engineering.

Specific department requirements for the Ph.D. degree include the following:

1. A minimum of 108 quarter hours credit beyond the Bachelor's degree, exclusive of credit for the M.S. thesis. Of this number, a minimum of 36 quarter hours credit in Doctoral Research and Dissertation will be required.

2. A minimum of 36 quarter hours of grad-
uate courses in the Civil Engineering Department, exclusive of thesis or disserta-
tion credit, at least 9 hours of which must be 6000-level courses.

3. Supporting courses in related scientific and engineering fields, amounting to approx-
imately 36 quarter hours, subject to approval by the student's faculty committee. These related fields will normally include such disciplines as mechanics, mathematics, microbiology, physics, and other engineering fields. A minimum of 12 quarter hours of mathematics will be required beyond the civil engineering under-
graduate 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, floor slabs and column footings and retaining walls. Prereq: 4110 and 4410.

4240 Structural Design (3) Plate girders, composite steel and concrete beams, connections and details, and analysis of simple industrial buildings. Prereq: 3230 and 4410. 2-3 hr periods. W, Sp.

4260 Photogrammetry (3) Methods of plotting maps from aerial photographs; stereoscopic plotting instruments; applications. Prereq: 2360 or Forestry Summer Camp for photogrammetry majors.

4420 Analysis of Framed Structures II (3) Maximum forces due to moving loads; uses of influence lines; lateral forces due to earthquake and wind; analysis of prestressed concrete structures, and space frames. Coreq: 4410. Formerly: Analysis of Framed Structures) moving loads; uses of influence lines; lateral forces due to earthquake and wind; analysis of portraits, building frames and space frames. Coreq: 4410. W.

4430 Construction Methods and Equipment (3) Fundamental operations in construction and selection of equipment; production rates, balancing of equipment, and cost estimates. Prereq: 3710. F, W.


4530 Cost Comparison in Design and Construction (3) Cost of engineering and construction. Cost comparison of alternate designs with emphasis on applications to civil engineering problems. Prereq: 4130.

4540 Computer Utilization (3) Computer use, economic justification, and extent of use by industry. Utilization of computers for solution of civil engineering problems. Prereq: Basic Engineering 1410. F.

4560 Stabilization of Soils (3) Mechanical stabilization of soils by compaction, drainage, and blending; chemical stabilization of clays and soils; and understanding and modifying soils with additives. Prereq: 4310. W.

4570 Geotechnical Aspects of Construction (3) Unbraced and braced excavations, in situ densification by vibration and deep dynamic compaction methods; applications of well point systems, sand drains, wick drains; filter design and geoteextiles. Prereq: CE 4310, coreq: CE 4220.

4620 Airport Planning and Design I (3) Emphasis on airport master planning. Includes consideration on the air side are runway configuration, capacity, geometrics and lighting; on the land side are included terminal layout and design of airport access systems for air traffic. Prereq: 3600 and 3610. Sp.

4640 Traffic Engineering (3) Characteristics of driver, vehicle and roadway and their interrelationship; traffic studies; basic considerations of traffic circulation and control; elements of urban transportation planning studies. F.

4660 Airport Planning and Design II (3) Integration and application of principles of airport master planning for purpose of site selection and design of an airport facility through a comprehensive team project, includes environmental evaluation of design. Prereq: 4620. 1 hr and 2 labs. Su.

4710 Portland Cement Concrete Mix Design (3) Properties and tests of portland cement concrete, methods of concrete evaluation testing, use of concrete admixtures. Coreq: 3710. 2 hrs and 1 lab. F.

4720 Asphalt and Bituminous Concrete (3) Properties and tests of asphalt and asphaltic mixes, mix design of bituminous concrete. Prereq: 2440. 2 hrs and 1 lab. W.

4731-32 Earthquake Resistant Structures I, II (4, 4) (Same as Architecture 4731-32.) Su.

4800 Introduction to Civil Engineering Systems (3) Methods of modeling civil engineering systems and their specific application to problems of transportation, environment, water resources and materials. Prereq: Senior standing or consent of instructor. Sp, Su.

4850 Elementary Structural Matrix Methods (4) (Same as Architecture 4850 and Engineering Science and Mechanics 4850.) Su.

4860 Structural Wood Design (3) Application of structural design principles to structural members of various combinations, shear walls, columns, beams, cohnings, and diaphragm construction with plywood. Various types of fastenings and connections. Prereq: 3230. F.

5000 Thesis (1-15) P/N 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. Coreq: SINC only. E.

5110-20 Statically Indeterminate Structures (3, 3) Deflections of beams and trusses; analysis by force methods and by slope-deflection in 5110, analysis by moment distribution and other displacement methods, secondary stresses in 5120. W, F.

5150 Matrix Formulation of Structural Problems (3) Review of matrix algebra, vectors, stability considerations; stiffness and flexibility analysis of plate trusses, general members and structures composed of general members. Prereq: 2510 and 4410 or consent of instructor.

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 with many degrees of freedom; elastic-plastic behavior considered for structural systems; approximate design methods developed. Prereq: 5120, 5180. Sp.

5180 Finite Element Structural Analysis (3) Application of finite element method to structural analysis; plane stress, plate strain, axisymmetric, and three-dimensional elements; use of typical computer programs. Prereq: 5150, or Engineering Science and Mechanics 5860. Civil Engineering is the primary department. Sp, A.

5220 Pavement Design (3) Pavement loads; pavement design, design practices; construction and maintenance. Prereq: 4310 and 3710. Sp.

5240 Advanced Properties of Materials: Cement and Concrete (3) Permeability and durability; volume changes by vibration and deep dynamic compaction methods; applications of well point systems, sand drains, wick drains; filter design and geoteextiles. Prereq: CE 4310, or Engineering Science and Mechanics 4850. (Same as Architecture 4850.) Su.

5260 Structural Mechanics I (4) Building stresses in beams, plates, analysis and design of bridge and building floors and structural plate components. Prereq: 5110. F.

5270 Transportation and Planning (3) Preparation of transportation and elements of comprehensive development plans, urban, transportation modes 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.


5410 Construction Contract Law and Administration (3) General principles applicable to construction contracts and construction related sales contracts. Prereq: 4220. 2 hrs and 1 lab. W.


5520 Advanced Foundations (3) Planning subsurface investigations; bearing capacity and settlement of shallow foundations; slope stability; pile foundations; drilled piers; foundation design with the pressuremeter. Prereq: CE4220.


5560 Stress and Strength Strain Behavior of Soil (3) Stress strength of fine grain soil from perspective of idealized, simple day. Drained and undrained shear strength and strain behavior of real soils. Consolidation theory. Coreq: 4220.

5570 Soil Mechanics—Seepage (3) Saturated flow through embankments, filter design criteria, seepage forces and velocities, subdrains, and embankment failures. Prereq: 4310 or consent of instructor. Sp.

5590 Numerical Models for Geologic Materials (3) Numerical models to represent the stress-strain-volume relationships for soil, rock, and concrete; nonlinear elastic models; classical plasticity models; critical state and caved plasticity models; multifield surface models; examples from laboratory tests. Prereq: CE 4310 or consent of instructor.

5610 Behavior of Steel Structures (3) Behavior of structural steel members due to static and fatigue loading; relation between fatigue and current specialization for design. Prereq: 3230. W.

5730 Prestressed Concrete (3) Properties of prestressing materials and anchorage systems; methods of pretensioning 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: 4150. W.

5760 Structural Reliability (3) Application of probability theory and statistics to evaluating the reliability of structures; development of safety factors and probability based design codes. Prereq: 5230, 4110, Statistics 3450.

5770 Advanced Structural Reliability (3) Monte Carlo methods; reliability of structural members and systems; load modeling and load combination. Prereq: CE3760.

5800 Urban Systems: Engineering and Management (3) The 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 dealt with in municipal public works. Prereq: Graduate standing in Civil or Environmental Engineering or consent of instructor. W, A.

5805 Urban Systems: Engineering and Management II (3) Continuation of 5800. Management and engineering of urban streets, including lighting, cleaning and snow removal, water supply and waste-water drainage, solid waste, air pollution and regulations. Prereq: 5800. Sp, A.

5810 Traffic Engineering—Characteristics (3) Driver-vehicle-roadway system; level of service concept of capacity. Coreq: Statistics 3450. 2 hrs and 12-hr lab. F.

5820 Traffic Engineering—Operations (3) Fixed-time and volume-density controllers; progressive systems, one-way operations; reversible flows; system operation, including computerized networks; legal aspects of operational controls. Prereq: 5810. 2 hrs and 12-hr lab. W.


5850 Functional Design of City Streets and Urban Transportation Modes (3) Development of urban streets, including lighting, cleaning and snow removal, water supply and waste-water drainage, solid waste, air pollution and regulations. Prereq: 5800. Sp, A.

5860 Design for Traffic Safety (3) Traffic safety principles; traffic control devices and traffic engineering; effects of traffic on the environment; physical characteristics of the motor vehicle and effects of the vehicle on traffic safety. Prereq: Co-requisite CE5760.
Freeways (3) Effect of street systems upon urban growth and development; classification and function of streets and expressways, including cross section, intersection design, utility considerations, parking, effect of mass transportation; channelization, marketing, highways and streets inside the central business district. Prereq: Consent of instructor. Su

5890 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 and rail 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. Sp, A

5880 Highway Safety I (3) Transportation safety, highway safety. Legislation, federal-state-local relationships, current highway safety standards. Prereq: Graduate standing or consent of instructor. Su

5885 Highway Safety II (3) Effect of current tort law upon highway safety activities; roadway safety design; cross-section, barriers, guardrails and energy attenuation; identification and correction of high accident locations and system deficiencies. Prereq: 5880 and graduate standing in Engineering.

5890 Traffic Accident Reconstruction (3) Proper traffic accident reconstruction as basis for determining accident prevention or control programs. Many contributing factors to an accident; proximate and secondary accident causes as they relate to road way 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 option, a student must enroll in special problems in thesis. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/N only. E

5910-20-30 Special Topics (1-5, 1-6, 1-4) Topics relate to current developments in civil engineering not included in other courses. May be repeated.

5915 Measurement Science I (3) (Same as Nuclear Engineering 5915.)

5925 Measurement Science II (3) (Same as Nuclear Engineering 5925.)

5935 Measurement Science III (3) (Same as Nuclear Engineering 5935.)

6000 Doctoral Research and Dissertation (3-15) Preregistration only. E

6110 Research Development (3) Development of research projects. Activities include market research, planning, proposal writing, and communicating to potential funding sources. Course cannot be used to satisfy 6000-level course requirements in doctoral programs. Prereq: Graduate standing and consent of instructor.

6120 Research Management (3) Management strategies for research projects/programs. Long range and day-to-day management requirements. Course cannot be used to satisfy 6000-level course requirements in doctoral programs. Prereq: 6110.

6530 Soil Dynamics (3) Behavior of soils and soil structure systems under time dependent loadings; wave motions in soils; principles of seismic design; and methods of determining and soil parameter. Prereq: CE4220. SEM4710 or CE5170.

6610 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 5610. Sp, A

6740 Behavior of Reinforced Concrete Beams and Frames (3) Ultimate strength and behavior of statically indeterminate reinforced concrete structures; application of the failure analysis and fracture mechanics limit analysis. Prereq: 5120 and 5740. Sp, A


6860 Statewide Passenger Transportation Planning (3) Comprehensive multimodal transportation plan, intercity traffic models, functional classification, programing and scheduling, and government, economic, and public policy decisions, as they affect air and highway investments. Prereq: 5860. W, A

6880 Planning Models for Transportation System I (3) Analytical analysis of trip generation and trip distribution, mathematical, statistical, and computer science techniques; modal split, trip distribution, and trip assignment. Statistical analysis and techniques used in transportation planning process. State-of-the-art and new modeling techniques. Prereq: 5860 or 5820; Mathematics 3150 and Statistics 3450. W, A

6890 Planning Models for Transportation Systems II (3) Application of modal 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

6910-20-30 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 water resources, bodily wastes and wastewaters, air environment, solid wastes, commercial insects and rodents, food, and environmental energy to prevent impairment of health, to promote efficiency and comfort, and to safeguard balances in natural ecosystems. Principles of environmental protection will be presented by design and practice without detailing design of practice methods.

4030 Environmental Engineering Chemistry (3) Fundamentals of chemistry which relate to generation, formation analysis, and removal of environmental contaminants. Prereq: Chemistry 1130 and senior standing. F

4150 Urban Water Management (3) Introduction to urban water management; evaluation of optimum water policies; formulation of system constraints and analysis of decision-making process; management of storm water for beneficial use. Prereq: 5330. Sp

4210 Water Resources Engineering Design (3) Planning and design of multipurpose dam project, including reservoir, dam, and discharge control works. Considerations of dam safety and environmental impact. Microcomputer applications. Prereq: 3330 or consent of instructor. F

4220 Water Resources Engineering Development (3) Multiobjective evaluation procedures for comparing and selecting among water resources project alternatives; achieving project optimality; single and multi-purpose projects; environmental assessment procedures; risk assessment methods for making water resource project decisions; and selecting among water resources development alternatives; achieving project optimality; single- and multi-purpose projects; special topics in new developments in water resources engineering; prerequisite: 3330 or consent of instructor. W

4330 Hydrologic Design (3) Application of frequency and regression analysis to hydrologic design of water resources systems; unsteady surface runoff 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


4520 Elements of Water and Wastewater Treatment Systems Design (3) Unit operations and processes employed in physical, chemical and biological treatment of water and wastewater. Application of unit operations and processes in design of water and wastewater treatment plants. Prereq: Engineering Science and Mechanics 3110 or consent of instructor. Sp, Su

4525 Water and Wastewater Treatment Plant Design (3) Detailed process design of water and/or municipal industrial wastewater treatment plants, sludge handling systems, ultimate disposal of residuals. Prereq: 4520 or consent of instructor. W

4530 Environmental Engineering Laboratory (3) Standard analytical techniques for evaluation of specific air, water and solid waste pollutants. Prereq: 4300 or consent of instructor. W

4600 Solid and Hazardous Waste Management (3) Magnitude and characteristics of solid and hazardous waste problems; collection systems; disposal systems including landfill, incineration, composting, fixation, resource recovery, and proposed new technologies; current and future regulations. Prereq: Junior standing. Sp

4700 Air Pollution—Air Resources Management (3) Introductory course on concepts of air pollution; analysis of relationship among emission sources, meteorology and air quality models; control techniques; engineering approaches for air pollution control. Sp

4820 Environmental Engineering Law (3) Legal aspects of water, and air pollution, drainage, land use controls and environmental impact statements with emphasis upon federal-state relations, recent legislation and court decisions, and enforcement. Prereq: Senior standing. F

5000 Thesis (1-15) F/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

5230 Open Channel Hydraulics (3) Opens channels and properties; principles and applications of uniform and gradually-varied flow; unsteady flow/flood routing; dam break flood analysis, spatially-varied flow. Microcomputer applications. Prereq: Environmental Science and Mechanics 3110 or consent of instructor.

5222 Sediment Transport I (3) Sediment properties and measurement; bed loads and suspended load movement; erosion, scour, transportation and deposition of sediments by flowing water; siltation of reservoirs and related topics. Prereq: 5330. W

5234 Flood Damage Reduction (3) National, regional, local flood problems; hydrologic design criteria; traditional flood control measures; land use controls and mechanisms; major floods and flood control projects, 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 optics, and the interaction of EM radiation and matter; current data handling technology. Prereq: Consent of instructor.

5262 Remote Sensing Data Acquisition (3) Active and passive sensors, their areas of special application and limitation; description of remote sensing platforms, including unmanned platforms such as unmanned and autonomous vehicles, and other flood damage reduction elements; interdisciplinary approach in floodplain management; case studies. Prereq: Consent of instructor. Sp


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
5320 Stormwater Modeling II (3) Continuous streamflow network methods, interpreting methods of stochastic hydrology, including flow frequency and time series analysis. Hydrologic design of water resources systems using stochastic hydrology, statistical hydrologic auto-regressive and fractional Gaussian noise models. Prereq: Consent of instructor. Sp


5330 Descriptive Hydrology (3) Occurrence and description of elements of hydrologic cycle, effects on earth 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 location of central facilities; exposure to current literature on environmental management problems; optimization of these systems. Prereq: Graduate standing. Civil Engineering 4800 or consent of instructor. Sp

5501 Water and Wastewater Treatment Theory I (3) Theory of unit operations employed in sanitary engineering. Prereq: 4520. E

5502 Water and Wastewater Treatment Theory II (3) Theory of physical, chemical, and biological processes employed in sanitary engineering. Prereq: 4520. W


5530 Environmental Engineering and Natural Systems Behavior (3) Seminar in selected issues of environmental engineering science research relating to natural system behavior. Eutrophication, 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 microbial processes involved in water and wastewater treatment. Includes basic microbiology, detection and identification, enzymes, metabolic reactions, energy transfer, synthesis and growth; aerobic and anaerobic biological treatment processes. Prereq: Graduate standing. Sp

5593 Advanced Environmental Engineering Laboratory (3) Application of modern and typical methods, principally instrumental, to analysis of environmental pollutants. Prereq: 4520. 2 hrs and 1 lab.

5615 Solid Waste Resource Recovery (3) Analysis and design of resource recovery processes and operations that apply to municipal and industrial waste. Prereq: 4600. W


5710 Air Pollution Control Engineering (3) Emission control systems for industrial and power generating processes, stack sampling methods, air pollution dispersion, collection of pollutants. Prereq: Graduate standing. F

5715 Ambient Air Monitoring (3) Physical and chemical characteristics of air, ambient air monitoring, survey network design. Quality control of air monitoring data. Use of air monitoring data in air quality management programs. Prereq: Consent of instructor.

5720 Air Pollution Particle Collection Theory (3) Mechanisms of particles suspended in gaseous medium including particle migration, agglomeration, 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 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 pollutant emissions from industrial processes. Prereq: Graduate standing: 2 hrs and 1 lab. Su

5745 Ambient Air Chemistry (3) Reaction mechanisms for production of secondary air pollutants from anthropogenic primary pollutants and naturally occurring precursors. Prereq: Consent of instructor.

5760 Diffusion in the Atmosphere (3) Movement and distribution of material, wind and related material released to the atmosphere. Basic theory. Rise of buoyant plumes, relation between Eulerian and Lagrangian spectra, differences between instantaneous and continuous sources, diffusion in a zone of wind shear and diffusion from urban area sources. Prereq: 5725.

5900 Special Problems in Environmental Engineering (1-9) To fulfill the special problem requirement in the 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) 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 internship, research, or employment involving (1-9) To fulfill the special problem requirement in the non-thesis program. Enrollment limited to environmental engineering science research relating to The University of Tennessee, Knoxville. Course credit not applicable to graduate degree program. Prereq: Active graduate standing in environmental engineering. May be repeated. S/NC only. F, W, Sp

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 industrial by-products in design. Prereq: 5501, 5502, 5503, 5593, 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 encapulation; design oriented. Field trips. Prereq: 5501, 5502, 5503.

6530 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 earthen solids). Development of intuitive sense to enhance problem solving. Prereq: 5501, 5503 or consent of instructor.

6910-20-30 Special Topics in Environmental Engineering (3, 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

Electrical Engineering M.S., M.E., Ph.D.

Professors:

W. L. Green (Head), Ph.D. Texas A&M; J. Alexeff, Ph.D. Wisconsin; W. E. Bailey, Ph.D. Georgia Institute of Technology; J. D. Cilborn, Ph.D. Clemson; T. V. Blaock, Ph.D. Tennessee; R. E. Bodenhimer, Ph.D. Northwestern; D. W. Boudin, Ph.D. Vanderbilt; J. W. Cunningham, Ph.D. Tennessee; R. C. Gonzales, Palm Beach; J. M. Gooze, Ph.D. Georgia Institute of Technology, P.E.; G. W. Hoffman, Ph.D. Harvard; J. C. Hung, Ph.D. New York; E. F. E. J. Kennedy, Ph.D. Tennessee; W. O. Leffel, (Emeritus), M.S. Tennessee; W. A. McGinnis, Ph.D.; H. P. Neff, Ph.D. Auburn, P.E.; M. O. Pace, Ph.D. Georgia Institute of Technology; J. F. Pierce, Ph.D. Pittsbughe, P.E.; T. A. Reynolds, Ph.D. Tennessee; R. W. Rochelle, Ph.D. Maryland; R. J. Roth, Ph.D. Denver; F. W. Symmonds, Ph.D. Nottingham (UK); J. D. Tillman, Ph.D. Auburn; C. H. Weaver, Ph.D. Wisconsin, P.E.

Associate Professors: R. A. Beiz, Ph.D. Montana; J. D. Birdwell, Ph.D. Massachusetts Institute of Technology; B. W. Bomar, Ph.D. Tennessee; J. S. Lawler, Ph.D. Michigan State; A. Fajú, Ph.D. Vanderbilt; D. Rosenberg, Ph.D. New York; J. M. Yon; Ph.D. Tennessee; J. W. Waller, Ph.D. Tennessee.


B.A. Haliburton Professor
B.M. IBM Professorship
M. M. A. Lewis of Assurance
Distinguished Professor
Western University Professorship
John Fisher Young Professorship
Tenneo, Inc. Professor
Space Institute, Tullahoma

MASTER OF SCIENCE PROGRAM

Graduate work leading to the Master of Science degree in Electrical Engineering may be completed during one academic year of full-time study, or the degree may be obtained in two or three years of study in the evening. Graduate assistantships are available for outstanding students, who may obtain the Master’s degree in one calendar year.

MASTER OF ENGINEERING PROGRAM

A graduate program leading to the Master of Engineering degree is available to qualified graduates of A.B.E.T.-accredited undergraduate curricula in electrical engineering or its equivalent.

A minimum of one-third of the program must be in engineering design, and one-third must be in, or a combination of, advanced math, computer sciences, basic sciences, or engineering sciences.

ADMISSION REQUIREMENTS

Students applying for admission to the Master of Science or Master of Engineering program and who hold a B.S. degree in Electrical Engineering are considered for admission on an individual basis. The minimum expectation is an undergraduate cumulative grade point average of 3.0 out of 4.0 and a GPA of 3.0 for the senior year. Students who hold the B.S. or B.A. degree in a field other than Electrical Engineering are also expected to have a minimum cumulative undergraduate grade point average of 3.0 and a minimum senior year average of 3.0 in that field. These students should have a background equivalent to that obtained by earning credit with a minimum 3.0 grade point average in the following undergraduate Electrical Engineering courses: 2010, 2020, 3030, 3810, 3820, 3830, 3040, 3050, 3060, 3080, 3090, 3010, 3720, 3100, 3190, 3160 and three 4000 level courses in the student’s major area of
concentration in the Master's program. Students from fields other than Electrical Engineering who have met the admission standards will be admitted only as non-degree students until a program of study is developed by the student and his/her faculty advisor. It is filed with the E.E. Department, Graduate Committee. The program of study should include recommended undergraduate courses and graduate courses in Electrical Engineering.

DEGREE REQUIREMENTS

Specific degree requirements which must be met include:

1. Electrical Engineering 5070-80 and 5710. Electrical Engineering 5710 is normally available in both fall and spring quarters. Students electing courses such as 5650-60, 5720-30, or 5750-50 which require 5710 as a prerequisite should register for 5710 in the fall quarter.

2. Nine quarter hours of graduate credit in mathematics consisting of Mathematics 4710, 4550, and 4250, or 4510-20-30. Other approved 4000-5000 level mathematics courses must be submitted for any of the above course material covered in undergraduate work.

3. An additional 18 quarter hours of 5000-level work in electrical engineering or 9 quarter hours of 5000-level work in one area of electrical engineering and 9 quarter hours of 5000-level work in another area approved by the student's Master committee.

The 18 quarter hours of 5000-level work in electrical engineering must be divided equally between two different electrical engineering areas.

4. Master's thesis, totaling 9 quarter hours or more.

5. A final oral examination covering the thesis and related course work.

DOCTORAL PROGRAM

The Ph.D. degree with a major in Electrical Engineering may be pursued in the areas of circuit theory, computers, electro-optics, communication theory, electromagnetic theory, plasma engineering, power systems, solid-state electronics, and control systems.

Specific departmental requirements for 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 3000 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 18 hours of mathematics, including Mathematics (or Physics) 5610-20-30 and 9 hours of mathematics at the 4000 level or above.

Courses required in electrical engineering undergraduate curriculum cannot be used in either the M.S. or Ph.D. programs. In addition, 4000-level courses in electrical engineering may not be used if 5000-level courses are available in the same area.

A. A minimum of 36 quarter hours credit in doctoral dissertation.

4. One foreign language if the student's faculty committee feels that a reading knowledge of foreign language is crucial to the student's research efforts.

5. 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 usually chosen from the doctoral committee 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 36 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 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 formal written dissertation proposal. The comprehensive examination 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.

6. Participation in departmental seminars.

Many of the electrical engineering courses are offered in the evening. Engineers working in industry are encouraged to participate in 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 linear systems; Laplace transform method and classical differential equation methods for system analysis; complex frequency concept and pole-zero analysis; applications to engineering problems. Prereq: 3030.

3040 Basic Communication Systems (3) Fourier series and transforms. Network response to signals and noise. Elements of amplitude, frequency and phase characteristics. Introduction to linear time-invariant systems. Prereq: 3010. 3 hrs including project laboratory.


3110 Basic Electrical Engineering—Circuits and Fields (3) For non-electrical engineering majors. Prereq: 3110. 3 hrs including biweekly lab.

3130 Basic Electrical Engineering—Machinery (3) For non-electrical engineering majors. Prereq: 3110. 3 hrs including biweekly lab.

3180 Logic Design of Digital Systems (3) Introduction to boolean algebra and design of combinational circuits. Design of clocked sequential circuits and other systems containing memory. Introduction to minicomputer architecture and system components to include basic structures and functions, addressing, input, and output, and control systems. Instruction set capabilities and machine language programming. Prereq: 2030 or Computer Science 2710. 3 hrs including biweekly lab.

3190 Plasma I (3) Engineering applications of physical electronics, plasma effects and devices. Topics include electrostatic precipitators and plasma light sources, laser operation and applications (electro-optics), and MHD, controlled thermonuclear and other techniques of advanced power production. Prereq: Physics 2310-20-30. 3 hrs including biweekly lab.

3270 Linear Systems Analysis (3) Steady-state and transient response; frequency analysis. For non-electrical engineering majors. Prereq: 3110. 3 hrs including project laboratory.

3310 Basic Electronics I (3) Circuit theory fundamentals. For non-electrical engineering majors. Prereq: 3110. 3 hrs including biweekly lab.

3320 Basic Electronics II (3) Physical operation of bipolar transistors and vacuum tubes with applications in basic amplifiers. Integrated circuit fundamentals. Prereq: 3310. 3 hrs including project laboratory.


4020 Direct Energy Conversion (3) Background physics; conversion devices including photovoltaic power sources, thermoelectric and cryogenics; heat pumps, magnetohydrodynamics, fuel cells, related aspects of d.c.-a.c. conversion and energy storage. Prereq: 3810. 3080.

4080 Microwave Circuits and Electronics (3) Superconducting waveguide design, optical fiber and waveguide amplification, isolation and filtering, electromagnetic wave propagation, microwave devices and by solid state (bulk and junction) devices. Microwave switching, filtering and multiplexing. Prereq: 3589. 3 hrs including biweekly lab.

4090 Propagation I (3) Metal tube, dielectric rod, and

4500 Electromagnetics and Detection and Instrumentation (3) Sensitivity, resolution (frequency response) and noise concepts of and practical engineering data for both spatial, and temporal media (e.g., photodiodes) will be given. The third last of the course will be devoted to selected problems of communication systems (e.g., laser light scattering, optical data processing, holographic interferometry).


4570 Electro-Acoustics (3) Wave equation for sound, radiation of sound, scattering, loudspeakers, horns, speakers, systems, phonograph recording and reproduction, tape recording and reproduction, noise reduction systems. Prereq: Senior standing.

4600 Analog Signal Processing Circuits for Electronic Instrumentation (3) Operational amplifiers, instrumentation amplifiers and other integrated circuits in signal processing. Filter design, attenuators, function generators, active rectifiers, and synchronous demodulators. Analysis of interfacing problems between analog and digital signal-processors. Prereq: 3830. 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 and digital systems. Prerequisites: 3060, 3830. 3 hrs including laboratory.


4630 Digital System Organization and Design (3) Considers system organization of digital systems including microcomputer and microprocessor architectures and comparisons. Characteristics of ALU and CPU structures, storage systems (RAM, ROM, and PROM building blocks), and input/output systems are developed. Course organization control unit organization to include serial-parallel modes of operation, synchronous/asynchronous operations, and computer and program management of control functions. Prereq: 3180. 3 hrs including laboratory.

4680 Bioelectric Instrumentation (3) Nature and origin of biomelectric potentials, transducers, amplifier requirements, recording instrumentation and function generators. Principles of reliability and error detection in digital systems. Prereq: 3180. 3 hrs including 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: 3830. 3 hrs including project laboratory.

4770 Synchronous Machines (3) Construction and application, performance of analysis from equivalent circuits. Prereq: 3049. 3 hrs including project laboratory.

4810 Discrete-Data Systems (3) Introduction to analysis and design of discrete data control systems using frequency domain techniques. Real-time digital filtering techniques; application of digital computers in closed-loop feedback systems. Prereq: 3720.

4820 Introduction to Pattern Recognition (3) Role of pattern recognition within framework of artificial intelligence. Topics dealing with the design of learning and adaptive machines. Typical applications of pattern recognition to problems of practical significance. Course covers simulation techniques and their application. Prereq: Either 3100 and Computer Science 3150, or Statistics 3420 and Computer Science 1510. (Same as Computer Science 4820.)

4830 Digital Image Processing (3) Principles for reconstructing, storing, analyzing, and operating digital images. Mathematical transforms, digital filtering, sampling, and reconstruction. Prereq: 3100 and Computer Science 3150 or 3150. 3 hrs including laboratory.

4910-20-30 Special Electrical Engineering Problems (3, 3, 3) Problems in electrical engineering involving library research and experimental work.

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

5040-50-60 Electrical Engineering Research (3, 3, 3)

5070-60 Modern Transform Methods (3, 3) Laplace transforms and complex-variables methods for solving difference equations and distributed parameter systems.

5110 Introduction to Network Analysis (3) Topological considerations in networks, graph theory oriented. Priority structures, peripheral devices, system software and assembly language programming. Course is project oriented. Prereq: Basic Engineering 1410, Computer Science 1510 or 3150 or consent of instructor. (Same as Computer Science 4880.)

5120 Network Synthesis and Design (3) Frequency domain and time domain synthesis of network functions; realization of one-port and two-port networks by R, L, and C elements; approximation problem and filter design; computer aided techniques. Prereq: 5070 or equivalent.


5175 Introduction to Logic Design (3) Combinational and sequential network design. Digital mod- ules and memory devices. Asynchronous and synchronous machines. Sequential machines as finite automata. Identification of experiments on sequential machines. Biweekly lab. Prereq: Elementary linear algebra and calculus of several variables. (Same as Computer Science 5175.)

5210-20 Advanced Electrical Machinery (3, 3) Fundamental principles and the design of electrical machines. Analysis and computer-aided design of electrical machines. Interconnection and stability of several machines. Biweekly lab. Prereq: Elementary linear algebra and calculus of several variables. (Same as Computer Science 5175.)
5320 Advanced Electrical Machinery Applications (3) Linear motors; pole amplitude modulation and other control techniques; variable frequency operation. Prereq: 5210.

5240-50 Control Systems Design I, II, III (3, 3) Analysis and design of continuous and digital control systems using modern techniques. Feedback theory; system modeling; stability analysis; system response analysis; design of estimator and observer, systems with measurement and control engineering aspects of control systems. Coreq: 5070 or equivalent.

5271 Modern Systems Theory I (3) Introduction to linear systems theory. State-space model, linear dynamical systems, state transition map, matrix exponential, controllability, observability, realization theory, pole placement, observers, stability theory for linear systems. Prereq: Consent of instructor.

5281 Modern Systems Theory II (3) Optimal estimation theory. Probability theory and stochastic processes, uncertain dynamical systems, estimation and filtering theory. Wiener filtering, the Kalman filter and its extensions. Prereq: 5271 or consent of instructor.

5291 Modern Systems Theory III (3) Optimal control theory. Deterministic optimal control problems, minimal principle, Pontryagin's maximum principle, linear quadratic Gaussian control system, stochastic 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.

5315 Plasma Diagnostics I (3) Classical plasma diagnostic techniques for low temperature plasmas. Active and passive methods including Langmuir probes, capacitive, magnetic and calorimetric probes, and perturbing spectroscopic techniques. Prereq: 4445 or consent of instructor. (Same as Nuclear Engineering 5315.)

5320 Plasma Diagnostics I (3) Classical plasma diagnostic techniques for low temperature plasmas. Active and passive methods including Langmuir probes, capacitive, magnetic and calorimetric probes, and perturbing spectroscopic techniques. Prereq: 4445 or consent of instructor.

5325 Plasma Diagnostics II (3) Active and passive non-perturbing diagnostic techniques for fusion-related plasmas. Laboratory safety, electrostatic energy analyzers, particle probes, RF emission measurement, photon diodes, interferometry and Thomson scattering, neutron and reaction product diagnostics. Prereq: Consent of instructor. (Same as Nuclear Engineering 5325.)

5335 Plasma Diagnostics Laboratory (3) Data from at least four diagnostic instruments in the UTK Plasma Science Laboratory. Langmuir probes, capacitive probes, RF emission detection, retarding potential energy analyzers, charge-exchange neutral detectors, spectroscopic measurements, microwave interferometry, and other methods. Prereq: 5315 and 5325. (Same as Nuclear Engineering 5335.)


5350 Properties of Quantum Devices (3) Optical resonant cavity theory and design; steady-state and Q-switched operation. Stable modes of oscillation, modulation and stabilization techniques. Laser output power spectral line shape and noise considerations. Operation in transitions and rubidium, potassium and semiconductor diode lasers. Prereq: 5340 and Mathematics 4710 or equivalent.


5540 Thick-Film Hybrid Microcircuits (3) Processing and basic design techniques for prototype production of hybrid thick-film-integrated circuits; from circuit design through packaging; properties of thick-film pastes; cost-effective design techniques. Project oriented, includes weekly laboratory.

5570-90 Advanced Electronic Switching Circuits (3, 3) Switching circuits using active devices in discrete, monolithic, and hybrid configurations; clippin and clamping circuits, negative resistance circuits, comparators, time-base generators, sweep circuits, blocking oscillators, analog 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.

5580-85 Control Systems I, II (3, 3) Design considerations for continuous and discrete systems. Continuous filtering, design considerations for continuous and discrete systems. Digital and analog filter design. Prereq: 4100 or equivalent.


5590 Digital Signal Processing (3) Analysis of discrete signals; sampling theorem and its implications; frequency domain design of digital filters; time domain design of digital filters; quantization effects; processing of digital signals; discrete Fourier transform. Prereq: 4100 or equivalent.


5700 System Identification (3) Various identification schemes: deterministic, stochastic, and hierarchical methods. Applications in all areas of engineering and science. Prereq: Consent of instructor.

5750 System Identification (3) Various identification schemes: deterministic, stochastic, and hierarchical methods. Applications in all areas of engineering and science. Prereq: Consent of instructor.


5830-40 Microwave Antennas and Antenna Arrays (3) Hertzian dipole, linear antennas, impedance loop antennas, receiving antennas, linear arrays. Prereq: 5820.

5835 Microwave Antennas (3) (Same as Nuclear Engineering 5835.)

5840 Aperture Antennas (2) (Same as Nuclear Engineering 5840.)

5850 Microwave Electronics (3) Vacuum electronic and semi-conductor electronic oscillators and amplifiers.
Frequency swept oscillators. Energetic electron beams, mode coupling in loaded beams, modern traveling wave devices, Parasitic systems, transit time devices. Prereq: 5820 or equivalent, S

5800 Electromagnetic Wave Propagation (3, 3, 3) Waves, rays, and beams in generalized propagation media; power, energy and moment, interference and diffraction phenomena, dispersion, general properties of electromagnetic waves; geometrical optics approximation, accounts of far fields and near fields due to edge and surface distortions, beam modes, computation of power flux density, Coreq: 5820 or equivalent, W

5870 Introductory Microwave Networks (3) Scattering and transfer representations for multiports, unilateral and bilateral microwave and millimeter wave devices, component and system parameter measurement by modern network analyzers, Design of multiports, intergration of high frequency multiprot designs with analyzer measurements, F

5910 Special Topics and Special Course Topics in Electrical Engineering (3-9) Open to students with graduate standing, Special projects and special course topics taught by members of the graduate faculty, S

5915 Measurement Science I (3) (Same as Nuclear Engineering 5915)

5925 Measurement Science II (3) (Same as Nuclear Engineering 5925)

5930 Digital Image Processing (3) Theory and techniques of digital two dimensional surfaces and interpretation, image representation and transformations, image enhancement, restoration, reconstruction, image compression and decompression, image synthesis, scene analysis, and scene matching. Prereq: 4830 or consent of instructor

5935 Measurement Science III (3) (Same as Nuclear Engineering 5935)

5940-50 Advanced Small Computer Systems (3, 3) Real-time applications, memory and CPU organization, interface software, and peripheral devices of minicomputer and microcomputer system are studied. Project-oriented, supported by hardware and software interface design, Prereq: 5715 or 4850, (Same as Computer Science 5940-50).

5990 Graduate Seminar in Electrical Engineering (1-3) Topics of particular seminar sequences may include those of interest or research in department. Open to students with graduate standing, Cannot be included in 36 hrs of course work required for Master's. May be repeated with the consent of department. SNC only.

8000 Doctoral Research and Dissertation (3-15) F/NP

6240-60 Advanced Systems Theory I, II, III (3, 3, 3) Advanced topics in modern theory. Topics vary. 6240—Game theory, dual control problem, information structure and control, hierarchical systems, reliable control, and optimization of control systems, theory, systems defined on groups. 6250—Qualitative analysis of systems, nonlinear systems analysis, stability theory. Not to be taken in sequence. Prereq: 5271-61 or consent of instructor

6270-80-90 Special Topics in Systems Methodology (3, 3, 3) Advanced topics of current interest to system analysis and design of new developments as found in current literature. Prereq: Consent of instructor


6500-10 Electrical Conduction in Gases and Plasma Physics (3, 3) (Same as Physics 6500-10)

6530 Advanced Topics in Image Pattern Analysis (3-9) Discussion of new developments as found in current literature. Prereq: 5670-80, Computer Science 5840-50 or consent of instructor

6610-20-30 Microwave Networks (3, 3, 3) Scattering and transfer representations. Narrow band and wide band synthesis of networks containing lumped and distributed components, interstage matching and response equalization. Low noise, low distortion and high designs of amplifiers and oscillators. Topical selection from reciprocal and non-reciprocal devices, directional devices, high frequency switches and multiple aperture antennas. Further selected topics from current practice in optimization and in distortion control. Network analyzer measurement techniques and integration of measured data with design procedures. Prereq: Consent of instructor.


6760-70-80 Asymptotic Techniques in Wave Propagation (3, 3, 3) Selected topics on electromagnetic waves with spatial and temporal dispersion and with fluctuation. Geometric theory of diffraction for electromagnetic waves, supported by results from canonical approximations of geometrical optics and physical optics. Field and power flux scattering radiating transport in tenuous particulate media; multiple scattering theory; coherence and modespread. Fluctuations of fields, Coreq: 5810 or consent of instructor

6710-20-30 Network Synthesis (3, 3, 3) Synthesis of one-, two-, and n-port networks for prescribed frequency and time domain conditions. Approximation of prescribed network characteristics by functions suitable for synthesis. Recent contributions to topological synthesis. Prereq: 5110-20-30


6760 Coding Theory (3) Mathematical structure of algebraic and probabilistic codes. Coding metrics and bounds, linear codes, linear feedback shift registers, convolutional codes, burst-error-correcting codes and decoding methods. Prereq: 5710 or consent of instructor


7000-10-20 Advanced Electricity Systems (3) Analysis of electric energy systems. Influence of recent energy advances on system performance. Prereq: 5070-80, 9 hrs of 5000-level power courses.

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. SNC only.

8900 Project in Engineering Administration (3) Study and formal report of engineering administration topic, normally performed during the second quarter of work toward degree. For M.S. in Engineering Administration can be repeated up to three times only. Maximum 3 hrs credit to be applied toward degree. Must register for 5900 until project is complete. SNC only.

Engineering Science and Mechanics MAJOR DEGREES

Engineering Science

M.S., Ph.D.

Professors: J. E. Stoneking, Ph.D., (Dean), Ph.D. Illinois, P.E.; A. E. Baker, Ph.D., New York; T. G. Caseley, Ph.D., Illinois, P.E.; J. H. Forrester, Ph.D., Iowa State, P.E.; R. M. Hackett, Ph.D., Carnegie-Mellon; R. J. Jendrucko, Ph.D., Virginia, P.E.; D. R. Keever, Ph.D., Florida, K. H. Kim, Ph.D., North Carolina State; J. D. Landes, Ph.D., Lehigh, P.E.; C. W. Lee, Ph.D., Illinois Institute of Technology; W. A. Miller (Associate Dean), Ph.D., Georgia Institute of Technology; P. E.; H. Pih, Ph.D., Illinois Institute of Technology; C. J. Rensney, Ph.D., Johns Hopkins; F. Shahraki, Ph.D., Oklahoma; L. R. Shobe, (Emeritus), M.S. Kansas State, P.E.; W. T. Snyder (Dean), Ph.D., Northwestern; D. G. Thomas, Ph.D., Ohio State, P.E.

Research Professor: T. F. Moriarty, Ph.D., Illinois, P.E.

Associate Professors: J. E. Caruthers, Ph.D., Georgia Institute of Technology; R. C. Engels, Ph.D., Virginia Polytechnic Institute; A. Matthews, Ph.D., Illinois, P.E.; J. M. Myers, Ph.D., Indiana University; W. E. Scott, Ph.D., Johns Hopkins; M. D. Soliman, Ph.D., Tennessee, P.E.; J. S. Stichtenoth, Ph.D., University of Chicago; J. Wasserfield, Ph.D., Cincinnati, P.E.

Assistant Professor: J. A. M. Boulet, Ph.D., Stanford; W. J. Jones, Ph.D., Clemson.

*U.T.S.I. faculty members.

Graduate programs leading to the degrees of Master of Science and Doctor of Philosophy carry the name of the Department of Engineering Science and Mechanics. The knowledge engineering program, which is offered only at UTSI, uses computer systems in collaboration with human experts to assimilate and efficiently manage and increase knowledge, called knowledge. The thrust of the program is to educate engineers and scientists in the development and application of knowledge-based expert computer systems to engineering problems.

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 concentrations 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 at one of the interfaces between science and engineering, or can best be met by interdisciplinary study in engineering. The department's course offerings and research activities are also intended to meet the needs of students who seek preparation for employment in engineering areas requiring specialization in mechanics, or in related interdisciplinary studies such as biomechanics.

THE MASTER'S PROGRAM

Two M.S. options are offered: option I requires a thesis, while option II does not. The second plan is offered 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 course work more than from work on a thesis.

In Option I a minimum of 45 quarter hours, including the thesis is required. Option II a minimum of 48 hours is required. The requirements include the following:

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<th>Hours</th>
<th>Credit</th>
<th>Option I</th>
<th>Option II</th>
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<tbody>
<tr>
<td>Mathematics</td>
<td>9</td>
<td>9</td>
<td>27*</td>
</tr>
<tr>
<td>Engineering Courses</td>
<td>18</td>
<td>27*</td>
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(Major concentration; may include but is not restricted to courses offered by the Engineering Science and Mechanics Department.)

Related courses (May include additional courses in mathematics, computer science, or the physical and life sciences as well as engineering courses.)

Thesis

A final examination is required under both options, covering graduate course work and the thesis (if any).

*Engineering courses under Option II may include advanced laboratory work or special problem work, for example Engineering Science and Mechanics 5910 or analogous courses in other departments.

THE DOCTORAL PROGRAM

Specific departmental requirements for the Ph.D. degree include:

1. A minimum of 108 quarter hours credit beyond the Bachelor's degree, exclusive of credit for the Master's thesis. These shall include a minimum of 36 quarter hours credit in Doctoral Research and Dissertation and a minimum of 72 quarter hours credit in other courses.

2. A minimum of 36 quarter hours in engineering graduate courses, exclusive of thesis and dissertation credit. These courses will normally be numbered 5000 and above, with at least 12 quarter hours of 6000-level courses, which constitute one or two areas of concentration selected by the student. The number of courses in this group to be taken will depend on the program selected by the student and the approval of his/her advisory committee.

3. A minimum of 18 quarter hours in mathematics or computer science in courses numbered 4000 and above, exclusive of a first course in ordinary differential equations.

4. A minimum of 9 quarter hours of courses numbered 5000 and above, offered in departments other than those of analysis, computer science, and the student's major department and which are not included in the areas of concentration under item 2.

5. Active participation in graduate seminars and colloquia.

6. Two doctoral examinations must be passed to be admitted to candidacy for the Ph.D. in Engineering Science.

After being admitted as a potential candidate for the Ph.D., a qualifying examination must be taken at the first offering after the student has either completed a Master's degree or completed 36 quarter hours of graduate credit. The purposes of qualifying examination are:

(a) To determine the qualifications of the student to continue the Ph.D. program, and
(b) To identify the areas of strengths and weaknesses to guide the student's graduate course work and research.

The qualifying examination will be administered by the department's Graduate Studies Committee. The examination will be written and contain at least four graduate level subject areas. One of the subject areas 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 6 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 consist of both a written and oral portion.

7. 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 receive committee approval of the proposal 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.


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, biomat erial s, mathematical modes 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; hospital organization 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.

3700 Dynamics (4) Kinematics of rigid bodies; mass moments of inertia; applications to mechanics of rigid bodies using force, mass, acceleration; work-energy; impulse-momentum. Not for departmental 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.

4020 Computer-Aided Design (3) Use of computer graphics and analysis programs for design of selected systems, structures, and components. Evaluation of design alternatives. Prereq: Computer Science 2410.

4520 Biomedical Fluid Mechanics (3) Discusses objectives, review foundations and present developments in biomechanics and fluid mechanics. Properties of human blood and blood vessels of cardiovascular performance, analysis and measurement of flow and pressure in arteries, nontraumatic study of circulatory system, mechanics of fluid and blood flow; applications to areas of hemodynamics, thrombosis, and fluid dynamics of heart assist devices. Prereq: 4500 or a course in fluid mechanics or consent of instructor.

4530 Biomechanics (3) Discusses objectives, review foundations and present developments in areas of biomechanical properties of living tissues, biomechanics of injury and prosthesis, material compatibility 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 temperature, fracture toughness, 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.

4610 Experimental Stress Analysis (3) Basic concepts; theory, techniques, and instrumentation of resistance strain gages; theory and techniques of brittle coating method; introduction to other stress analysis methods. Prereq: 3310, Electrical Engineering 2020 or 3110. 2 hrs and 3-lab.

4620 Dynamic Data Acquisition (4) Instrumentation of measuring systems for dynamic events and responses; signal conditioning; oscillographs, oscil-locopes, and magnetic tape recording; telemetry and data transmission; data processing. Prereq: 3311, 4710, Electrical Engineering 3120. 3 hrs and 3-lab.

4630 Introductory Photomachanics (3) Introduction to photoelasticity, photoelastic coating method. More involved interferometric methods. Prereq: 3310, Physics 2320. 2 hrs and 3-lab.

4810-20 Engineering Analysis (4, 3) Integration of calculus and ordinary differential equations with other related courses, review foundations and present developments in real engineering problems. Prereq: 2020 and 2010. 1 hr and 3-lab.

4810-20 Engineering Analysis (4, 3) Integration of calculus and ordinary differential equations with other related courses, review foundations and present developments in real engineering problems. Prereq: 2020 and 2010. 1 hr and 3-lab.

4810-20 Engineering Analysis (4, 3) Integration of calculus and ordinary differential equations with other related courses, review foundations and present developments in real engineering problems. Prereq: 2020 and 2010. 1 hr and 3-lab.
6110-20 Fluid Dynamics (3, 3) Kinematic, transport and constitutive theories of fluids; development of rate deformation laws; mass, momentum and energy conservation relationships; non-dimensional numbers; the Navier-Stokes equations; exact solutions, potential flow and boundary layer approximations, coupled heat transfer models; discussion of finite element methods. Must be taken in sequence. Prereq: 5800.

5130 Introduction to Turbulence (3) Development of basic concepts and governing equations for turbulent and turbulent field motion. Formation for computational fluid dynamics, stability, and direct numerical simulation; turbulent transport processes; "free" turbulence, "wall" turbulence and engineering turbulence closure models. Prereq: 5800.


5225 Computational Thermal Analysis (3) Construction of numerical solution algorithms using interpolative numerical methods for energy systems; finite element theoretical framework, extensions to non-linear, fluid convection and radiation. Concepts of completeness, accuracy and convergence; convection boundary condition. Unsteady problems with fluid convection and accurate and approximate dimensional algorithms, modifications to reproduce finite difference and finite volume constructions. Computer project. Prereq: 5210.


5250 Introduction to Finite Element Structural Analysis (3) Finite element analysis techniques for structural mechanics and elasticity. Two and three-dimensional problems involving stress, strain, and displacements in mechanical and numerical quadrature. Equation solving, substructuring, skline solvers, matrix iteration techniques. Applications to plates and shells, including use of representative computer programs. Prereq: ESM 5200.

5310-20-30 Advanced Mechanics of Materials (3, 3) Advanced topics in mechanics of materials: three-dimensional transformations for stress and strain, uniqueness theorems; uniqueness theorems; extremum and variational principles. Problems in perfectly plastic solids; finite element analysis and design for materials for advanced structural components. Prereq: ESM 5200.


5410-20 Theory of Elasticity (3, 3) Equations of equilibrium; strain-displacement relations, compatibility equations; solutions for three-dimensional problems; thick wall pressure vessels, beams on elastic foundation, beam columns, introduction to elementary theory of elasticity. Must be taken in sequence. Prereq: 5340.


5525 Advanced Engineering Acoustics (3) Theory and application of acoustic analysis; vibration of con- tinuous systems, plane waves, transmission phenomena, spherical acoustic waves. Applications: resonators, filters, absorption mechanisms, microphones, ultrasonics, sonar transducers; speech and hearing, architectural acoustics. Prereq: 4710 or 4780.

5570 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 4550.

6110-20 Advanced Topics in Fluid Mechanics and Convective Transfer (3, 3) Advanced topics in con- vective momentum, heat and mass transfer, advanced boundary layer analysis, stability, transition, turbulence, closure models; Navier-Stokes equations, closure procedures including time- and volume-averaging, large scale structure, high speed flow, reacting, non-re- acting, excitation, ionization. Applications in propulsion, lasers, aerodynamics. Must be taken in sequence. Prereq: 5120.


6210-20-35 Advanced Topics in Computational Fluid Dynamics (3,3,3) Advanced topics in computational fluid mechanics using modern concepts in approxima- tion theory; theoretical analysis of accuracy and convergence, stability for smooth and non-smooth solutions including shocks; two- and three- dimensional, compressible viscous and inviscid flows; Euler and complete Navier-Stokes descriptions; mixed subsonic-supersonic flows. Various algorithm con- structions including finite difference, finite volume, approximate factorization, flux vector splitting, finite volume, generalized coordinates and adaptive grids; steady flows including high order turbulence close- sure. Thin layer and parabolic Navier-Stokes equations; multi-dimensional, turbulent and reacting flows. Computer projects. Must be taken in sequence. Prereq: 5230.

6310 Theory of Plates (3) Classical theory of bending plates of various shapes; thick plate; plates of variable thickness; buckling and large deflection problems. Prereq: 5800.

6320 Analysis and Design of Thin Shell Structures (3) Geometry of surfaces, derivation of thin shell theory for arbitrary shell geometry; selected applications of theory in structural engineering. Prereq: 5130 or Civil Engineering 5160.


6440 Nonlinear Viscoelasticity (3) Same as Polymer Engineering 6210.

6450 Theory of Plasticity (3) Yield conditions; strain hardening; general constitutive equations; plastic potential; uniqueness theorems; extremum and variational principles. Problems in perfectly plastic solids; finite plastic deformations; piecewise linear plasticity. Applications. Prereq: 5340.

6610 Advanced Photoelasticity (3) Scattered light three-dimensional photoelasticity; dynamic photoelas- ticity; photoelasticity and photoviscoelasticity; holographic-photoelasticity. Recent developments. Prereq: 5610.

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 re-scheduled. Prereq: High speed flow, reacting, resistance of depart- ment.

NOTE: not all of the above courses will be offered in any one year.
Industrial Engineering
MAJOR
Industrial Engineering

DEGREES
M.S., M.E.

Professors:
J. N. Snider (Head), Ph.D. Ohio State State, P.E.;
W. W. Clamton, Ph.D. Virginia Polytechnic Institute, P.E.;
P. E. L. Ohrstr, Ph.D. Virginia Polytechnic Institute, P.E.;
D. C. Doulet, M.S., P.E.

Tennessee, P.E.; H. F. Emerson (Emeritus), S. B.
Massachusetts Institute of Technology, P.E.;
G. Garrison,
Ph.D. North Carolina State, P.E.;
R. A. Wood, Georgia Institute of Technology, P.E.;
H. Loveless, M.S., North Carolina State, P.E.;
W. G. Sullivan, Ph.D. Georgia Institute of Technology, P.E.;
J. D. Westbrook, Ph.D. Virginia Polytechnic Institute, P.E.

Associate Professors:
D. H. Hutchinson, Ph.D. Georgia Institute of Technology, K. E. Kirby, Ph.D. Tennessee.

Assistant Professors:
C. H. Allen, Ph.D. Tennessee, P.E.;
M. K. Goodman, M.S., Tennessee, P.E.;
J. C. Hungerford, Ph.D. Ohio.

Instructor:
D. D. Ford, M.S., Tennessee.

Lecturers:
J. A. Bondadé, Ph.D. Ohio State State; S. Douglas,

"IBM Professor
Part-time Space Institute, Tullahoma

THE MASTER OF SCIENCE 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 have taken 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 and production systems, human factors engineering, information systems, reliability and quality control, and traditional industrial engineering. Either one of two minors can be elected in Engineering, Mathematics, Psychology, Business, Computer Science, Statistics or Economics.

Masters of Engineering Program

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 industrial engineering program. This 45-quarter hour program comprises coursework work in an industrial engineering core, 9 hours of technical methods 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.

4040 Manufacturing Materials and Processes (3)

4060 Production Systems Planning and Control I (3)
Theory and applications of forecasting, capacity and materials planning, production systems design and inventory control. Not 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 systems, and other advanced industrial forecasting methods. Prereq: 4060.

4080 Forecasting Methods in Industrial Engineering
(3) Application of technological forecasting techniques to industrial engineering problems. Includes 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, time-cost trade-off algorithms, and computer programs. Prereq: 3430.

4160 Materials Handling (3)
Analysis and planning for the overall problem of moving, packaging, and storing of materials; equipment comparison and selection; cost analysis. Prereq: 4520 and Engineering Science and Mathematics 3310. Not available for graduate credit for industrial engineering students.

4200 Production Facilities Design (4)
Plant layout, service areas, inventory control applications, and purchasing procedures design. Prereq: 3630, 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 improving given schedules. Deterministic and probabilistic dispatching conditions. Prereq: 3520.

4250 Work Measurement Applications (3)
Application of learning curves, queueing theory, standard data methods and incentive systems to the design of industrial work situations.

4520 Engineering Economy (3)
Methods and problems in selection or replacement of equipment. Decisions among engineering alternatives, including capital recovery, economic life of equipment, and rate of return on investment. Not available for graduate credit for industrial engineering students.

4530 Case Studies in Engineering Economy (3)
Extension of basic engineering economy principles to actual problems faced by competitive firms and regulated industries. Case studies taken from literature for case based discussion. A full class assignment is made which involves working with local companies to evaluate make or buy options, leasing versus purchasing, equipment replacement studies, energy source economies. Prereq: 4520.

4590 Simulation (3)
Generation of outcome of complex random process by computer. Models of complex systems using available simulation languages. Simulation as design tool in industrial systems. Prereq: 3430 and Computer Science 3150.

4600 Predetermined Time Systems (3)
Work design and measurement using predetermined time system; methods timing, basic motion time, factor and work study. Theory and application. Prereq: 3630.

4610 Human Factors in Work Design I (3)
Human capabilities and limitations affecting work place layout, working environments, design of tools and equipment, and communications and response in human-machine systems. Prereq: 3600, 3630, or consent of instructor.

4830 Health Systems Engineering (3)
Hospital management systems and means by which they may be improved through application of modern industrial engineering principles and techniques.

4870 Mini-Computer Applications in Industrial Engineering (3) Introduction to computer hardware and human-computer interfaces, emphasis on small computers as element of larger system; applications and limitations of small computers in solving industrial engineering problems. Prereq: Senior standing.

4910-20-30 Special Industrial Engineering Topics (3, 3, 3) Prereq: Consent of instructor. May be repeated.

4950 Industrial Safety (3) Development of organization and programs for prevention of accidents with emphasis on OSHA Rules and Regulations.

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

5002 Non-Thesis Graduation Examination (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.

5100 Advanced Work Design Applications (3) Advanced work methods analysis, design and improvement of work systems, human factors, use of learning curves, queueing theory and wage incentive systems. Prereq: 3630, Statistics 3450.

5110 Industrial Engineering Methods and Control Techniques (3) Management control systems through IE techniques. Quantitative and qualitative systems: methods analysis, decision analysis, inventory systems, wage and salary development, and production and inventory control. System development and application. Not for credit toward a fifth undergraduate degree in Industrial Engineering.


5240 Facilities Planning and Design (3) Design modern materials handling techniques, computer-aided layout techniques, applications of operations research models, and use of these to design manufacturing facility. Prereq: Production facilities planning or consent of instructor.


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 simulation techniques to inventory systems. Closed form solutions, search techniques, and use of available computer codes. Prereq: 5700, Coreq: 5710.

5301 Accounting for Engineering Managers (3) The underlying financial and organizational framework of accounting is reviewed from the perspective of cost control and economic analysis. Emphasis is placed on the accounting structure and the implications of this structure for the engineering manager. The course provides an understanding of traditional financial statements and their implications in engineering decision making, knowledge of the computerized accounting data base, and the use of accounting systems in cost estimation.

5302 Structure, Organization, and Control of the Enterprise (3) Explores the relationship between organizational structure, behavior and productivity. The impact of organization size, technology, external environment, and age on structure and productivity are included. Characteristics of a bureaucracy, their appropriateness, andINET are related to industries of varying technologies. Current organizational structures such as matrix, team management, and lattice are studied.

5303 Analysis and Control of Product Distribution (3) Theories, principles, tools, and techniques of distribution, including planning and distributing technical products and services. The impact of rapidly changing technology on traditional
5540 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 economic feasibility of the project. Prereq: 5700.

5580 Human Factors Engineering (3) Human characteristics which influence design of tools, equipment, environments, and products. Modeling of human behavior as process or system controller. Prereq: Consent of instructor.

5610 Human Factors Engineering (3) Human operator, performance characteristics, and environmental requirements. Formal description of human operator's transfer characteristics through queueing models and models describing operator as information processor. Prereq: 5600.

5700 Optimization Methods in Industrial Engineering (3) Operations research. Analytical techniques required in 5710, 5720, and 5730. Computational and theoretical optimization problems. Prereq: 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 Separable Programming (3) Mathematical theory of linear programming, quadratic programming, and separable programming. Computer solutions to programming problems. Prereq: Computer Science 3150 and matrix algebra.

5720 Queuing Models and Simulation (3) Theory and application of stochastic models and simulation methods employed to evaluate complete queueing systems. Data analysis and hypothesis testing related to pertinent waiting line probability density functions. Prereq: 5700, 5360.

5730 Game Theory and Random Processes (3) Operations research including game theory with applications to decision making in competitive environments, and random processes. Applications to inventory, queueing theory, and decision models and decision making. Prereq: 5360.

5830 Health Systems Engineering II (3) Health systems for analysis, control, and improvement of function and total health system. Prereq: 4830.


5900 Design Project (1-9) Industrial engineering topic to fulfill design project requirement in nonthesis program. Enrollment limited to industrial engineering students in non-thesis program. May be repeated. Maximum 9 hrs. S/N only.

5190-20-30 Special Topics in Industrial Engineering (3, 3, 3) Special problems for students qualified to do individual group research projects. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.


6520 Operations Research Models in Engineering Economy Decisions (3) Traditional capital planning and budgeting techniques; operations research approaches to capital budgeting problems. Mathematical programming and computer simulation of interest projects, uncertain cash flows, and choice of appropriate evaluation criteria. Prereq: 5520, 5710.


6740 Advanced Topics in Optimization of Dynamic Systems (3) Multi-stage optimization theory. State dependent dynamic programming, and separable optimization theory, and other selected topics. Prereq: 6730.

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 group as appropriate. Prereq: Graduate standing and consent of instructor. May be repeated with consent of department.

Materials Science and Engineering

MAJOR

DEGREES

Metallurgical Engineering  M.S., Ph.D.
Polymer Engineering  M.S., Ph.D.

Professors:
J. E. Spruiell (Head), Ph.D. Tennessee; D. C. Bogue, Ph.D. Delaware; B. S. hole, Ph.D. Massachusetts Institute of Technology; J. P. Jacobs, Ph.D. Illinois; R. Brooks, Ph.D. Tennessee; R. A. Buchman, Ph.D. Vanderbilt; E. S. Clark, Ph.D. California (Berkely); D. A. Canonic, Ph.D. Lehigh; J. F. Fellers, Ph.D. Akron; J. S. Lin, Ph.D. Kansas; G. D. Lucas, Ph.D. Rensselaer Polytech; Institute; C. J. McGilpargue, Ph.D. Kentucky; K. J. Mackenzie, Ph.D. Cornell; B. F. Oliver, Ph.D. Pennsylvania State; J. Phillips, Ph.D. Pepperdine (California); E. E. Stanbury, (Emeritus), Ph.D. Cincinnati.

Associate Professors:
W. T. Becker, Ph.D. Illinois; J. Bentley, Ph.D. University of Salford (England); C. L. Brown, Ph.D. Virginia; D. M. Kroger, Ph.D. Vanderbilt; W. J. Lackey, Ph.D. North Carolina State; C. T. Liu, Ph.D. Brown University; A. J. Pedraza, Ph.D. National University (Argentina); C. L. White, Ph.D. Michigan Tech. University.

Lecturer: George D. Wignall, Ph.D. Sheffield (England).

Graduate programs are offered leading to the degrees of Master of Science and Doctor of Philosophy in Metallurgical Engineering or Polymer Engineering.

THE MASTER'S PROGRAM

Minimum departmental requirements include the satisfactory completion of:
1. A major concentration, approved by the student and the department advisor, totaling a minimum of 24 quarter hours of graduate courses in metallurgical engineering or polymer engineering. The Polymer engineering major must include Polymer Engineering 5110, 5230, 5310, 5430, and 5120.
2. One or two minors or collateral work, 9 to 18 hours total in engineering, chemistry, mathematics, physics, or other related fields. All course work offered for the Master of Science degree is subject to the approval of the student's faculty committee.
4. Active participation in graduate seminars in the department. Resident students must register for the appropriate 5010 every quarter offered.
5. Final examination covering thesis, related topics, and graduate level courses.

THE DOCTORAL PROGRAM

Students applying for entrance into the doctoral program must display concrete evidence of ability to perform and report...
independent research to the satisfaction of the department. The Master's thesis may be offered as such evidence by the student.

Departmental requirements consist essentially of the satisfactory completion of:

1. Graduate courses in materials science and engineering, metallurgical engineering, or polymer engineering accounting to approximately 36 quarter hours, at least 12 of which must be in 6000 series courses. The polymer engineering major must include Polymer Engineering 5110, 5210, 5230, 5310, 5420, and Chemistry 5140.

2. 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 chemistry, mathematics, physics, and engineering.

3. The comprehensive examination, usually given in two parts, and covering such topics as materials science and engineering, metallurgical or polymer engineering operations and processes, thermodynamics, technology, mathematics, physics, chemistry, and other related fields.

4. Active participation in graduate seminars conducted by the department. Resident students must register for the appropriate 5010 every quarter offered.

PROGRAM AREAS IN MATERIALS SCIENCE AND ENGINEERING

Both the metallurgical and polymer engineering programs are flexible and interdisciplinary in nature. Students may be admitted from a wide range of disciplines; these include physics, chemistry, chemical engineering, mechanical engineering, electric engineering, materials engineering, and engineering science programs. Prospective students should consult materials science and engineering faculty concerning development of individual special programs compatible with their backgrounds and goals.

Areas of concentration or specialization within the metallurgical engineering program include physical metallurgy of structure-property relations, materials processing, microstructure and materials joining, materials characterization, failure analysis, and mechanical, physical, and chemical behavior of materials.

Areas of concentration or specialization within the polymer engineering program include rheology and polymer processing, polymer morphology, polymer structure-property relationships, mechanical, physical, and chemical behavior of polymers, and composit materials.

PROGRAM OPTIONS IN POLYMER SCIENCE AND ENGINEERING

In addition to the polymer engineering program described above, M.S. and Ph.D. degrees with specialization in polymer science and engineering are possible through two joint programs. One program has a process engineering emphasis and is carried out jointly with the Chemical Engineering Department. The second program is joint with the Chemistry Department and has a chemistry emphasis.

The specialization program with the Chemical Engineering Department requires, for the M.S. degree, 4520, and a thesis in the field. The completion of Polymer Engineering 4910, 5110, 5310, 5420, and either 5230 or 5430 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. Materials science and engineering departmental requirements include completion of Polymer Engineering 4910 and 4920, Chemistry 5531 and 5140, and active participation in the Polymer Seminar. Ph.D. students must also pass a special written examination as well as complete the above requirements.

UTK-JAPAN COOPERATIVE PROGRAM IN POLYMER ENGINEERING

The UTK-Japan Program provides a means for Japanese research professors to teach part-time in the graduate program, and provides a joint Japanese-UTK 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 an UTK committee acts on them.

Materials Science and Engineering

3110 Engineering Materials I (4) Introductory course correlating the atomic, crystal, and microstructure of solids with mechanical, physical, and chemical properties of engineering significance. 3 hrs and 1 lab.

3120 Engineering Materials II (3) Extension of 2110 with emphasis on control of mechanical properties of materials by specification of composition, thermal, and mechanical treatment; correlation of resultant properties with service performance. Suggested for mechanical, civil and industrial engineering students.

3130 Engineering Materials III (3) Extension of 2110 with emphasis on control of electrical and magnetic properties of materials by specification of composition, thermal, and mechanical treatment; correlation of resultant properties with service performance. Suggested for electrical engineering students.

3140 Engineering Materials IV (3) Extension of 2110 with emphasis on materials processing, specification, and evaluation. Suggested for mechanical and industrial engineering students.

3150 Engineering Materials V (3) Extension of 2110 with emphasis on mechanisms and control of reactions of engineering materials with aqueous, nonequilibrium, and gaseous environments. Prereq 2110 or 2030. W, S, SU.

3160 Engineering Materials VI (3) Extension of 2110 or 2030 with emphasis on materials of significance 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 engineering.

3170 Engineering Materials VII (3) Extension of 2110 to biomedical applications of materials. Engineering materials in biomedical applications; metals, polymers, and ceramics; prosthetic devices; dental applications; corrosion problems; failure analysis; fabrication. Prereq: 2110 or equivalent.

4510 X-Ray Diffraction and Its Applications (4) Lectures and laboratory work in the basic principles and applications of x-ray diffraction. Structure determination, powder technique, precision lattice constants, chemical analysis and phase identification, preferred orientation. 3 hrs and 1 lab.

Metallurgical Engineering

3050 Production Metallurgy I (3) Roasting, smelting, and refining. Gas and liquid equilibria, slag-metal processes and solution behavior, correlation with phase constitution. Kinetics of reactions, rate laws, activated complex theory, adsorption and catalysis and applications. Prereq: 3040, Chemical Engineering 3410 and 3420 or equivalent. 2 hrs and 2 labs.


3320 Diffusion and Annealing (3) Introduction to solid state kinetics; point defects, solid solutions, diffusion equations and mechanisms, annealing of cold worked structures. Prereq: Mathematics 2840.

3310 Biomedical Applications of Materials for Life Scientists (3) Principles of engineering materials, metals, polymers, and ceramics; methods of fabrication of components; corrosion; applications of prosthetic devices and dental materials. Prereq: Chemistry 1110-20-30 or equivalent.

3520 Materials Behavior and Chemical Process Equipment Design (3) Mechanical, metallurgical and chemical considerations in design of chemical processing equipment. Prereq: Materials Science Engineering 2030 or equivalent; 3150; and Chemical Engineering 3420.

3710 Metallurgical Applications in Manufacturing Technology (3) Fabrication methods and principles of mechanical/thermal processing for finished and seminished articles: casting, powder metallurgy, plasti forming, joining, heat treatment. Prereq: 2110 or equivalent.

4240 Engineering Materials Design (3) Property control through composition, processing, and resultant properties with service performance. Prereq: 3230 or consent of instructor.

4250 Design and Analysis (3) Design and laboratory sessions on analysis of materials, requirements and performance in engineering structures and componts. Prereq: Senior standing.

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 relations; plane stress vs. plane strain loading; failure by yielding; stress concentration and notch sensitivity; ductile fracture; brittle fracture due to geometry and loading rate. Prereq: First course in Materials Science and Engineering Science and Mechanics 3311. Also suggested for mechanical engineering and engineering science students.

4740 Mechanical Metallurgy II (4) Brittle fracture due to metallurgical and environmental factors; fatigue, residual stresses; creep and stress rupture; effect of microstructure; finite plastic strain and plastic stress-strain relations; fabrication by forging, rolling, deep drawing; formability testing. Prereq: 4730 or Mechanical Engineering 3850 and first course in Materials Science, or consent of instructor. Suggested for engineering science and mechanical engineering students.

4760 Casting and Welding (3) Principles and processes of casting and welding; heat transfer, solidification, segregation, gas-metal and slag-metal interaction, thermal treatments, associated stresses. Prereq: 3120 or 3520. 3 hrs. S, SU.

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

5010 Graduate Seminar (1) Prereq: Admission to graduate program. May be repeated. S, NC only. 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 mecha-
nisms of plastic deformation of single crystals; slip and twinning; working: hardening; effects of temperature and plasticity on mechanical properties. Prereq: 5100.


5120 Diffusion in Solids (3) Analysis of models and experimental procedures for diffusion in solid systems. ti- logical and mechanistic description of diffusion and annealing of point defects.

5150 Phase Transformations I (3) Thermodynamic considerations of driving force and interface forma- tion in phase transformations. Prereq: 5110. Overall theory of nucleation and thermally-activated growth in heterogeneous phase transformations. Overall transform- ations are considered. Application to dislocation and deformation, austenite decomposition and recrystallization.

5210-50 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 crack- ing, hot cracking and porosity formation are developed. Prereq: Physical metallurgy.

5310 Solidification and Crystal Growth I (3) Solute redistribution, thermodynamic considerations, kinetic, nucleation, and growth effects on the solid to liquid transition. Prereq: Mathematics 4550.

5540 Electron Microscopy I and II (3) Kinematical and dynamical diffraction theories are developed and their application to electron diffraction patterns and contrast effects. Lattice imaging and microscopy are discussed. Special attention is given to metallog- ical applications such as plastic deformation, fracture, precipitation, and phase transformation. Prereq: 4510.

5560 X-Ray Metallurgy (3) Application of x-ray diffraction theory and techniques to metallic sys- tems. Powder and single crystal techniques; reciprocal lattice; analysis of scattered intensity; line profiles; orientation of single crystals; preferential orientation; phase analysis; order-disorder transformations.

5750 Corrosion (3) Analysis of corrosion processes in terms of polarization measurements and the Pour- baix diagram. Influence of stress, temperature, and local environment conditions contributing to pitting, crevice, and stress corrosion.

5840-50 Metallurgy of Deformation and Fracture (3, 3) Theoretical and engineering analysis of effect of stress, strain rate, temperature, and mechanical structure on mechanical behavior in service, testing, and fabrication.

5900 Special Topics in Metallurgical Engineering (5) Recent advances in metallurgical engineering and relat- ed fields: fiber composites, ordered alloys, grain boundaries and radiation effects. May be repeated. Maximum 9 hrs.

5910-20-30 Metallurgical Thermodynamics (3, 3, 3) Application of thermodynamic and physical-chemical methods to metals and metallurgical reactions. Rela- tion of theory and experiment to structure of liquid and solid solutions, and to alloy systems.

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

6110-20-30 Theoretical Metalurgy (3, 3, 3) Phases of solid state physics applicable to metallurgy, elas- ticity, introductory quantum theory, specific heats, electron theory, electrical and thermal conductivity, mag- netic properties, theory of alloyed metals. Prereq: 4610 or Physics 3720; Mathematics 4550 and con- sent of instructor.

6160-70 Phase Transformations II and III (3, 3, 3) Continuation of 5110 with emphasis on more advanced theoretical formulations of nucleation and growth the- ories. Models and experimental observations relating to martensitic transformations and shape memory phenomenon. Prereq: 5150.


6510-20 Advanced X-ray Diffraction (3, 3) General- ized theory; crystal structure determination; thermal motion, lattice faults, diffuse scattering. Prereq: 5560.

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 physical properties of polymers. Polymer structure, crystalline and glassy transitions, physical properties of amorphous and crystalline polymers, crystalliza- tion 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 oper- ations 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; melt, wet and dry spinning of manmade fibers; draw- ing and texturing of fibers; weaving and knitting. Emphasis on quantitative aspects.

4940 Plastics Fabrication Operations (3) Lecture and laboratory course treating operations of the plastic industry. Types and mechanisms of operation of machin- ery used and the structure and properties of fabricated parts. Operations to include extrusion, compaction, injection molding including structural foam, thermofor- mation, blow molding, rotational molding.

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

5010 Graduate Seminar (1) Prereq: Admission to graduate program. May be repeated. 5 INC only. E

5060 Engineering Analysis (3) (Same as Chemical Engineering 5650)

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 Sy- stems (3) Representation of orientation in matter, characterization using electromagnetic radiation, ori- entation factors. Experimental methods of measurement including birefringence, wide angle x-ray diffraction, and dichroic ratio. Prereq: Undergraduate physical chem- istry and texturing; preparation of yarn; dyeing, weaving, and solid solutions, and to alloy systems.

5200 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 spheri- ulitic structures and fibers, studies of Stein, light scattering from polymer films.

6150 Advanced X-Ray Diffraction Methods for Characterization of Macromolecular Structures (3) Methods of crystal structure determination; Patterson and Fou- rier functions; helical nets and Bessel function techniques; levels of detection; protein crystallography, order-disorder transitions and para crystallinity. Prereq: Weissenberg photography, single crystal and powder diffractometry with applications to syn- thetic and biological macromolecules.

6210 Nonlinear Viscoelasticity (3) Tensor formulation of constitutive equations of viscoelastic materials sub- jected to large deformations. Integral, differential, and acceleration tension formulations. Applications to poly- mer flow problems. Prereq: 5210 or equivalent. (Same as Engineering Science and Mechanics 6440.)

6220 Advanced Methods of Polymer Processing (3) Advanced methods in polymer processing for the design of polymer products. Prereq: Engineering Science and Mechanics 6440.

6230 Advanced Mechanical Behavior of Polymers (3) Stress analysis with emphasis on theoretical and engineering con- siderations of yielding behavior of solid polymers, failure analysis and general deformation mechanisms of solid polymers. Relation of microscopic properties to molecular structure.

6240 Polymer Engineering Applications of Statistical Mechanics (3) Formalisms, postulates and basic statistical mechanics concepts. Statistical function, relation to population in equilibrium. Lattices, the Ising Model and phase behavior applied to rubber elasticity, solution theories of random and crosslinked chains and glassy state mechanical properties. Prereq: 5310.
6250 Large Deformation Elasticity (3) Curvilinear tensor analysis and solutions of finite strains, Mooney-Finger-Rivlin formulation of isotropic non-linear elasticity, solution of large homogeneous and nonhomogeneous deformation problems, application to vulcanized rubber, reinforcement with inextensible cords. Prereq: 5230 or equivalent.


6610 Advanced Industrial Polymer Chemistry (3) Chemistry and properties of new polymeric engineering materials, highly integrated chemistry 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 science and technology of polymers. May include topics of morphology, structure, characterization. Prereq: Consent of instructor.

Mechanical and Aerospace Engineering

MAJORS DEGREES

Aerospace Engineering

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

Mechanical Engineering

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

Professors:

Associate Professors:

Assistant Professor:
P. E. George II, Ph.D. Purdue, M. Keyhani, Ph.D. Ohio State.

*Space Institute, Tullahoma.

Graduate programs in Mechanical Engineering or Aerospace Engineering are available which lead to the degrees of Master of Engineering, Master of Science, and Doctor of Philosophy with concentrations in solar energy, energy conversion and utilization, power generation, machine design and dynamics, aerodynamics and gasdynamics, flight mechanics, aeroacoustics, stress analysis, propulsion, heat transfer and fluid mechanics, and thermodynamics. In addition to the general policies and requirements of The Graduate School, each student must satisfactorily complete a program of study which has been approved by the student's committee. Specific program requirements are given below.

MASTER OF ENGINEERING PROGRAMS

Entrance into the Master of Engineering program is restricted to qualified graduates of A.B.E.T.-accredited undergraduate curricula in mechanical or aerospace 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 insure 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 graduate students who satisfy the necessary prerequisites.

MASTER'S PROGRAM OPTIONS

Three program options are available:

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 the student's program of study.

3. Participation in the departmental seminar programs.

4. Submission and defense of a written thesis which demonstrates the ability to conduct and report on an independent investigation.

5. Passing a final examination on all work submitted for the degree.

Note: Option 1 is restricted to those students who have had the equivalent of 30 quarter hours of graduate (5000-level or above) course work which includes at least 27 quarter hours of course work in mathematics. No more than 3 quarter hours of graduate course work may be below the 5000 level.

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 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

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.

3330 Engineering Thermodynamics (3) Properties of gases and mixtures; chemical reactions; equilibrium; applications to mechanical engineering problems.

3410 Fluid Flow (3) Development of continuity, momentum and energy equations for fluid systems; applications of mechanical and aerospace engineering problems.

3440 Heat Transfer (3) Heat transfer processes, heat conduction, thermal radiation.
true position tolerance theory; tolerance analysis; and specification; dimensional analysis of size and form; manufacturing processes with emphasis on coal technology. Design of experiments; data analysis; experimental techniques. Principles underlying tool and fixture design, selection of manufacturing operations, redesign of product to reduce cost. Product specification; dimensional analysis of size and form; true position tolerance theory; tolerance analysis; and workplace control for production to tolerance. Materials and Manufacturing Process (3) Selection of materials in design process, emphasizing relationship between stress and strain analysis, material properties, environment, temperature, manufacturing technology and cost. Machine Elements (3) Application of strength and properties of materials, design factors, theories of failure to design machine elements, springs and shafting, selection of sleeve and rolling element bearings. Machine Elements (3) Application of strength and properties of materials, design factors, theories of failure to design machine elements, springs and shafting, selection of sleeve and rolling element bearings. Thermodynamic properties of materials, design factors, theories of failure to design machine elements, springs and shafting, selection of sleeve and rolling element bearings.

Energy Conversion Systems (3) Operating and maintenance of power generation methods; evaluation of new energy sources and concepts; energy conservation schemes.

Environmental Noise (3) Basic principles of acoustics—measurement and control of noise in industrial and community environments.

Heat Transfer (3) Heat transfer by free and forced convection, heat transfer with phase change, heat transfer applications.

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.

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.

Manufacturing Processes (3) Comparison of machining methods; plastic production; metrology.

Tool Design (3) Principles underlying tool and die design, design of high-speed production tools and molds, work holding fixtures.


Manufacturing Engineering Systems Design (3) Design of complete manufacturing system for a particular product; manufacturing planning, tool and fixture design, scheduling and manufacturing operations, redesign of product to reduce cost.

Process Engineering I (3) Product specification; dimensional analysis of size and form; true position tolerance theory; tolerance analysis; and workplace control for production to tolerance.

Materials and Manufacturing Process (3) Selection of materials in design process, emphasizing relationship between stress and strain analysis, material properties, environment, temperature, manufacturing technology and cost.

Machine Elements (3) Application of strength and properties of materials, design factors, theories of failure to design machine elements, springs and shafting, selection of sleeve and rolling element bearings.

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Manufacturing Processes (3) Comparison of machining methods; plastic production; metrology.

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Manufacturing Engineering Systems Design (3) Design of complete manufacturing system for a particular product; manufacturing planning, tool and fixture design, scheduling and manufacturing operations, redesign of product to reduce cost.

Process Engineering I (3) Product specification; dimensional analysis of size and form; true position tolerance theory; tolerance analysis; and workplace control for production to tolerance.
3630 Magneto-hydrodynamics III (3) Engineering application of magneto-hydrodynamics, propulsion and power generation. Prereq: 3630, Mathematics 5630.

6410 Physical Gasdynamics (3) High-speed, high temperature flow of gas from molecular point of view; molecular concepts and simple kinetic theory; equilibrium concept review; nonequilibrium gas mixtures from steady-state kinetic theory chemical thermodynamics, and statistical mechanics. Prereq: 5220 and Mechanical Engineering 5120.

6420 Physical Gasdynamics (3) Continuation of 6410; flows of gas mixtures in local thermodynamic and chemical equilibrium; physical and chemical basis of rarefied gases; flow with vibrational and chemical nonequilibrium. Prereq: 6410.

6510-20-30 Advanced Aerodynamics (3, 3, 3) Subsonic, transonic, supersonic, and hypersonic flows treated 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 student's interest. Prereq: 5110, 5220, and 5240 or equivalent.


6910 Advanced Topics in Gasdynamics (3) Selection of topics based on particular interest of students; nonequilibrium transport phenomena, radiation gasdynamics, nonequilibrium gasdynamical flows, advanced kinetic theory, perturbation techniques. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

**Nuclear Engineering**

**DEGREES**

**Nuclear Engineering**

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

Professors:


Associate Professors:


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 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 36 quarter hours of 6000-level courses approved by the student's advisory committee.
2. A minor of 9 quarter hours in mathematics, statistics or computer science. A 9 quarter hour master's thesis must be submitted which demonstrates research or design capabilities.
3. The student must pass a final examination covering the thesis and graduate course work.
4. An alternate program is available for the Master of Science degree which involves an 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.
5. Final examination covering graduate course work 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 who have completed at least 18 quarter hours of Nuclear Engineering courses numbered 5000 or above and (or the equivalent), with at least 12 quarter hours in mathematics, computer science, or statistics in courses beyond the Bachelor's degree. These are exclusive of thesis or dissertation credit.

1. A minimum of 18 quarter hours in mathematics, computer science, or statistics in courses beyond the Bachelor's degree. These are exclusive of thesis or dissertation credit.
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, basics 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 in mathematics, computer science, or statistics in courses beyond the Bachelor's degree. These are exclusive of thesis or dissertation credit.

4. A minimum of 18 quarter hours in mathematics, computer science, or statistics in courses beyond the Bachelor's degree. These are exclusive of thesis or dissertation credit.
5. A minimum of 9 quarter hours in courses numbered 5000 or above from a department 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.

4110-20-30 Introduction to Nuclear Reactor Theory (3, 3, 3) Nuclear structure; radioactive decay laws, neutron interaction, fission process, chain-reacting systems; diffusion equation; multigroup diffusion theory, neutron moderation, reactivity coefficients; perturbation theory. Prereq: Physics 3730 or consent of instructor. F, W, Sp.

4210-20-30 Nuclear Reactor Laboratory (3, 3, 3) Radiation detection and counting instrumentation, counting statistics, half-life and decay schemes, gamma spectrometry, cross-section measurements, analog computer application, diffusion processes of neutrons, critical loading experiments, control rod calibration, statistical weight, shielding, xenon poisoning, prompt critical reactor behavior, fission density and adjoint flux. Prereq or coreq: 4110 or equivalent. F, W, Sp.

4445 Introduction to High Temperature Plasma Physics (3) (Same as Electrical Engineering 4445.) Electrical Engineering is the primary department.

4455 Principles of Fusion Reactors (3) (Same as Electrical Engineering 4455.) Electrical Engineering is the primary department.

4465 Introduction to Fusion Technology (3) (Same as Electrical Engineering 4465.) Electrical Engineering is the primary department.


4710 Energy Transport (4) Development of differential and integral energy conservation equations; conduction, convection, and radiation heat transfer; applications to nuclear reactor fuel elements and heat exchangers. Prereq: 3730, F.

4720 Reactor Thermal Design (4) Hydrodynamics and heat transfer in boiling systems; boiling crisis; fuel element thermal design, steam generator design. Prereq: 4710, W.

4730 Nuclear Reactor Design (3) First order reactor design, integration with non-nuclear heat transfer and power conversion system, economic evaluation; optimization procedures, description of typical systems. Coreq: 4130. Sp.


4820 Reactor Kinetics and Controls (3) Derivation of kinetic equations, basic kinetic parameters; transient response with feedback and feedforward control and protection systems. Prereq: 4110. F.

4840 Nuclear Reactor Safety (3) Presentation of reactor safety concepts and criteria; credible accidents; fission product release and transport; containment system; accident analysis; engineered safeguards. Prereq: 4120.

4930 Nuclear Fuel Management (3) Discussion of...
problems associated with processing of nuclear materials; fuel cycle analysis; burnup calculation. Prereq: 4120. 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

5110-20-30 Transport Processes in Nuclear Engineering (3, 3, 3) Momentum and heat transport; development of conservation equations; elementary theory of turbulence; heat transfer and flow through conduits; conduction; radiation; reactor core thermal analysis. Prereq: 4720 or equivalent, Mathematics 4710, 4850, F, W; Sp

5210 System Dynamics (3) Transient analysis, Laplace transforms, frequent response, stability (linear and non-linear), and sensitivity analysis by state variable methods. Dynamic analysis of distributed systems. Prereq: Consent of instructor. F

5220 Reactor System Dynamics (3) Application of methods of general system dynamics to reactor systems. Modeling of nonreactive and non-neutron nuclear processes. Dynamics, stability, power reactor and power reactor systems. Prereq: 5210, 4130 or equivalent. W


5310-20-30 Nuclear Systems Reliability (3, 3, 3) Systems reliability analysis as applied to nuclear systems. Qualitative and quantitative methods. Coreq: Statistics 3450. F; W; Sp

5315 Plasma Diagnostics I (3) (Same as Electrical Engineering 5315.) Electrical Engineering is the primary department.

5325 Plasma Diagnostics II (3) (Same as Electrical Engineering 5325.) Electrical Engineering is the primary department.

5335 Plasma Diagnostics Laboratory (3) (Same as Electrical Engineering 5335.) Electrical Engineering is the primary department.

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 economic viewpoints. Prereq: 4130 or equivalent.

5420 Reprocessing and Waste Disposal (3) Basic processes related to solvent extraction of nuclear fuel isotopes and advanced reactor fuels. Disposition of radionuclides: reprocessing, site selection and environmental effects. Prereq: 4130 or equivalent.

5710-20-30 Nuclear Design (3, 3, 3) Analytical techniques for nuclear aspect of nuclear reactor core design. Multigroup discrete ordinate theory, multigroup PN theory, integral transport theory, perturbation theory, and others. Generation of required multigroup constants formulated with available point data and Neutron treatment in slowing down region and gas kernel in thermal region. Prereq: 4130 or equivalent. F, W; Sp

5740 Reactor Shielding (3) Application of analytic solutions of Boltzmann transport equation to shield design problems. Source spectra, moment methods, numerical solutions, adjoint calculations, and invariant imbedding cases studied. Prereq: 4810. F


5815 Fundamentals of Fusion Physics and Engineering (3) (Same as Electrical Engineering 5815.) Nuclear Engineering is the primary department.

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. W

5825 Plasma Engineering (3) (Same as Electrical Engineering 5825.) Nuclear Engineering is the primary department.

5830 Fusion Technology (3) (Same as Electrical Engineering 5830.) Nuclear Engineering is the primary department.

5880 Nuclear Reactor Design (3) Engineering problems associated with fusion reactor design: vacuum and magnetics 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. Sp.


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 Alternative 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

6510 Nuclear Reactor Noise Analysis (3) Modern system theoretical methods for evaluating reactor performance descriptions from operating data. Prereq: 4610 and Electrical Engineering 5740 or equivalent.

6810 Plasma Engineering II (3) Continuation of 5820. Detailed modeling of plasma breakdown, start up, burn dynamics, heating and fueling, plasma wall interactions, disruptions, current drive, and stability and control. Prereq: 5820. F

6820 Fusion Reactor Design (3) Basic plasma performance requirements for fusion power systems; engineering and technological constraints and requirements; integration of physics, engineering, and technological factors to determine fusion reactor parameters. Prereq: 6810. W

6830 Special Topics in Fusion Engineering (3) Selected advanced topics in plasma engineering and fusion reactor engineering and technology. Different subject matter each quarter. May be repeated with consent of department. Prereq: 6820. Sp
College of Human Ecology

Nancy Belck, Dean
Jay Stauss, Associate Dean
Jane Savage, Associate Dean
Karl Weddle, Assistant Dean

Graduate studies in Human Ecology prepares the student for teaching, research and public service in colleges and universities or managerial positions in government, business and industry. Within the College of Human Ecology, the Master of Science degree is offered in Child and Family Studies, Home Economics, Interior Design, Food Science, Food Systems Administration, Nutrition, (including Public Health Nutrition), and Textiles and Apparel (see departmental sections for further information); the Doctor of Philosophy is offered with concentrations in Child Development, Family Studies, Food Science, Nutrition Science, and Textiles and Apparel. For additional information, contact Jay Stauss, Associate Dean, College of Human Ecology, The University of Tennessee, Knoxville, TN 37996-1900, Phone: (615) 974-6276.

Admission Requirements: A completed file for review includes a College of Human Ecology application, Graduate Record Examination (GRE) scores for the verbal and quantitative sections and completion of three Graduate School Rating forms by individuals who can attest to your potential for graduate education. Forms may be obtained from the Dean’s office. Interior Design students are required to submit a portfolio of their undergraduate or graduate work consisting of 15-20 slides which represent their best creative accomplishments from a studio experience. The M.S. in Home Economics requires an undergraduate degree in Home Economics.

Academic Common Market: The ACM is an interstate agreement among southern states for sharing academic programs. If you are a resident of one of the participating states and qualify for admission, you may enroll in certain programs on an in-state tuition basis. Potential students for the doctoral program in Human Ecology who are residents of Alabama, Arkansas, Kentucky, Louisiana, Mississippi, South Carolina, Virginia, or West Virginia are eligible. Students planning to enter the Master’s program in Food Systems Administration who are residents of Arkansas, Kentucky, South Carolina, and Kentucky; and students planning to enter Nutrition who are residents of Alabama, Arkansas, Georgia, Kentucky, South Carolina, and Virginia are also eligible for in-state tuition.

THE MASTER'S PROGRAM

The M.S. in Home Economics is a college-wide multi-disciplinary program. Thesis (45 hours) and non-thesis (51 hours) options are offered.

The program includes 6 hours in research methodology, 9-12 hours in program planning and implementation (Agricultural Extension, Home Economics Education, other areas of Education), 3 hours in the integrative nature of home economics, and 18 (thesis) to 30-33 (non-thesis) hours in home economics subject matter. At least one course is to be from each department in the College. A written and oral comprehensive examination is required in the non-thesis option. Other M.S. programs available: Child and Family Studies; Food Science; Food Systems Administration; Nutrition; (including Public Health Nutrition) Textiles and Apparel; and Interior Design (see Department of Instruction for details).

THE DOCTORAL PROGRAM

Graduate study leading to the Doctor of Philosophy Degree is available in the Departments of Child and Family Studies, Nutrition and Food Sciences, and Textiles, Merchandising and Design. A major challenge of the doctoral program in Human Ecology is to draw upon the basic research generated from the natural sciences, social sciences, humanities and the arts, to provide a holistic perspective that contributes to the ultimate aim of improving individual and family well being. For example, the physiological chemist may study metabolic-dietary interrelationships, and psychologists may study child behavior. But, it is within human ecology that the nutrient needs of the growing child are considered, along with the factors that affect the child’s acceptance of different foods. Within the College of Human Ecology, research from one discipline is enhanced by encompassing and utilizing the findings of research from other disciplines. The doctorate is a research degree granted only to individuals who demonstrate proficiency in conducting original research. Course requirements for the degree are determined by the student’s faculty committee, based upon College and departmental requirements and student needs and interests. The Graduate School sets minimum requirements for the doctoral degree (see pages 23-24) and the College has the following minimal requirements:

1. Selection of a concentration and fulfillment of the requirements as directed by the major professor and approved committee;
2. Minimum 117 quarter hours in courses beyond the baccalaureate degree (exclusive of Master’s thesis credits);
3. HES110 Professional Seminar in Human Ecology (4);
4. Minimum 15 quarter hours of 6000 level coursework (not including dissertation);
5. Successful completion of written comprehensive examinations as provided by each department’s procedures and the student’s doctoral committee;
6. Original research project, which culminates in a dissertation; maximum 42 quarter hours of dissertation credit may be applied to the degree;
7. Final oral examination in defense of the dissertation. The doctoral committee shall determine whether a reading knowledge of a foreign language is required.

THE PH.D. CONCENTRATIONS

Child Development or Family Studies: The doctoral program in Child and Family Studies prepares scholars in the fields of child development and family studies. The strength of this doctoral program is based on three major components: the integration of child development and family studies within the context of human ecology and related areas, specialization in child development or family studies, and an emphasis on
becoming proficient producers and consumers of research. A doctoral program that is concurrently specialized and integrative in nature reflects the complexity of the disciplinary subject matter, provides a broader context to formulate theoretical questions, and provides the empirical literature for addressing those questions.

Requirements are:
1. Minimum 19 credits in Child and Family Studies required for courses: 5410, 5510, 5210, 5450, 5550, 5910;
2. Minimum 15 credits in 5000- and 6000-level courses in Child Development or Family Studies, with at least 6 credits in 6000-level courses (in addition to the required courses described in #1);
3. Minimum 9 credits in a cognate area;
4. Minimum 12 credits in statistics, with at least 3 of these credits in advanced statistics;
5. Minimum 3 credits of specialized research methods;
6. Predoctoral research project approved by faculty;
7. Minimum 3 credits of college teaching methods;
8. Elective credits selected by the student in consultation with adviser.

Student Progress: Monitored by tenured faculty; reviews held at the end of the first year for full-time students—end of second year for part-time students. Comprehensive exam after completion of a minimum of 60 hours toward the approved program. See department guidelines on Evaluation Policy and Procedures.

Food Science or Nutrition Science: Students enrolled in the Food Science concentration specialize in either the physico-chemical or socio-cultural aspects of food in relation to people and their environment. Students are expected to develop strength in nutrition and other fields by taking courses in a collateral area. Food systems administration, food technology, education, and the natural and behavioral sciences are among the potential collateral areas.

The Nutrition Science concentration enables students to study the science of nutrition from the cellular level to the application of nutritional principles by people in a changing environment. Students are expected to acquire advanced training in food science, chemistry, biology, and other natural and behavioral sciences. The doctoral program emphasizes the human nutrition, experimental nutrition (small animals), and intermediary metabolism. Requirements for both concentrations are:
1. Twenty-four hours with major emphasis in food science or nutrition including 9 hours at the 6000-level, exclusive of dissertation and seminar;
2. NFS 5070, 5075, 5100, 5150 and 5155;
3. Minimum 4 hours of NFS 6900. Attendance at seminar is required for all full-time students.
4. Minimum 12 hours of statistics, computer science and research methods.
5. Minimum 9 hours in a cognate area.
6. Students who have not had college teaching experience are required to take C&I 5090 (Fall Quarter Seminar for GTA's) and NFS 5800 (3 hrs) for a college-supervised problem in college teaching.

Student Progress: It is the responsibility of the student's committee to monitor the progress of the doctoral student.

Textiles and Apparel: Students take one course in this concentration that provides a foundation for the integration of textiles and apparel, around the context of the near environment. A department research seminar is required which exposes students to research being conducted in the research programs in the department. Textiles and Apparel concentration requirements are:
1. Thirty-six hours in textiles and apparel, including 9 hours at the 6000-level, exclusive of dissertation;
2. T&A 5120 or 5250; 5170; 5180; 6110; 6520.
3. Minimum of 3 hours of T&A 6500 Research Seminar: Attendance at seminar is required for all full-time students.
4. Minimum 12 hours chosen from statistics, computer science and research methods.
5. Minimum 12 hours in a cognate area.

Departments of Instruction

Child and Family Studies

MAJORS

Child and Family Studies

DEGREES

M.S. in Human Ecology

Ph.D.

Professors:
G. L. Fox (Head), Ph.D. Michigan; N. Belch (Dean), Ph.D. Michigan State; L. L. Grumette, Ph.D. Michigan State; V. M. Nordquist, Ph.D. Tennessee; P. White, Ed.D. Tennessee.

Associate Professors:
J. H. McInnis, Ph.D. Florida State; G. Peterson, Ph.D. Brigham Young; J. Stalans (Associate Dean), Ph.D. Washington State; S. Twardosz, Ph.D. Kansas.

Assistant Professors:
J. Allen, Ph.D. Purdue; L. Bivin, Ph.D. Ohio State; C. Blueher, Ph.D. Minnesota; C. Catron, Ed.D. Vanderbilt; R. Halioitros, Ph.D. Ohio State; J. Kidwell, Ph.D. Purdue; G. Pettit, Ph.D. Indiana University; D. Tagano, Ph.D. Virginia Tech; J. G. Weddle, (Assistant to the Dean), Ph.D. Tennessee.

The Department of Child and Family Studies encompasses two primary concentrations: child development and family studies. Integration of these areas creates a unique perspective for the study of individuals and families. Each graduate student's program of study is carefully planned in consultation with a faculty committee to establish a program consistent with the individual goals of the student. All programs are characterized by a broad array of coursework, varied research experiences, and opportunities for experiences in applied settings. Students at the doctoral level receive substantial preparation in statistics and research methodology. Interested students should contact the Department Head.

Admission Requirements: Admission to the program is contingent upon faculty evaluation of the student's graduate GPA, rating forms, and work experience.

THE MASTER'S PROGRAM

An individual program of study may be designed by the student in collaboration with his or her major professor and committee. The program may have a concentration in one or both of the following areas:

child/human development

frontier research relationships.

All students, regardless of individual emphasis should follow these guidelines: 1. One theories course in the major concentration of child, or family (i.e., 5210 or 5410). At least one graduate course in each of the two concentrations in child/human development, family development/relationships. 3. At least one-hour of credit from the research seminar, CFS 5910.

Non-thesis students have these requirements in addition to 1-3 above: 4. At least one course in interpretation of statistics and methodology such as Education Psych 5210 or 5220. 5. A comprehensive written examination. 6. At least 45 credit hours required for the M.S., 24 hours must be in the major field with 18 of these at the 5000 and 6000 level, a minimum of 30 hours must be at the 5000 and 6000 level. 7. At least 9 hours in one minor area or at least 9 hours in a collateral area.

Thesis students have these requirements in addition to 1-3 above: 4. At least one course in statistics such as Stat. 5211, or 5050. 5. At least one course in methodology such as CFS 5530. 6. Completion of an acceptable thesis and oral examination. 7. Of the 45 credit hours required for the M.S., 9 hours are required for the thesis, a minimum of 30 hours must be at the 5000 and 6000 levels; 18 hours must be in the major concentration with 9 of these at the 5000 and 6000 level. 8. At least 9 hours in one minor area or at least 9 hours in a collateral area.

Students seeking the M.S. degree in Child and Family Studies are required to file a plan of study with the Department Head after 15 hours of graduate credit have been completed.

4290 Adult Development and Aging (3) Adult life in our society. Adjustment to internal and environmental changes through middle and aged years. Prereq: 2110 or Home Economics 1510 or equivalent background in adult development or consent of instructor.

4300 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. W

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: 2210 or Home Economics 1510 or consent of instructor. W

4430 Family Interaction (3) Dynamics of family interaction at different points in the life cycle. Includes dynamics of parent-child relationships and marital dyad, with family and as family interacts within community: formal and informal support systems within community. Prereq: 3518.

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 and implementation of programs for infants and young children, nursery school programs, and special education programs for deprived preschool children. Prereq: 3350 or 4110.

4710 Contemporary Developments (1-3) Student or staff-initiated course for study of special topic(s) pertinent to the academic year to be determined by students and instructor with departmental approval. Elective credit only. Prereq: Consent of instructor.
110 Advanced Special Topics in Child Development (3) Advanced study of research and theory related to current issues in child development. Variable topics. Prereq: 12 graduate hrs in child and family studies or consent of instructor. May be repeated. Maximum 6 hrs.

120 Advanced Special Topics in Family Studies (3) Advanced study of research and theory related to current issues in family studies. Variable topics. Prereq: 12 graduate hrs in child and family studies or consent of instructor. May be repeated. Maximum 6 hrs.

250 Advanced Independent Study in Child Development (1-3) Individual study of research and theory in specific area of child development. Prereq: 12 graduate hrs in child and family studies or consent of instructor. May be repeated. Maximum 6 hrs.

260 Advanced Independent Study in Family Studies (1-3) Individual study of research and theory in specific area of family studies. Prereq: 12 graduate hrs in child and family studies or consent of instructor. May be repeated. Maximum 6 hrs.

625 Seminar in Programs for Infants and Preschool 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.

6500 Thesis (1-15) P/NP only. E

6502 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.

6600 Practicum (1-12) Field experience in selected agencies and organizations that focus on solutions to problems in family studies. Prereq: Consent of instructor. S/NC only.

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.

5160 Assessment of Family Behavior (3) Methods of measurement related to study of family. Current methodological issues. Prereq: 5410 or 5530 or consent of instructor.

5210 Theories of Human Development (3) Prereq: 4350 or equivalent. W

5220 Family Life Programs (3) School and community programs in family life; survey and evaluation; students 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. Classes concentrate on types 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.

5320 Individual and Family Development: Cognition (3) Processes through which humans learn to recognize their world. Cognitive processes involved in development across life span. Prereq: 5510 or equivalent or consent of instructor.

5330 Individual and Family Development: Socialization (3) Processes of socialization throughout the life span. Family as primary socializing agent. Prereq: 5510 or equivalent or consent of instructor.

5410 Survey of Research in Family Studies (3) Problems in modern family life: individual adjustments, group relationships. Prereq: 3515, 4430, or consent of instructor.

5420 Naturalistic Interventions for Parents and Teachers of Young Children (3) Common problems of young children faced by parents and teachers; emphasis on methods available to modify problem behavior. Prereq: 5610 or equivalent or consent of instructor.

5430 Families in Crisis (3) Interpersonal transactions in disordered family behavior. Prereq: 5410 or equivalent. W

5440 Parent-Child Relationships (3) Major theoretical and research issues of parent-child socialization; influence of kinds of roles of parents on children, reciprocal interaction between parents and children, applications of systems models, child abuse, and divorce on children. Prereq: 5410 or equivalent or consent of instructor.

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. Sp

5460 Marital Dyad (3) Theory and research related to quality of marital relationships: communication, power, marital satisfaction. Prereq: 5410 or equivalent or consent of instructor.

5510 Survey of Research in Human Development (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; methodology of behavioral sciences. Recommended as a companion to the beginning thesis work in this area. 9 hrs child and family studies, 3 hrs. lectures and 1 hr. discussion.

5540 Program Models in Early Childhood Education (3) Description, analysis, and evaluation of various preschool program models. Prereq: 5520 or equivalent or consent of instructor.

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 evaluation techniques. Prereq: 5540. 3 hrs and 1-2 hr lab.

5560 Assessment of Development and Learning in Young Children (3) Procedures for formal and informal assessment of development and learning; properties of young, non-handicapped and handicapped children. Critical issues in assessment and evaluation of appropriateness of procedures, and interpretation of results for curriculum implementation. Some supervised assessment. Prereq: 5510 or equivalent or consent of instructor.

5610 Theories of Management in the Family Environment (3) Fundamental management concepts, development and application to current family situations.

5640 Teaching Child and Family Studies (5) Seminar and practicum in techniques for teaching child development and family relationships. Prereq: Consent of instructor. W only.

5650 Organizational Principles for Caregiving/Teaching Environments (3) Selection of appropriate problem-solving strategies, scheduling of daily routines, assignment of staff responsibilities, staff evaluation and feedback, arrangement of physical environment and selection of play materials. Day care centers, classrooms, residential facilities for retarded, and homes for elderly. Organization to prevent and remediate group problems and facilitate program implementation. Prereq: Consent of instructor. Sp

5700 Special Topics in Child Development (3) Research and research concerning normative and nonnormative development during preschool years of life; cognitive, emotional, social and physical aspects. Prereq: 5510 or equivalent or consent of instructor.

5730 Advanced Study in Infant Development (3) Theory and research concerning normative and nonnormative development during the first two years of life; cognitive, emotional, social and physical aspects. Prereq: 5510 or equivalent or consent of instructor.

5740 Advanced Study in Early Childhood Development (3) Theory and research concerning normative and nonnormative development during preschool years of life; cognitive, emotional, social and physical aspects. Prereq: 5510 or equivalent or consent of instructor.

5750 Advanced Study in Adolescent Development (3) Theory and research concerning normative and nonnormative adolescent development; physical, cognitive, moral, social, familial, sexual, and personality. Prereq: 4350 or equivalent or consent of instructor.

5800 Special Topics in Family Studies (3) Research and theory related to current issues in family studies. Variable topics. Prereq: 8 graduate hrs in child and family studies or consent of instructor. May be repeated. Maximum 9 hrs.

5810 Independent Study in Family Studies (3-15) Individual study of specific topics in family studies. Prereq: 6 graduate hrs in child and family studies or consent of instructor. May be repeated. Maximum 6 hrs.
6310 Advanced Topics (3) Comprehensive individual and group discussion of individual and family behavior, physiological development and well being, environmental factors, and economic and social well being. Prereq: 6110. May be repeated.

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 Technological and Adult Education. The department offers the M.S., Ed.S., and Ed.D., degree programs with a concentration in home economics education. Inquiries may be addressed to Home Economics Education, Jessie Harris Building. (See pages 67-69 for staff, program descriptions, and course offerings).

**Nutrition and Food Sciences**

**MAJORS**
- Food Science
- Nutrition
- Food Systems Administration

**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. P. Penfield, Ph.D. Tennessee; J. R. Savage (Associate Dean), Ph.D. Wisconsin; J. T. Smith, Ph.D. Missouri; M. A. Smith (Memphis), Ph.D. Tennessee.

**Associate Professors:**
- F. E. Andrews, Ph.D. Ohio State; G. W. Disney, Ph.D. Tennessee; N. L. Marable, Ph.D. Massachusetts; D. S. Sachan, Ph.D. Illinois;
- M. N. Traylor, M.P.H. California (Berkeley).

**Assistant Professors:**
- J. B. Britts (Memphis), Ph.D. Tennessee;
- M. D. Brooks (Memphis), M.S. Alabama;
- M. R. Evans, Ed.D. Tennessee; B. Haughton, Ed.D. Columbia;
- P. Redlinger, Ph.D. Kansas State;
- J. D. Skinner, Ph.D. Oregon State.

In the Department of Nutrition and Food Sciences, Master of Science programs are available in Nutrition, Food Science, and Food Systems Administration. Within the Nutrition program, a student may choose to study nutrition science or public health nutrition.

**Admission Requirements:** Admission to the Nutrition and Food Sciences programs is dependent on completion of undergraduate coursework in nutrition, food science, mathematics, economics, human physiology, microbiology, chemistry, biochemistry, and analytical chemistry. For Food Systems Administration, undergraduate coursework in quantity food production and food service system administration is required.

**The Master's Program**

In nutrition students studying nutrition science may choose a thesis or a non-thesis option. Students emphasizing public health nutrition must choose the non-thesis option. Students in the Food Science or Food Systems Administration programs may select either the thesis or non-thesis option.

**Thesis Option:** The program will consist of a minimum of 45 hours with at least 24 hours of coursework in the department. Nine hours of thesis are required and may be applied toward the 45 hours. Nine hours outside the department are recommended. A minimum 30 hours at the 5000 and 6000 level is required.

An oral examination over the thesis and coursework is given at the end of the program.

**Non-Thesis Option:** The program will consist of a minimum of 45 hours with at least 30 hours of coursework in the department. Nine hours in one area outside the department are required. A minimum of 30 at the 5000 and 6000 level is required.

A written comprehensive examination is given at the end of the program.

Students studying public health nutrition are required to complete one quarter of supervised field experience in a health agency.

**4200 Introduction to 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.

**4500 Food Preservation** (3) Application of basic principles and research findings to food preservation in home. Prereq: 3015 and 4 hrs microbiology. 2 hrs and 1 lab.

**4130 Nutrition in Disease** (4) Nutrition problems in diseases influenced by diet. Prereq: 3160. W, Su

**4140 Nutrition in Disease II** (3) Interdisciplinary lectures and discussions on the metabolic processes of normal and diseased organs and/or tissues and the dietary or behavior modifications required. Prereq: 4130. Designed for senior students in the coordinated undergraduate program in dietetics.

**4150 Community Nutrition** (3) Nutrition problems and services in the community; supervised field experiences. Prereq: 3120 or 3160.

**4180 Environmental Effects on Nutrition** (3) Effect of natural and synthetic food toxins, drugs both social and therapeutic, and extreme environmental conditions upon nutrient availability, utilization, and requirements of humans. Prereq: 6 hrs natural science.

**4190 Diet and Drug Therapy** (3) Effect of drug therapy on absorption and utilization of nutrients, and effect of diet on absorption, utilization, and toxicity of drugs. Prereq: 3160 or consent of instructor. W

**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 systems for decision making in hotel-motel complex; computer application in hospitality industry. Prereq: 3220, Accounting 2130; Computer Science 1410; Marketing 3120, a statistics course, Sp, Su.

**4340 Food Systems Personnel Development** (3) Development of training programs and personnel management policies for food service personnel. Prereq: 3120. W

**4250 Food Systems Managerial Cost Control** (3) Cost analysis for food and beverage operations; use of financial statements for decision making in food service systems. Prereq: 3220, a statistics course, Accounting 2110, Economics 2520. W

**4260 Food and Lodging Physical Plant and Maintenance** (4) Fundamentals of mechanical systems and building components of food and lodging physical plant; organization and principles of personnel management. Prereq: 3220, 4210, Accounting 2130, Computer Science 1410, Marketing 3120, a statistics course. 3 hrs and 1 lab. W

**5000 Thesis (1-15)** P/N/P 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 completed. May be repeated. S/NC only. E

**5100 Food Texture** (3) Classification of foods according to textural parameters; instrumentation in evaluation of texture. Prereq: 4010 or Food Technology 4920; Plant and Soil Science 3610 or equivalent; or consent of instructor. F

**5200 Food Sensory Testing Methods** (3) Principles and methodology of sensory evaluation of food; application of methods; analysis of sensory data. Prereq: 4020 or equivalent. Su

**5300 Advanced Experimental Food Science** (3) Application of research methods to individual problems. Prereq: 5010-20 or consent of instructor. Sp

**5400 Food Behavior of the Individual** (3) Development of and changes in choices from food and food habits of individual. Prereq: 4000, 3 hrs of nutrition, or consent of instructor. Sp or Su

**5500 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, Sp

**5605 Hydrocolloids, Pigments, and Structural Polysaccharides in Relation to Food Science** (3) Physical and chemical characteristics; behavior in food. Prereq: 4010, 3140-50 or equivalent. W

**5700 Sugars, Starches, and Lipids in Relation to Food Science** (3) Physical and chemical characteristics; behavior in food. Prereq: 4010, 3140-50 or equivalent. W

**5705 Proteins in Relation to Food Science** (3) Physical and chemical characteristics; behavior in food. Prereq: 4010, 3140-50 or equivalent. W

**5710 Advanced Physiological Chemistry I** (4) Bioenergetics and related metabolism of nutrients. Prereq: 3140 or equivalent. F

**5715 Advanced Physiological Chemistry II** (3) Nutritional factors in relation to body fluids, gas transport, and endocrine function. Prereq: 3140. W

**5710 Community Nutrition** (3) Nutrition problems and practices in community; supervised field work. Prereq: 3160 and consent of instructor. 3 labs. F

**5715 Community Nutrition** (2) Observations and participation in nutrition programs of local and state agencies. Prereq: 5116 and consent of instructor. 3 labs. W

**5720 Community Nutrition** (3) Nutrition programs of state and federal agencies; preparation of material for nutrition education; supervised field work. Prereq: Consent of instructor. 3 labs. Su

**5725 Field Study in Community Nutrition** (1-12) Personal participation in and evaluation of projects or regional and state activities. Prereq: 5116 or consent of instructor. S/N/C only. Sp

**5730 Mental Retardation or Other Developmental Disorders of Childhood** (1-12) Interdisciplinary diagnosis and treatment of developmentally-handicapped child. Role of nutritionist; clinical experience and lectures at Child Development Center, Center for the Health Sciences, Memphis. Prereq: Consent of department head. F, W, Sp

**5735 Nutrition in Mental Retardation and Developmental Disorders** (1-12) Interdisciplinary diagnosis and treatment of developmentally-handicapped child. Role of nutritionist; clinical experience and lectures at Child Development Center, Center for the Health Sciences, Memphis. Prereq: Consent of department head. F, W, Sp

**5740 Experimental Methods in Nutrition** (3) Use of small animals in experimental nutrition. Prereq: 3140-50-60, 3410. 2 hrs and 1 lab. F

**5745 Human Metabolic Research** (3) Basic principles of planning, conducting, and interpreting human
metabolic studies. Prereq: 3150 and 6 hrs 5000-level nutrition courses. 2 hrs and 1 lab.


5160 Physiological Bases for Diets in Disease (3) Developments in dietary treatment of disease in which nutrition plays a major role. Prereq: 4130 or equivalent. Su


5170 Survey Methods in Human Nutrition (3) Food consumption, food practices and nutritional status of population groups. Prereq: 5150-55. 2 hrs and 1 lab. F, W

5175 World Food Supply and Human Nutrition (3) Food supplies and food practices as related to human nutrition throughout world. Regional, national and international agencies concerned with food and nutrition problems. Prereq: 5150 or consent of instructor. Su

5180 Nutrition and Aging (3) Nutritional problems of aging individual, nutritional requirements, dietary intakes, and effect of nutrition on rate of biological aging. Prereq: Consent of instructor. W

5185 Adolescent Nutrition (3) Application of nutrition principles and theories to factors that influence the nutritional status of adolescents during their growth and development. Prereq: 5130 or consent of instructor. W, Su

5200-20 Experimental Quantity Food Study (2, 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, Su

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. W


5270 Administration of Food Service Delivery System (3) Principles and practices of management of administrators in maintaining desired qualitative and quantitative standards in food service delivery system. Prereq: 3250 or consent of instructor. W, A

5280 Human Resource Planning and Development for Food Service Industry (3) Identification of human resource needs; program planning and evaluation for personnel in food service industry. Prereq: 4240, 5230, or consent of instructor. Sp

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: Nutrition 4760 or consent of instructor. Sp

5340 Foods and Nutrition: Physiological Principles (3) Thermodynamics; physicochemical properties of proteins, carbohydrates and lipids; chemistry of colloidal state of practical foods; specialized kinetics of enzymatic processes. Prereq: 3140 or equivalent. Sp, A

5360 Instrumental Methods in Research (3) Theory and application of instrumentation for analysis of food and biological materials. Prereq: 3150, 2 hrs and 1 lab. F

5380 Field Experience (3-9) Experience in food-related industry or agency under supervision of faculty member. Prereq: Consent of instructor.

5700 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.

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/NC only. E

6100 Food Dispersions (3) Physical characteristics of solutions, colloidal dispersions, and suspensions in relation to treatments applied. Prereq: 5040 or 5050. Consent of instructor. F, W

6110 Proteins and Amino Acids (3) Lectures, reports, and discussions. Prereq: 5150-55. 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. A

6140 Vitamin Metabolism (3) Lectures, reports, and discussions. Prereq: 5150-55. A

6310 Advanced Topics (3) Comprehensive individual study and group discussion of topics related to current problems in nutrition and food sciences. Prereq: Consent of instructor. May be repeated.

6900 Seminar (1) May be repeated. S/NC only. E

Textiles, Merchandising and Design

<table>
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<tr>
<th>MAJORS</th>
<th>DEGREES</th>
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<tbody>
<tr>
<td>Textiles and Apparel</td>
<td>M.S.</td>
</tr>
<tr>
<td>Interior Design</td>
<td>Ph.D.</td>
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Professors:
- J. G. DeJonge (Head), Ph.D. Iowa State;
- J. D. Blake, Ph.D. Florida State; A. J. DeLong, Ph.D. Pennsylvania State; M. F. Drake, Ph.D. Pennsylvania State; K. E. Duckett; Ph.D. Tennessee

Associate Professors:

Assistant Professors:
- J. L. Crouse, Ph.D. North Carolina State;
- J. B. Hassey, Ph.D. Ohio State; B. A. Oliver, Ph.D. Florida State; J. H. Rabun, Ph.D. Tennessee

Interior Design

The department of Textiles, Merchandising and Design offers a Masters Degree in Interior Design. Students are expected to have a good foundation in this area to enter the program. The program of study will prepare students for careers with interior design or architectural firms, public and private agencies, and educational institutions. Interested students should contact the Department Head for more information.

The MASTER'S PROGRAM

**Thesis Option:**

<table>
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<tr>
<th>Thesis</th>
<th>Hours</th>
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<tr>
<td>Minor (minimum of 9 hours of 5000 courses)</td>
<td>18 hrs</td>
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**Total:**

- Minor is chosen in an area other than Human Ecology with the approval of the major professor.

ACQUISITIONS AND EXHIBITIONS

Prospective graduate students pursing a degree in advanced interior design should submit a portfolio of their 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 problems; housing regulations and restrictions; site selection and neighborhood development; financing procedures. Prereq: 6 hrs from Economics 2110-20-30. Sp

4450-51 Advanced Interior Design (6, 6) Intensive interior design experiences: complex design problems utilizing systematic design methodology. Project types: multi-family housing, commercial and institutional environments, or complex working environments. Assistance and critiques from area professionals. Prereq: 4520 for 4450. Courses taken in sequence or consent of instructor.

4460 The Consumer and the Market (3) Analysis of consumer decision-making and problems in the marketplace. Consumer issues and policies with emphasis on consumer choice; the role of information, consumer protection and current issues. Prereq: Econ 2510 and 2520.

4791 History of Contemporary Interior Architecture (4) Furniture; design and design philosophies of Europe and America in relation to art and the period. Consumer decision-making and problems in the market. Consumer issues and policies with emphasis on consumer choice; the role of information, consumer protection and current issues. Prereq: Econ 2510 and 2520.


4940 Proxemics (4) Definition of proxemic variables. Recording and analysis of proxemic behavior using unobtrusive methods of observation, still photographs, scale-model environments and interview techniques. Observation and methods of bias reduction. Members of seminar required to design, conduct and present original proxemic research. Prereq: 2000 or consent of instructor. (Same as Architecture 4940.)

4950 Environment as Code (4) Theoretical issues involving consideration of environment as a medium of human communication. Codes and nature of coding behavior in animals and humans. Relationships between coding behavior and organization of the central nervous system. Coding and social behavior. Communication process as a generic model of human-environment relations in the study of environments of biocommunications. Prereq: 4900 or consent of instructor. (Same as Architecture 4950.)

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

5020 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise required. Must be taken during any quarter such that 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

5050 Advanced Interior Design (4) Integrative focus for students considering professional living variety of research and design methods. Prereq: Consent of instructor.

5060 Practicum (1-12) Field experience in selected agencies, organizations or firms that focus on solutions to problems in interior design. Prereq: 12 hrs graduate level interior design or consent of instructor.

5120 Historic Interior Design (3) Research studies of historic interior design: interior design, decorative arts of selected periods, historic areas of Europe or Orient. Variable topics. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.
5130 History of American Interior Design (3) Research studies of philosophical and stylistic movements with focus on America of seventeenth, eighteenth, or nineteenth centuries. Prereq: 4792 or consent of instructor. May be repeated. Maximum 9 hrs.

5140 Advanced Research in Historic Preservation (3) Evaluation and application of research methodology to historic preservation problems in interior design. Prereq: Consent of instructor.


5210 Furniture Design (3) Analysis of human factors data in design of body support, task support, and storage furniture pieces and systems; production of construction drawings and scale models. Prereq: 4440 or consent of instructor.

5220-30 Advanced Interior Design Studio (4,4) Investigation of interior design problems at macro level. Systematic design methodology and design research methods as part of design problem-solving experience. Prereq: Consent of instructor.

5410 Seminar in Design (3) Intensive reading, discussion and critical evaluation of twentieth century design concepts and perpectives. Prereq: 4791 or equivalent.

5420 Advanced Topics in Interior Design (3) Independent study discussion on current specialized topics: interior design, history of design or historic preservation. Variable topics. Prereq: 9 hrs. in interior design. May be repeated. Maximum 9 hrs.

5510 Environmental Factors in Interior Design (3) Human factors and associated research techniques related to design of interior architectural environments—deviation of design implications from anatomy, physiology, anthropology, and behavioral sciences. Prereq: 6 hrs behavioral science, and 6 hrs natural science or consent of instructor.

5520 Environmental Factors in Interior Design (3) Systematic design methodology as applied to design of microenvironments using human factors information. Prereq: 6 hrs behavioral science, and 6 hrs natural science or consent of instructor.

5530 Environmental Factors in Interior Design (3) Human factors and systematic design methodology applied to analysis, synthesis, and evaluation of research-oriented interior design projects. Comprehensive design research project by 2- or 3-member teams. Prereq: 6 hrs behavioral science, and 6 hrs natural science or consent of instructor.

5535 Environmental Design Research (1-3) Evaluation and application of research methodologies to interior design problems. Hours and credit arranged. Prereq: 5510-20-30 or equivalent and consent of department head and instructor. May be repeated. Maximum 9 hrs.

5810 Problems in Historic Design Studies (1-3) Advanced research in area of historic stylistic movements of interior design within cultural context. Prereq: 5130 or consent of instructor. May be repeated. Maximum 9 hrs.

5820 Problems in Interior Design (1-3) Advanced research in area of interior design. Prereq: 6 hrs graduate level interior design or consent of instructor. May be repeated. Maximum 9 hrs.

5830 Problems in Theory of Historic Preservation (1-3) Special topics in historic preservation. Prereq: 4792 or consent of instructor. May be repeated. Maximum 9 hrs. E

5910-20-30 Seminar (1-4, 1-4, 1-4) Hours and credit arranged. Prereq: Consent of instructor.

6000 Doctoral Research and Dissertation (3-15) Ph.D. only.

6420 Perspectives in Interior Design (3) Historical influences of and contemporary concepts in interior design. Prereq: 6404, 6 hrs of graduate level art history, or consent of instructor.

6430 Reading and Research in Interior Design (3) Investigations of methodological approaches appropriate to interior design. Prereq: 9 hrs. in graduate level interior design or consent of instructor. May be repeated. Maximum 18 hrs.

6500 Research Seminar (1-3) Required 1 hr for M.S. students, 3 hrs for Ph.D. students. S/NC only.

6510 Environmental Factors I: Theory, Design Decisions and Human Requirements (3) Systems-oriented theoretical approach to models and conceptual design, conduct and results of research in variety of fields. Research as it impacts design process and decision-making and communication model for guiding research in textiles, apparel and interior design. Prereq: 18 hrs of graduate credit.

6520 Environmental Factors II: Integrated Design Processes and Marketing Decisions (3) Systems-oriented approach to studio involving multidisciplinary points of view and inputs. Systems approach to composition of seminar: design disciplines as well as social and behavioral sciences. Moderate scale design problems of commercial nature requiring data from several disciplines: retailing, business, hotel management. Prereq: Consent of instructor.

Textiles and Apparel

The Department of Textiles, Merchandising, and Design offers the Master’s degree with concentrations in Textiles and Apparel. Students are expected to have a good foundation in one of these areas to enter the program. The program of study will prepare students for careers in industry, business, public and private agencies, and educational institutions. Interested students should contact the Department Head for more information.

THE MASTER’S PROGRAM

Thesis Option:
Major (minimum of 9 hours of 5000 courses) 18 hrs
Thesis
Minor (minimum of 12 hours of 5000 courses) 18 hrs

TOTAL 45 hrs

Required courses are 5160, 5170, 5180, and 5250. A minor is chosen in an area other than Home Economics with the approval of the major professor.

An oral examination is required.

4210 Elementary Textile Microscopy (3) Microscopic techniques are applied to the study of textile fibers and fabrics. Prereq: 4010. 1 hr and 2 labs. W, A


4410 Apparel Production Management (3) Management perspectives of apparel production industry: production planning, process, and management of human resources. Prereq: 4010 and 2 labs. W, A

4460 The Consumer and the Market (3) Analysis of consumer decision-making and problems in the marketplace. Consumer issues and policies with emphasis on consumer choice, information, consumer protection and current issues. Prereq: 4410 and 4460. S/NC only.

4520 Principles of Retail Management (3) Analysis of retail sector of economy from management perspective. Approaches to decision-making in retail operations, promotion, pricing, inventory control, product mix strategy. Prereq: Marketing 3110, 3120 or equivalent. F, W, Sp

5000 Thesis (1-15) S/NC 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 Textiles Testing and Methods of Research in Textiles (3) Physical and chemical testing. Research methods. 3 labs. Sp

5120 Advanced Problems in Textiles and Clothing (3) Refresher course; new developments in textiles. Selecting fabrics, agencies aiding consumer, and methods in textile field. 3 hrs and 3 labs. Sp

5150 Principles of Design Assignment (3) Application of flat pattern theory to garment design incorporating relationships of fabric geometry, texture, hand, and structure in garment design. Prereq: Consent of instructor. 1 hr and 2 labs. W

5170 Socio-Psychological Aspects of Clothing (3) Clothing as it relates to human behavior. Prereq: 6 hrs or equivalent from sociology and psychology. W

5180 Advanced Textile and Apparel Economics (3) Economic problems of current importance in textile and apparel industries, production, consumption, and governmental policy. Prereq: 6 hrs economics or consent of instructor. Sp

5220 Historic Textiles (3) Development of textile industry in world, fibers used, design, and color. F

5240 Practicum (1-9) Off-campus experience with business, industry, governmental agencies and civic groups; preplanned; supervised; apparel, historic, merchandising, textiles. Prereq: 12 hrs graduate coursework in topic area, consent of major advisor and department head. May be repeated. Maximum 9 hrs. S/NC only. E

5250-60-70 Problems in Textile Chemistry (4, 4, 4) Theoretical and experimental study of chemistry of textile fibers including polymerization, reactions, dyeing and finishing. 5250 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 finishes. 5270—Emphasis on dyeing. Prereq: 1 qtr organic chemistry. 3 labs. Sp

5310 Fashion Analysis (2) Fashion as social and economic force, evolutionary theories of fashion operation. Prereq: 6 hrs each of sociology and economics.

5321-22-23 Problems in Historic Costume (3, 3, 3) Variable flow of styles in relation to cultural developments. 5321—European; 5322—American; 5323—International. Prereq: 3480 or consent of instructor. F, W, Sp

5410 Consumer Economics (3) Economic framework for evaluating consumer behavior and analyzing consumer issues, using economic models of consumer choice; consumer preference, consumption and demand models. Prereq: 6 hrs of economics or consent of instructor.

5420 Governmental Regulation and Protection (3) Laws, rules, and regulations which affect business and industry. Product and performance standards in consumer protection and protection of textile and apparel interests. Prereq: 4460 or consent of instructor.

5510 Retail Management Information Systems (3) Approaches to acquisition and management of information for retail decision making, retail information system design and implementation, and use by retailers in management decision-making, forecasting, purchase order management, credit management, gross margin, selling, and return analysis. Computer based systems. Prereq: 4520. W
5520 Retailing Strategy and Decision-making (3) Development of analytical decision-making skills utilizing team case format. Strategy design in selected retail operational areas; issues pertaining to long-range comprehensive planning of company mission and objective. Prereq: 4520 and 5510 or equivalent. Sp

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 Topics in Textiles and Apparel (1-3) Lecture, group discussion, individual research and study on specialized topics: apparel production management, functional design, handicapped/elderly, new process finishing, preservation, thermal, toxicity. Prereq: 9 hrs textiles/apparel graduate coursework. May be repeated. Maximum 9 hrs. E

5800 Problems in Textiles and Apparel (1-3) Advanced individual study selected from field of textiles and apparel: apparel, American, European, and international historic textiles, merchandising, textiles. Prereq: 9 hrs textiles/apparel graduate coursework. May be repeated. Maximum 9 hrs. E

5900 Seminar in Textiles and Clothing (1-3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

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

6010 Advanced Studies in Textiles and Apparel (3) Independent analysis of major philosophies, theories, methods, and research: apparel, historic, merchandising, textiles. Prereq: 9 hrs graduate coursework, 5160, or consent of instructor. May be repeated. Maximum 6 hrs. E

6110 Selected Issues in Textiles and Apparel (3) Lecture, group discussion, individual research on advanced topics and research areas of current significance: future directions, professional issues, theoretical approaches. Prereq: 9 hrs graduate coursework. May be repeated. Maximum 9 hrs. E

6150 Social-Psychological Theories of Clothing Consumption (3) Analysis and evaluation of social science theories of consumer behavior in relation to apparel and textiles. Prereq: 8 hrs graduate level sociology or psychology and 5170 or equivalent, or consent of instructor. Sp

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 (3) Fundamentals of yarns and fabric structures; relationship of structure to physical characteristics of textile materials. Prereq: 5120, or consent of instructor.
**Aviation Systems**

**MAJOR**

Lead Professor: R. D. Kimberlin, M.S., Tennessee.

Professors:
- F. G. Collins, Ph.D., California (Berkeley); W. Frost, Ph.D., Washington; A. A. Mason, Ph.D., Tennessee; J. M. Wu, Ph.D., California Institute of Technology; R. L. Young, Ph.D., Northwestern.

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.

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 aerodynamic fundamentals, aircraft propulsion and performance, a background in accounting and a basic knowledge of economics.

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, 5710, and 5720; for the administration area, in 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 in 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.

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

**5900 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.**

**5210-20 Experimental Flight Mechanics (3, 3) Flight mechanics, experimental techniques. Specially-equipped airborne laboratory allows active student participation in series of experiments demonstrating acquisition of flight test data. Tests conducted covering broad range of aircraft performance, stability, and control characteristics. Development of theory necessary to support class experiments, test techniques, instrumentation and data reduction methods. 5210 emphasizes performance; 5220 emphasizes stability and control. Prereq: Aerospace Engineering 4120.**

**5970 Special Topics in Aviation Systems (3) Current problems in aviation systems. Prereq: Consent of instructor. May be repeated with consent. See also course descriptions for Aerospace Engineering 5810, 5820, and Industrial Engineering 5840.**

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**Comparative and Experimental Medicine**

**MAJOR**

**DEGREE**

Lead Professor: R. D. Kimberlin, M.S., Tennessee.

Professors:
- W. G. Collins, Ph.D., California (Berkeley); R. L. Young, Ph.D., Northwestern.

Graduate courses are open to approved graduate students seeking training in this area and are especially useful for individuals with professional degrees. For the student with an undergraduate biological science background, the Comparative and Experimental Medicine program provides an unusual opportunity to study disease processes common in humans and animals from a multidisciplinary perspective. The scope of this intercollegiate program, which pools faculty resources from both veterinary and human medicine, is broadened by faculty members representing animal science and numerous areas of the life sciences. The interdisciplinary training environment includes such diverse support as facilities and personnel at the Veterinary Teaching Hospital, the Oak Ridge National Laboratory, Knoxville Zoological Park, Hemophilic Clinic, Birth Defect Clinic, Aberrant Metabolism Laboratory, and Hematology and Oncology services.

For specific course listings please see College of Veterinary Medicine, page 36 and College of Medicine—Knoxville Unit, page 186 in this catalog.

**ADMISSION REQUIREMENTS**

**General Requirements:** Admission requirements of The Graduate School of UTK are

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**Comparative and Experimental Medicine**

**MAJOR**

**DEGREES**

Joint Graduate Coordinating Committee: H. Kitchen (Chairperson), J. E. Fuhr, R. A. Griesemer; J. E. Lawler; R. L. Michel.

The Comparative and Experimental Medicine degree program (M.S. and Ph.D.) is a jointly administered graduate program intended to prepare students for teaching and/or research careers in the health sciences. This program emphasizes the comparative approach to the study of pathology, immunopathology, aberrant metabolism, oncology, and genetic disorders. The Ph.D. program is open to approved graduate students seeking training in this area and is especially useful for individuals with professional degrees. For the student with an undergraduate biological science background, the Comparative and Experimental Medicine program provides an unusual opportunity to study disease processes common in humans and animals from a multidisciplinary perspective. The scope of this intercollegiate program, which pools faculty resources from both veterinary and human medicine, is broadened by faculty members representing animal science and numerous areas of the life sciences. The interdisciplinary training environment includes such diverse support as facilities and personnel at the Veterinary Teaching Hospital, the Oak Ridge National Laboratory, Knoxville Zoological Park, Hemophilic Clinic, Birth Defect Clinic, Aberrant Metabolism Laboratory, and Hematology and Oncology services.

For specific course listings please see College of Veterinary Medicine, page 36 and College of Medicine—Knoxville Unit, page 186 in this catalog.

**ADMISSION REQUIREMENTS**

**General Requirements:** Admission requirements of The Graduate School of UTK are...
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 course work including chemistry through organic, mathematics through calculus, one year of physics, one year of basic biology plus an additional half-year of more advanced study in the field of biology including courses such as biochemistry, mammalian anatomy, histology, cell biology, or others that are appropriate for individuals aspiring to research careers in biomedical science.

Applicants for admission to the Master of Science degree program whose backgrounds include no formal training in the biomedical field beyond the baccalaureate degree will be required to present evidence of satisfactory performance on the Graduate Record Examination.

Requirements for Admission to the Doctor of Philosophy Degree Program: Applicants will generally be expected to have a Master's degree in one of the biological sciences or a professional degree in one of the medical sciences.

Selected individuals having baccalaureate degrees with strong backgrounds in the physical and biological sciences may be admitted upon presenting evidence of satisfactory performance on the Graduate Record Examination. Exemptions to the above requirements may be made at the discretion of the Admissions Committee if the minimum requirements of The Graduate School have been met.

Applicants who are admitted to graduate programs but who are lacking in course requirements will be required to correct these deficiencies early in their graduate programs.

For additional information, see sections in this catalog on College of Veterinary Medicine and College of Medicine—Knoxville, or contact the Program Director of the Graduate Programs, P.O. Box 1071, Knoxville, TN 37901.

THE MASTER'S PROGRAM

The minimum 45 quarter hours of graduate credit shall include Ecology 5210-20-30 or an equivalent and 9 hours of Thesis 5000. In addition, at least 8 hours must be selected from among nine ecology course categories. A minimum of four of these nine must be represented and one of these must be quantitative methods. The remainder of a student's course program is determined in consultation with the faculty. At least 8 hours exclusive of 5210-20-30, must be in courses numbered above 5100.

The general requirements for this Master's degree are listed in page 22. A minor in ecology is available.

THE DOCTORAL PROGRAM

The requirements for this degree are in general the same as those of The Graduate School. The doctoral program must include Ecology 5210-20-30 or an approved equivalent and a minimum of 9 quarter hours of courses numbered above 6000. Category requirements are the same as those of the Master's program. A student cannot enroll for dissertation until the research proposal has been discussed and approved by the doctoral committee. A foreign language is required.

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

5100 Special Problems in Ecology (1-3) Individual investigations in ecology. May be repeated with consent of instructor. Maximum 3 hrs.

5175 Environmental Planning (3) (Same as Planning 5175)

5190 Development Planning in the Third World (3) (Same as Planning 5190)


5230 Principles of Ecology: Ecosystems (3) Patterns, underlying principles behind short and long-term dynamics, energetics and nutrient cycling of terrestrial, freshwater and marine ecosystems. Prereq: 5220.

5310 Ecology for Planners and Engineers (3) Ecological principles and effects that human-induced changes have on living organisms. Lectures and field trips. For students in Graduate School of Planning and Environmental Engineering.

5320 Implementation of Environmental Policy (3) Goals and problems of environmental legislation, especially National Environmental Policy Act; purpose, preparation, and enforcement of environmental impact statements and similar multipollutant studies. Prereq: 5210 or 5310, or Environmental Engineering 4820.

5370 Natural Resource Management and Environmental Assessment in Developing Nations (3) Assessment of environmental and resource development issues. Scientific basis for integrated resource management and environmental assessment in developing nations. Prereq: 5370 or General ecology or equivalent.

5610 Environmental Toxicology (3) (Same as Biochemistry 5610)

5640 Techniques in Environmental Toxicology (3) (Same as Biochemistry 5640)
6120 Seminar in Aquatic Ecology (2)
6100 Special Topics in Ecology (3)
Seminars on trial and Organizational Psychology") and
Knoxville, Tennessee 37996-0545.
Stokely Center for Management Studies,
Organizational Psychology Program, 413
School and the Chairperson, Industrial and
ADMISSION PROCEDURE
sophistication in areas of deficiency.
The first-year program provides the opportu-
program will represent widely different
programs are adminis-
metrics) Psychology 5530.
3. Eighteen hours of additional course
work to be selected primarily from among
management and psychology e.g., Management
110 (Organizational Theory), 5220 (Wage &
5230 (Human Problems in Adminis-
4. Nine hours of Psychology or
Management 5000 (Master's Thesis).
5. Recommended electives in Psychology,
Social Work, Sociology, Planning, etc., as
approved for individual programs of study.
Program Requirements:
1. Completion of a comprehensive exami-
nation covers the following specific areas:
statistics, psychometrics, experimental
design.
4. Completion of a special comprehensive exam-
ation in scientific methodology before
beginning the third year of study. The exami-
nation covers the field of doctoral research and related topics,
and must be passed at least four weeks prior to
the awarding of the degree.
7. Maintenance of at least 3.0 grade point
average.
Life Sciences
MAJOR DEGREES
Life Sciences
M.S., Ph.D.
Coordinating Council:
H. I. Adler (Chair) Physiology; H. G. Welch;
Biotechnology; D. K. Doughal; Cellular, Molecular
and Developmental Biology; J. M. Becker;
Environmental Toxicology; W. R. Farkas; Ethology;
G. B. Burghardt; Plant Physiology and Genetics;
O. J. Schwarz.
The programs leading to the M.S. and
Ph.D. degrees in Life Sciences are inter-
departmental and intercollegiate programs
which augment the programs of individual
departments.
The graduate program in Life Sciences

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

**See program handbook for definition of a B average.

6370 Applied Ecology (4) Review of contemporary and historical issues. Analysis of scientific basis of environmental assessment and natural resource management. Analysis of careers and career planning in applied ecology. Prereq: 5210-20-30 or equivalent or consent of instructor. (Same as Botany 6370.)
6431 Current Topics in Environmental Toxicology (1) (Same as Biochemistry 6431.) S/N/C only.

Industrial and Organizational Psychology
MAJOR
DEGREES
Industrial and Organizational Psychology M.S., Ph.D.

Committee:
J. M. Larsen, Jr. (Chairperson); W. H. Calhoun;
H. D. Dewhirst, R. L. Jenkins; R. T. Ladd;
J. W. Lounsbury; M. C. Rush; J. E. A. Russell;
E. Sundstrom; R. G. O'Brien.

For complete Faculty Listing, see Department of Management and Psychology.
The master's and doctoral programs are offered jointly by the Department of Psychology and the Department of Management.
They are designed to prepare students for personnel, managerial, and organizational research, for university teaching, and for consulting relationships with industry. The program emphasizes a scientist-practitioner model in applying and conducting research based on accepted theories found in classical and modern organization theory, organizational behavior, psychology, management, and statistics. The programs are administered by a joint committee of the two departments, appointed by the Vice Provost and Dean of The Graduate School on recommendations from the two department heads.

It is intended that students entering the program will represent widely different undergraduate and graduate backgrounds including psychology, business administration, engineering, science, and liberal arts.
The first-year program provides the opportunity to take courses which will assist the student to attain a reasonable level of sophistication in areas of deficiency.

ADMISSION PROCEDURE
Applicants for admission should request forms and materials from both The Graduate School and the Chairperson, Industrial and Organizational Psychology Program, 413 Stokely Center for Management Studies, Knoxville, Tennessee 37996-0649.

Requirements
One application for admission to The Graduate School (apply for major in "Industrial and Organizational Psychology") and one application for admission to the Industrial and Organizational Psychology program. Deadline: New students are admitted in fall quarter only, and applications must be received by the Graduate Admissions and Records Office by March 1. Standards: At least 9 quarter hours of college mathematics and one course in statistics are required. Ordinarily, an undergraduate grade point average of 2.5 or above is required, with no evidence of special weakness in mathematics and physical sciences.

Test scores on each section of the general portion and the Subject Psychology portion of the GRE are required. Customarily, those students admitted to the program have performed at or above the 89-97th percentile on the general tests. (This corresponds to a raw score or approximately 600 on each of the tests.) The GRE Subject Psychology score will be used in making admission decisions, although special consideration will be given in the case of non-psychology majors.

THE MASTER'S PROGRAM
Course Requirements
1. Management or Psychology 5170-80-90 (Proseminar in Industrial/Organizational Psychology).
3. Eighteen hours of additional course work to be selected primarily from among the 5000-level course offerings in management and psychology e.g., Management 110 (Organizational Theory), 5220 (Wage & Salary), 5230 (Human Problems in Administration).
4. Nine hours of Psychology or Management 5000 (Master's Thesis).
5. Recommended electives in Psychology, Social Work, Sociology, Planning, etc., as approved for individual programs of study. Program Requirements:
1. 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 Subject Test in Psychology.
2. Completion of a comprehensive examination in scientific methodology before beginning the third year of study. The examination covers the following specific areas: statistics, psychometrics, experimental design.
3. 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.
4. By the end of nine quarters a student is expected to choose a major advisor (Chairperson of Doctoral Committee).
5. 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 weeks prior to the awarding of the degree.
6. Maintenance of at least 3.0 grade point average.

DEGREES
M.S., Ph.D.

Program Requirements
(a) B average in course work.
(b) Fulfillment of specified minimum requirements.
(c) Fulfillment of other requirements as specified by the Doctoral Program Committee. In special cases, the program committee may waive or substitute course work.

THE DOCTORAL PROGRAM
Course Requirements (Currently under review and subject to change for Fall 1985 entrants)
1. Minimum course requirements:
   a. Management or Psychology 5170-80-90. (Proseminar in Industrial/Organizational Psychology) and Psychology 5530 (Applied Psychometrics).
   c. Minimum of five 6000-level seminars to be selected from Psychology or Management 6250-60-70, and Management or Psychology 6380.
   d. 36 hours of Psychology or Management 6000.

**May be repeated for additional credit.
supports studies and research in the following concentrations: biotechnology, cellular, molecular and developmental biology, environmental toxicology, ethology, plant physiology and genetics.

Students interested in any of these areas should contact the Director 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.

ADMISSION REQUIREMENTS
1. A Bachelor's degree with a major in a biological, behavioral or physical science.
2. GRE (general) 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.

PROGRAM REQUIREMENTS

The Master's program requires 45 hours of study approved by the student's committee, a thesis, and a comprehensive oral examination. The minimum requirements for the doctoral program include at least 9 hours above the 6000 level, 36 hours of course work and a pattern of courses approved by the student's committee, a comprehensive examination, a doctoral dissertation, and a final examination. Individual concentration areas may have additional requirements.

AREAS OF CONCENTRATION

Physiology: The inter-departmental program in physiology includes research in the areas of regulatory, reproductive, comparative, exercise, cellular, developmental, muscle, or neuro-physiology.

Biotechnology: The biotechnology program will prepare students to participate in the wide variety of opportunities presented by the use of living cells and their components for the production of useful materials. This will be achieved at the M.S. level by a prescribed course of study in the biology and biochemistry of cells and molecules in the first year, by further individual study of cells and of engineering aspects of biotechnology in the second year and by the development of special expertise in areas such as animal embryo manipulation, automated chemical synthesis of macromolecules, bioprocess engineering, bioproducts and biotransformations, liposomes, microscopy and image processing, monoclonal antibodies and hybridoma technology, plant tissue culture, receptor binding technologies, and risk assessment and modeling. The production of a research thesis or an industrial co-op experience plus an area of specialization will also be an important part of the training experience.

Cellular, Molecular and Developmental Biology: The inter-departmental program in cellular, molecular and developmental biology includes research in structural or functional aspects of cells or subcellular components, or the interactions between cells.

Environmental Toxicology: The toxicology program offers intensive training in basic toxicological principles and techniques. Courses and research expose trainees to mechanisms of intended and unintended interactions between living systems and potentially toxic agents from the point of view of biochemistry, physiology, ecology, public health, environmental law and regulation, pest management, pollution control and repair, and testing and residue analysis of toxicants.

Ethology: Ethology is the naturalistic study of normally occurring animal and human behavior. The program provides intensive training in basic ethology with specialized studies available in the development, evolution, and physiology of behavior; human ethology; and behavioral ecology and sociobiology.

Plant Physiology and Genetics: This program provides the opportunity for intensive training and research experience in areas transcending the usual boundaries of botany, biochemistry, and agricultural plant sciences. It devotes itself to seeking solutions of problems concerning the interactions of physiology and genetics in applied and fundamental aspects of plant science.

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

5002 Non-Thesis Graduation Completion (3) 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 Biotechnology Seminar (1) Seminar to address topics of importance to biotechnology; repeatable to a maximum of 6 credit hours.

5100 Special Topics in Life Sciences (1-3) Specializations in biotechnology; cellular, molecular, and developmental biology; environmental toxicology; ethology; plant physiology and genetics; and physiology. May be repeated. Maximum 9 hrs.

5109 Research Practicum in Life Sciences (1-3) Individual sections for each of biotechnology; cellular, molecular, and developmental biology; environmental toxicology; ethology; plant physiology and genetics; and physiology. May be repeated. Maximum 9 hrs.

5110-30 Cellular and Molecular Biology (3, 3, 3) Survey of cell structures and functions at molecular and supramolecular level. 5110—Cellular organization; cell metabolism; energy production and use; membrane structure and function; cellular communication; 5115—Cellular defense; 5120—Cellular interactions; immune functions; DNA replication, repair and recombination; transcription and RNA processing. 5129—Transcription and RNA processing; translation; control and regulation. Prereq: Consent of instructor.

5119-29 Techniques in Cellular and Molecular Biology (1,2) 5119—Growth of microorganisms, analysis of extracellular and intracellular components. 5129—Subcellular fractionation processes; purification of macromolecules. Prereq: Consent of instructor.

5129 Recombinant DNA Laboratory (3) (Same as Microbiology 5139.)

5209 Biotechnology Practicum (Co-operative Experience) (3) Work experience in a commercial organization for students undertaking the non-thesis option of the biotechnology Ph.D. course. An evaluation by supervisor and a written report by the student are required. May be repeated once, maximum 6 hours.

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

6100 Advanced Topics in Life Sciences (3) Variable topics. May be repeated. Maximum 9 hours.
the student's first quarter and must approve all courses on a quarter-by-quarter basis. Recognizing the diverse backgrounds and needs of Management Science M.S. students, the Management Science Committee is prepared to waive some of the above requirements on an individual basis. For example, an undergraduate mathematics major with a strong background may be allowed to take 6 additional hours of electives in place of the mathematics requirements. On the other hand, a student lacking experience in rigorous senior-level mathematics courses will be asked to take such courses to fulfill the 6-hour mathematics requirement. The total course load will remain 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. For course listings and description of the Ph.D. program in Management Science, refer to p. 49.

**Statistics**

**MAJOR**

Statistics

Program Faculty:
- D. L. Sylwester, Statistics. (Chairperson);
- Henry Fribourg, Plant and Soil Science;
- S. W. Huck, Educational and Counseling Psychology;
- Mary Leitnaker, Statistics;
- J. B. McLaren, Animal Science;
- Robert McLean, Statistics;
- Ralph O'Brien, Statistics;
- John Philpott, Statistics;
- Gipsie Ranney, Statistics;
- Richard Sanders, Statistics;
- James Schmidhammer, Statistics;
- Charles Thigpen, Statistics;
- Mary Sue Younger, Statistics.

The Intercollegiate Graduate Statistics Program is a formal University of Tennessee academic program established to recognize graduate students for completing the requirements of a major or minor in statistics as part of their degrees. The Program enables a student to obtain the M.S. in Statistics alone or simultaneously with the Ph.D., DBA, or Ed.D. degree in another department. The Program also enables a student to obtain a statistics minor along with the M.S., Ph.D., DBA, or Ed.D. degree in another department. The Program is administered by an Executive Committee with advisory input from the Program faculty. The Program is open to well-qualified graduate students in all departments which have an approved statistics minor and/or joint major curriculum offered through the Program. Curriculum requirements for the statistics component of each joint degree are specified in terms of completion of alternative sequences of course options. Course options consist of courses in statistics, offered either by the Department of Statistics or by other departments, that have been reviewed and approved by the Executive Committee. Interested students should contact their major department head for information on specific course requirements.

**GENERAL ADMISSION REQUIREMENTS**

1. The student's sponsoring department must have established with the Executive Committee an approved joint degree program along with specified sequences of statistics courses taught by the Statistics Department and/or other departments.

2. The student's Admission to Candidacy form must contain all courses required for the statistics minor/major set off in a group and labeled as 'Statistics courses required for the minor/major.'

3. In many cases, a student may not decide to apply for participation in the Program until he/she has completed two or three statistics courses. In that case the student's major professor should file a program change with the cooperating departments and assist the student in obtaining a Statistics Department faculty member to serve on the student's committee.

**DEGREE REQUIREMENTS**

The Intercollegiate Graduate Statistics Program offers the M.S. in Statistics with a minor in another department; a joint major program in which the student earns a master's or doctoral degree in the student's sponsoring department along with the M.S. degree in Statistics; and a joint major and minor program in which the student earns a master's or doctoral degree in the student's sponsoring department along with a minor in statistics. The table below presents the minimum number of quarter hours in statistics for each of these alternatives. The student selects courses to satisfy the requirements established by the student's sponsoring department and approved by the Program Executive Committee. The student's committee must include a faculty member of the Statistics Department, at the rank of Assistant Professor or above. The student's formal examination procedure as established by the sponsoring department must include an appropriate section on statistics. Successful completion of the statistics minor/major is recognized by appropriate documentation on the student's transcript. Students who do not complete all requirements for the statistics major/minor will still receive academic credit for statistics courses they have successfully completed.

**Required Quarter Hours**

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<thead>
<tr>
<th>Degree Program</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.S. in statistics, minor outside of statistics</td>
<td>27</td>
</tr>
<tr>
<td>M.S. outside of statistics, minor in statistics</td>
<td>12</td>
</tr>
<tr>
<td>M.S. outside of usual separate statistics requirements for both degrees</td>
<td>24</td>
</tr>
<tr>
<td>M.S. in statistics, minor in statistics</td>
<td>36</td>
</tr>
</tbody>
</table>

a. Approved statistics courses from the Department of Statistics and/or other departments.

b. Courses taken for the minor or the master's degree in statistics may fulfill requirements for the doctoral degree. Contact the home department for details.
College of Law

Kenneth L. Penegar, Dean
Mary Jo Hoover, Associate Dean
Julia P. Hardin, Associate Dean
John A. Sebert, Jr., Associate Dean
N. Douglas Wells, Assistant Dean

The College of Law is conducted on the semester system.

The most current information regarding admission, financial aid, course requirements, academic policies, extracurricular activities, and student services is available in the College of Law Bulletin. Students interested in the college should obtain a copy of the Bulletin from the Admissions Office, The University of Tennessee, College of Law, 1505 West Cumberland Avenue, Knoxville, Tennessee 37996. Completed application should be received before February 1 of the year of requested admission.

The University of Tennessee College of law commenced operation in 1890 and has continuously sought to provide high quality legal education in a university community.

While the principal objective of the college is to prepare students for the private practice of law, its total mission is more broadly conceived. The college exposes students to the legal issues of our society enabling them to develop analytical skills with respect to decisional law and statutes, the ability to communicate effectively their knowledge of the law, an awareness of the historical growth of the law, a knowledgeable appreciation of the interrelationship of law and society, and the ability to use law as an implement of societal control and development. Students are thus equipped to serve their community not only as advocates and counselors, but as policy makers and active, responsible citizens.

The coordinated program of the college has three dimensions: teaching and learning, research and appraisal of our legal systems and institutions, and service to the community. Each plays a significant role in the college as a modern law center.

The teaching and learning element of legal education at the college involves a cooperative classroom interaction between faculty and students in the analytical study of a host of questions and problems found in today’s legal profession. These involve decisional law, statutory interpretation, administrative regulation, techniques of trial and appellate advocacy, and the roles and responsibilities of the lawyer in advising and representing clients. While proper consideration is given to the problems of Tennessee law, the course of study is conducted with a view toward providing an awareness and understanding of the regional and national perspective in order to prepare our students for service in any state.

The college is also directly involved in providing service to the community of which it is a part. A major element of public service is centered in the Legal Clinic where students, under the guidance of skilled and experienced licensed practitioners, provide legal services to indigent persons of Knox County. Additionally, through research, consultation, and other services to legal institutions and groups within the state, the college seeks to participate in the development and improvement of the society in which its students may eventually practice law. The Public Law Institute is a primary example of this function.

In combination, the direction and objectives of the college lead to the development of a narrow technician, but of a student conceived. The College of Law building especially designed for teaching, study, and research in the law. In the spring of 1971 the college occupied the new wing, doubling the available facilities. The library, the classrooms, and the offices are air-conditioned. Adequate classrooms, courtrooms, seminar rooms, a private office for each full-time faculty member, the well-equipped offices of the Legal Clinic, and a spacious, well-lighted Law Library are contained in this modern building. Stack space for more than 200,000 volumes will permit one of the largest law book collections in the South.

LEGAL CLINIC

The University of Tennessee Legal Clinic was established in 1947. Though the Legal Clinic provides legal assistance to indigent persons, it is designed primarily as a teaching device to correlate theory and practice. It introduces the student, under faculty supervision, to the law in practice through personal contact with clients and their problems. The Legal Clinic functions as a large law office in which the student gains experience in interviewing clients, writing legal letters, investigating and evaluating facts, preparing memoranda of law, preparing cases for trial or adjustment, and briefing cases. Classroom work supplements the handling of actual cases. The student is thus trained in the technique of law practice and the management of a law office. The ethical responsibilities of lawyers and their function as public servants are stressed. Under present rules of the Tennessee Supreme Court, third year students, under the direct supervision of the Legal Clinic staff, are certified to practice before all the courts of Tennessee.

THE LAW LIBRARY

The Law Library contains the official state reports of all states, the complete National Reporter system which covers all states and the federal courts, the Annotated Reports, standard sets of miscellaneous reports, the reports of the Canadian cases and of English cases from the yearbooks to date. In addition to these, there are adequate encyclopedias, digests and dictionaries, standard textbooks, law reviews, and current loose-leaf services, totaling together more than 145,000 cataloged volumes. The library is located across the street from the Law Library, the Undergraduate Library a few blocks away, and other branch libraries.
DEGREE OF DOCTOR OF JURISPRUDENCE

The degree of Doctor of Jurisprudence will be conferred upon candidates who complete, with the required average, six semesters of resident law study and who have 84 semester hours of credit, including all required courses. The required average is 2.0 and that average must be maintained on the work of all six semesters and also for the combined work of the grading periods in which the last 28 hours of credit were earned. Average is computed on weighted grades. Grades are on a numerical basis from 0.0 to 4.0. A grade of 0.9 or below is a failure.

Eligible law students may receive credit towards the J.D. degree for acceptable performance in up to three (3) upper-level courses taken in other departments at The University of Tennessee. Courses selection and registration are subject to guidelines approved by the law faculty which include the requirement that any such course be acceptable for credit towards a graduate degree in the department offering the course.

DUAL J.D.-MBA DEGREE PROGRAM

The College of Business Administration and the College of Law offer a coordinated dual degree program leading to the conferment of both the Doctor of Jurisprudence and the Master of Business Administration degrees. A student pursuing the dual program is required to take fewer hours of course work than would be required if the two degrees were to be earned separately.

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 commence studies in the dual program at the beginning of any term subsequent to matriculation in both colleges provided, however, that dual program registration must be started prior to entry into the last 28 semester hours required for the J.D. degree and the last 24 hours required for the MBA degree.

Curriculum: A dual degree candidate must satisfy the graduation requirements of each college. Dual degree students withdrawing from the dual degree 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 degree program. For students continuing in the dual degree program, the J.D. and MBA degrees will be awarded upon completion of all requirements of the dual degree program.

The College of Law will award credit toward the J.D. degree for acceptable performance in a maximum of 8 semester hours of approved courses taken in other departments of the University except for those taken in conjunction with the joint program.

Note: Students are advised to consult The Program of Instruction/College of Law, which should mean a grade of at least 2.0. A grade will be changed to a regular grade if one Law College course has been taken on an S/NC basis. A student may take, a non-law course for which credit is received is counted as two-thirds (2/3) of a course. Thus, a student may take three non-law courses in the College of Law courses are taken on an S/NC basis, but may take only one non-law course if one Law College course has been taken on an S/NC basis. A student should be aware that if two or more non-law courses are taken, no Law College courses may be taken on an S/NC basis.

MAINTENANCE OF A SATISFACTORY RECORD

No student will be excluded from the College of Law for academic reasons prior to the completion of two semesters of academic study. A full-time student who fails to achieve an overall average of at least 2.0 upon completion (receipt of a grade) of two semesters of academic study shall be excluded. Such exclusion shall occur regardless of whether the student has obtained permission to vary the first-year full course load.

MAXIMUM COURSE LOAD PER SEMESTER

The maximum course load for a law student is 18 hours in any one semester. During the summer term the maximum course load is 7 hours.

POLICY FOR GRADUATE STUDENTS

Taking Law Courses

Law courses are not available for graduate credit; however, a graduate student may be allowed to take up to 6 semester hours of law courses and receive credit toward a degree upon approval of the College of Law and the major chairperson. The graduate student must register for the law course during regular registration at the College of Law requesting an S/NC grade only. If a 2.0 or above is earned in a law course, an S will be recorded on the transcript. If a student earns below a 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 average.

Different rules apply to the student enrolled in the J.D.-MBA Program. Grades must be earned according to the grading system of the respective college, e.g., numerical grades for law courses, letter grades for graduate courses. Refer to page...
1101 College of Law/Program of instruction

21 for the grading scale acceptable toward meeting degree requirements. Cumulative GPA for law courses only will be carried until graduation. The grade on the permanent record and the law cumulative will be shown on the permanent record.

Faculty

Professors:
- J. D. Vanderbilt
- J. A. Sebert
- J. D. Michigan
- J. D. Duke
- E. E. Overton (Emeritus), S. J. D.

Chicago
- D. S. Jones, J. D. North Carolina
- J. J. Gobert, J. D. Duke
- R. M. Gray (Emeritus), L. L. M. Harvard
- J. G. Cook, L. L. M.
- K. L. Penegar (Dean), L. L. M. Yale
- N. P. Cohen

and the law cumulatives will be shown on graduation, at which time both the graduate and the graduate's rights of persons charged with crimes: arrest, search and seizure, identification, interrogation, entrapment, electronic eavesdropping, right to counsel, and jury trial.

8062 Criminal Procedure II (3) Pre-and post-trial procedures in a criminal case: bail, preliminary hearing, trial, jury, prosecutorial discretion, discovery, speedy trial, plea bargaining, and post-conviction relief.

8125 Admiralty (2) Admiralty courts and jurisdiction; death and injury to persons; special provisions concerning various maritime workers; carriage of goods by ships; principles governing collisions and liability.

8170 Trial Practice (3) Criminal and civil litigation: trial situations and preparation; basic trial strategy; professional responsibility, fact investigation, witness preparation; discovery and presentation of evidence, selection and instruction of jurors, opening and closing arguments.

8200 Administrative Law (3) Administrative agencies and processes: delegation and interpretation of powers; investigatory and rule-making procedures and requirements; adjudicative procedures, evidence, findings; standing; deciding; and res judicata; exhaustion of remedies, openness, and standing; review proceedings and scope of review.

8230 Law and Current Problems (2-3)

8260 Bills and Notes (2) Negotiable instruments, negotiable orders, draft, check, promissory note, negotiable order of withdrawal, negotiability; remedies; defeasibility; remedies; adequacy of consideration; and the Writing Requirement. These additional requirements may be taken at any time during the second or third year.

1102 Civil Procedure I (3) Introductory course; binding effect of judgments; selecting proper court—judicial power, national legislative power, regulation of commerce, power to tax and spend; other sources of national power, state power to regulate and tax, intergovernmental immunities; substantive due process; congressional enforcement of civil rights.

8280 Conflict of Laws (3) Jurisdiction, foreign judgments, recognition and enforcement of foreign judgments; jurisdiction; personal jurisdiction; subject matter jurisdiction; effect of judgments; selecting proper court—choice of state or federal law, habeas corpus, abstention, and conflicts between federal and state judicial systems.

8340 Debtor-Creditor Law (3) Enforcement of judgments; bankruptcy and its alternatives for the businessman; emphasis on federal bankruptcy statutes.

8360 Family Law (3) Survey of laws affecting formal and informal family relationship: premarital disputes, antenuptial contracts, creation of common law and formal marriage, legal effects of marriage, support obligations within family, legal separation, annulment, divorce, alimony, property settlements, child custody, child support, adoption, abortion, and illegitimacy.

8420 Evidence (4) Rules regulating introduction and exclusion of oral, written, and demonstrative evidence, including relevancy, competency, impeachment, hearsay, privilege, judicial notice, presumptions, burden of proof.

8460 Federal Courts (3) Jurisdiction of federal courts and conflicts between federal and state judicial systems, including nature of judicial power, federal questions, diversity, removal, jurisdictional amount, choice of state or federal law, habeas corpus, abstention, enjoining state proceedings, appellate jurisdiction, joinder of parties and claims.

8490 Environmental Law and Policy (2) Methods of public policy analysis, framework for understanding responses of legal system to environmental litigation: Clean Air Act, National Environmental Policy Act, and selected regulatory issues.

8500 Future Interests (3) Law of future interests, including reversions, remainders, possibilities of reverter and rights of entry, executory interests, construction of limitations, and remainder interests.

8510 Government Contracts (3) Principles relating to government procurement, both federal and state; award, performance, and termination of contracts; administrative settlement of disputes arising under government contracts. Prereq: 8200.

8525 International Business Transactions (3) Legal status of persons abroad, acquisition and use of prop-
erty within a foreign country, doing business abroad as a foreign corporation, engaging in business within a foreign country, expropriation or annulment of contracts or concessions.

8530 Public International Law (3) International agreements, organizations, recognition of states, nationality, territory, jurisdiction and immunities, claims, expropriation, force and war.

8535 Jurisprudence (3) Legal theories: natural law, idealism, historical jurisprudence, utilitarianism, analytical jurisprudence, sociological jurisprudence, legal realism, critical legal studies, legal pluralism.

8540 Law/Business (4) Evaluation of labor relations laws, rights of self-organization; employer and union unfair labor practices; strikes, boycotts and picketing, collective bargaining; public employee labor relations; internal union affairs; individual rights in labor relations; employment discrimination; federalism and preemption; unions and antitrust laws.

8560 Law, Language, and Ethics (3) Intermediate level jurisprudence-type course; law as the mind's attempt to defend, direct, and administer human activity; exploration of ethical values underlying formal legal reasoning and statement; analysis of judicial reasoning and legal concepts through methods of epistemology.

8565 Law and Economics (3) Relationship between legal and economic thought, use of economic in legal decision making and legal criticism.

8569 Legal Accounting (2) Accounting problems and techniques, use and understanding of accounting information.

8570 Copyright, Patent and Trademark (3) Protection for intellectual property under federal and state law; patents, trademarks and trade names, trade secrets, software, considerability, international aspects.

8575 Legal Imagination (3) Systematic study of literature and its application to accurate, fluent, and creative legal composition.

8670 Legal Writing (1) By arrangement. Completion of a potentially publishable Casenote or Comment or Perspective for the Tennessee Law Review or participation as a member of a faculty supervised moot court competition. S/N only.

8680 Legislation (3) Interpretation and drafting of statutes, legislative process, and legislative power; judicial views on legislative process subjected to critical comparison with realities of legislative processes and applicable constitutional principles.

8690 Modern Land Use Law (2) Land use planning, nuisance, zoning, eminent domain.

8700 Local Government (3) Distribution of power between state and local governmental units; sources of authority for limitations on local government operations; creation of local governmental units and dissolution; intergovernmental aid; local government problems represented by fragmentation of local government units; problems in financing of local services; influence of federal programs on local government finance and decision making.

8710 Natural Resources Law (3) Selected materials on nature of interest, conveying, royalties, grants and reservations, leases, and taxation.

8740 Business Associations (4) Legal forms of cooperative business enterprise: agency, partnership, limited partnership, corporation, joint venture.

8750 Remedies (4) Judicial remedies: damages, restitution, and equitable relief; consideration of availability, limitations and measurement of various remedies; comparative evaluation of remedies available in various situations.

8755 Selected Problems in Remedies (3) Course content varies. Topics: civil rights injunctions, remedies in complex litigation (class actions and/or derivative suits); bankruptcy; property in restitution. Prereq: 8750 or consent of instructor.

8760 Advanced Business Associations (2) Selected topics. Prereq: 8740.

8770 Products Liability (3) Negligence of manufacturers, products liability of retailer and other suppliers; detectiveness and causation; disclaimers and contributory fault.

8800 Sales and Secured Transactions (4) Art. 2 (Sales) and Art. 9 (Documents of Title) of the Uniform Commercial Code; brief survey of suretyship and guaranty; Art. 9 (Security Interests in Personal Property) of the Uniform Commercial Code.

8815 Discrimination and the Law (3) Comparison of race, sex and other invidious discriminatory practices as they affect political participation, education, employment, housing and other social and economic activities; emphasis on legislative enforcement of post-Civil War Amendments. Prereq: 8860.

8830 Securities Regulation (3) Advanced problems of governmental regulation of issuance of securities.

8835 Social Legislation (3) Schemes other than traditional tort law for compensating victims of accidents, disability and other malocurrences; Workers Compensation and no-fault systems of compensation; Social Security disability benefits and administrative procedure for resolving such claims. Brief survey of medical assistance, welfare, related matters.

8840 Wealth Transfer Taxation (3) Transfers of wealth at death (probate, trust); generation-skipping transfers; deductions and credits; interrelationship of transfer taxation. Prereq: 8860.

8850 Tax Theory (3) Comparative study of methods and purposes of governmental revenue collection through taxation; effects on various actual proposed schemes of taxation. Prereq: 8860.

8860 Income Tax II (3) Partnership taxation; corporate reorganizations and distributions; transactions among corporations and shareholders. Prereq: 8860.


9050 Decedents' Estates (3) Nature, creation, transfer, termination, and modification of trusts; fiduciary administration; intestate succession; validity, executory, mistake, revocation, probate and contest of wills; ademption, advancements and contribution of wills.

9200 Antitrust (3) Federal antitrust laws; monopolization, price-fixing, group boycotts, and anticompetitive practices generally; government enforcement techniques and private treble-damage suits.

9250 Directed Research (1-2) Hours to be arranged. Independent research under direct supervision of instructor; maximum of one credit each year in last two years of study. Proposal must be approved in advance by Academic Standards Committee.

9290 Land Finance Law (2) Financing devices: mortgages, trusts, secured transactions, partnerships, Subchapter S corporations and shareholders, and Art. 9 (Security Interests in Personal Property) of the Uniform Commercial Code; brief survey of suretyship and guaranty; Art. 9 (Security Interests in Personal Property) of the Uniform Commercial Code.

8756 Introduction to Advocacy (4-5) Litigation, trial problems and preparation; basic trial strategy, discovery, presentation of evidence, voir dire, jury instructions (res judicata) and c. Ang. lib. S. D. (generally) in simulated situations; representation of actual clients; ethical issues during suppression of evidence and other problems of professional responsibility. Select civil or criminal component. After successful completion of one component, student may enroll for second component in subsequent semester. 8746—Civil Component; nature, function, dynamics and processes of lawyering and legal decision making. Development of frameworks and models useful in evaluating roles of legal system, underserved or unrepresented fieldwork experience, representation of clients with problems in the same areas as the problems of proof of proof including use of expert testimony.

8795 Advanced Advocacy (4) Creation of 8746-56; litigation and advocacy of greater complexity. Completion of 8746-Supervised Fieldwork; law reform, complex litigation, drafting and appellate practice. Completion of 8756—Supervised Fieldwork, criminal defense representation in preliminary hearings and misdemeanor trials and criminal appeals. Prereq: 8746 or 8756.

8785 Economic Development (4 or 5) Models and skills pertaining to representation of corporations and businesses. Non-litigation skills, negotiation, counseling, document preparation, business planning and representation before various state and federal agencies; supervised fieldwork: legal representation of community groups and small business ventures; ethical issues during supervised fieldwork, selected problems of professional responsibility. Prereq: 8740 and 8862 (8862 may be taken concurrently with 8785 with consent of instructor).

NOTE: Students receiving credit for 8710 prior to taking an Introduction to Advocacy course (8746 or 8756) will receive 5 hours credit for taking the Introduction to Advocacy course. Students receiving credit for taking a second Introduction to Advocacy course will receive 4 hours credit for taking 8746 and 8756. Completion of 8746-Supervised Fieldwork will receive 7 hours credit for the Introduction to Advocacy course.

SEMINARS

9240 Arbitration Seminar (2) Arbitration of labor agreement problems; judicial and legislative developments, nature of process, relationships to collective bargaining, selected arbitration problems on various topics under collective agreements, and role of lawyers and arbitrators in the process.

9320 Constitutional Law Seminar (2) Current constitutional law problems; original paper required. Prereq: 8300.

9345 Criminal Law Seminar (2) Advanced problems in criminal law and administration of justice.

9400 Estate Planning Seminar (2) Problems of estate planning both inter vivos and testamentary, and preplanning both intervivos and testamentary; advanced problems arising in such areas as condemnation, cooperative, housing subdivisions, and shopping centers.

LEGAL CLINIC COURSES

Student are eligible to enroll in clinical courses only after the successful completion of their fourth semester (56 semester hours) in addition to meeting other specified prerequisites. Students must enroll in only one clinical course per semester and are limited to a total of two courses. Clinical courses are 8746, 8756, 8775, 8785.

8746-56 Introduction to Advocacy (4-5) Litigation, trial problems and preparation; basic trial strategy, discovery, presentation of evidence, voir dire, jury instructions (res judicata) and c. Ang. lib. S. D. (generally) in simulated situations; representation of actual clients; ethical issues during suppression of evidence and other problems of professional responsibility. Select civil or criminal component. After successful completion of one component, student may enroll for second component in subsequent semester. 8746—Civil Component; nature, function, dynamics and processes of lawyering and legal decision making. Development of frameworks and models useful in evaluating roles of legal system, underserved or unrepresented fieldwork experience, representation of clients with problems in the same areas as the problems of proof of proof including use of expert testimony.

8756 Introduction to Advocacy (4-5) Litigation, trial problems and preparation; basic trial strategy, discovery, presentation of evidence, voir dire, jury instructions (res judicata) and c. Ang. lib. S. D. (generally) in simulated situations; representation of actual clients; ethical issues during suppression of evidence and other problems of professional responsibility. Select civil or criminal component. After successful completion of one component, student may enroll for second component in subsequent semester. 8746—Civil Component; nature, function, dynamics and processes of lawyering and legal decision making. Development of frameworks and models useful in evaluating roles of legal system, underserved or unrepresented fieldwork experience, representation of clients with problems in the same areas as the problems of proof of proof including use of expert testimony.

8756 Introduction to Advocacy (4-5) Litigation, trial problems and preparation; basic trial strategy, discovery, presentation of evidence, voir dire, jury instructions (res judicata) and c. Ang. lib. S. D. (generally) in simulated situations; representation of actual clients; ethical issues during suppression of evidence and other problems of professional responsibility. Select civil or criminal component. After successful completion of one component, student may enroll for second component in subsequent semester. 8746—Civil Component; nature, function, dynamics and processes of lawyering and legal decision making. Development of frameworks and models useful in evaluating roles of legal system, underserved or unrepresented fieldwork experience, representation of clients with problems in the same areas as the problems of proof of proof including use of expert testimony.

8756 Introduction to Advocacy (4-5) Litigation, trial problems and preparation; basic trial strategy, discovery, presentation of evidence, voir dire, jury instructions (res judicata) and c. Ang. lib. S. D. (generally) in simulated situations; representation of actual clients; ethical issues during suppression of evidence and other problems of professional responsibility. Select civil or criminal component. After successful completion of one component, student may enroll for second component in subsequent semester. 8746—Civil Component; nature, function, dynamics and processes of lawyering and legal decision making. Development of frameworks and models useful in evaluating roles of legal system, underserved or unrepresented fieldwork experience, representation of clients with problems in the same areas as the problems of proof of proof including use of expert testimony.
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8870 Business Planning Seminar (2) Selected problems on corporate and tax aspects of business planning and transactions. Prereq: 8860, 8862, and 8749.

8875 Commercial Law Seminar (2) Content varies. Planning seminar to execute a complex commercial transaction or selected problems in commercial transactions; major research paper. Prereq: 8860.

8890 Environmental Protection Seminar (2) Problems of litigating in defense of environment and mobilizing public and private efforts in defense of environment. Problems of proving environmental impact of selected projects, interpretation and evaluation of scientific data, use of expert witnesses. Special environmental concerns of region, e.g., TVA operations, strip mining, forest management, wildlife preserves. Team-teaching and selected experts. Prereq: 8490.

8910 Administrative Law Seminar (2) Principles of administrative law. Discretion, choice of adjudication or rulemaking to develop administrative policy; consistency in administrative action.

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

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

8955 Trade Regulation Seminar (2) Antitrust laws and laws applicable to regulated industries.

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

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

COURSE OFFERINGS SUBJECT TO CHANGE

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

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

General Information

FOREIGN STUDY COURSES

Foreign study courses offered in some departments of the College provide an opportunity to undertake independent study outside the United States. Prior to departure the student must have a plan of study approved by the department head and a supervising faculty member of the department concerned. Credit will be given only upon fulfilling all requirements set by the department and may vary from 1-12 hours. The maximum credit which may be applied toward a degree in the College is established in each individual case by the department in which the student is working.

OFF-CAMPUS STUDY

Recognizing that learning is not restricted to formal classroom situations, the College provides for students to earn credit toward graduation for approved off-campus study. Such study may be undertaken only with prior approval of the faculty member and the department concerned. It may include certain kinds of 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               DEGREES
Anthropology        M.A., Ph.D.

Professors:
W. M. Bass (Head), Ph.D. Pennsylvania;  
C. H. Fautナー, Ph.D. Indiana;  
R. L. Jantz, Ph.D. Kansas;  
P. W. Parmalee, Ph.D. Texas A & M;  
M. C. Wheeler, Ph.D. Yale (part-time).

Associate Professors:
I. E. Harrison, Ph.D. Syracuse;  
W. E. Klippel, Ph.D. Missouri;  
M. H. Logan, Ph.D. Pennsylvania State;  
G. F. Schroedl, Ph.D. Washington State;  
F. H. Smith, Ph.D. Michigan.

Assistant Professors:
B. J. Howell, Ph.D. Kentucky;  
J. F. Simen, Ph.D. SUNY-Binghamton;  
P. S. Wilkey, Ph.D. Tennessee.

Instructor:
M. A. Bass (part-time), Ph.D. Kansas State.

Research Associate Professor:

Research Assistant Professors:
M. D. Smith, Ph.D. Tennessee;  
S. D. Tardiff, Ph.D. Michigan 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 folklore. Additional information may be obtained from the Anthropology Department.

THE MASTER'S PROGRAM

Requirements for the M.A. degree include:

1. For admission, a letter of intent by applicant and submission of three letters of recommendation.
2. A minimum of 45 quarter hours for graduate credit. Thirty-six of these 45 hours must be in anthropology; 9 hours may be taken in closely related disciplines; at least two-thirds of all credit must be at the 5000 level or above.
3. A minimum of three quarters of residence at UTK.
4. Introductory statistics course to be taken before taking the Graduate Evaluation Examination.
5. Graduate Evaluation Examination taken during the quarter the student is enrolled in her/his 33rd quarter hour or the first time the examination is given after completing the 33rd hour. The examination is given each year in January.

THE DOCTORAL PROGRAM

Requirements for the Ph.D. degree include:

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

3070 Genetics and Society (3) (Same as Botany 3070.)
3410 Principles of Cultural Anthropology (3) Basic concepts and objectives in study of culture. Range of
4250 Medical Anthropology: Lecture (3) A survey of medical anthropology. Emphasis on Western and non-Western cultural aspects of health, disease, treatment, death, and related concepts. Focus on analyses and descriptions of anthropological fieldwork. A

4300 Readings in Anthropology (1-9) Intensive reading, problem oriented. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

4240 Field Work in Archaeology (3-9) Practicum work surveying, excavating, processing, and analyzing of data; intensive reading. Prereq: 2510-25-30 and consent of instructor. May be repeated. Maximum 9 hrs. A

4400 Cultural Ecology (3) Survey of concepts and methods in studying dynamic interactions between cultures and their environments. Topics include ecological theory, methods of analysis, and application from selected case studies. Prereq: 2520, 2530, 3410 or consent of instructor. A

4420 Dynamics of Culture (3) Culture change, innovation, diffusion and acculturation: cultural continuity and stability. Prereq: 2530 or consent of instructor. A

4440 Urban Anthropology (3) Survey of theoretical and methodological issues anthropologists encounter researching cross-cultural urban settlements. Focus on anthropological perspectives on urban problems and planning. Prereq: 3450 or consent of instructor. A

4480 Current Trends in Anthropology (3) Analytical integrative review in symposium of the current debates, research directions, theories, fieldwork methods, and general assumptions of the four subfields of anthropology: archaeology, physical anthropology, linguistics, and cultural anthropology. Sp

4550 Indians of the Southeastern United States (3) Survey of Southeastern Indian cultures; emphasis on aboriginal adjustment to environment; lifeways of Southeastern Amerind groups prior to Euro-American contact. Prereq: 2520, 3540 or consent of instructor W

4560 Cherokee Ethnology (3) Intensive survey of ideology and material aspects of Cherokee culture existing at time of first European contact. Prereq: 2520 and 3540 or consent of instructor W

4600 Method and Theory in American Archaeology (3) Historical development of North World archaeology with emphasis on theory and field techniques. Prereq: 2520 or consent of instructor. Sp

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. (Same as Afro-American Studies 4610) A

4640 Zooarchaeology (3) Basic osteological studies of vertebrate classes; emphasis on primate and cultural use of bone remains. F

4650 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. (Same as Afro-American Studies 4610) A

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: 3700 or consent of instructor. Sp

4740 Biology of Native Americans (3) American Indian origins and evolution from standpoint of skeletal remains and radiometric and genetic data. Emphasis on North American Indians. Prereq: 2510 or consent of instructor. A

4950 Primate Studies (3) Survey of field and laboratory investigations of comparative anatomy and non-human primate behavior. Prereq: 2510 or consent of instructor. A

4960 Primate Paleontology (3) Survey of fossil primate forms; origin and evolution of major primate lineages; high assemblages in various geologic periods and fossilized primates. Prereq: 2510. Recommended prereq: Zoology 4380, A

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

5010 Graduate Research (1-9) Independent investigation of special problems in anthropology. May be repeated. Maximum 18 hrs. E

5030 Seminar in Cultural Anthropology (3-9) A

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

5180 History of Thought in American Archaeology (3) Readings in the development of archaeological thought. Emphasis on the contributions of influential anthropologists. Recommended prereq: 5410. A

5200 Biological Anthropology: Laboratory (3) Laboratory work with emphasis on the development of techniques in physical anthropology and the application of anthropological methods. Prereq: 2510 and 2520. A

5290 Nutrition Anthropology (3) Anthropological contributions to study of food-related cultural and biological variability in present and past populations. Prereq: 2510, 2520, 2530 and consent of instructor. Recommended: Basic nutrition course. A

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

5410 Ethnographic Research Techniques (3) Methods of collecting, ordering, and utilizing data. Prereq: Consent of instructor.
5450 Comparative Social Organization (3) Social structure in nonliterature societies. Kinship, age, sex, locality, and other factors in determining relations between individuals and groups. Prereq: At least one area course. A

5460 Quantitative Methods in Anthropology (3) Application of quantitative methods to anthropological data. Correlation and derivative procedures, distance analysis, discriminant analysis, and implementation of computer routines. Prereq: Statistics 2100 or equiv. F

5470 The Healer in Cross-Cultural Perspective (3) Graduate seminar dealing with socialization, methods of diagnosis, and therapeutic modes of healers in apparently non-Euro-American milieu. Prereq: 4250. W

5510 Education in Cultural Perspective (3) (Same as Curriculum and instruction 5510.) F

5511 Non-Western Education: Anthropological Approaches (3) Analysis of traditional educational practices among non-Western peoples, problems from application of Western models of education among American Indian, African tribal groups and Asian 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

5520 Problems in Old World Archaeology (3) Selected topics and problems in European and African prehistory investigated in depth. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. A

5560 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 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 stone tools, raw materials employed; typological constructs utilized in archaeological analysis. Prereq: Consent of instructor. F

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 regional resource surveys, discrete regions in terms of lithology and cultural homogeneity, particularly East and Middle Tennessee, input from professional geologists, and field research. Recommended prereq: 5560.

5700 Theory in Folk Culture Studies (2) Seminar analyzing development of theory and method in European and American folk culture studies. Prereq: Consent of instructor. A

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


5900 Dental Anthropology (3) Dental anatomy, theories of dental evolution, genetic and environmental influences controlling dental morphology, comparative primate dental morphology, dental trait analyses, and techniques of dental age and sex determination. Prereq: 3900. A

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

5920 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. Prereq: 3900. Sp

5940 Skeletal Biology of Early Human Population (3) Practical and theoretical approaches to analysis of prehistoric human skeletal populations. Demography, vital statistics, pathology, nutrition, and measurement of biological relationships as they relate to population as adaptive unit. Prereq: 3900. F

5960 Dermatoglyphics (3) Methods of dermatoglyphic analysis; genetics and population variation of various dermatoglyphic elements; forensic applications; relationships to various genetic and chromosomal abnormalities. Prereq: Consent of instructor.

5980 Neanderthal Man and Human Evolution (3) Morphology, distribution, and evolutionary relationships of Neanderthals. Prereq: 4970 or consent of instructor. W, A

5990 Human Variation (3) Nature of human biological variation with emphasis on microevolutionary processes responsible for establishing and maintaining variation and relationship of variation to population structure. Prereq: 3930 or consent of instructor. A

6000 Doctoral Research and Dissertation (3-15) Independent research and dissertation. May be repeated. Maximum 18 hrs. Only 3 hrs may count toward 6000-level requirement. W

6220 Seminar in Nutritional Anthropology (3) Analytical review of major theoretical viewpoints in nutritional anthropology. Prereq: 5220 and consent of instructor.

6410-30 Seminar in Cultural Anthropology (3, 3) Seminar to explore specific research problems in North American archaeology. Research topics on prehistoric and historic cultural contexts and settlement patterns in North America. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. A

5990 Human Variation (3) Nature of human biological variation with emphasis on microevolutionary processes responsible for establishing and maintaining variation and relationship of variation to population structure. Prereq: 3930 or consent of instructor. A

6000 Doctoral Research and Dissertation (3-15) Independent research and dissertation. May be repeated. Maximum 18 hrs. Only 3 hrs may count toward 6000-level requirement. W

6220 Seminar in Nutritional Anthropology (3) Analytical review of major theoretical viewpoints in nutritional anthropology. Prereq: 5220 and consent of instructor.

6410-30 Seminar in Cultural Anthropology (3, 3) Seminar to explore specific research problems in North American archaeology. Research topics on prehistoric and historic cultural contexts and settlement patterns in North America. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. A

6610 Selected Topics in Archaeology (3, 3) Seminar is offered each quarter primarily for doctoral candidates. Prereq: Consent of instructor.

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

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

Archaeology—Greek and Roman

See Classics

Art

MAJOR

DEGREES

Art

M.F.A.


Assistant Professors:


The Master of Fine Arts is the terminal degree in studio art. It is offered with concentrations in ceramics, graphic design/illustration, drawing, fiber-fabrics, painting, printmaking, sculpture and watercolor. Inter-area concentrations are available with consent of the faculty. 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 of work evaluated by the faculty. Application forms and further information are available by writing to the Department of Art.

The Master's Program

A minimum total of 90 hours is required:

1. Successful completion of 30 hours of studio in concentration area. Inter-area studios must normally be approved by the faculty no later than the third quarter in residence. Fifteen hours of the major must be in second year courses.

2. Sixteen hours of Art History for graduate credit, including at least one course in history of art, excluding courses at the 5000 level.

3. Seminar in Art Criticism (4 hours).

4. Ten hours of electives which may consist of any committee-approved combination of graduate credit courses outside the student's departmental concentration.

4. A portfolio of work evaluated by the faculty. Application forms and further information are available by writing to the Department of Art.

The graduate degree is normally conferred at the end of the third year of study in the candidate's major field. Six quarters beyond the baccalaureate degree are required in residence. Residence is defined by the Department of Art as (1) a minimum enrollment of 6 hours per quarter, and (2) use of Department of Art facilities so that students are available for discussion and criticism.

The candidate's committee will consist of a minimum of 3 members and a maximum of 6 members, and will be appointed prior to registration for Art 5999. Three members of the committee shall be as follows: one from the candidate's major area who shall be the major professor, one from art history, and one from a studio discipline outside the concentration area.

Exhibition and oral examination: With the completion of the requirements for the M.F.A., the student must produce an exhibition, and, in the presence of the work, must satisfactorily complete an oral examination.

Retention and Termination

First year evaluation: At the end of the first quarter, the student must present work for evaluation by the fac-
ulty and receive permission to continue in the program.
2. Second year evaluation: With completion of all course work the student must present work for evaluation by the faculty and receive permission to register for Projects in Lieu of Thesis (Art 5999).
3. If, in a review by the student's major area faculty, the student's progress is deemed insufficient, the faculty may recommend the following: a pause in which work is continued without advancement towards the degree; probation with specific goals set for a specific time; or termination.

GRADUATE MINOR IN THE HISTORY OF ART
A graduate minor in Art History may be arranged with the consent of the student's committee, the instructors involved, and the Graduate School. Prerequisite is an undergraduate Art History minor, or its equivalent, and reading knowledge of French, German, or Italian, unless waived by the art history faculty.

3516 Typography (4) Theories and techniques of type-setting and printing as fine art medium. Creative problem using type and printing presses. May be repeated. Maximum 12 hrs.
3517 Airbrush (4) Techniques 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 and pilgrimage church, Gothic cathedral
3705 Northern European Painting: 1350-1600 (4) From courtly art of late Middle Ages to Northern Renaissance. Jan van Eyck, Roger van der Weyden, Bosch, and Durer; early printmakers. A
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) Tintoretto, El Greco, Caravaggio, Zurbaran, Velazquez. Renaissance and Baroque, crosscurrents 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
3736 History of Twentieth-century Painting in Europe and America (4) Survey of landmarks in painting, architecture, sculpture, and design from prehistory to 1900. F
3766 History of Twentieth-century American Art (4) Analysis of developments in architecture, painting, sculpture, and design from 1900. W
3767 Nineteenth-century American Painting (4) From West and Copley to emergence of "The Eight." F
3775 Art of Indian Asia (4) History of Indian art with consideration of art of Central Asia and Southeast Asia. Sp
3776 Chinese Art (4) F
3777 Japanese Art (4) F
3811 Museology (4) Concepts, practices and historical development of museums of art, archaeology, anthropology and science. (Same as Anthropology 3811.)
4008 Special Topics (2-4) Student- or instructor-initiated course offered at convenience of department. Prereg: Determined by department. May be repeated. Maximum 16 hrs.
4015 Individual Problems (4) Prereg: Consent of instructor. May be repeated. Maximum 12 hrs.
4106 Special Topics in Drawing (3) Student- or instructor-initiated course offered at convenience of department. Prereg: Determined by department. May be repeated. Maximum 16 hrs.
4115 Drawing IV (6) Individualized pursuit of personal drawing techniques and concepts; individual and group critiques; weekly life drawing sessions. Prereg: 12 hrs 3315. May be repeated. Maximum 18 hrs. E
4206 Special Topics in Painting (3) Student- or instructor-initiated course offered at convenience of department. Does not substitute for basic program. Prereg: Determined by department. May be repeated. Maximum 12 hrs.
4215 Painting IV (6) Advanced painting stressing individual concepts and personal expression with varied media. Prereg: 12 hrs in 3215. May be repeated. Maximum 18 hrs.
4256 Special Topics in Fiber and Fabrics (3) Student- or instructor-initiated course to be offered at convenience of department. Prereg: Determined by department. May be repeated. Maximum 20 hrs.
4270 Fabric: Advanced Projects (4-6) Prereg: 8 hrs of 2370 or consent of instructor. May be repeated. Maximum 12 hrs.
4275 Fiber: Advanced Projects (4-6) Prereg: 8 hrs of 3275 or consent of instructor. May be repeated. Maximum 12 hrs.
4406 Special Topics in Sculpture (3) Student- or instructor-initiated course offered at convenience of department. Prereg: Determined by department. May be repeated. Maximum 12 hrs.
4415 Advanced Sculpture IV (4-6) Individual development of sculptural problems and techniques. Prereg: Consent of instructor. May be repeated. Maximum 18 hrs.
4470 Advanced Wood Sculpture (4-6) Application of lamination, carving, and joining techniques in designing and constructing of contemporary forms. Prereg: 2450 or consent of instructor. May be repeated. Maximum 18 hrs.
4502 Graphic Design/Illustration Practicum (1-16) Practical work experience in design or illustration field only by prearrangement with department. Prereg: Senior or graduate standing or consent of instructor. May be repeated. Maximum 16 hrs.
4505 Advanced Graphic Design (4) Advanced projects in conceptual and applied design for printed materials; publications, posters, advertisements. Prereg: 3545.
4506 Special Topics in Graphic Design/Illustration (3) Student- or instructor-initiated course offered at convenience of department. Prereg: Determined by department. May be repeated. Maximum 12 hrs.
4509 Product Illustration (4) Advanced media, techniques, styles and concepts as applied to illustration of products for printed reproduction. Prereg: 3529 or consent of instructor.
4516 Portfolio and Exhibition Techniques (4) Application of design principles to promotion, construction, display and evaluation for two- and three-dimensional artists. Prereg: Senior or graduate standing or consent of instructor. Sp
4519 Editorial Illustration (4) Advanced study of conceptual approaches in editorial illustration for printed reproduction. Prereg: 4505 or consent of instructor.
4506 Special Topics in Printmaking (3) Student- or instructor-initiated course offered at convenience of department. Prereg: Determined by department. May be repeated. Maximum 16 hrs.
4515 Intaglio IV (4-6) Photographic, collage techniques, combine printing with other print media. May be repeated. Maximum 18 hrs. F, W, Sp
4517 Screen Printing IV (4-6) Traditional hand cut and photographic stencils; combine printing on paper and other surfaces. May be repeated. Maximum 18 hrs. F, W, Sp
4706 Special Topics in Art History (4) Student- or instructor-initiated course offered at convenience of department. Prereg: Consent of department. May be repeated. Maximum 16 hrs.
4720 History of Printmaking (4) Survey of prints from fifteenth century to present. Twentieth century in Europe and the U.S. Prereg: 1815, 1825.
4811 Museum Internship (1-16) Prereg: 8 hrs from 3811-21-31 and consent of instructor. May be repeated. Maximum 16 hrs.
4855 Studies in Art History (2) Concentration in selected areas. Prereg: 18 hrs of art history and consent of instructor. May be repeated. Maximum 6 hrs.
4905 Advanced Photography (4-6) Individual development of photographic problems and techniques. Prereg: 3905, 3915, 3925. May be repeated. Maximum 18 hrs.
4906 Special Topics in Photography (3) Student- or instructor-initiated course offered at convenience of department. Prereg: Consent of department. May be repeated. Maximum 12 hrs.
4956 Special Topics in Ceramics (2) Student- or instructor-initiated course offered at convenience of department. Prereg: Determined by department. May be repeated. Maximum 12 hrs.
4968 Honors Ceramics IV: Advanced Projects (4-6) Prereg: 3900, 3960, and consent of instructor. May be repeated. Maximum 18 hrs.
4975 History of Ceramics Seminar (4) Historical and contemporary ceramics: clay sculpture, architecture, and pottery. Oriental, Ancient Greek, Pre-Columbian, and American ceramics. May not be used toward art history requirements. Prereg: 2950, 2960, and 2970.
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 not be repeated. S/NC only. E

5011-21-31 Exhibition in Lieu of Thesis (3, 3, 3) S/NC only. E

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

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

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


5525 Graduate Graphic Design/Animation II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp.


5706 Special Topics in Art History (4) Student- or instructor-initiated course offered at the convenience of the department. May be repeated with consent of department. Maximum 12 hrs.

5710 Studies in Medieval Art (4) Art and architecture of the Middle Ages: major monuments from Byzantium or western Europe. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 8 hrs.

5720 Studies in Baroque Art (4) 17th century art and architecture; major artists and works from either southern or northern Europe. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 8 hrs.

5730 Studies in Italian Renaissance Art (4) Art and architecture of the 14th, 15th and/or 16th centuries in Italy. Early or High Renaissance or Mannerist periods. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 8 hrs.

5740 Studies in Modern Western Art (4) Selected topics in 19th and 20th century western art. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 8 hrs.

5750 Studies in Modern American Art (4) Selected topics in 19th and 20th century American art. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 8 hrs.

5760 Studies in Asian Art (4) Selected topics in Japanese or Chinese art. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 8 hrs.

5900 Seminar in Art Criticism (4) Theory and practice. Intended for majors in studio art. A


5975 Graduate Ceramics II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp.

5999 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by the graduate faculty. May be repeated. Maximum 30 hrs. S/NC only. E

*Graduate II courses must be preceded by successful first year evaluation by the faculty.

Courses listed below offered periodically only at the Pi Beta Phi Arrowmont School of Crafts, Gatlinburg, Tennessee. Courses may be repeated.

4004 Special Topics (1-4) Student- or instructor-initiated course offered at convenience of the department.

4104 Drawing (1-4) Intermediate to advanced.

4204 Painting (1-4) Intermediate to advanced.

4254 Fiber Processes (1-4) Intermediate to advanced.

4264 Fiber Construction (1-4) Intermediate to advanced.

4274 Fabric Surface Design (1-4) Intermediate to advanced.

4284 Fabric Constructions (1-4) Intermediate to advanced.

4304 Watercolor (1-4) Intermediate to advanced.

4404 Communication Design (1-4) Intermediate to advanced.

4604 Printmaking (1-4) Intermediate to advanced.

4654 Metal Design (1-4) Intermediate to advanced.

4664 Enameling (1-4) Intermediate to advanced.

4904 Photography (1-4) Intermediate to advanced.

4954 Ceramics (1-4) Intermediate to advanced.

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Audiology and Speech Pathology

**MAJORS**

- **Speech and Hearing Science**
- **Speech Pathology**

**DEGREES**

- M.A.
- Ph.D.
- M.A.

**Professors:**

- H. L. Luper (Head), Ph.D. Ohio State; S. Adler, Ph.D. Ohio State; C. W. Asp, Ph.D. Ohio State; H. A. Peterson, Ph.D. Illinois; B. Silverstein, Ph.D. Purdue;

- Associate Professors: S. B. Burchfield, Ph.D. Michigan State; C. J. Ferrell, Ph.D. Tennessee.

**Assistant Professors:**

- A. G. Delafield, Ph.D. Washington; E. Hamby, Ph.D. Iowa; J. Robinson, Ph.D. Wayne State.

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**THE MASTER'S PROGRAM**

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

The intent of each major program is to provide the student with the scholarly and professional skills necessary for functioning as an independent practitioner 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 concentrate in audiological assessment, aural habilitation-rehabilitation, medical or pediatric or industrial audiology. Within the M.A. in the Speech Pathology program, a student may concentrate in language disorders, cultural language differences, or speech disorders such as aphasia or stuttering. Students interested in specializing beyond the typical 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 or 6000 level, no more than 9 hours of which may be thesis courses. Students in the non-thesis option program must present a total of 48 quarter hours of approved graduate credit and pass a final written examination. Students in the non-thesis program must present a total of 48 quarter hours of approved graduate credit and pass a final written examination. No more than 9 quarter hours of credit for practicum will be counted toward the degree requirements for thesis or non-thesis students. 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 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 have the opportunity 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.

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

1. Successful completion of course work in the study of one or more research tools, or other specific scientific methodological vehicles pertinent to the research interests of the candidate. The choice of research tools is subject to departmental approval.
2. A minimum of 9 quarter hours of graduate credit obtained in course work in a cognate field outside the Department of Audiology and Speech Pathology. These hours are in addition to those required in item 1 above.
3. Sufficient course work within the department but outside the area of specialization to give a broad foundation and understanding.
4. A comprehensive examination to demonstrate a general knowledge of the 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: 3200, 4330, or consent of instructor. (Same as Special Education 4040). F, Sp
4070 Free Association (4) Oral and written free association as process for diagnosing and treating communication disorders. Includes didactic self-analysis. W
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: 3204 or consent of instructor. (Same as Special Education 4310). F, Su
4320 Introduction to Clinical Practice in Speech Pathology (3) Prereq: 3040, 3050, 3310, and consent of instructor. (Same as Special Education 4320.)
4330 Clinical Practice in Speech Pathology (1-4) Prereq: 4320 and consent of instructor. (Same as Special Education 4330.) Audiology and Speech Pathology is the primary department.
4340 Clinical Practice in Speech Pathology (1-6) Prereq: 4040, 4330 and consent of instructor. (Same as Special Education 4340). May be repeated. Maximum 9 hrs.
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: 4720 and 4930. E
4460 Clinical Practice in Audiology (1-6) Prereq: 4450, 4720 and 4930. E
4470 Clinical Practice in Audiology (1-6) Prereq: 4460, 4720, 4930. May be repeated. Maximum 9 hrs. E
4520 Speech Pathology (3) Independent study of special 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. May be repeated. Maximum 6 hrs. E
4610 Introduction to Language Pathology in Children (4) Nature and identification of language retardation. Observation in language clinic is available. Prereq: 3040, 3200, or consent of instructor. F, Sp
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. Sp
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. W
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 various minority groups, 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, early childhood education, developmental psychology, genetics, and psychology. Prereq: 4610 or consent of instructor. Su
4720 Audiology II (4) Basic principles of clinical audiometry, pure-tone, speech, masking and overview of special auditory tests. Prereq: 3710. (Same as Special Education 4720.) W, Su
4930 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 4930.) F, W, Su
4940 Introduction to the Verbo-Tonal System (4) Prereq: 3710. Recommended prerequisite: management of 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 be used toward degree requirements. May be repeated. S/N.C only. E
5005 Thesis Equivalent Research (1-9) Prereq: 5110 and M.A. in Speech Pathology or Audiology or equivalent. May be repeated. Maximum 9 hrs.
5040 Advanced Clinical Practice in Audiology Study and Practice (1-6) Prereq: 4720 and 4930. May be repeated. Maximum 12 hrs. (Same as Special Education 5040.) E
5041 Advanced Clinical Practice in Audiology: Off-Campus Sites (1-6) Prereq: Consent of instructor. E
5045 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, suggestions for better use of communication skills. Prereq: 4720, 4930, and consent of instructor. May be repeated. Maximum 9 hrs. E
5050 Practicum in Verbo-Tonal Habilitation (1-6) Prereq: 4940, 5950, or consent of instructor. May be repeated. Maximum 9 hrs. E
5051 Practicum in Aural Rehabilitation (1-6) Prereq: 4720 and 4930. May be repeated. Maximum 9 hrs. E
5060 Neural Bases of Speech and Language (3) Structure and function of central and peripheral nervous systems, with emphasis on their role in speech and language. Prereq: 3050. F, W
5070 Anatomy and Physiology of Hearing (3) Structure of human ear, pathologies of hearing impairment, and psychoacoustics of audition. Prereq: 3710. F
5071 Electrophysiological Assessment of Auditory Function (2) Techniques for electrophysiological measurement of auditory sensitivity, sound transmission by ear, distortion in ear, and ear as analytic mechanism. Prereq: 4720, 5070 or consent of instructor. Sp
5100 Comparative Anatomy of the Peripheral Auditory Structures (3) Tutorial laboratory course in comparative anatomy of temporal bone employing microscopic dissection techniques. Prereq: 5070 or consent of instructor. E
5110 Introduction to Research in Speech and Hearing (3) Analysis of research techniques, application of statistics, and completion of pilot research project. Prereq: Elementary statistics. F, W, Su
5117 Instrumentation in Audiology and Speech Pathology (3) Principles of instrumentation used in audiology and speech pathology. Prereq: 3010. W, Sp
5119 Laboratory in Instrumentation in Audiology and Speech Pathology (1) Laboratory assignments designed to familiarize student with instruments for measuring sound and hearing phenomena. 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, 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, W, Su
5230 Seminar: Voice Disorders (3) Current significant research in theory and management of voice disorders. Prereq: 4400 or consent of instructor. W, Su
5230-30-40 Advanced Clinical Practice in Speech and Language Disorders (1-6, 1-6, 1-6, 1-6) Prereq: 4400 or consent of instructor. May be repeated. Maximum 9 hrs. E
5350-60-70 Advanced Clinical Practice in Speech-
5351 Advanced Clinical Practice in Speech-Language Pathology: Public Schools (1-6) May be repeated. Maximum 9 hrs each.

5380 Cerebral Palsy (3) Neurological foundations and speech and language training. Prereq: 5060. (Same as Special Education 5280.) F, W, Sp

5381 Adult Dysarthria (3) Neuromotor organization for adult production: types of adult dysarthria and associated neuromuscular 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 Auditorium Calibrazione (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 Audiology (3) Audiologist's role in noise-related activity, clinical, legal and consulting applications. Prereq: 5450 or consent of instructor.

5460 Advanced Audiometry (3) Theory and practice of advanced pure tone and speech of audiometry; interpretation and instrumentation 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 using several impedance measurement devices. Prereq: 4720 and 5070. W


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 differential diagnosis between 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 and consent of instructor. May be repeated. Maximum 8 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 in children. Prereq: 4510 (Same as Special Education 5540.) Sp

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. Role of speech and language pathologists interested in private practice, supervisory or administrative positions. Su

5600 Independent Study in Audiology (1-6) Special reading, consultation, and research activities in field of audiology. May be repeated. Maximum 6 hrs. E

5610 Practicum: Language Pathology in Children (3) Seminar and practicum involving discussion and utilization of testing tools and analyses of habilitative philosophies, specialties and techniques. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5651 Seminar in Language Differences (3) Significant research relevant to the language development of culturally different children. Prereq: 4850. Su

5730 Hearing Disorders (3) Advanced study of auditory disorders commonly encountered in medical environment. Identification of possible procedures to differentiate lesions of auditory mechanism. Field trips may be required. Prereq: 4720 or equivalent and 5070. F

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. W

5750 Educational Audiology (3) Advanced case management of hearing impaired child: audiology follow-up; educational alternatives, teacher and parental counseling, social adjustment, classroom acoustics and psychological and social factors of educational significant. Prereq: 5040 and 5440. W, Su

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 Aural Rehabilitation (3) Procedures and program assessment of rehabilitative interventions and counseling strategies for hearing-impaired. Prereq: 4930. Sp

5950 The Verbo-Tonal System (3) Theory, procedures, and instrumentation of Verbo-Tonal System in habilitation, rehabilitation, diagnosis, speech therapy, and foreign languages. Prereq: 3710. Recommended prereq: 3050, 4720, and 4930. F, W, Su

6000 Doctoral Research and Dissertation (3-15) P/Ed.

6560 Directed Research (1-6) Participation in ongoing or non-dissertational research. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. W, A

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 Hearing Science (1-3) May be repeated. Maximum 9 hrs. E

6600 Directed Study in Language Pathology: Public Schools (1-6) Prereq: 100 hrs clinical experience, consent of instructor. May be repeated. Maximum 9 hrs each.

6651 Seminar in Language Differences (3) Significant research relevant to the language development of culturally different children. Prereq: 4850. Su

6717 Theories of Hearing (3) Physiological process basic to classical theories of hearing related to sensitivity; loudness; pitch; and discrimination of acoustic stimuli. Prereq: 5070 or consent of instructor. Sp, A

6850 Seminar in Hearing Science (3) Advanced study of perception of non speech acoustic signal: detectability, pitch, loudness, differential threshold, adaptation, and fatigue. Prereq: 5020 or consent of instructor. May be repeated. Maximum 9 hrs. W, A

6910 Experimental Design in Speech and Hearing (3) Analysis of experimental design in theses and related journals. Psychophysical methods for data acquisition. Generation of experimental designs based on parametric statistics. Prereq: 5110 or equivalent and consent of instructors.

6917 Theories of Hearing (3) Physiological process basic to classical theories of hearing related to sensitivity; loudness; pitch; and discrimination of acoustic stimuli. Prereq: 5070 or consent of instructor. Sp, A

6950 Advanced Seminar in Audiology (3) Prereq: Consent of instructor. May be repeated. Sp

6952 Advanced Seminar in Speech Pathology and Language Pathology (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 symbolism. Prereq: Consent of instructor. May be repeated. E

6956 Directed Research (1-4) Participation in ongoing or non-dissertational research. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. E

6957 Directed Study in Speech Pathology (1-3) May be repeated. Maximum 9 hrs. E

6958 Directed Study in Audiology (1-3) May be repeated. Maximum 9 hrs. E

6959 Directed Study in Speech Science (1-3) May be repeated. Maximum 9 hrs. E

6960 Directed Study in Speaking Science (1-3) May be repeated. Maximum 9 hrs. E

Biochemistry

MAJOR

DEGREES

Biochemistry

M.S., Ph.D.

Professors:

W. D. Wicks (Head), Ph.D. Harvard;
J. E. Chunrith, Ph.D. Sheffield (England);
L. Huang, Ph.D. Michigan State; J. G. Joshi, Ph.D. Poona (India); K. J. Moony Ph.D. Rochester;
T. P. Solo (Emeritus), Ph.D. Michigan.

Assistant Professors:

A. H. Forbath, Ph.D. California (Berkeley);
E. Freer, Ph.D. Virginia; J. W. Koontz, Ph.D. Kentucky.

Adjunct Faculty:

W. Farkas, Ph.D. Duke; S. Keneel, Ph.D. California (San Diego); B. Lewis, Ph.D. Yale.

The graduate program includes successful completion of a minimum of 90 credits of coursework, seminars and exams. In addition, 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 MASTER'S PROGRAM

This program requires about two years of full-time study and provides both breadth and depth of training in advanced areas in biochemistry and related 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 and university laboratory work, cancer research, scientific journalism, and pursuit of Ph.D. degrees.
Candidates usually should offer course work covered by an undergraduate major in the biological sciences, chemistry or biochemistry. 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:

a. The preparation of a research manuscript suitable for submission for publication in a major scientific journal; and oral defense of that manuscript before a examining committee of three faculty members appointed by the head of the department, at least two of whom shall be members of the department.

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

4110-20 Cellular and Comparative Biochemistry (4, 4) Electrolyte behavior; chemistry and structure of proteins; enzyme behavior and biological function; catalabile; enzy; metabolic pathways; the role of proteins in nutrition and defense; nucleic acid function, protein synthesis and biochemical genetics; regulation of biological processes. Must be taken in sequence. Prereq: Chemistry 3211-21-31, 3219-29-39, and 1 course from Biology 1210-20-30 or Botany 1110-20-30. 3 lectures and discussion. F, Sp.

4119 Cellular and Comparative Biochemistry Lab (3) Basic analytical and biochemical procedures in biochemistry and molecular biology: pH, titrations, spectrophotometry, chromatography, electrophoresis, sedimentation and immunological assays. Prereq or coreq: 4110 or equivalent. F, W.

4129 Cellular and Comparative Biochemistry Lab (2) In depth experiments with enzymes, nucleic acids and membrane components. Biochemical kinetics; hybridization, sequencing, sedimentation, radiotopic labeling, and immunochromatography analysis. Prereq or coreq: 4110-20 and 4119. Sp.


4210-20 Introduction to Physical Biochemistry (3, 3) Introduction to thermodynamics; phase stability and phase change; chemical potential; osmotic pressure; activity and the Debye-Huckel model; electrochemistry; membrane permeability. Elements of statistical mechanics, diffusion; collision theory; chemical kinetics and transition state theory, higher order kinetics and transition state theory, higher order kinetics; specialized kinetics of enzymatic processes; some biocatalysis studies. Prereq: Mathematics 1840-50-60, Chemistry 3211-21-31 and 3219-29-39, and an introductory course in biology. F, W.

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

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

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

5310 Experimental Techniques (3) Laboratory course in modern experimental methodology and instrumentation. Intended for both non-scientists graduate students. Prereq: Consent of instructor.

4320-30 Experimental Techniques (3, 3) Laboratory rotations. Prereq: 5310. Some opportunities for independent study. Intended for graduate students. Prereq: Consent of instructor.

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


5610 Environmental Toxicology (3) Basic concepts in toxicology, interactions at subcellular, cellular, organ, organismal, population, and environmental levels, legal aspects of major environmental biochemistry. Prereq: 4116-20. Chemistry 3211-21-31. Chemistry 4910-20-30, or consent of instructor. (Same as Ecology 5614) W.

5640 Techniques in Environmental Toxicology (3) Survey of experimental techniques for assessment of presence, toxicity, and impacts of pollutants in global ecosystems. Laboratory methods and techniques: analytical, biological, and bioassay methods employed in toxicological studies. Prereq: Chemistry 2140-49, 3211-21-31, 3219-29-39. (Same as Ecology 5646.) W.

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


6110 Advanced Topics in Biochemistry and Biophysical Methods (3-3) Application of modern biological methods to biochemical and biological problems; biochemical genetics, biophysical problems; biophysical and biophysical properties of biological macromolecules and membranes. Static and time-resolved fluorescence spectroscopy, calorimetric methods, resonance Raman spectroscopy, x-ray crystallography, magnetic resonance, gene cloning, hybridization technology, electron microscopy and other techniques. Prereq: 5510-20-30 and 4230.

6129 Advanced Topics in Mechanisms of Enzyme Catalysis (3) Enzyme function: specificity and rate accelerations; enzyme-substrate complementarity; theories of catalysis; measurements and magnitudes of catalytic rate constants; rapid mixing techniques; relaxation methods; rate-determining processes; group transfer reactions; oxidations and reductions; eliminations, isomerizations and rearrangements and reactions that make and break carbon-carbon bonds. Prereq: 5510-20-30 and 4220.


6140 Advanced Topics in Membrane Structure and Function (1-3) Structural organization of biological membrane components, dynamic properties as studied biophysically and biophysically and biophysically, selected topics of membrane functions related to structural organization. Prereq: 5510-20-30.

6150 Advanced Topics in Metabolic Regulation (1-3) Structure and function of enzymes and their regulation by metabolites or hormones; regulation due to ligand interactions or covalent modification; hormone-receptor interactions, internalization, degradation, and recycling. Prereq: 5510-20-30.


6170 Current Topics inBiochemistry (1) Seminars and lectures dealing with current advances in field of chemical biology. May be repeated with consent of department. S/NC only. F, W, Sp.


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

6440 Current Topics in Regulation of Protein Function (1) Covalent modifications of proteins by phosphorylation-dephosphorylation, allosteric interactions, etc. Prereq: 4110-20 or equivalent. May be repeated. Maximum 9 hrs. S/NC only. F, W, Sp

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

**Biology**

4150 Scientific Illustration (3) Introduction to design and production of graphs, charts for scientific illustration; planning of poster presentations and displays. No graphics background required. Prereq: 6440. S/NC only. F, W, Sp

**Botany**

MAJOR DEGREES

Botany M.S., Ph.D.


Associate Professors: C. C. Amundson, Ph.D. Colorado; A. S. Heilman, Ph.D. Ohio State; R. R. Henke, Ph.D. Miami (Ohio); L. G. Kickok, Ph.D. Massachusetts; B. Moller, Ph.D. North Carolina State; O. J. Schwartz, Ph.D. North Carolina State; W. O. Smith, Ph.D. Duke.

Assistant Professors: E. E. Schilling, Ph.D. Indiana; D. K. Smith, Ph.D. Tennessee; B. E. Wolford (Curator), Ph.D. Tennessee.

*Alumni Distinguished Service Professor*

The Department of Botany offers the Master of Science and Doctor of Philosophy degrees with concentrations in anatomy, bryology, cytology, cytokinetology, ecology, genetics, lichenology, morphology, mycology, photobiology, physiology, pteridology, and taxonomy.

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.

For further information, contact the Department Head or the Graduate Coordinator.

**Requirements for Admission:** The Botany Department requires scores from the general and subject test portions of the Graduate Record Examination, at least three letters of recommendation or standard recommendation forms from academic or professional persons, a short statement describing reasons for interest in graduate education in botany, and the following specific courses: (1) general botany or biology, 12 quarter hours; (2) advanced botany or closely allied biological sciences, 18 quarter hours; (3) physical sciences; general inorganic chemistry, 12 quarter hours organic chemistry and physics highly recommended; (4) college mathematics, 9 quarter hours.

**THE MASTER'S PROGRAM**

**Thesis Option:**
1. Satisfactory preparation of a written formulation and as 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. Demonstrate reading proficiency in one modern foreign language or in the use of computers for data analysis. Proficiency in a foreign language may be demonstrated by satisfactory performance on an examination or an oral examination. Proficiency in the use of computers may be demonstrated by satisfactory performance on an examination or an oral examination.
3. Satisfactory completion of 9 credit hours at the 6000 level.
5. Presentation of a thirty-minute departmental seminar.

**Non-Thesis Option:**
1. Satisfactory completion of 51 quarter hours of approved graduate courses of which 30 quarter hours must be in botany including Botany 5003 and 5004.
2. Satisfactory completion of 2 credit hours at the 6000 level.
3. Satisfactory performance on a final examination on all work offered for the degree. A grade of A or B in Botany 5003 and 5004 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 and oral 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 comprehensive examinations may be required by the individual student's faculty committee.*

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

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

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

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

**3070 Genetics and Society (3) An introduction to genetics, anthropology and evolution with emphasis on their implications for human society. (Same as Anthropology 3070.) W

**3090 Botany and Human Affairs (3) Basic biological principles involved in preservation and development of an environment in which human cultures may survive. F

**3210 Introductory Plant Physiology (4) Organismal physiology of plants; water relations, mineral nutrition, morphogenesis, elements of metabolic processes, effects of age, light, natural rhythms, temperature and other environmental factors. Lecture and lab. Prereq: 1 yr general chemistry and 1 yr biological sciences. F, Sp, Su

**4017 Field Mycology (3) Field experience on identification of higher fungi. Frequent field trips, field recognition of species and habitats, laboratory sessions. Prereq: 6 hrs. by satisfactory performance on an examination. Recommended prerequisite: 3010-20 or equivalent. Sp, A

**4021 Field Bryology (3) Field experience on identification of mosses and liverworts. Frequent field trips, field recognition of species and habitats, laboratory sessions. Prereq: 6 hrs. of botany. Recommended prerequisite: 3010-20 or equivalent. Sp, A

**4022 Field Lichenology (3) Field experience on identification of lichens. Frequent field trips, field recognition of species and habitats; laboratory sessions. Prereq: 6 hrs. botany. Recommended prerequisite: 3010-20 or equivalent.

**4023 Field Agroecology (3) Field experience on identification of grasses. Frequent field trips, field recognition of species and habitats; laboratory sessions. Prereq: 6 hrs. botany. Recommended prerequisite: 3010-20 or equivalent. Sp, A

**4030 Mechanisms of Plant Speciation (3) Processes of plant speciation emphasizing population genetics, isolation, drift, hybridization, variation in populations, establishment of population barriers and other aspects of plant speciation. Prereq: 3010-20 and Botiology 3110. W

**4045 Aquatic Vascular Plants (3) Field experience on identification of aquatic vascular plants. Frequent field trips, field recognition of species and habitats. Prereq: 6 hrs. botany. Recommended prerequisite: 3010-20 or equivalent. Sp, A

**4050 Synanthropology (3) Field experience on identification of composite plants. Frequent field trips, field recognition of species and habitats; laboratory sessions. Prereq: 6 hrs. botany. Recommended prerequisite: 3010-20 or equivalent. Sp, A


**4061 Field Physiography (3) Field experience on identification of fresh water algae. Frequent field trips, field recognition of species and habitats; laboratory
to phytoplancton communities, and physiological adaptations by populations to environment. Prereq: 3010 or consent of instructor, F, A.

5070 Principles of Biological Illustration (3) Principl es and application of photomicrography and photomacrography, drawing graphics, and other methods for recording and presentation for research and publication of data in pictorial or graphic form. 1 hr and 2 labs. W.

5080 Pteridology (4) Evolutionary study of lower vascular plants: morphology, cytology, ecology, life cycles and classification. Biochemical studies and investigations on correlation of ultrastructure, cell fractionation and isolation of subcellular components; differentiation and analytical centrifugation; photomicrography and microcinematography. Intended for graduate students in the biological sciences. 2 hrs and 2 labs, Sp, A.

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

5150 Advanced Morphology of Flowering Plants (4) Vegetative and reproductive organography; regulatory physiology, floral development, pollination mechanisms, embryology and deviations, seed and fruit development. Prereq: 3020-30 or 4120; 3210 or consent of instructor, F.

5160 Biosystematics (4) Major experimental methods used in systematics and application to studies of types of systematic problems. Cytotaxonomy, numerical taxonomy and chemotaxonomy. Prereq: Consent of instructor.

5210 Advanced Plant Physiology I (3) Plant cell metabolism: carbon, nitrogen and sulfur assimilation, respiration and biosynthesis of specialized plant products such as terpenoids, alkaloids and pigments. Prereq: Consent of instructor. F, A.

5220 Advanced Plant Physiology II (3) Photophysics, response of plants to light: photochemistry, photore sponse, and photophore mediated responses. Water and solute uptake, ion, and movement; translocation; and fundamentals of mineral nutrition. Prereq: 5210 or Biochemistry 4120 and plant or cell physiology course. Recommended prereq: 1 yr of physics, V.

5235 Advanced Plant Physiology III (3) Growth and differentiation of plants at molecular, cellular and organ ismic levels. Hormonal regulation of development; macromolecular interpretation of differentiation control by hormonal factors; germination, flowering and senescence. Prereq: 5210 or Biochemistry 4120 and a plant cell physiology course. Recommended prereq: 5220, Sp.

5250 Quaternary Problems (4) (Same as Geology 5290 and Zoology 5250.)

5310-20-30 Special Problems in Botany (1-6) Needs of students determine content. Prereq: 3110-20 or 4110, 2 hrs and 1 lab for 5310; 3 hrs and 1 lab for 5320; 4 hrs and 1 lab for 5330.

5350 Analysis of Plant Communities (4) Plants as elements of ecosystems. Prereq: 5350 or equivalent. 2 hrs and 2 periods (field trips), Sp, A.

5360 Marine Ecology (3) Relationships of marine organisms to environment and their interactions with each other. Trophic relationships in nertic, coastal and pelagic communities; carbon, nitrogen and sulfur assimilation, nutrient uptake, primary production, community structure, and classification. Prereq: Biology 3110 and Chemistry 3231. F.

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

5440 Seminar in Botany (1) Readings and discussions of current literature and/or selected topics in botanical research. May be repeated. Maximum 12 hrs. S/N only, F, W, Sp.


5730 Population Biology (4) (Same as Zoology 5730.)

5870 Plant Cytology (4) Intensive consideration of cellular organization, structure and function, with emphasis on investigation into cell division, meiosis, and chemotaxonomy. Prereq: 5870 for 5910; 5910 for 5920, 2 hrs and 1 lab for 5910; 1 hr and 1 lab for 5920. F, A.

6000 Doctoral Research and Dissertation (3-15) PrNP only.

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

6310 Advanced Topics in Cryptogamic Botany (2-4) Advanced studies and current research in experimental physiology, mycotaxy, bryology, pteridology, or developmental morphology of cryptograms. Prereq: May be repeated with consent of department.

6600 Doctoral Research and Dissertation (3-15) PrNP only.

6610 Advanced Topics in Morphology of Vascular Plants (4) Needs of students determine content. Topics selected from broad categories of experimental anatomy, morphology, and morphogenesis. Prereq: 3020-30 or 4120, 5910-20 or consent of instructor. May be repeated with consent of department.
cytoplasmic organelles and cellular systems, experimental cytology, cellular control of nucleic acids and biosynthesis. Prereq: 5780. Biology 3110; Biochemistry 4110-20. May be repeated with consent of department.

6320 Ecosystems of the World (3) (Classification and characterization of ecosystem types; interrelationships of climate topography, soils, vegetation, and fauna. Prereq: 5340. F, A)

6370 Applied Ecology (4) (Same as Ecology 6370.)

6420 Advanced Topics in Genetics (2-4) Literature survey of selected topics from all areas of genetics. Prereq: Biology 3110; Biochemistry 4110-20. May be repeated with consent of department.

6620 Seminar in the History of Botany (2) F, A

6820 Advanced Topics in Plant Physiology (2-4) Requirements of student determine content, including growth and growth hormones; minor element nutrition; photoperiodism; radiation effects. Prereq: 5210, 1 yr college physics. May be repeated with consent of department.

6830 Advanced Topics in Ecology (2-4) Needs of student determine content, such as morphophysiology; radiation ecology; system ecology. Prereq: 4310, 5340, 5350. May be repeated with consent of department.

6830 Advanced Topics in Systematics (2-4) Needs of student determine content, such as morphophysiology; radiation ecology; system ecology. Prereq: 4310, 5340, 5350. May be repeated with consent of department.

6930 Advanced Topics in Systematic Botany (2-4) Needs of student determine content, such as morphophysiology; radiation ecology; system ecology. Prereq: 4310, 5340, 5350. May be repeated with consent of department.

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, including:
   a. 4180-70.
   b. Two of the following (except for polymer science): 5511, 5521, 5531.
   c. For emphasis in polymer science, 5531, 5410-50, Polymer Engineering 4910 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 5250-60-20 or 5420-30 or 5710-20-30, 5810), and Mechanical Engineering 4180.
   f. For other specializations, one of the following sequences: 5110-20-30-35 or 5250-60-70 or 5420-30 or 5710-20-30, 5810, and Mechanical Engineering 4180.
4. 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.

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.

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.

b. Two of the following (except for polymer science): 5511, 5521, 5531.
   c. For specialization in analytical, inorganic, organic, physical, or theoretical 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 organic, 5110-20-30-35; (4) for physical, 5340-50, 5410-20-30-50, (5) for theoretical, 5340-50, 5410-20-30-50; Physics 5210.
   d. For specialization in environment or energy, a six-month internship in a government 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, ecology, computer science, statistics, and industrial health; (2) for energy, 5410, 5610-20-30, a chemistry sequence (5110-20-30-35 or 5250-60-20 or 5420-30 or 5710-20-30, 5810), Mechanical Engineering 4180, plus other courses from areas such as catalysis, heterogeneous equilibria, kinetics, thermal science, combustion and propulsion engines, resource economics, civil engineering, and electrical engineering.
   e. For specialization in chemical physics, an examination on the basic principles of mechanics, electricity, and magnetism; 5410-20-30-35, 5110-20 or 5710-20, 6730 or 6810, Mathematics 4540, 4610, 4710, Physics 4510-20-30, 5110-20-30, 5210, 5610-20-30.
   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.

Graduate course work in related fields may be used for undesignated course work in this requirement at the discretion of the student's faculty committee.

All course selections must be approved by the appropriate departmental committee.

4. A comprehensive advanced examination in the field of specialization.

5. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.

6. A final oral examination.

*3211-21-31 Organic Chemistry (3, 3, 3) Compounds of carbon and their elements; characterization of structure; spectroscopic and other physical properties. Must be taken in sequence. Prereq: 1110-20-30. Corresponding lecture (3211-21-31) is coreq for students not having credit for the laboratory. E

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

chemistry majors and students planning careers in molecular systems. Molecular symmetry, crystal structures, chemical kinetics. Quantum mechanics of atomic and molecular systems in tracer and therapeutic applications. (3521-31 or 3221-31) is coreq for students not having completed 4160. F, W, Sp.

3529-39 Organic Chemistry Laboratory (1,1) Experiments on topics discussed in 3221-31. Similar to 3521-39 except designed for students who need for operating knowledge of various spectroscopic and chromatographic techniques. Corresponding lecture (3521-31 or 3221-31) is coreq for students not having had credit for the lecture.

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


4119 Physical Chemistry Laboratory (2) Solutions, phase equilibria, reaction kinetics and spectroscopy. The corresponding course 4110 is coreq. F, W.

4160-70 Intermediate Physical Chemistry (3, 3) (Designed for entering graduate students who have had one year of physical chemistry.) 4160—The three laws of thermodynamics, phase equilibria and solutions, and chemical equilibria. 4170—Gases and kinetic theory of gases. 4160-70 recommended. F, W.

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

4219 Advanced Analytical Chemistry Laboratory (2) Experiments on topics in 4210. Coreq: 4210. W.

4220 Advanced Analytical Chemistry (3) Electroanalytical methods of analysis (including potentiometry, coulometry, polarography, and voltammetry); magnetic susceptibility, nuclear magnetic resonance, infrared, and mass spectrometry. Prereq: 4221-39 or equivalent. F, W, Sp.

4510 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. F, W.


4510 Organic Chemistry of Polymers (3) Synthesis of monomers; mechanism, stereochemistry, and sequence distribution of polymerizations. Formation of block, graft, and network polymers. Reactions on polymers, including degradation. Prereq: 5140 and 5531. A.


5220 Analytical Chemistry of Environmental Pollutants (3) Application of modern 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 spectroscopy, structure elucidation by IR, NMR, UV, and mass spectrometry; 5260—Chemical separation methods: solvent extraction, chromatography, electrophoresis; radiochemical methods; fluorescence, x-ray methods; 5270—Electroanalytical, magnetic and thermal analytical methods; on stream and automatic analysis. Prereq: 1 yr of physical chemistry. F, W, Sp.

5340 Quantum Chemistry (3) Postulate approach to fundamental principles of quantum mechanics. Accurate solutions to Schrödinger equation; approximate (ab initio and semiempirical) molecular orbital methods; calculation of molecular properties. F.

5350 Quantum Chemistry (3) Electronic excited states; introduction to group theory and electronic 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. 5440—Statistical thermodynamics.

5511 Survey of Inorganic Chemistry (3) Atomic structure, wave mechanical atoms, ionic and covalent bonding, coordination complexes, 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; spectrophotometric, electroanalytical, and separation methods. F.

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

5560 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.

5560-30-30 Chemical Basis of Energy Conversion (1, 1, 1) Chemistry of various energy and fuel interconversion systems. Introduction to homogeneous and heterogeneous catalysis, the dynamics of energy conversion systems, fossil fuels chemistry, and electrochemical and photochemical conversion systems. Prereq: 5410 and one 5000 sequence. F, W, Sp.


5580 Nuclear Chemistry (3) Nuclear properties, radioactivity, radioactive decay processes, nuclear structure and models, nuclear reactions, radiation and matter, radiation detection. Prereq: 1 yr of physical chemistry. A.

5911-31-31 Seminar (1, 1, 1) Departmental research, current literature research, general topics, Major Requirements. Registered students only. Freq. offered each quarter except summer for resident graduate students. SI 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 synthesis of naturally occurring substances of biological or environmental significance. Course content varies with each offering to reflect areas of current chemical interest. Prereq: Two of 5110-20-30-35.


6175 Organic Photochemistry (3) Physical and chemical effects of electron excitation of organic molecules. Experimental data and theoretical techniques of photochemistry and photophysics; application of these techniques to reactions of organic molecules. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

6210 Advanced Analytical Spectroscopy (3) Newer methods of spectroscopic analysis, including transform methods, lasers in spectroscopy, fiber optics, study of materials and other photoactive species. Two of 5110-20-30-35.

6211 Selected Topics in Analytical Chemistry (3) Subject matter varies among important topics of current significance: environmental chemistry, biotechnology, food industry, nuclear chemistry, and so on. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

6430 Photochemistry and Radiation Chemistry (3) Fundamental physical and chemical processes occurring in photochemical processes, including application of these processes to current problems in chemistry. Prereq: Consent of instructor. 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 nuclear structure and behavior. Prereq: Two of 5110-20-30-35.

6430 Chemistry and Radiation Chemistry (3) Fundamental physical and chemical processes occurring in photochemical processes, including application of these processes to current problems in chemistry. Prereq: Consent of instructor. May be repeated. A

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

6411 Selected Topics in Physical and Theoretical Chemistry (3) Subject matter varies among important topics of current significance. Prereq: Two of 5410-20-30-50, 5340-50. May be repeated. A

6280 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: photochemistry, spectroscopy, transition chemistry, organometallic compounds, inorganic solution kinematics and mechanisms, crystal chemistry, nonaqueous chemistry, and coordination and organometallic compounds. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

6730 Topics in Quantum Chemistry (3) Application of newer methods to complex systems including metal complexes, polymers, and molecules of biological significance. Recent theoretical developments. (Effect of external fields and collision processes.) Recent theoretical developments. Prereq: 5340-50.

6750 Molten Salt Chemistry (3) Structure, spectroscopic properties, solvation 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


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 Euripides (2) A

4020 Aeschylus, Sophocles (3) A

4040 Aristophanes (3) A

4500-60-70 Directed Readings in Greek (3, 3, 3) F, W, Sp

5010 Special Topics in Greek Literature (3) May be repeated. Maximum 9 hrs.

Latin

3440 Livy (3) A

3460 Elegiac Poets (3) A

4310 Selected Readings from Latin Literature (3) A

4320-30 Selected Readings from Latin Literature (3, 3) May be repeated: A; A

4340 Horace, Odes (3) A

4350 Tacitus (3) A

4360 Lucretius (3) A

4370 Readings in Medieval Latin (3) A

5310 Special Topics in Latin Literature (3) May be repeated. Maximum 9 hrs.

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

5510-20 Roman Comedy; Plautus (3, 3) A

GENERAL COURSES

3310 Art and Archaeology of the Aegean Bronze Age and Early Greece (3) Troy, the Cyclades Islands, Greek mainland, and Crete. Emphasis on palaces of Crete and Mycenae, Tiryns, and Pylos, their fall, the fall of Troy, and the Dark Ages. May be repeated. Maximum 9 hrs.

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 of quality of life. Such cities as Mycenae, Athens, Priene, Alexandria, Rome, and Lepcis Magna will be studied. F

3350 Shrines and Sanctuaries of the Greek and Roman World (3) Survey of major shrines and sanctuaries of Greek and Roman world with emphasis on archaeological remains. Such sites as Olympia, Epidaurus, Paeonian, Pergamum, and Baalbek will be considered. Greek and Latin authors will add to understanding of place of great shrines and sanctuaries in Greek and Roman life. A

4220 Seminar in Classical Studies (3) Field of classical studies today. Recent archaeological discoveries in areas of both philology and archaeology; impact of decipherment of Linear B, new understandings of cultural and political "golden ages" of Pericles and Augustus; classical studies and academic profession on both high-school and college levels. May be repeated. Maximum 6 hrs.

4410 Special Topics in Classical Civilization (1-3) Topical in art, literature, religion, and society of Greece and Rome. May be repeated with consent of department. Maximum 9 hrs.

4510 Selected Readings in Latin Literature in Translation (3) Content varies; may be repeated with consent of department. Maximum 9 hrs.

4610 Studies in Classical Archaeology (3) Variable content course offering subject matter not taught in existing course, or concentrating on one aspect of existing survey. Prereq: According to topic. May be repeated. Maximum 9 hrs. A

4620 Roman Law (3) Development of Roman law by jurists; relationship of Roman law to American law and society; relationship of Roman law to American jurisprudence. Case-book format.

5610 Special Topics in Classical Civilization (3) May be repeated. Maximum 9 hrs.

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

Computer Science

MAJOR

DEGREE

Computer Science

M.S., Ph.D.

Professors: John S. Bradley, Acting Head, Ph.D. Iowa (Mathematics, Head); M. Moore Jr., Ph.D. Aligarh; J. E. Bloor, Ph.D. Manchester (U.K.) (Chemistry); R. C. Gonzalez, Ph.D. Florida (Electrical Engineering); K. K. O’Kane, Ph.D. Pennsylvania State; G. R. Sherman, Ph.D. Purdue (Director of Computer Center); M. G. Thomason, Ph.D. Duke.

Associate Professors: R. B. Blake, Ph.D. Oxford (U.K.); C. P. Pfleegor, Ph.D. Pennsylvania State; Z. Ras, Ph.D. Warsaw (Poland).

Assistant Professors: J. R. B. Cockett, Ph.D. Leeds (U.K.); Seung-Chul Lee, Ph.D. Florida State; D. W. Straight, Ph.D. Texas; M. Zemankova, Ph.D. Florida State.
BACKGROUND REQUIREMENTS TO M.S. PROGRAM
Upon admission to the graduate program in Computer Science, students will need to develop any missing parts of the following background:

1. 2610 and 3520 or equivalent course in advanced programming and assembler language programming.

NOTE: The department currently offers a 7-hour Immigration Course (5100/5109) that covers the material in these courses. The Immigration Course is taught once a year, in the fall quarter; it assumes the student has had at least one quarter of substantial programming background:

2. 2215 and 3215 or equivalent courses in discrete structures.

3. 3155 or an equivalent course in introductory numerical algorithms.

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

THE MASTER'S PROGRAM
All 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 department offers two options:

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

2. Complete at least 9 hours of thesis credit, Computer Science 5000.

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

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

2. Pass written and oral comprehensive examinations.

Under either option, 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.

A student will not be allowed to continue in the Computer Science program if any of the following occurs:

1. The student cheats or engages in any other act of dishonesty with respect to the University community. In particular, for computer programs assigned as individual projects, this includes getting or giving help as well asコピーing or modifying all or part of another person's program.

2. The student's cumulative graduate GPA falls below 3.0 for two consecutive quarters, excluding the summer quarter.

3. The student earns two or more grades below C in courses taken for graduate credit.

THE DOCTORAL PROGRAM
Entrance Requirements: In addition to the admissions procedures required by the Graduate School, a student seeking admission to the Ph.D. program must:

1. Have three letters of recommendation sent directly to the Department Head from individuals capable of assessing the student's potential for advanced work in computer science (for example, college teachers, or employers for whom the student has worked after earning a bachelor's degree). The department reserves the right to contact these individuals or other knowledgeable people of additional information deemed necessary or desirable.

2. Complete at least 9 hours of thesis credit, Computer Science 5000.

3. Have three letters of reference sent to the University, subject to the same deadline as (2) above. In lieu of an Achievement Exam score in Computer Science, Engineering or Mathematics, the Department will consider:

a. An Achievement Exam score in another area, or
b. Alternate evidence of achievement in computer science or computer engineering, such as significant work experience or a degree in the field.

c. An earned graduate degree requiring substantial computer science coursework.

An applicant who wishes to submit an alternate exam score or alternate evidence of achievement must make this request to the department as soon as possible.

4. Satisfy the background requirements for Master's program.

The department will admit only those students who, in the judgement of the faculty, have demonstrated ability and a desire to complete a program of study based on creative research and high achievement in course work. The number of students admitted will depend upon departmental resources available.

Precandidacy Course Work:
The departmental precandidacy course requirements include a set of 4000-level core courses and a distribution among 5000-level and 6000-level courses as determined by the Departmental Graduate Committee.

Admission to Candidacy: Admission to the Ph.D. program does not guarantee admission toward the degree. Official admission to candidacy is based on the following procedures:

1. The student completes the coursework requirements as defined above.

2. The student passes written comprehensive examinations covering three areas selected by the student in advance. Each exam is graded as high pass, pass, low pass, or fail; the student must make a high pass in at least one of the areas and no less than low pass in all other exams. These exams may be taken a maximum of two times, separated by no more than one calendar year; in a second attempt, a student does not have to repeat any area in which a high pass was earned on the first attempt. The CS Graduate Committee administers these exams, which must be passed prior to admission to candidacy and at least three quarters prior to the degree.

3. The student reaches an agreement with a member of the Computer Science Department's faculty to become the major professor, dissertation director, and chair of the student's committee. The committee must have at least four members, with at least three from the Computer Science Department and at least one holding an appointment in another department. At least three members, including the chair, must be approved by the Graduate Council to direct doctoral research.

4. The student's committee evaluates the student's background and outlines a coherent program of study, which may include additional courses and outside readings in the technical literature. This program is subject to periodic revision within reasonable limits and will be reviewed by the committee no less frequently than once a year (Completion of the entire program is not required before admission to candidacy).

5. In an open, public meeting, the student presents to the committee a survey of current literature in the area of proposed Ph.D. research. A specific dissertation topic is not required at this time; rather, the student is expected to know state-of-the-art work in the general area of interest.

6. The student completes Graduate School requirements for formal admission to candidacy.

Dissertation Proposal: After consultation with the committee and initial investigation of a topic, the student submits a written proposal to the committee and makes an oral presentation of this proposal in a meeting which other faculty may attend. The written version must be typed, conform to high standards of scholarly writing, and contain an overview of previous research in the area of interest. Based on the written and oral presentations, the committee will accept the topic, reject the topic, or modify the topic to make it suitable for doctoral research.

Dissertation and Residency Requirements: The student continuously registers in CS 6000 (minimum of three hours each quarter) from the time the topic proposal is approved, admission to candidacy occurs, or registration for course 6000 is begun, whichever comes first. In the quarter in which the dissertation is accepted by the Graduate School and including the summer quarters. The minimum residency for a doctoral degree is three consecutive quarters of full-time study (minimum of nine hours each quarter) in the graduate program subsequent to admission to candidacy. Part-time enrollment does not count toward this requirement.

Dissertation Defense: The student presents and defends the dis-
sertation in a public meeting. The committee determines Pass or Fail. A student entering the Ph.D. program well prepared to begin research (e.g., a student who has a Master's degree in computer science and an area of research in mind) could complete the program in perhaps three years. A less well-prepared student (e.g., a student entering without a Master's degree but with solid undergraduate experience) could expect to devote five to six years to the program.

New Courses Proposed:
The UTK Computer Science Department currently offers a wide variety of 5000-level courses as part of its Master's degree program. The courses will be the initial basis for admission to doctoral candidacy. In conjunction with admission to candidacy and beyond, 6000-level courses will be added to the curriculum which will present advanced studies in areas of doctoral research.

3150 Introduction to Numerical Algorithms and Programming (3): Roots of equations, systems of linear equations, least-squares fitting, numerical integration, ordinary differential equations. Introduction to programming in FORTRAN. Prereq: 3150 and 3155 may not both be taken for credit. Students with no knowledge of FORTRAN should take 3155. Prereq or coreq: Mathematics 2860. (Same as Mathematics 3150.) E

3155 Introduction to Numerical Algorithms (3): Roots of equations, systems of linear equations, least-squares fitting, numerical integration, numerical methods for ordinary differential equations. 3150 and 3155 may not both be taken for credit. Students with no knowledge of FORTRAN should take 3155. Prereq or coreq: Mathematics 2860. (Same as Mathematics 3155.) E

3215 Discrete Structures II (3): Continuation of Computer Science/Mathematics 2215. Partially ordered sets, lattices, Boolean algebras; propositional and predicate calculus. Trees and operator domains. Elements of discrete probability. Prereq: 2215 (Same as Mathematics 3215.) W


4210 Introduction to Artificial Intelligence (3): Intelligent programming technology as implemented by computer; computer representation of knowledge, problem solving and search, game playing, automated deductive systems, natural language understanding, computer vision and learning. Computer implementation of AI problems. Prereq: 4510. 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.) W, Sp

4245 Numerical Linear Algebra (3): (Same as Mathematics 4245.) F, Sp

4310 Statistical Data Processing (3): FORTRAN language for organization and analysis of scientific data. SPSS and SAS programs for standard statistical computations: t-tests, chi-square tests, multiple regression, data reduction correlation and regression, analysis of variance. Not for credit for computer science majors. Prereq or coreq: Mathematics 2860. (Same as Mathematics 4210.) F

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.

4470 Programming Languages (4): Comparison and analysis of programming languages, design, features, and implementation of compilers; processors, operations, sequence control, data control, and storage management. Detailed discussion and programming experience with at least one other 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, dynamic allocation; memory management; allocation organization; files, programming languages for information structures. Prereq: 4620 and 4615.

4550 Systems Programming (3): Computer organization and design of computers, representation of information, computer operating systems, input-output systems, interpreters, macro assemblers. Prereq: 3520 or equivalent. E


4590 Advanced Systems Programming (3): Multitasking, overlays, advanced I/O techniques, high-level language macros, interrupt handling, virtual systems (all in a high-level language), and OS utilities. Prereq: 4510 and 4550. F

4610 Introduction to Operating Systems (3): Detailed examination of major operating systems. Memory management; device and data management; interrupts; machine-level input/output, loaders and relocations, device characteristics, data set organizations, SPOOLing. Prereq: 4510 and 4550. 4570 may not both be taken for credit.

4660 Principles of Compiler Design (3): Techniques of compiler design and parsing of languages described by regular and context-free grammars. Prereq: 4510 and 4715. Sp


4750 Interactive Computer Graphics (3): Point-plott ing, vector generation, interactive graphical techniques, two- and three-dimensional transformation, perspective depth, 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 and Electrical Engineering 4750.) E

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 Installations (3): Issues in design and management of computer systems: implementation, justification, personnel in systems, perspective on systems. Prereq: 3520 or equivalent. W

4915 Topics in Computer Science (1-4): Credit determined at registration. Prereq: 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 undertakes any university activity. This credit course beyond 6000-level courses will be added to the curriculum which will present advanced studies in areas of doctoral research.

5050 Computer Modeling and Simulation of Physical Systems (3): Techniques for computer modeling and simulation, inputs, driving functions, outputs, interactive simulations as applied to various physical systems. Models to represent spatial relationships, Prereq: 3150 or 3155, and 3920 and introduction to probability.

5100 Immigration to Computer Science (5): Designed for graduate students with limited computer science background who wish to enter computer science major or minor program. Advanced programming techniques; control of input-output devices; machine organization and assembly language programming; introduction to data structures and algorithm analysis. Prereq: One course in programming. F

5109 Immigration to Computer Science Practicum (2): Design and implementation of medium to large scale computer programs. Prereq: 4510. F

5130 Introduction to Research Computing Systems (3): VAX 11/780 architecture, operating systems (VMS, UNIX, RSX, TSX), utilities (RMS), editors, macro assemblers, high-level language compilers, languages for simulation and monitoring, and the DEC PG-350 architecture and facilities; survey of existing research applications involving VAX and PG-350. Prereq: 4510 or 4550. F

5175 Introduction to Logic Design (3): Same as Electrical Engineering 5175.

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. Computer simulation of AI problems. Prereq: 4510 or consent of instructor. (Same as Electrical Engineering 5090.) W

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

5310 Computer Networks (3): International Standards Organization open system interconnection model and protocols. Analysis of model as it applies to computer communication. Local area networks (ARPANET, SNA, DEGNET, and X.25) and major local networks (ETHERNET, 4510 and 4550).

5430 Advanced Compiler Design (3): Design and implementation of compilers, affine and two-level optimizations, compiler-compilers, incremental compilation, run-time organization, data flow analysis, optimization, and error recovery. Prereq: 4680.

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

5670 Database Management Systems (3): Data model theory, comparison of several existing data base systems, implementation technology, selection and evaluation of techniques, integrity, security, authorization and protection, hardware architectures, and future trends in DBMS area. 4570 and 5570 may not both be taken for credit. Prereq: 4510. W

5685-65-75 Numerical Mathematics (3, 3, 3): (Same as Mathematics 5685-65-75.) F, W, Sp

5670 Operating Systems (3): Detailed examination of
major operating system. Memory management, dispatchers, interrupts, device characteristics, theory and analysis of operating systems. Implementation of portions of multiuser operating system. Prereq: 4510 and 4550 or equivalent, or consent of instructor. 4610 and 5670 may not both be taken for credit. F

5680 Case Studies in Operating Systems (3) Examination of different operating systems. Operating system design, alternative strategies for memory, device and CPU allocation and management: protection, time sharing, real-time systems. Prereq: ECE 4510 or 5670 or consent of instructor. W


5730 Computability and Computational Complexity (3) Computability and decidability, Turing machines and halting problem. Register machines. Recursive and recursively enumerable sets; partial and total 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 processes. Type 0, 1, 2, and 3 languages, operations on languages and grammars; deterministic context-free languages. Theory of translation. Prereq: 4710. W

5790 Computer Architecture (3) Elements, major components, Storage components and traces; size, specialization, organization. Processor organization, instruction set organization, stack machines, pipelining, overlap and vector processors. Operating system considerations. Prereq: ECE 4570 or 5940.

5910 Information Organization and Retrieval (3) Organization, storage, searching and retrieval of information. Development of IR systems from offline to modern on-line operations. Information analysis and dictions, any computer storage system. Search and matching procedures; retrieval process. Information dissemination systems. Data base retrieval systems. Prereq: ECE 4590. F

5840-50 Pattern Recognition (3, 3) Prereq: 3150, Statics 3450 and Mathematics 4050 or equivalent. (Same as Electrical Engineering 5670-80). F, W

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, 1-4, 1-6) May be repeated. Maximum 9 hrs.

5940-50 Advanced Small Computer Systems (3, 3) (Same as Electrical Engineering 5940-50) Prereq: EE 5175 or 4850.

5970 Independent Study in Computer Science (1-3) Special project under faculty guidance. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6000 Doctoral Research and Dissertation (3-15) F/ NP only. May be repeated with consent of instructor.

6210 Advanced Topics in Artificial Intelligence (3) Issues of knowledge organization, knowledge representation and problem solving that underlie the design of expert systems. Analytical and design techniques used in implementing non-trivial expert systems. Prerequisite: consent of instructor.

6570 Advanced Topics in Database Management Systems (3) Advanced topics concerning normalization, query optimization, database security and integrity in data base systems. Prerequisite: consent of instructor.

6870 Advanced Topics in Operating Systems (3) Advances in operating systems including distributed and multiprocessor systems. Prerequisite: consent of instructor.

6730 Advanced Topics in Computability and Computational Complexity (3) Advanced topics in computability and decidability. Prerequisite: consent of instructor.

6750 Advanced Topics in Formal Languages and Automata (3) Advanced topics concerning formal languages and automata machines. Prerequisite: consent of instructor.

6810 Advanced Topics in Information Storage and Retrieval (3) SMART and SIRE system, system evaluation, methodological file clustering, dynamic query languages, information retrieval, natural language processing. Prerequisite: consent of instructor.

6910 Advanced Topics in Computer Science (3) Advanced topics is forum for graduate students individually or in groups. Prereq: Consent of instructor. May be repeated. Maximum 18 hrs.

Cultural Studies

Afro-American 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.

3530 Peoples and Cultures of Africa (3) (Same as African Studies 3500-4000) Issues of knowledge organization, knowledge representation, and problem solving that underlie the design of expert systems. Analytical and design techniques used in implementing non-trivial expert systems. Prerequisite: consent of instructor.


4250 History and Philosophy of Afro-American Education (4) Attempt by Afro-Americans to secure an education for themselves and their children from era of slavery to Supreme Court decision of 1954. Black perceptions of importance of education and social obstacles confronting blacks who tried to get an education. (Same as Curriculum & Instruction and History 4292.)

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

4500 Issues and Topics in Afro-American Studies (3-4) Problems, topics and issues in area of Afro-American Studies. Content and credit determined by instructor. May be repeated. Maximum 12 hrs.

4610 African Prehistory (3) (Same as Anthropology 4610.)

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 (3) (Same as Psychology 4880.)

4950 The Afro-American Experience to 1865 (3) (Same as History 4950.)

4960 The Afro-American Experience Since 1865 (3) (Same as History 4960.)

Asian Studies

3670 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 Knights', 'The Rubaiyat of Omar Khayyam' and Gibran's 'The Prophet'.

4010-20-30 Readings in Asian Literature (4, 4, 4) (Same as Anthropology 4310) 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.

4431-32-33 Advanced Modern Standard Arabic I, II, III (4, 4, 4) (By 3530) Readings in essays by modern Arab writers dealing with 20th century issues. Written and oral exercises over points of grammar and syntax that occur in essays. Prereq: 4311-32-33 or consent of instructor.

4434-35 Spoken Lebanese/Palestinian Arabic I, II (4, 4) Aural-oral introduction to central dialect of Arabic-speaking world. Prereq: 2431-32-33 or consent of instructor.

4531-32-33 Advanced Chinese (4, 4, 4) Prereq: 3531-32-33 or equivalent of consent of instructor. Must be taken in sequence.

4631-32-33 Advanced Japanese (4, 4, 4) Reading in graded primer with attention paid to finer points of grammar. Conversation, drill and composition practice with native speaker. Must be taken in sequence. Prereq: 3531-32-33.

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, Welles, and others. Prereq: Completion of three literature courses in foreign language about one culture, or one culture course. F, W

5022 Approaches in Comparative Literature (3) French and American schools; "comparative literature" vs "general literature"; Van Tighem, Carre, Baldenberg, Welles. 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 104.

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

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

Latin American Studies

4001 Cultural Plurality in Latin America (3) Value systems and behavioral patterns based on Spanish-Mediterranean, Luso-Mediterranean, indigenous Indian and African heritage existing today in Latin America. Prereq: Consent of instructor.

4002 Institutional Changes in Latin America (3) Government, political parties, role of military, Church, educational institutions, democracy and dictatorship, nationalism, and family. Evolution of institutions in Latin American Studies. Prereq: Consent of instructor.

4970 Latin American Studies Seminar (3, 3, 3) May be repeated with consent of instructor. Maximum 8 hrs.

Linguistics

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

4120-30 Foundations of Linguistics Science, Development of Methodology, Contemporary Theory (3, 3) Intellectual and methodological foundations of linguistics science. Changes in linguistic interest brought about by Saussure's 'Cours' and the growing importance of other disciplines on linguistics science. (Same as English 4120-30.)

4250 Introduction to Descriptive Linguistics (3) (Same as French, German, Russian, Spanish 4250.)

4260 Introduction to Historical and Comparative Linguistics (3) (Same as French, German, Russian, Spanish 4260.)

4270 Introduction to Romance Linguistics (3) (Same as French, 4270.)

4271 Introduction to Slavic Linguistics (3) (Same as Russian 4271.)

4440 Sociolinguistics (3) (Same as English 4440.)

4460 Special Topics in English Linguistics (3) (Same as English 4460.)
THE MASTER'S PROGRAM

The departmental requirements for the M.A. degree in English include (1) thesis and 36 quarter hours of courses in the Department of English or 45 quarter hours without a thesis, (2) evidence of proficiency in one foreign language, and (3) a final oral examination for thesis students, written and oral for non-thesis students. The courses should include 12 hours at the 6000 level, 12-21 additional hours of courses at the 5000-6000 level, and 12 hours for graduate credit, including the 3000-4000 level. A reading list is in the office of the Director of Graduate Studies in English.

The M.A. with writing option is intended for those 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 three 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 take at least 15 hours in writing and 15 hours in literature, the remaining 6 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 5000 level.

2. Students in the M.A. with writing option may choose one of the following writing projects in consultation with a project director and faculty committee:
   a. A thesis, using research to analyze some aspect of writing or rhetorical theory, for which 9 quarter hours credit is given.
   b. A creative project, for which 9 quarter hours credit is given. A collection of poems or short stories, a short novel, a play, or a creative work of non-fiction prose would be acceptable as creative projects.

3. A final oral examination consisting chiefly of questions covering the general history and interpretation of English and American literature. A 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 emphasis, but most of the oral examination should focus upon the literature outlined in the original reading list.

4. Evidence of proficiency in one foreign language.

THE DOCTORAL PROGRAM

The departmental requirement for the Ph.D. degree in English is completion of a minimum of three academic years of resident graduate study. This includes a balanced program of at least 72 quarter hours (or the 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 5000-6000 level. In addition to the 72 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 may transfer at least 36 quarter hours.

After all, or most of the course work has been taken and after the two language requirements have been satisfied, the student will take one or two comprehensive examinations from several areas divided as the department directs. Successful completion of these examinations will be followed by the writing of the dissertation and by an oral examination in the field of the dissertation.

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

*1211 Written and Oral English for Foreign Students (6) Rapid review of English grammar structures and pronunciation with intensive oral, aural, and written drill. Required for 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 1211. A, B, C, I, F, W grading. Students registered for this course are permitted to register for only 2 other courses. E
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 studies. Emphasis on oral literature: folk song, myth, legend, proverbs, riddles, superstitions, dance, games, and architecture. A

3910 Comparative Literature (3) Ancient. A

3920 Comparative European Literature (3) Selected medieval and renaissance masterpieces, in translation, by such authors as Dante, Machiaveli, and their influence on English literature. A

3930 Comparative European Literature (3) Selected masterpieces of continental literature, in translation, and British literature from Enlightenment to present: interdependence of national literatures and ideas.

3940 The Novel of the Contemporary Western World (3) Proust, Joyce, Man, and others. 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 tragic and dramatic romances. E

4042-43 Topics in Mode and Genre (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 director. 5 hrs. max. S

4045 Topics in Literary Theory and Criticism (3) Content varies. Special topics in theoretical and practical approaches to British and American literature. May be repeated with consent of department. Maximum 8 hrs. S

4047 Special Topics in Literature: Major Authors (3) Content varies. Studies in major British and American writers. May be repeated with consent of department. Maximum 8 hrs. S

4050-60-70 American Novel (3, 3) 4050—From earliest sentimental novels through Brown, Cooper, and Kennedy, and major figures to 1875. 4060—Henry James 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. S

4120-30 Foundations of Linguistics Science, Development of Methodology, Contemporary Theory (3, 3) (Same as Linguistics 4120-30). S

4140 Advanced Technical Writing (3) For students planning careers in industry, education, and government who need technical writing skills. Definitions, process descriptions, sets of instructions, descriptions of mechanical devices, recommendation reports, advertisements, brochures, and technical reports. Prereq: Junior standing in the student's major or consent of instructor. F, W, Sp

4150 Professional Writing (3) Articles, theses, and dissertations in which data are marshaled and analyzed. Abstracts, varieties of documentation styles, proper use of visuals, guidelines and procedures for manuscript submission, and process of editorial review. Prereq: 4140 or consent of instructor. S

4160 Technical Editing (3) Techniques and language skills necessary for technical editing. Formats, graphics, layout methods, and mechanics of publications production. Prereq: Completion of either 4140 or 4150, or consent of instructor.

4250 Advanced Fiction-Writing (3) Further development of skills acquired in basic Writing Fiction course. Prereq: 3459 or consent of instructor.

4254 Writing the Detective and Mystery Story (3) Instructor case writing covering entire crime field: suspect, police procedural, private eye, spy, and adventure fiction. Recommended prereq: 3450-70-80 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 in basic Writing Poetry course. Prereq: 3470 or consent of instructor.


440 Sociolinguistics (3) Study of language in relation to society. Empirical and theoretical study. Emphasis both on individuals and on large-scale social units: tribes, nations, and social classes. Prereq: 3330 or Linguistics 2000 or consent of instructor.

4460 Dialectology (3) Theories and methodologies of dialect research, fieldwork, and analysis. Prereq: 3340 or consent of instructor.

4465 American Dialects (3) Characteristics of major social and regional dialects of American English. Their origins and functions. Implications for cultural pluralism. Prereq: 3330 or Linguistics 2000 or consent of instructor.

4466 Quantitative Analysis of Language (3) Techniques of statistical analysis of data both in spoken and written texts, including literature. Identifying questions, collecting, analyzing, and interpreting data. Implications for linguistics and/or literary theory. Prereq: 3330 or Linguistics 2000 or consent of instructor.

4471-81 English as a Second or Foreign Language (3, 3) 4471—Applied linguistics in teaching and learning of English 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 testing language competence and performance, with emphasis on construction of tests. Team teaching with an experienced member of the staff. Prereq: 4471. (Same as Linguistics 4471-81) W; Sp

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

4640 Black American Literature and Aesthetics (3) Evaluation of the black arts, the black spirit, black symbols, black values, black community, black philosophy, and black art, with particular attention to oral and written texts. Prereq: 4440 or consent of instructor.

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

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

4660 Emerson and Thoreau (3)

4680 American Humor through Mark Twain (3)

4721-31-41 Ballad and Folk tale (3, 3, 3) 4721—Study of traditional English and Scottish popular ballads and their North American variants; 4731—Study of native American ballad and folk tale; 4741—The folk narrative; functions, categories, and patterns of storytelling.

4850 Milton (3) Emphasis on major poets. A

4880 Seventeenth-century Prose and Poetry (3) Bacon and Donne to Marvell. 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 when degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

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

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

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

5140 Teaching Freshman Composition (3) Introduc- tion to teaching of Freshman English through study of various techniques and philosophies of composition. Required of all first-year teaching assistants. F

5150 Old English Prose (3) A

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

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

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 continuation of 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. May be repeated. Maximum 9 hrs. Enrollment by consent of Director of Graduate Studies only.

5290 Analysis of Technical Writing (3) Theory and practice of technical writing. Exploration of current theories of scientific, business, technical, academic, and government rhetoric. Analysis of shared elements and practices in professional writing. Prereq: 4140 or consent of instructor.

5310 Rhetoric and Composition: History and Theory (3) Modern developments in rhetorical theory, their origins in Plato, Aristotle, and others.

5410-20 Readings in Middle English Literature (3) A

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

5610-20 Reading in English Literature of the Nineteenth Century (3, 3, 3) A

5690 Film History, Rhetoric, and Criticism (3) Film as narrative art form: historical development of film; the "rhetoric" of film; critical approaches to film study, including genre, auteur, formalist, and historical; critical analysis of individual films.

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

5800 Introduction to Literary Research (3) Critical examination of aims of English studies, profession of English teacher, theory of literature, and methods of research including collection of data, methods of analysis of material, and transmitting of results of scholarship. F

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

College of Liberal Arts/English
### 6000 Doctoral Research and Dissertation (3-15) P/ NP only. E

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<th>Course Code</th>
<th>Title</th>
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<tr>
<td>6100-20-30</td>
<td>Studies in Elizabethan Literature (3, 3, 3)</td>
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<tr>
<td>6140</td>
<td>Studies in Old English Language and Literature (3) For students who know Old English well and who wish to do research in literature, structure of language, paleography, Anglo-Latin backgrounds and sources, and related topics.</td>
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<tr>
<td>6150</td>
<td>Old English Poetry (3) Prereq: 5150.</td>
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<td>6160</td>
<td>Beowulf (3) Prereq: 5150, 6150.</td>
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<td>6170</td>
<td>Studies in Middle English (3)</td>
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<td>6181-82-83</td>
<td>Studies in English Language (3, 3, 3)</td>
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<td>6210-20-30</td>
<td>Studies in American Literature (3, 3, 3)</td>
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<td>6241-42</td>
<td>Studies in Colonial American Literature (3, 3)</td>
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<td>6270-80</td>
<td>Studies in American Fiction (3, 3)</td>
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<td>6310-20-30</td>
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<td>6410-20-30</td>
<td>Studies in Chaucer (3, 3, 3)</td>
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<td>6510-20-30</td>
<td>Studies in Spencer and Milton (3, 3, 3)</td>
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<td>6550</td>
<td>Studies in Mode and Genre (3) Content varies. May treat drama, novel, short story, poetry, or satire, the comic, the tragic, etc., depending on professor.</td>
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<tr>
<td>6590</td>
<td>Special Topics (3) Content varies. Humor, history of ideas, biography, autobiography, literature of travel, literature and extra-literary disciplines, etc.</td>
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<td>6610-20-30</td>
<td>Studies in English Romanticism (3, 3, 3)</td>
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<td>6710-20-30</td>
<td>Studies in Eighteenth-century Literature (3, 3, 3)</td>
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<td>6810-20-30</td>
<td>Studies in Drama and Theatre (3, 3, 3)</td>
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<td>6860</td>
<td>Textual Bibliography and Criticism (3) Study of evidence gathered from printing process to make critical judgments about text of literary work. Prereq 5860 or consent of instructor.</td>
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<td>6910-20-30</td>
<td>Studies in Twentieth-century Literature (3, 3, 3)</td>
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### THE MASTER'S PROGRAM

The department offers both the thesis and non-thesis options for the Master of Science degree. Both options require a minimum of 45 quarter hours beyond completion of a course 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 (at each offering during residency), 5150, 5160 and 6 quarter hours at the 6000 level. In the thesis option, no more than 9 hours may be thesis courses. A final examination is required in both programs.

### THE DOCTORAL PROGRAM

The doctorate is a research degree and is granted only to those persons who demonstrate proficiency in conducting independent research. Students must have achieved the equivalent of a comprehensive Master's program before they will be admitted to the doctoral program. Course requirements for the degree shall be determined by the student's faculty committee in accordance with specific interests and needs. The program of study must include sufficient course work within the department, but outside the areas of specialization, to give a broad foundation and understanding of the discipline. The program must include 5160, 5170, 5720, and (at each offering during residency) 5100. A minimum of 15 hours of credit must be earned in related fields outside the department. Emphasis upon research in a foreign language, cartography, and quantitative techniques is required. Other techniques pertinent to the student's areas of specialization may be required. The language will be French or German unless otherwise approved by the student's faculty committee. 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 program as determined by the student's doctoral committee.

#### 3410 Intermediate Economic Geography (4)
- Concepts, theories, and practices in location planning.
- Location patterns in agriculture, manufacturing, and service activities. W or Sp

#### 3430 Urban Geography (4)
- Concepts and theories concerning development and significance of systems of cities and internal morphology of cities. F or W

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

#### 3450 Geography of Resources (4)
- Study of factors related to variations in resource availability from time to time and from place to place, with particular emphasis upon energy and metallic resources. F or Sp

#### 3250 Climatology (4)
- General circulation system leading to world patterns of climate. Climatic change and modification, relation of climate and human activity. W or Sp

#### 3530 The Land-Surface System and Man (4)
- Nature and regional variations in relationships among surface forms, weather, vegetation, and surface materials. Humans as evaluators and agents of change. F, Su

#### 3610 Political Geography (4)
- Importance of geographical factors for understanding political relationships within and among nations: spatial implications of political decision making processes, geography of administrative units. F

### 3580 Cultural Geography (4)
- Basic concepts of culture, methods and basic sources of cultural geography, world patterns of cultural phenomena. Sp

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

### 3800 Geography of South America (4)
- W

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

### 3910 Regional Geography of the United States and Canada (4)
- Major physical, economic, and social distributions as they assist in the development of distinctive characteristics of regions of United States and Canada. F

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

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

### 4075 Geography of Transportation (4)
- Geographic examination of transportation systems, emphasizing transportation of people and freight by public facilities. Relationship of these systems to changing geography of cities and urban hinterlands. Sp

### 4100 Quantitative Methods in Geography (4)
- Geographical applications of statistical techniques, point pattern analysis and analysis of areal units. Prereq: Mathematics 3000 or consent of instructor. W

### 4210 Problems in Geographic Method (4)
- Examples of problems and approach in geographic analysis and synthesis. Emphasis on nature of geographic data, areal sampling, generalization, classification, regionalization, and questions of scale. Sp

### 4240 Historical Geography of the United States (4)
- Survey of changing human geography of United States during prehistoric times and development after colonization. Emphasis upon changing population patterns, development of agricultural regions and patterns of urban development. Sp

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

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

### 4710 Cartographic Design and Production (4)
- Principles and techniques of design, construction, and reproduction of maps. Recommended prerequisite: 3700. 2 hrs and 2 labs.

### 4720 Data Mapping (4)
- Automated techniques of representing surfaces, using geographic information systems. Recommended prerequisite: 3700 and knowledge of a computer language. F

### 4730 Advanced Cartography (4)
- Map production from design through color proofs. Prereq: 3700, 4710, and 4720 or consent of instructor. Sp

### 4740 Remote Sensing: Types and Applications (4)
- Basic principles and uses of aerial photography and other remote sensing techniques. Emphasis upon use of various types of imagery for geographic interpretation and mapping. Prereq: Consent of instructor. For Sp

### 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
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 8 hrs. S/NC only. E

5101 Foreign Study (1-12) See page 104. Prereq: Written consent of instructor prior to registration. E

5102 Off-campus Study (1-12) See page 104. 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 Geographic Concept and Method (3) Traditional and modern thought regarding the nature, scope, problems, and methods of geography. A

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

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) Geographic 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: 3650 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 America 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: 3520 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: 3520 or consent of instructor. May be repeated with consent of instructor. A

5660 Advanced Political Geography (3) Geographic consequences of public decisions, emphasis on understanding how administrative systems affect public land management, spatial distribution of public goods, and urban morphology. Prereq: 3610 or consent of instructor. A

5710 Seminar in Geography (3)

5720 Topics in Quantitative Geography (3) Multivariate analysis and 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 photograph imagery for interpretation and mapping of geographic data. Prereq: 4740 or consent of instructor. A

5780 Topics in Cartography (3) Trends, concepts, problems, and methods in cartography. Prereq: 4730, or consent of instructor. May be repeated with consent of instructor. Maximum 8 hrs. A

5799 Advanced Practicum in Cartography/Remote Sensing (2-6) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

5915 Regional Geomorphology (4) (Same as Geology 5915) 6000 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 of the United States (3, 3) A

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

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

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

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

Geological Sciences

**MAJOR**

**DEGREES**

Geology

M.S., Ph.D.

Professors: K. P. Walker (Carden Professor and Head), Ph.D. Yale; H. J. Klopfer (Emeritus), Ph.D. Ohio State; O. C. Kopp, Ph.D. Columbia; R. E. McLaughlin (Emeritus), Ph.D. Tennessee; K. M. Rasa, Ph.D. Western Ontario; L. A. Taylor, Ph.D. Lehigh; J. G. Wells (Emeritus), Ph.D. North Carolina.

Associate Professors: T. W. Broadhead, Ph.D. Iowa; D. W. Byerly, Ph.D. Tennessee; G. M. Clark, Ph.D. Pennsylvania State; H. V. McSween, Ph.D. Harvard.

Assistant Professor: R. W. Arrhenius, Ph.D. Northwestern; P. A. Delcourt, Ph.D. Minnesota; S. G. Driesel, Ph.D. Wisconsin; T. C. Labeke, Ph.D. California Institute of Technology; M. L. McKinnay, Ph.D. Yale; N. B. Woodward, Ph.D. Johns Hopkins.

The Department of Geological Sciences offers both the M.S. and Ph.D. degrees in geography. Persons interested in these programs should contact the department. For admission, an applicant must provide two rating forms or letters of recommendation, and GRE scores, including the subject exam in geography (or in another area if geology was not the area of previous undergraduate level concentration). Students are not admitted under provisional or non-degree status.

General course requirements for both degrees include:

1. At least 6 quarter hours in mineralogy, petrology, stratigraphy/sedimentation, paleontology, structural geology, optical mineralogy, and field geology (normally taken in an undergraduate program).

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

**THE MASTER'S PROGRAM**

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

Course requirements include a minimum of 45 quarter hours of graduate credit that include no fewer than 24 hours in geology courses (21 or more hours above 5000 level) and 9 hours of Thesis 5000.

A public oral presentation of the thesis is required. Failure to achieve a 3.0 GPA for two successive quarters will terminate a student's candidacy.

**THE DOCTORAL PROGRAM**

Completion of the Ph.D. degree includes satisfactory performance on the comprehensive examination taken no later than the end of the second year, maintenance of a minimum B average in all graduate coursework, and successful defense of the dissertation.

Course requirements include a minimum of 39 quarter hours of graded courses for graduate credit and at least 36 hours of Dissertation 6000. At least 28 of the 39 hours must be at or above the 5000 level with a minimum of 9 hours in courses at the 6000 level. Up to one-third of required hours may be taken in related fields. Attendance in a weekly seminar is required each quarter for not more than 6 hours S/NC credit toward the degree total.

Each Ph.D. student must satisfy research tool requirement which will be determined by his/her faculty committee and will consist of one of the following:

- Demonstration by examination of a read knowledge in one modern foreign language in which there is a significant body of geological literature.
- Completion of course 3030 in an appropriate foreign language with a B or better.
- Courses (minimum of 6 hours) at 3000 level or higher taken for undergraduate credit are completed with a B average in appropriate mathematics, statistics, or computer science courses. The course must be taken during a student's graduate program and must be approved by the student's entire committee.

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

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

**3180 Mineralogy (4)** Introduction to crystallography and study of minerals. Laboratory includes hard specimens, chemical and x-ray methods of identification. Prereq: 1010, Chemistry 1110-20 or equivalent. 3 hrs and 1 lab. A

**3310-20 Intervertebrate Paleontology (4, 4)** Systematic review of important Mesozoic and Cenozoic fossil groups. 3210—Porifera to Annelida, including cnidarians, echinoderms, and brachiopods; and conodonts. Completion of the M.S. degree includes satisfactory performance on an oral qualifying examination during the second term, maintenance of a minimum B average in all graduate coursework, and successful defense of the thesis. Course requirements include a minimum of 45 quarter hours of graduate credit that include no fewer than 24 hours in geology courses (21 or more hours above 5000 level) and 9 hours of Thesis 5000. A public oral presentation of the thesis is required. Failure to achieve a 3.0 GPA for two successive quarters will terminate a student's candidacy. Course requirements include a minimum of 39 quarter hours of graded courses for graduate credit and at least 36 hours of Dissertation 6000. At least 28 of the 39 hours must be at or above the 5000 level with a minimum of 9 hours in courses at the 6000 level. Up to one-third of required hours may be taken in related fields. Attendance in a weekly seminar is required each quarter for not more than 6 hours S/NC credit toward the degree total.

Each Ph.D. student must satisfy research tool requirement which will be determined by his/her faculty committee and will consist of one of the following:

- Demonstration by examination of a read knowledge in one modern foreign language in which there is a significant body of geological literature.
- Completion of course 3030 in an appropriate foreign language with a B or better.
- Courses (minimum of 6 hours) at 3000 level or higher taken for undergraduate credit are completed with a B average in appropriate mathematics, statistics, or computer science courses. The course must be taken during a student's graduate program and must be approved by the student's entire committee.

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

A written and oral comprehensive exam and an oral defense of the dissertation are required. Failure to pass the comprehensive exam (a second opportunity may be granted by the department) or to achieve a 3.0 GPA for two successive quarters will terminate a student's candidacy.
4240 Paleobotany (4) Survey of fossil record of plants with particular emphasis on comparative morphological and evolutionary trends in major groups, and chronological succession and geographic distribution of past floras on earth. Prereq: 4220 or Botany 3210-20 or consent of instructor. (Same as Botany 4240.) 3 hrs and 1 field period.

4250 Evolution of Higher Taxa (4) Field survey of diverse groups of plants, with particular emphasis on evolutionary patterns of speciation and radiation of families, orders, and classes of plants. Prereq: 3260 or Botany 3210-20 or consent of instructor. (Same as Botany 4250.) 3 hrs and 1 field period.

4307 Introduction to X-Ray Methods (1) Generation and nature of x-rays as applied to x-ray diffraction, x-ray fluorescence, and electron microprobe analysis. Prereq: 3180 or consent of instructor.

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

4320 Introductory Environmental Geology (4) Application of geological sciences toward a comprehension of natural systems. Prereq: 1010-20-30. 3 hrs and 1 lab or field period.

4330 Geology of East Tennessee (4) Lectures and field excursions. Prereq: 12 hrs of geology and consent of instructor.

4360 Stratigraphy-Sedimentation (4) Introductory study of stratigraphic principles and practices and of sedimentary processes and interpretation of depositional environments. Prereq: 1020 and 3180. 3 hrs and 1 lab or field period.

4370 Structural Geology (4) Introductory discussion of structures such as folds, faults, joints, cleavage, and primary structures. Laboratory work includes depth and thickness problems, structure sections, structure contour maps. Prereq: 1020. Mathematics 1840-50 or equivalent. 3 hrs and 1 lab.

4400 Field Geology (3) Five-week field course, first term survival course. Advanced undergraduates or first-year graduates in geology. Employs entire time of students. Field techniques demonstrated, practiced and applied to solve geological problems. Prereq: 12 hrs geology and consent of instructor.

4460 Geologic Photography, Photogrammetry and Remote Sensing (4) Terrestrial, airborne, and satellite geologic remote sensing; photographic principles and practice, geometry of terrestrial and aerial photogrammetry, principles of nonphotographic remote sensing systems.

4510 Principles of Geomorphology (4) Gradational processes as they affect earth's surface and landforms produced. Prereq: 1010-20-30 or equivalent. (Same as Geography 4510.) 3 hrs and 1 lab.

4550 Optical Mineralogy (4) Identification of minerals and determination of crystal-chemical parameters using petrographic microscope.

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

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

4670 Exploration Methods (4) Principles of geophysical, geophysical and geochemical exploration methods. Computational skills and reserves. Application to different types of mineral deposits.

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

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

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.

5069 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) Prereq: Consent of instructor. 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 5290 and Zoology 5290.)

5310 Depositional Environments and Models for Exploration (4) Modern depositional environments and recognition of ancient analogs; facies applications to exploration and production. Prereq: 3210 or consent of instructor.

5331 Quaternary Geology of North America (4) Development of quaternary landscapes as influenced by climatic change in conjunction with glacial, periglacial, fluvial, and eolian processes; regional characterization of quaternary stratigraphy, sedimentology, and geomorphology for North America. Prereq: 1410, equivalent, or consent of instructor.

5332 Quaternary Paleogeology (4) Perturbation, processes, and patterns of quaternary ecosystems; climatic change and vegetational responses during last 2.5 million years. Prereq: Consent of instructor.

5333 Quaternary Field and Lab Techniques (4) Field methods for description and sampling of quaternary terraced deposits and terrace sediments; identification of pollen and plant macrofossils; laboratory analyses of fossil pollen and macrofossils from sites in eastern North America. Prereq: 1410, equivalent or consent of instructor: 2 hrs and 2 labs.

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 such topics as may be recommended by the instructor. Topics for each quarter except summer for resident full-time graduate students. S/NC only.

5370 Mesoscale Fabric Analysis (4) Techniques of gathering, processing, and interpreting tectonic mesoscale fabric data. Prereq: 4310 and 4330. 3 hrs and 1 lab.

5460 Photogeologic Interpretation (4) Advanced photogeologic techniques to obtain geological measurements from aerial photographs. Practice in photo interpretation of imagery covers both geological and morphological features. Prereq: Consent of instructor.

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

5520 Igneous Petrology (4) Genesis and emplacement of magmas, and mineralogical, chemical, and textural properties of resulting igneous rocks. Laboratory empha- sizes petrographic description and classification of rocks in thin section. Prereq: 3310 and 4550. 2 hrs and 2 labs.

5530 Metamorphic Petrology (4) Physical and chemical characteristics of metamorphic environment, and effects on texture, chemical composition, and mineral assemblages of metamorphic rocks and their equilibria. Laboratory emphasis petrographic description and interpretation of metamorphic rocks in thin section. Prereq: 3310 and 4550. 2 hrs and 2 labs.

5540 Terrigenous Clastic Sedimentary Petrology (4) Field and microscopic analysis of terrigenous clastic rocks of Paleozoic and Mesozoic age, and Jurassic and Cretaceous rocks in thin section. Analysis of depositional processes, affecting sediment texture and composition. Prereq: 3360 or equivalent. 3 hrs and 1 lab.

5550 Carbonate Sedimentology (4) Environments of deposition of modern and ancient carbonates. Prereq: 3290 or consent of instructor. Recommended: 4550. 3 hrs and 1 lab.

5570 Advanced Structural Geology (4) Brittle and ductile deformation features with orogenic belts in context of tectonic evolution. Course readings from recent literature and discussion of ongoing research. Prereq: 3370 or consent of instructor. 3 hrs and 1 lab or seminar.

5610 Analytical Techniques in Geology (1) Survey of sampling procedures and sample preparation, collection and treatment of data and application of modern analytical techniques to geological problems. S/NC only.

5611 Atomic Absorption Analysis (1) Application of atomic absorption spectrophotometry to chemical analysis of bulk geological samples: minerals, rocks, and ores. Prereq: 5610 or consent of instructor. 1 lab.

5612 Electron Microprobe Analysis (2) Theory and application of electron microprobe for chemical analysis of solid particles such as minerals. Prereq: 5610 or consent of instructor. 2 labs.

5618 X-Ray Diffraction Analysis (1) Application of x-ray diffraction procedures in identifying crystaline substances. Prereq: 5610 or consent of instructor. 1 lab.

5617 X-Ray Fluorescence Analysis (1) Application of x-ray fluorescence to chemical analysis of bulk geological samples, such as minerals, rocks, and ores. Prereq: 5610 or consent of instructor. 1 lab.

5635 X-Ray Diffraction: Single Crystal Techniques (3) Single crystal x-ray diffraction techniques, emphasis on precession 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.

5660 Clay Mineralogy (4) Origin of clay minerals; structural models for clay minerals; application of analytical techniques in clay mineral studies. Prereq: 5310 and 5630 or equivalent. 2 hrs and 2 labs.

5660 Thermodynamics for Geologists (3) Principles
of chemical thermodynamics related to geologic processes. Prereq: Chemistry 1110-20 and calculus of a single variable or equivalents.

5655 Aqureous Geochemistry (4) Introduction to and applications of equilibrium thermodynamics to earth surface environments, including geochemistry of natural water and weathering reactions, and early diagenesis. Prereq: Chemistry 1110-20. Chemistry 1120 may be cored, with consent of instructor. Recommended prereq: 5650. 3 hrs and 1 lab.

5680 Physical Geochemistry (4) Theory and practice of thermodynamics as applied to geologic situations: phase equilibria, kinetics, geothermometers/bathometers, and partitioning geochemistry. Prereq: 3310. Recommended prereq: 4610. 3 hrs and 1 lab.

5690 Cathodoluminescence Petrography (2) Application to geological problems. Prereq: 3150 and 4550 or consent of instructor. 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 the practice of paleontology. Prereq: techniques in preparation and illustration of paleontologic materials and manuscript preparation for publication. 3 hrs and 1 lab.

5760 Biostatigraphy (3) Application of paleontologic data to stratigraphic study, codification of stratigraphic nomenclature and recommended practice. Prereq: 3260 and 3360. 1 hr and 1-2-hr seminar.

5820 Stratabound and Stratiform Sulfide Deposits (4) Classification, distribution, characteristics and genesis of strata-bound and stratiform sulfide deposits. Mississippi Valley-type Pb-Zn deposits, strata-bound massive Cu-Zn-Pb deposits of volcanic and sedimentary associations, and stratiform Cu deposits. Prereq: 3210 or consent of instructor. 2 hrs and 2 lab/field/sem. periods.

5830 Magmatic Mineral Deposits (4) Classification, distribution, characteristics and genesis of mineral deposits related to magmatic processes. Magmatic segregation deposits of ultramafic-mafic association and porphyry Cu-Mo deposits. Prereq: 4110 or consent of instructor. 2 hrs and 2 lab/field/sem 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, such as porphyry, 3110 and 4550, or consent of instructor. 2-2 hr labs.

5850 Regional Studies in Geology (1-3) Literature and seminars on specific regions of geologic interest, supplemented by field trip. 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 in 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 genetically similar assemblages of landforms. May be repeated with consent of department. (Same as Geography 5915.)

5920 Process Geomorphology (4) Gradational processes operating on or near earth's surface; application of analytical methods in lab and field. Prereq: 1430 and 4510. 3 hrs and 1 lab or field period.

6000 Doctoral Research and Dissertation (3-5) Prereq: 4610 or consent of instructor. Not available for graduate credit for geology majors.

*6710 Seminar in Geochemistry (3) Prereq: 4610 or consent of instructor.

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

*Not available for graduate credit for geology majors.

*Registration for 6000-level courses may be repeated with consent of department. Maximum 9 hrs per course.

**Germanic and Slavic Languages**

**MAJORS**

**DEGREES**

German

German Language and Literature

M.A.

Emeritus Professors: H. W. Fuller, Ph.D. Wisconsin; R. L. Hiller, Ph.D. Cornell.

Professors: H. Kratz (Head), Ph.D. Ohio State; J. E. Feilen, Ph.D. Pennsylvania; D. M. Irvine, Ph.D. Indiana; J. C. Osborne, Ph.D. Northwestern; M. P. Rice, Ph. D. Vanderbilt.

Associate Professors: N. A. Seuqken, Ph.D. Wisconsin; D. E. Lee, Ph.D. Stanford; C. J. Meier, Ph.D. Chicago; L. J. Knitop, Ph. D. Connecticut.

Assistant Professors: C. Hodges, Ph.D. Chicago; J. J. Kolodziej, M.A. Indiana.

The Department of Germanic and Slavic Languages offers two advanced degrees, the Master of Arts (M.A.) in German and the Doctor of Philosophy (Ph.D.) in German Language and Literature.

**THE MASTER'S PROGRAM**

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

**THE DOCTORAL PROGRAM**

The candidate for the doctoral degree must complete a minimum of 81 quarter hours of course work beyond the Bachelor's degree in addition to 36 hours of doctoral research and dissertation. At least 45 quarter hours of the minimum must be taken in 5000 or 6000 courses. Of these 45 hours, a minimum of 18 hours must be chosen from the program (5200) and the literary or philosophical 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 another field must consist of at least 18 hours of 5000 or 6000 courses. Students must show a fluent command of German, both oral and written, and a knowledge of two foreign languages. French and another language, such as Italian, Latin or Russian, appropriate to the field of research. A comprehensive examination, both written and oral, on German language and literature in an allied field or fields, must be passed before the student may be admitted to candidacy. The student will be examined on an extensive reading list which covers the whole range of German literature, and will be expected to show familiarity with major works of world literature. The candidate will be required to defend the dissertation in an oral examination, which will cover also the general area of the dissertation. Central emphasis is put on the doctoral dissertation as a final test of the candidate's scholarly qualifications.

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

**German**

3010-20-30 Elements of German for Upper Division and Graduate Students (3, 3, 3) 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 students having completed elementary German. E

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 Germany 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. Su

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

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

4250 Introduction to Descriptive Linguistics (3) (Same as French, Italian, Spanish, and Linguistics 4250.) F

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

4310-20 History of German Language (3, 3) 4350 German Civilization (3) Prereq: Intermediate German or equivalent.

4810-20-30 Advanced Conversation and Composition (3, 3, 3) Prereq: 3810-20-30 or equivalent or consent of department. F, W, Sp

5000 Thesis (1-15) Prereq: Undergraduate or graduate credit. E

5100 German Phonetics and Advanced Grammar (3) Advanced work in phonetics, pronunciation, and selected topics in German grammar. For teachers and prospective teachers. Prereq: Consent of instructor.

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

5200 Prossemia (3) Bibliography; methods; illustrative problems; preparation of papers. F
5210-20-30 College Teaching of German (1, 1, 1) Required of all M.A. or Ph.D. candidates, except those whose previous teaching experience warrants excuse from this requirement or who wish to pursue vocations other than teaching. F; W; Sp

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

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

5510 German Humanism and the Reformation (3)

5520 German Baroque Literature (3)

5530 The Enlightenment and the Rococo (3)

5540 German Classicism (3)

5560 German Romanticism (3)

5570 German Realism and Naturalism (3)

5580 Modern German Literature (1869-1945) (3)

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

5600 German Literary Theory and Criticism (3) W

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

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

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

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

6000 Doctoral Research and Dissertation (3-15) Pr: 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—Introduction: phonology, morphology, and syntax of Old High German of eighth and ninth centuries. Dialects. Representative 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 Seminar in German Literature (3, 3, 3) May be repeated. E

6310-20-30 Seminar in German and Germanic Philology (3, 3) May be repeated. E

Russian

3030 Elements of Russian for Graduate Students and Seniors (3, 3, 3) For graduate students preparing for advanced language examinations and seniors desiring reading knowledge of a second foreign language. Prereq: 2 years of some foreign language in college or consent of department. Undergraduate credit only. No credit for students having completed 1 yr ofElementary Russian.

3220 Works of Leo Tolstoy in English Translation (3-4) War and Peace, Anna Karenina, and other works.

3221 Works of F.M. Dostoevsky in English Translation (3-4) Crime and Punishment, Brothers Karamazov and other works.

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

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

3260 Russian Folklore in English Translation (3-4)

4010 Selected Topics in Russian and East European Studies (3) Interdisciplinary seminar on selected topic using comparative approach.

4110-20-30 Studies in Major Russian Writers (3, 3, 3) Content varies. Pushkin, Lermontov, Gogol, Turgeniev, Tolstoy, Chekhov, and others. Prereq: 9 hrs of 3000 course (exclusive of 3010-20-30, 3220-40-50-60) or equivalent. May be repeated.

4250 Introduction to Descriptive Linguistics (3) (Same as French, Spanish, Linguistics, and German 4250.) F

4260 Introduction to Historical and Comparative Linguistics (3) (Same as French, German, Spanish, and Linguistics 4260.) W

4271 Introduction to Slavic Linguistics (3) (Same as Linguistics 4271.)

Greek

See Classics

History

DEGREES

History

MAJOR

M.A., Ph.D.

Graduate assistantships are available. Graduate assistantship application is due February 15. Applicants must hold a bachelor's degree and have completed at least one sequence in a language department (or an equivalent one in a language for which a graduate major is not planned) and provide three letters of recommendation. Applications should include a current resume, a letter of interest, and any relevant research. Awardees are selected by the Graduate Awards and Review Committee for a total of 45 hours of coursework, including one 5240, 5270, 5280, and 6000 seminars. Students transferring from other institutions may count up to 36 hours of coursework toward the required 75 hours.

The GSA Fellowship Program is available for students who have completed the M.A. degree. Fellowship assistantships are available. Applications must be submitted by March 15. Awardees are selected by the Graduate Awards and Review Committee for a total of 45 hours of coursework, including one 5240, 5270, and 6000 seminars. Students transferring from other institutions may count up to 36 hours of coursework toward the required 75 hours.

The Department of History offers graduate study leading to the Master of Arts and Doctor of Philosophy degrees. The M.A. program includes a thesis and a non-thesis option and also offers a non-thesis concentration in historic preservation. The doctoral program has concentrations in American or European history. Detailed information may be obtained from the Director of Graduate Studies in History.

All incoming students will be advised by the Director of Graduate Studies in History. All incoming students will be advised by the Director of Graduate Studies in History.

THE DOCTORAL PROGRAM

Admission Requirements: (1) Acceptable scores on the Graduate Record Examination (general and subject history); (2) Successful completion of the M.A. degree.

Residence and Course Work: Students are required to offer a minimum of 75 credit hours in course work beyond the Bachelor's degree. No fewer than 45 hours must be in courses that are numbered 5200 or higher, including one 6000 seminar. Students must take 5240, 5270 or have taken their equivalent elsewhere. Candidates who have not written a Master's thesis must take two seminars in their field. Students transferring from another institution may count up to 36 hours of coursework toward the required 75 hours. All students pursuing the Ph.D. degree must take a minimum of 9 related hours outside the department. No fewer than 6 quarters of the 9 quarters of residence work (3 of which must be consecutive quarters) shall be under the supervision of the staff of UTF.

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 a B or better performance in appropriate statistical course and History 5290.

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 form and 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 course 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 stu-
dent must have at least a B in the final quar-
Comprehensive Examination: The comprehensive examination which will be both written and oral must be taken after all course work is completed, language require-
ments fulfilled, and at least nine months before the degree is expected. This exam should normally be taken before beginning the ninth quarter of work toward the doctorate.
The candidate must present four fields, distributed as follows: one major field (histo-
ry); two minor fields (history); and one minor field in another history or outside the department. In any case, the student is required to have 9 hours of grad-
uate work outside the History Department. Three of the four areas listed below must be
represented by a major or a minor field, or both.

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

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

III. Modern
   (1) Europe, 1815-1914
   (2) European World Since 1914
   (3) United States, 1815-present
   (4) Latin America, 1789-present
   (5) East Asia, 1641-present
   (6) Middle East, 1798-present

IV. National, Regional and Continental
   (1) England, 1465-1763
   (2) Great Britain, 1750-present
   (3) France, 1559-1815
   (4) France, 1559-1815
   (5) Germany, 1555-1806
   (6) Germany, 1806-present
   (7) Russia, 1806-1800
   (8) Russia, 1800-present
   (9) Colonialism and Imperialism
   (10) Diplomatic History of the States
   (11) Social and Cultural History of the States
   (12) The South
   (13) Frontier and Westward Movement
   (14) Afro-American

Dissertation and Final Examination: Orig-
inal research forms the basis for the disserta-
tion. After the dissertation has been com-
pleted, a final oral examination will be given on the dissertation in its historical con-
text.

3060-70 History of Western Religious Thought and Institutions (3, 3)
3140-50-60 History of England (3, 3, 3)
3160-80 History of France (3, 3, 3, 3)
3240-50 History of Russia (3, 3)
3250-60-70 History of Western Religious Thought (3, 3)
3280-90 History of the British Empire (3, 3)
3310-20 History of European Civilization (3, 3)
3340-50 History of the French Revolution (3, 3)
3360-70 History of the United States (3, 3)
3380-90 History of the United States (3, 3)
3390-10 History of Latin America (3, 3)
3400-10 History of the United States (3, 3)
3420-30 History of the United States (3, 3)
3440-50 History of the United States (3, 3)
3450-60 History of the United States (3, 3)
3470-80 History of the United States (3, 3)
3490-10 History of the United States (3, 3)
3510-20 History of the United States (3, 3)
3530-40 History of the United States (3, 3)
3550-60 History of the United States (3, 3)
3570-80 History of the United States (3, 3)
3590-10 History of the United States (3, 3)
3600-10 History of the United States (3, 3)
3620-30 History of the United States (3, 3)
3640-50 History of the United States (3, 3)
3660-70 History of the United States (3, 3)
3680-90 History of the United States (3, 3)
3700-10 History of the United States (3, 3)
3720-30 History of the United States (3, 3)
3740-50 History of the United States (3, 3)
3760-70 History of the United States (3, 3)
3780-90 History of the United States (3, 3)
The Afro-American Experience Since 1865 (3) Black attempts to realize freedom and equality pro-
related plight of free blacks in context of slave trade, American Revolution, westward migration, and gen-
(3) (Same as Afro-American Studies 4960.)
4960 The Afro-American Experience Since 1865 (3) Black attempts to realize freedom and equality pro-
4880 Topics in Twentieth-century American History (3)
4790 Topics in the American Westward Movement (3)
4660 Topics in American Social and Cultural History (3)
4651-52 American Frontier and Westward Movement I, II, III (3, 3, 3) Settlement and development of the "West" throughout American history.
4620-30 The American Frontier and Westward Movement I, II, III (3, 3, 3) Settlement and development of the "West" throughout American history.
4610-20-30 The American Frontier and Westward Movement I, II, III (3, 3, 3) Settlement and development of the "West" throughout American history.
4061-20 Topics in Twentieth-century American History (3, 3) 
4060 Topics in Twentieth-century American History (3, 3) 
4051 Topics in the American Westward Movement (3) 
4041 Topics in the American Westward Movement (3) 
4031 Topics in the American Westward Movement (3) 
4021 Topics in the American Westward Movement (3) 
4011 Topics in the American Westward Movement (3)
Human Services
4300 Working Within the System (6) Survey of context within which need for human services arises, and analysis of process by means of which such services are provided. Prereq: Consent of instructor.

Latin
See Classics

Mathematics

MAJOR

DEGREES

Mathematics

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

Professors:

G. E. Alber (Emeritus), Ph.D. Wisconsin;
J. S. Bradley (Head), Ph.D. Iowa; J. H. Carruth,
Ph.D. Du Pont; C. E. Clark, Ph.D. Louisiana State;
R. E. Cline, Ph.D. Purdue; R. J. Daverman,
Ph.D. Wisconsin; D. J. Dessart, Ph.D. Maryland;
D. D. Desoer (Emeritus), E. D. Eaves (Emeritus),
Ph.D. Texas; H. Frandsen, Ph.D. Illinois;
D. A. Gardiner; Ph.D. North Carolina State;
R. F. Gregory (Emeritus), Ph.D. Illinois;
T. G. Hallam, Ph.D. Missouri; D. B. Hinton, Ph.D.
D. D. Huse (Emeritus), Ph.D. Chicago;
L. S. Husch, Ph.D. Florida State;
G. S. Jordan, Ph.D. Princeton; R. M. McCone,
Ph.D. Duke; H. T. Mathews, Ph.D. Indiana;
D. L. Miller (Emeritus), Ph.D. Michigan;
B. S. Rajput, Ph.D. Illinois; K. C. Reddy*, Ph.D.
Indian Institute of Technology (India);
P. W. Schafer, Ph.D. Maryland; S. Serber, Ph.D.
T. G. Stephenson, Ph.D. Wisconsin; R. E. Cline,
Ph.D. Purdue; H. J. Davison, Ph.D. Illinois;
L. L. Dydak, Ph.D. Wisconsin; L. E. Eaves (Emeritus),
Ph.D. Georgia; P. W. Hough, Ph.D. California;
C. G. Wagner, Ph.D. Duke; J. W. Walsh, Ph.D.
SUNY (Binghamton).

Associate Professors:

V. Alexopoulos, Ph.D. Delaware; N. Attikos, Ph.D.
R. Brown, D. F. Anderson, Th.D. Chicago;
V. A. Douglas, Ph.D. Harvard; J. Dyck, Ph.D.
W. L. E. Kimele*, Ph.D. Ohio State; Y. Kuo,
Ph.D. Cincinnati; R. A. Kuperschmidt*, Ph.D.
Massachusetts Institute of Technology; H. L. Lee
(Emeritus), Ph.D. Duke; W. H. Legget (Emeritus),
Ph.D. Wisconsin; R. Rowlett, Ph.D. Virginia; H. Simpson,
Ph.D. California Institute of Technology; J. Smith,
Ph.D. California (Berkeley); K. Soni, Ph.D. Oregon State;
R. F. Soni, Ph.D. Oregon State;
K. R. Stepherson, Ph.D. Wisconsin; C. Sundberg,
Ph.D. Wisconsin.

Assistant Professors:

L. Aiello, Ph.D. Cornell; L. Barker, Ph.D. Florida State;
J. Cohen, Ph.D. Washington; S. Einer, Ph.D. Cornell;
L. J. Gross, Ph.D. Cornell; S. Hanafah*,
Ph.D. Carnegie Mellon; C. Karakashian, Ph.D.
Harvard; S. Lenzart, Ph.D. Kentucky; J. J. Long,
Ph.D. Michigan State; S. Muly, Ph.D. Purdue.

*Space Institute, Tiahuanac.

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

MASTER OF MATHEMATICS PROGRAM

Before admission, 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 teaching experience. Evidence of the requirement being met must be supplied by the student.

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

The following requirements must be met:

1. Completion of 45 hours (at least 24 of which must be in courses numbered above 5000). Of the additional 9 hours, 5 must be in courses in mathematics numbered above 5000.
2. Passing a comprehensive examination upon completion of all course work.

THE MASTER OF SCIENCE PROGRAM

The department offers two options for this degree. The first option requires a thesis for which 9 hours must be earned along with 36 additional hours of acceptable courses numbered above 4000. Of the additional 9 hours, 5 must be in courses in mathematics numbered above 5000.

After two years of graduate study, a student whose supervisory committee gives its approval may choose the non-thesis option, for which 45 hours of work in courses numbered above 5000 are required. Of these, 30 hours (at least 24 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 (5900-5995) 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 four requirements:

1. Satisfy either of the following: A, the standard option or B, the mathematical ecology option. A student intending to work in mathematical ecology may complete either option but he/she is encouraged to complete the mathematical ecology option. A student may elect to switch from either option to the other option provided that the constraints of the latter option have not been violated. A student's status after electing such a transfer is determined by the history of his/her earlier examinations from the standard option and part I of the interdisciplinary mathematical ecology option.

A. Standard option: Pass Written examinations covering four subjects, at least three of which must be from the following list:

- Algebra 5510-20-30
- Functions of a Complex Variable 5110-20-30
- Topology 5910-20-30
- Functions of a Real Variable 5210-20-30

- Linear Analysis 5240-50-60
- Partial Differential Equations 5450-60-70
- Ordinary Differential Equations 5870-80-90

B. Mathematical Statistics 5565-65-75

C. Numerical Analysis 5750-70-70

Students may not take examinations in both d and e. Students may not take examinations in both f. Students may not take examinations in both g and h. Students may not take examinations in both i and j. Students may not take examinations in both k and l. Students may not take examinations in both m and n. Students may not take examinations in both o and p. Students may not take examinations in both q and r. Students may not take examinations in both s and t. Students may not take examinations in both u and v. Students may not take examinations in both w and x. Students may not take examinations in both y and z. Students may not take examinations in both a and b. Students may not take examinations in both c and d. Students may not take examinations in both e and f. Students may not take examinations in both g and h. Students may not take examinations in both i and j. Students may not take examinations in both k and l. Students may not take examinations in both m and n. Students may not take examinations in both o and p. Students may not take examinations in both q and r. Students may not take examinations in both s and t. Students may not take examinations in both u and v. Students may not take examinations in both w and x. Students may not take examinations in both y and z.

2. Pass a written examination in ecology, covering material selected from nine hours of coursework outside of mathematics at the 5000 level or above.

3. Pass a written examination in a field appropriate to the student's area of specialization, covering twenty-four hours of coursework in the student's area of specialization, at least twelve of which must be at the 5000 level or above.
The course submitted for examination must be approved by the supervisory committee and the departmental Graduate Committee. The exam is to be prepared, administered, and graded by instructors of the course involved, along with at least one member of the Mathematical Ecology section. The student must obtain written agreement to participate in the examination from instructors of these courses and from at least one member of the student's doctoral committee before submitting materials to the committees for approval.

b. A student may take the written examination twice.

c. Demonstrate 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 doctoral committee may require that the student pass a second language exam.

III. Pass an intensive exam in the field of specialization. This exam will be given by a committee of three department head and the student’s doctoral committee. (Such approval may occur after completion of the course.)

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 with such credit. Such courses may be offered upon the initiative of interested faculty, students, or the department head (though in all cases subject to the approval of the department head).

3050 Elementary Probability and Statistical Analysis (3) Combinatorial problems; sample spaces, sets, and events; statistical independence; axiomatic probability theory; random variables and their distributions; simple random processes. Does not satisfy requirements of major or minor in mathematics. Prereq: 1500-60 or equivalent. W, Sp

3060 Elementary Statistical Analysis (3) 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 polynomials over other fields. Prereq or coreq: 3100 or consent of instructor.

3100 Logic and Sets (3) Elements of mathematical logic; elementary algebra of sets. Primarily for students in the College of Education. Does not satisfy requirements of major or minor in mathematics. Prereq: 1 yr college mathematics. Su

3110 Real Number System (3) Laws of arithmetic; rational numbers and their properties; real numbers and their properties; sequences of real numbers. Primary 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

3215 Discrete Structures II (3) (Same as Computer Science 3215.)

3220 History of Mathematics (3) Survey of development of various branches of mathematics, from ancient to modern times. Prereq: 1860 or 2550 or equivalent.

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

3350-60 Intermediate Analysis (3, 3) Real number system, functions, sequences, limits, continuity, uniform continuity, differentiation and integration. Must be taken in sequence. Prereq: 2860-50 or equivalent. Su


3780-90 Introduction to Combinatorial Theory (3, 3) Introduction to problems of arrangement and selection within discrete systems. Enumeration by recurrence relations and generating functions, graph theory, finite geometries and finite fields, partitions, block designs. Prereq: 2860 or consent of instructor. F, W, or W

3810 How To Prove It (3) Course is designed to improve understanding of nature and methods of mathematical proof by means of practice and participation in seminar setting. Variable content but will include certain standard topics such as elementary set theory, relations and functions, and mathematical induction. Coreq: 2860 or 2550, 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.

3890 Studies in Mathematics (1-4) Credit determined at registration. Prereq: Consent of instructor. May be repeated with consent of department. Maximum 9 hrs.

4000 Mathematics and Microcomputers for Teachers (3) Primarily for students in secondary mathematics education. The use of microcomputers to study certain concepts and problems in mathematics. Emphasis on the development of algorithms fundamental to mathematics computer science. Does not satisfy the major requirements for a B.S. or M.S. degree in mathematics. Prereq: 3050 or consent of instructor. Does not satisfy requirements of major or minor in mathematics courses and some programming experience.


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

4150-50 Abstract Algebra (3, 3) Equivalence relations and partitions, properties of integers, elementary theory of groups and 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 solutions of equations, and numerical approximations. Introduction to computation, instabilities, rounding errors. Solution of a single nonlinear equation, introduction to iterative methods for linear and nonlinear systems. Polynomial equations; power and inverse power methods for eigenvalues; eigenvectors. Power, Householder, and tridiagonal methods; tridiagonal, polynomial, trigonometric and rational functions. Prereq: 3150 or 3155. (Same as Computer Science 4225.) F, W

4235 Numerical Methods for Ordinary Differential Equations (3) Introduction to numerical methods for one- and two-order ordinary differential equations; existence and uniqueness, stability, consistency and convergence. Current algorithms, variable step and order; stiff systems. Boundary value problems. Prereq: 3150 or 3155 and 4610 or 4226. (Same as Computer Science 4235.) W


4250-60 Introduction to Complex Analysis (3, 3) 4250 Complex numbers, Cauchy’s theorem, Taylor and Laurent expansions, residue and applications. 4260 Conformal mapping, Singularities, Riemann’s mapping theorem. Direct numerical methods, applications (steady temperatures, electrostatics, fluid flow), additional topics in complex function theory. Must be taken in sequence. Prereq: 3150, 3155, and 3050. 4000-level mathematics course recommended.


4410-20-30 Introduction to Analysis (3, 3, 3) Real numbers, sequences, series, uniform continuity, differentiation, integration. Functions of several variables implicit function theory. Multiple integrals, improper integrals. Power series, uniform convergence, Taylor series. Should be taken in sequence. Note: Credit will not be given for both 4530 and 5520.

4460 Infinite Series and Functions of Several Variables (3) General theory, power series and Taylor’s formula, uniform convergence. Partial differentiation and maxima and minima for functions of several variables; partial derivatives, total differential, saddle points, extreme values. LaGrange multipliers. Prereq: 2860.

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

4610-20-30 Differential Equations (3, 3, 3) Linear first and second order equations. Power series
Equations (3, 3, 3) Existence, uniqueness, extendability, continuity of solutions, power series, Frobenius methods for regular singular equations; Poincare-Bendixon theorem, stability of critical points; boundary value problems for linear systems; regular and singular perturbation theory for nonlinear systems. Prereq: 4610, 4505, 4510-20-30. F, W, Sp, A

5910-20-30 Elementary Topology (3, 3, 3) Topological spaces; metrization, homeomorphic invariants of point sets; structure of Peano continua. Mapping, homotopy, introduction to combinatorial topology. F, W, Sp, A


5970-80 Mathematical Systems Theory (3, 3, 3) Analytical approach to discrete and continuous dynamical systems, fundamentals of control theory, linear problems, linear perturbation theory, nonlinear analysis, semigroups and applications. Abstract dynamical systems, role of dynamical systems in ecological modeling, optimal control problems. Prereq: 4610, 4505, 4510 or consent of instructor. F, W, A

5990 Graduate Reading in Mathematics (1-3) Open to graduate students with consent of department head. Independent study with faculty guidance. May be repeated. Maximum 9 hrs.

5991 Seminar Analysis (1-3)
5992 Seminar Topology (1-3)
5993 Seminar Algebra (1-3)
5995 Seminar Applied Mathematics (1-3) May be taken for S/NC or letter grade.

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

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

6210-20-30 Functional Analysis (3, 3, 3) Topological vector spaces, Frechet spaces, bounded linear transformations, seminorms, Banach-Schauder and Banach-Alaoglu theorems, Krein-Milman theorem, Born spaces and their duals, Goldstine's theorem; distributions, weak derivatives, n-dimensional Fourier transforms, Paley-Wiener theorems, Sobolev spaces, theorems of Malgrange, Ehrenpreis and Lux; Banach algebras, Gelfand transform, the spectral theorem of Banach-Naimark theorem, the spectral theorem for normal operators.


6450-60-70 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: 5510-20-30.

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) Theory of ordinary differential equations from advanced viewpoint. Topics from current literature. Subject matter varies according to interests and preparations of students. Prereq or coreq: 5210, 4610, 4150-60, and 5110-20-30 or 5210-20-30 or consent of instructor.


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

6910-30 Modern Topology (3, 3, 3) Technical background to current literature in topology. Topics vary from year to year.

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

6991 Seminar Analysis (1-3)
6992 Seminar Topology (1-3)
6993 Seminar Algebra (1-3)
6995 Seminar Applied Mathematics (1-3)
6996 Seminar in Numerical Mathematics (1-3)

NOTE: registration for 6000-level courses may be repeated with consent of department.

Microbiology

MAJOR

DEGREES

Microbiology

M.S., Ph.D.

Professors: A. Brown (Head), Ph.D. Chicago; R. W. Beck, Ph.D. Wisconsin; J. M. Becker, Ph.D. Cincinnati; T. C. Montie, Ph.D. Maryland; W. S. Riggsby, Ph.D. Yale; B. T. Rouze, Ph.D. Guelph (Canada); G. S. Rich, Ph.D. Idaho; J. M. Woodward (Emmett), Ph.D. Kansas; David C. Whiter, Ph.D. Rockefeller; C. J. Wust, Ph.D. Indiana.

Associate Professors: D. A. Banks, Ph.D. Cornell; D. A. Brian, Ph.D. D.V.M. Michigan State.

Assistant Professors: R. N. Moore, Ph.D. Texas (Austin); K. M. Sircelk, Ph.D. Michigan State; G. Stacey, Ph.D. Texas (Austin).

The Department of Microbiology offers both the M.S. and Ph.D. degrees. Students have the option of selecting from a variety of graduate research programs. For a description of each program, contact the Department.

The Graduate Programs: Each new graduate student meets with an advisory committee chair appointed by the departmental Director of Graduate Studies to plan a program of study for the first year or two quarters until a research advisor is selected. All first year students participate in a laboratory rotation program during the first quarter of study. This program allows the student to adjust smoothly to the research programs of the department, to develop a background of research procedures and concepts, and to facilitate the selection of a research professor. Usually the student selects a research professor toward the end of the laboratory rotation period. The student must have the approval of the Department of Graduate Studies in the selection of and carrying out of a suitable research program and in the naming of a thesis or dissertation committee.

THE MASTER'S PROGRAM

The program leading to the M.S. degree is designed to provide the student with basic knowledge, to permit the acquisition of technical competence in the fundamentals of research, and to encourage creative and independent thinking. Two to three calendar years are usually needed for the course of study which has the following requirements: (1) 45 hours including thesis credits; (2) a 3.0 GPA in all courses taken for graduate credit after 18 hours of credit have been earned in courses graded on the A-F system; (3) a 3.0 GPA in all courses taken in the department; (4) a complete course sequence in biochemistry; (5) coursework in at least five of the subdisciplines recognized by the department: microbial physiology, pathogenic bacteriology, molecular biology, microbial genetics, immunology, microbial eco-logy, molecular biology, and applied microbiology; and (6) presentation of a research proposal and an oral defense.

THE DOCTORAL PROGRAM

The program leading to the Ph.D. degree is designed to develop the student's ability to pursue independent and original research in microbiology and allied fields, to teach both oral and written communication of the results of research to the scientific community, and to train effective teachers. Students may enter the program after receiving either a Bachelor's or Master's degree. Students who enter with a Bachelor's degree usually take three to four years to complete the degree. Departmental requirements are: (1) a 3.0 GPA in all courses taken for graduate credit after 18 hours of credit have been earned in courses graded on the A-F scale; (2) a 3.0 GPA in all courses taken in the department; (3) satisfactory performance in at least one quarter as a teaching assistant; (4) two quarters of physical chemistry; (5) one course in statistics; (6) courses in at

* Distinguished Scientist, Science Alliance Center for Excellence.
least five of the sub-disciplines listed in the Master's program; (7) satisfactory performance in a comprehensive examination that must be passed before admission to candidacy; and (8) the presentation of a written research proposal and its oral defense.

5135 Recombinant DNA (3) History, principles and basic discoveries leading to development of current recombinant DNA techniques. Bacterial plasmid and bacteriophage molecular biology applied to the development of recombinant DNA techniques. Prereq: 4140 or consent of instructor.

5139 Recombinant DNA Laboratory (3) Practical details and procedures applicable to recombinant DNA methodology and techniques. Utilization of available vectors, experimental conditions and filter immobilized nucleic acid hybridization. Prereq: Consent of instructor. (Same as Life Sciences 5139.)

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

5360 Topics in Immunology and Immunohemistry (4) Molecular and genetic aspects of immunoglobulin synthesis. Theoretical and practical exercise in immunohemistry. Prereq: 4270; Biochemistry 4110-20 or equivalent.

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

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

5730 Pathogenesis of Infectious Disease (3) Host responses to infection. Derangement of host-microorganism stimuli by microbial invasion, exotoxins, endotoxins and other factors related to virulence. Alteration of growth and metabolism of pathogens resulting from progressive infection. Prereq: 4320.

5750 The Oncogenic Viruses (3) Lectures and special laboratory exercises dealing with known tumor-inducing viruses. Prereq: 4430 or consent of instructor. 2 hrs and 1 lab.

5760 The Bacterial Viruses (3) Lectures and discussions dealing with bacterial viruses with emphasis on the biological and chemical consequences of bacteriophage infection. Text supplemented by readings from literature. Prereq: 4420; Biochemistry 4110-20.

5819 Molecular Genetics Laboratory (3) Principles and methods of research in molecular genetics. Fundamental genetics concepts (mutation, complementation, recombination) at molecular level. 2 hrs and 1 lab.

6300 Seminar in Immunology (1) Readings and discussions based on current literature. May be repeated. S/NC only. E

6400 Seminar in Microbial Pathogenesis (1) Readings and discussions based on current literature. May be repeated. S/NC only. F, W, Sp

6500 Seminar in Microbial Physiology (1) Readings and discussions based on current literature. May be repeated. S/NC only. E

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.

6790 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

DEGREES

Music

M.M., M.A.

Professors:

Assistant Professors:

The Department of Music offers the degrees of Master of Music with concentrations in performance, accompanying, composition, theory, choral conductin, instrumental conductin, 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 UTK, 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.

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. Each student is responsible for the selection of his/her graduate committee. The student's
major area professor normally serves as chair of the Master's committee. One or two additional members from the major area (or related area, when necessary) serve on the committee along with one member from each of the remaining areas: music history, music theory, and music performance. When the student has chosen his/her committee, the Coordinator of Graduate Studies must be notified immediately in writing.

All concentrations require a written and oral comprehensive final examination.

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 allows for elective courses. Music theory and composition require a thesis.

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

THE MASTER OF ARTS PROGRAM

The department requires a minimum of 45 quarter hours including 21 hours of coursework above the 5000 level and 9 hours of thesis. A reading knowledge of French or German must be demonstrated by applicants before being admitted to candidacy.

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 instrumental works from Elizabethan period through J.S. Bach.

3240 The Symphony (3) Survey of symphonic literature from Middle Ages to present; problems of style and interpretation; pedagogical literature and methods; organ design. Prereq or coreq: 2510-29-30-40 and consent of instructor.

4035 Keyboard Literature Before 1750 (2) Survey of music for harpsichord and other keyboard instruments from Elizabethan period through J.S. Bach.

4036-37-38 Advanced Piano Literature (2, 2, 2) Piano music from pre-classic period to present. Prereq: Consent of instructor.

4140 Projects in Opera Theatre (1-3) Prereq: Consent of instructor.

4046-47-48 Song Literature (2,2,2) Study of song literature from 1750 to present including performance. Prereq: Consent of instructor.

4520 Saxophone (1-4)

4525 Horn (1-4)

4530 Oboe (1-4)

4535 Trombone (1-4)

4540 Baritone (1-4)

4542 Composition for Media (1-3) Prereq: Consent of instructor.

4545 Tubas (1-4)

4550 Viola (1-4)

4560 Violin (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.

4610 Jazz Directing (1) Rehearsal techniques for jazz ensembles: special conducting techniques, repertoire, library systems, programming, and supervised laboratory experience in rehearsing university jazz ensembles. Prereq: Enrollment in Applied Music with jazz emphasis or consent of instructor.

4640 JazzDirecting (1) Rehearsal techniques for jazz ensembles: special conducting techniques, repertoire, library systems, programming, and supervised laboratory experience in rehearsing university jazz ensembles. Prereq: Enrollment in Applied Music with jazz emphasis or consent of instructor.

4640 JazzDirecting (1) Rehearsal techniques for jazz ensembles: special conducting techniques, repertoire, library systems, programming, and supervised laboratory experience in rehearsing university jazz ensembles. Prereq: Enrollment in Applied Music with jazz emphasis or consent of instructor.
College of Liberal Arts/Music

gram. Prereq: Enrollment in Applied Music with jazz emphasis or consent of instructor.

4850 Jazz Composition (2) Prereq: 4870-75.

4860 Advanced Improvisation (2) Emphasis on further development of individual skills and solving individual problems in jazz improvisation. Prereq: 3852-53.

4870-75 Stage Band Arranging (2, 2) Analysis of scores and scoring for stage band. Prereq: 3112 and consent of instructor. Must be taken in sequence.

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

5001 Project in Choral Conducting Performance (1-3) Public performance; critical document; recording. May be repeated. Prereq: Consent of instructor.

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

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

*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 teaching. 5032—Analysis of the vocal problems of a selected group of students. Supervised teaching. Prereq: 4012-22-32 or consent of instructor.

*5020 Piano Literature Seminar (3) Topics vary.

5033-34-35 Advanced Diction for Singers (2, 2, 2) Practical performance and application of diction theory. Prereq: 2055-65-75 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 allied to score reading and preparation. Particular attention to individual problems. Prereq: 4050 or equivalent.

5060 Advanced Choral Conducting II (3) Expansion and continued refinement of conducting technique; development of choral rehearsal skills. Prereq: 4060 or consent of instructor.

5061 Choral Conducting Seminar (3) Score reading and preparation; problems in interpretation, performance practices, and conducting techniques of individual. May be repeated. Prereq: 5060 or consent of instructor.

5062-63-64 Choral Literature (2, 2, 2) Choral music from Middle Ages to present with consideration of historical development of major choral genres.

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

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

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

*5100 Independent Study in Music Theory (1) 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.

*5126 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.

5231-32 Recital Project (2, 2) Preparation and accompaniment of full recital. 5231—Vocal recital. 5232—Instrumental recital. Prereq: Consent of instructor.

*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, cantatas, 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艺术 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)

*5548 Tuba (1-4)

*5550 Percussion (1-4)

*5551 Accompanying and Coaching (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.

*5598 Composition (1-3) Prereq: Consent of instructor.

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

**5600 Chamber Music Ensemble (1)

**5602 Woodwind Choir (1)

5603 Small Jazz Ensembles (1) May be repeated. Maximum 12 hrs.

**5604 Jazz Ensemble (1)

5605 Studio Orchestra (1) May be repeated. Maximum 12 hrs.

**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 Varsity Band (1)

**5656 Laboratory Band (1)

**5657 Marching Band (1)

**5670 Symphony Orchestra (1)

**5680 Concert Choir (1)

**5682 University Chorus (1)

**5699 Accompanying (1)

*May be repeated.

**May be repeated. Maximum 6 hrs.
Philosophy

MAJOR

Philosophy

MA., Ph.D.

Professors:

W. Davis (Head) Ph.D. Emory; R. E. Aquila, Ph.D. Northwestern; W. G. Breckenir, Ph.D. Michigan; L. D. Cable, Ph.D. Nebraska; R. B. Edwards, Ph.D. Emory; G. C. Gruber, Ph.D. Michigan; B. C. Postow, Ph.D. Yale, D. Van de Vate, Jr., Ph.D. Yale.

Associate Professors:


Assistant Professors:

H. P. Hamlin, Ph.D. Georgia; E. R. Jones, Ph.D. Chicago; M. Lavin, Ph.D. Stanford.

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 and are ready to begin writing a dissertation, but who have not written a Master’s thesis.

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 18 quarter courses or their equivalent, exclusive of credit for the thesis and dissertation) of which no fewer than 45 hours shall be in courses numbered over 5000. The specific number and distribution of courses will be determined by the student’s faculty committee.

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

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.

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

Registration in any course in the 5000 or 6000 series (except 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.

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

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

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

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

3410 Philosophical ideas in Literature (4) Philosophical assumptions and implications in major literary works. F, W, Su

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

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


3510 Existentialism (4) E

3550 Marxism as Philosophy (4) W

3590 Business Ethics (4) Ethical problems as they confront both business as social institution and individuals in business. May not be taken for graduate credit by philosophy majors. Sp

3605-06 Professional Responsibility (4, 4) 3605—Critical analysis of selected classic texts from philosophy, religious studies, and social sciences; nature of responsibility, professionalism, and application of concepts of responsibility to professional activity. Illustrations from various professional fields of practice. 3606—Application of theoretical principles and analytic skills developed in 3605 to selected case studies and other detailed descriptions of professional practice from following professional fields: Engineering/Architecture; Business/Accounting; and at least one of (a) Law/Politics; (b) Helping Professions (Social Work, Human Services, Religious Ministry); (c) Teaching. (Same as Religious Studies 3605-06.)

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

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

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

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


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

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

3810 Symbolic Logic (4) Techniques for formal analysis of deductive reasoning (propositional logic and quantification theory.) Prereq: 1810 or 2510 or consent of instructor

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

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

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

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

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

4370 Theoretical Issues in Medical Ethics (4) Prereq: 2310 or 3611 or consent of instructor. (Same as Religious Studies 4370.) Sp

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

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

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

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

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

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

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

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

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

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

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

4810 Contemporary Metaphysics and Epistemology (4) Prereq: 8 hrs philosophy 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 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

5050 Symbolic Logic (4)

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

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

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

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

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

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

5335 Orientation to Medical Ethics (4) Survey of ethical theories in application to issues in medical ethics. Consent of Medical Ethics Committee required. (Same as Religious Studies 5335) F

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

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

5375 Clinical Medical Ethics (2) Medical terminology, history of medical ethics, case study discussions, clinical observation. Open only to students concentrating in medical ethics. Prereq: 5335 and consent of Medical Ethics Committee. May be repeated. Maximum 8 hrs. S/NC only.

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

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

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

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

5550-56 Philosophy of Science (4, 4) Nature of subject matter and method of sciences. 5550—Natural sciences. 5560—Social sciences.

5610 Recent Developments in Philosophy of Religion (4)

5710 Studies in Metaphysics (4)

5720 Studies in Epistemology (4)

5810 Social and Political Philosophy (4)

5940 Lakeshore Clinical Residnet (5-9) Seven-week clinical practicum at Lakeshore Mental Health Institute concentrating on ethical issues in mental health care. Open only to students concentrating in medical ethics. Prereq: Consent of Medical Ethics Committee. S/NC only.

5950 Clinical Practicum in Medical Ethics (4-12) Prereq: Consent of Medical Ethics Committee. Open only to students concentrating in medical ethics. S/NC only. E

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

6110-20-30 Seminars in the History of European Philosophy (4, 4, 4)

6150 Seminars in the History of American Philosophy (4)

6250 Seminar in the Philosophy of Religion (4)

6310 Seminar in Axiology (4)

6370 Advanced Topics in Medical Ethics (4) Prereq: 5370 or consent of Medical Ethics Committee.

6510 Seminar in Epistemology (4)

6550 Seminar in Philosophy of Science (4)

6950 Advanced Residence in Medical Ethics (4-12) Prereq: Consent of Medical Ethics Committee. Open only to students concentrating in medical ethics. S/NC only.

PhD Degree Program


Associate Professors:


Assistant Professors:

K. Breit, Ph.D. Oregon; J. Burgdorfer, Ph.D. Frie Universitat Berlin; R. DeSario, Ph.D. Chicago; T. Farrell, Ph.D. Ciems; S. Nave, Ph.D. Tennessee.

*Alumni Distinguished Professor.

1Space Institute, Tullahoma.

2Distinguished Scientists, Science Alliance Center of Excellence.

3Chancellor's Research Scholar.

Graduate programs leading to the degrees of Master of Science and Doctor of Philosophy are offered in a number of concentration areas: atomic and low temperature physics, biophysics, chemical physics, elementary particle physics, physics, heavy ion atomic physics, liquid state physics, molecular spectrosocopy, nuclear physics, plasma physics, solid state physics, theoretical physics, and ultrasonics. Departmental graduate programs provide special opportunities for academic work in areas of atmospheric and space flight research at the Space Institute, Tullahoma. For additional information, contact the Department Head.

Admission Requirements: A student who enrolls in The Graduate School with the intention of attaining an advanced degree in Physics will have completed an undergraduate major in physics or its equivalent. Physics 3110-20, 3230, 4310-20, 3710-20, or 4110-20 and 4230 or 4240 constitute the minimum course prerequisite to graduate study. A student who intends to present Physics as a graduate minor will have completed an undergraduate minor in physics or its equivalent. All first-year graduate students are required, for advising purposes only, to take a qualifying examination in undergraduate physics during the fall quarter registration period.

THE MASTER'S PROGRAM

Thesis Option: This program is designed primarily for students intending to go into industrial or governmental laboratories as physicists. The minimum requirements include 36 quarter hours in such courses as Physics 4510-20-30, 4640-50-60, 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, 9 credit hours, and pass an oral examination on course material and thesis.

Non-Thesis Option: This program is designed primarily for students intending to teach in colleges or universities on the elementary or intermediate level, or for students specifically intending to work toward a Ph.D. Students seeking the non-thesis option must apply to the department's graduate committee for permission to enroll under this program. The requirements are the satisfactory completion of 45 hours of course work composed of 30 hours from courses numbered above 5000; 9 hours in a minor field; and 6 hours from other courses in physics numbered above 4000 (preferably of advanced laboratory nature). In addition, the candidate must pass a written comprehensive examination administered by the committee.

THE DOCTORAL PROGRAM

All students are expected to take 5210-20-30, 5310-20-30, 5410-20-30, 5510-20-30, 5610-20-30, and 6110-20-30. Physics 6210-20-30 are normally required of students specializing in nuclear physics. Physics 6500-10 of students in plasma physics, Physics 6610-20 of students in solid state physics, and Physics 6810-20 of students specializing in molecular spectra. Students must pass a comprehensive examination normally taken after two years of graduate study. A Master's degree is not required for the doctorate.

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, the U. T. Space Institute, or at the Oak Ridge National Laboratory, Oak Ridge, Tennessee. A program leading to the Ph.D. in chemical physics is conducted jointly with the Chemistry Department, which offers a similar degree. Physics departmental requirements for the degree in chemical physics include the successful completion of Physics 4510, 4640-50-60, 5210-20-30, 5310-20-30, 5410-20-30, 5510-20-30, 5610-20-30, 6110-20-30, and 5720; Chemistry 4160-70, 5430, and any two quarters from 5340-50, 6730 or 6810-20.

Astronomy

Physics

3230 Heat and Thermodynamics (3) Concepts of temperature and heat; laws of thermodynamics; applications of laws to simple physical and chemical problems. Prereq: 3220 or 3230 and calculus; 3110 or consent of instructor. Sp, Su

3610-20 Electronics (3, 3) Electronic components and circuits of interest to physicists. Prereq: 2310-20-30 or 2210-20-30 and calculus. 3 labs. F, W, Su

3830 Nuclear Electronics Laboratory (3) Elementary circuits in nuclear instrumentation are designed and built, and their characteristics are tested as a function of various parameters. Prereq: 3610-20. Sp

3710-20-30 Introduction to Atomic and Nuclear Physics (3, 3, 3) 3710—Special relativity and early quantum theory. 3720—Atomic and nuclear physics. Prereq: Mathematics 2860; 2320 for 3710; 2310 or 3710 for 3720-30. E

4010 Background of Physics (3) Survey of historical development and philosophical foundations of natural science. Classical theories of gravitation, electromagnetism, and relativity. Unifying mathematical principles underlying physical applications. Readings from important original papers, thought-provoking problems and order-of-magnitude calculations combining different fields of classical physics, and written report on independent study. Prereq: Senior standing in Physics or consent of instructor.

4020 Forefront of Physics (3) Survey of modern developments in physics: various forms of quantum mechanics, quantum electrodynamics, and geometries of particles, fields and their interactions. Discussions of unsolved questions in physics, experiments of recent interest, readings in recent literature, and applications in other fields, with final oral report and term paper. Prereq: 4010 or consent of instructor.

4050 Foundation of Physics (3) Selected topics from history and philosophy of classical and modern physics. Prereq: One year of general physics and consent of instructor. Note: No student who has received a grade of C or better in 4010-20 may receive credit for 4050.

4110-20-30 Introduction to Quantum Mechanics (3, 3, 3) Introduction to fundamental principles of quantum mechanics and methods of calculation. Application to atomic, molecular, and nuclear physics. Prereq: 2320 or equivalent. Mathematics 4550, F, W, or Sp, W.

4140 Elementary Nuclear Physics (3) General properties of nuclei, nuclear forces, nuclear models, nuclear reactions, nuclear disintegrations and beta-decay, nuclear spin and magnetism. Prereq: 3730 or 4120. Sp

4160 Physical Acoustics (4) Considerations fundamental to sound, fundamentals of wave theory, the propagation of acoustic waves; propagation of acoustic waves in the infrasonic, the audible, the ultrasonic, and the hypersonic ranges of frequencies. Prereq: 3110-20, 3260 or 3230 and 3 lab. 1 hr and 1 lab. F

4230-40 Modern Optics (4, 4) 4230—Geometrical Optics: Reflection and transmission of light at a dielectric interface, paraxial theory of interfaces, lenses, and mirrors; thin lenses, lens systems, ray tracing; polarization; imagery; laser light. 4240—Physical Optics. Mathematics of wave motion, superposition of waves, interference; Fraunhofer and Fresnel diffraction; Fourier optics; holography. Prereq: 4310 or consent of instructor. 3 hrs and 3 hrs lab. W, F


4510-20 Atomic Physics Laboratory (3, 3, 3) Experiments in: fundamental particle properties, photoelectricity, conduction of electricity through gases, atomic and molecular spectroscopy, x-ray. Prereq or coreq: 3710-20-30. 3 labs. E

4540-50 Experimental Nuclear and Radiation Physics (4, 4) 4540—Advanced treatment of particles and electromagnetic radiation with matter; theory and characteristics of various detectors; statistics of counting, nuclear properties, recent techniques for investigating the nucleus and nuclear radiation. Prereq: 2330, 1 hr and 6 hrs lab. F, Su

4580 Principles of Nondestructive Testing (3) Detection and characterization of discontinuities in materials by nondestructive physical measurements. Ultrasonic, electromagnetic, holographic and penetrating radiation techniques are discussed. Prereq: 2310-20-30 and instructor. (Same as Engineering Science 4580). W

4590 Magnetic Induction Phenomena (3) Theory and application of magnetic induction phenomena: non-destructive testing with eddy currents, induction heating, magnetic levitation, forming, pumping, and flow measurement. Prereq: 4320 or equivalent; 2 hrs and 1 lab. (Same as Engineering Science and Mechanics 4590). W

4640 Kinetic Theory (3) Transport properties: discussion of scattering theory and classical distribution function. Prereq: 3230 or equivalent.

4650 Statistical Mechanics (3) Elementary methods of statistical mechanics applied to modern systems to derive the fundamental statistical properties. Prereq: 4640. Prereq: 3230.

4660-70 Solid State Physics (3, 3) 4660-Symmetry and crystal structure, lattice dynamics, specific heat. 4670-Electronic properties of solids, electronic properties. Must be taken in sequence. Prereq: 3230 or equivalent.

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

5080 Graduate Research Participation (3) Advanced research techniques under supervision of staff research director whose research area coincides with interests of student to help assure students are in good standing. Prereq: Consent of department and research director; May be repeated with consent of department. S/NC only. E


5210-20 Advanced Modern Physics (3, 3, 3) Basic principles of wave mechanics; one-electron atom; vector model; atomic and molecular spectroscopy; molecular binding; energy; transitions; nuclear force, nuclear forces and mass; high-energy physics. Prereq: 3110-20, 3110-20-30, 4120-20, differential equations. Must be taken in sequence, F, W, Sp


5440 Experimental Methods of Infrared and Raman Spectroscopy (3) Experimental equipment: instrumients, optical techniques; detector systems; analytical methods. Analysis of vibrating-rotating diatomic molecule. Prereq: 3710-20 or equivalent.


5640 Numerical Methods in Physics (3) Numerical methods available for solution of physical problems, presentation toward use of automatic computing machinery, analysis of errors. Prereq: 5610-20-30, or consent of instructor.

5720 Physics of Polyatomic Molecules (3) Introduc- tion to electronic structure of molecules and physical processes of luminescence. Theoretical and experimental aspects of intermolecular and intramolecular electron excitation energy transfer and charge transfer in biological energy transfer and charge transfer in such fields as organic molecular reactivity and organic scintillation. Prereq: 5210-20 or consent of instructor. Sp

5910-20-30 Special Problems (3, 3, 3) Specially assigned theoretical or experimental work on problems not covered in other courses. E


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

6110-20-30 Quantum Mechanics (3, 3, 3) Fundamen- tal principles of quantum mechanics and principal approximation methods. Applications to atomic, molecular and nuclear physics. Dirac equation; quantum electrodynamics. Prereq: 4130 or 5210; 5310-20-30 or 5410-20-30. Whatever of latter series not used as prerequisite is considered corequisite. F, W, Sp

6210-20 Nuclear Structure (3, 3, 3) General properties of nucleus; two body scattering problems; saturation and symmetry properties of nuclear forces; theory of light nucie; nuclear spectroscopy; special nuclear models; decay theory; theory of beta-decay. Prereq: 6110-20-30. F, W, Sp

6260-70 Elementary Particle Physics (3,3,3) Ge- neral physics of elementary particles; experimental methods; conservation laws; invariance principles; hadronic interactions; quark models; electroweak interactions; unification of elementary forces; attention to interplay between experiment and theory. Prereq or coreq: 6110-20-30. F, W, Sp

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

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

6420 Advanced Topics in Classical Theory (3) To meet special needs of students. Possible topics: angular-momentum theory, beta-ray theory, theory of atomic spectra, molecular structure and valence theory, theory of radiation, electric and magnetic susceptibilities, high energy processes, scattering and collision processes, theory of fields. Prereq: 6110-20-30. May be repeated with consent of department.

6430 Advanced Topics in Quantum Theory (3) To meet special needs of students. Possible topics: angular-momentum theory, beta-ray theory, theory of atomic spectra, molecular structure and valence theory, theory of radiation, electric and magnetic susceptibilities, high energy processes, scattering and collision processes, theory of fields. Prereq: 6110-20-30. May be repeated with consent of department.

6500-10-20 High Temperature Plasma Physics (3,3,3) (Same as Electrical Engineering 6500-10-20.) F, W, S.

6620 Interaction of Electrons with Solids (3) Collisions with free electrons; stopping power; electron slowing down spectra; energy straggling; nuclear scattering; electron energy distribution in irradiated solids; techniques in electron spectroscopy; applications to dosimetry. Prereq or coreq: 6110-20-30. F.

6630 Interaction of Radiation with Gases (3) Interaction of electromagnetic radiation with atoms and molecules; oscillator strength, interaction of charged particles with atoms and molecules in freezing out; trans-cituation and light emission. Electron interaction, transport and capture; electron swarm and electron beam experiments. Prereq or coreq: 6110-20-30. F.

6710-20-30 Advanced Solid State Physics (3, 3, 3) Lattice dynamics; phonons; Brillouin zones; heat capacity; energy band structure of solids; cohesive energy; work function; crystal oscillator strengths; effective mass approximation. Dia.-par., -ferro-magnetism; neutron diffraction. Fermi surface. Superconductivity. Phonon and electron scattering from phonons, electrons, and defects. Excitations; polarization; surface states. F-centers; dislocations; and other defects. Prereq: 4670, 5210-20. Prereq or coreq: 4670; 6110 for 6710, 6120 for 6720. A.

6810 Vibrational Problems in Molecular Spectra (3) Normal coordinates and potential functions; group theoretical aspects and selection rules in gases and condensed phases. Laserman spectroscopy and nonlinear electrooptical phenomena. Prereq: 5420 or equivalent. (Same as Chemistry 8810). A.

6820 Molecular Vibration-Rotation Theory (3) Molecules as vibrating and rotating systems possessing specific symmetry properties; quantum mechanical theory of symmetric and asymmetric molecular vibrations including vibration-rotation interaction theory; intensities and energies of molecular transitions; methods of data analysis in high resolution molecular spectroscopy. (Same as Chemistry 8820).

**Political Science**

**MAJORS**

**DEGREES**

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

Public Administration M.P.A.

Professors:

T. J. Conlin, J. Head; Ph.D. Iowa; R. S. Ayer (Emeritus); Ph.D. Northwestern; D. H. Carlsie, (Emeritus); Ph.D. North Carolina; L. S. Greene" (Emeritus); Ph.D. Wisconsin; A. H. Hopkins; Ph.D. Syrasuse; V. R. Iredell, Ph.D. Chicago; W. Lyons, Ph.D. Oklahomas; H. Haag, Ph.D. Utah; W. M. Robinson; Ph.D. Syrasuse; T. A. Smith, Ph.D. Ohio State; O. H. Stephens,** Ph.D. Johns Hopkins; D. M. Welbom, Ph.D. Texas.

Associate Professors:

R. B. Cuningham, Ph.D. Indiana; J. Dodd, Ph.D. Tulane, G. Evans, Ph.D. Columbia; M. R. Fitzgerald, Ph.D. Oklahoma; K. Freeman, Ph.D. Welbom; R. A. Gorman, Ph.D. New York; R. L. Peterson, Ph.D. Yale; T. McN. Simpson, Ph.D. Johns Hopkins.

Assistant Professors:


**Distinguished Professor.**

**Alumn Distinguished Professor.**

The Department of Political Science offers the M.A., M.P.A., and Ph.D. degrees. Inquiries concerning all programs should be directed to the departmental office.

**Admission Requirements:** Three departmental recommendation forms must be submitted to The Graduate School at least two of which must be completed by instructors at the institutions most recently attended by the student. In addition, scores for the general portion of the Graduate Record Examination must be submitted.

THE MASTER OF ARTS PROGRAM

Each candidate must earn 36 quarter hours in coursework and 9 hours of Thesis 5000, and must choose two of the following five broad fields in which to specialize: political theory and methodology, American government and politics, comparative government and politics, international relations, and public administration. A final oral examination must be passed by each candidate covering the thesis and two specialty areas.

THE MASTER OF PUBLIC ADMINISTRATION PROGRAM

The M.P.A. degree is a non-thesis program. Fifty-four quarter hours are required, consisting of a 30-hour core, a 15-hour elective specialized track, and a recommended 9 quarter-hour internship with a public agency lasting 3-6 months. Possible specialized tracks include general government, public health, budgeting and finance, planning, natural resources, program evaluation, criminal justice, public relations, personnel, and others.

The written comprehensive examination may be followed by an oral exam.

**THE DOCTORAL PROGRAM**

A minimum of 117 quarter hours following the Bachelor's degree is required. At least 72 hours in political science shall be in 5000-6000-level courses, and at least 45 hours shall be at the 6000 level. This figure includes 36 hours of credit for the dissertation.

Each Ph.D. candidate must pass an examination in one foreign language. 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. The candidate must also pass a final oral examination on the doctoral dissertation. Successful completion of the degree also depends on course performance and other evidence of professional interest and conduct.

THE BUREAU OF PUBLIC ADMINISTRATION

The University maintains in the College of Liberal Arts a Bureau of Public Administration for the purpose of promoting sound governmental administration through research, publication, and consultation. The Director is the Head of the Political Science Department, Thomas D. Unger.

**Note:** Registration in any courses in the 5000-5000 series may be regarded for credit with consent of the department.


3546 U.S. Constitutional Law: Civil Rights and Liberties (4) Judicial interpretation of first amendment, equal protection clause of fourteenth amendment and right to privacy.

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

3565 Introduction to Public Administrative Organization and Management (4) An overview of the decision-making process. Prereq: 3566. F.

3605 Policy Change in Developing Areas (4) Characteristics and problems of potential changes with primary focus on developing areas. F, Sp.

3515-16 Dynamics of Black African Politics (4, 4) W, F.

3621 Government and Politics of the People's Republic of China (4) Chinese political setting, political structures, participation and selected policy areas.

3525-26 Latin American Government and Politics (4, 4) F, W.

3531-32 Government and Politics of the Soviet Union (4, 4) F, W.

3535-36 Politics in Western Democracies (4, 4) Political culture, patterns, and institutions of Western democratic systems. F, W.

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 administrators. Attention will be paid to state government's role in formulating, enacting, and implementing state policy. W.

3750 The Urban Polity (4) Analysis of political institutions and processes in metropolitan areas. W.


3786 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) Augustine to Luther: emphasis on problems and theories of religion and politics. W.

3803 Studies in Early Modern Political Thought (4) Machiavelli through the Enlightenment. W.
5210-20 Seminar in World Politics (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 Seminar in Comparative Government (3) Selected topics in modern governments.
5340 Seminar in Latin American Government (3)
5370 Seminar in Soviet Politics and Government (3) W
5410-20 Seminar in Public Law (3, 3) Special problems in constitutional and administrative law. F
5440 Theory and Analysis of U.S. Foreign Policy Processes (4) Theoretical approaches to decision making in foreign policy area and analysis of policy-making process. W
5540 Seminar in Comparative Public Administration (3) Approaches to and methods used in comparative analysis.
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 Seminar in Organization Theory (3) Appraisal of major theories of organization and their applicability to public sector. F
5611 Seminar in State-Local Administration (3)
5645 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.
5660 Seminar in Metropolitan Areas (3)
5661 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) Organizational theory applications in public management; field analysis of public organizations.
5750-55 Seminar in Public Management (3, 3) Selected problems. F; W
5765 Law and the Administrative Process (3) Constitutional position; decisional processes, regulation and management; limitations on governmental action; questions of structure, role, and administrative choice. W

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. E; W
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
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 settings, judicial institutions, personnel, and public policy content.
6610 Advanced Studies in Public Administration (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.
6810-20 Advanced Studies in the Political Process (3, 3) Open to advanced graduate students upon approval of instructor. F; W

Psychology MAJOR DEGREES

Psychology

Professors:
- W. H. Calhoun (Head), Ph.D. California (Berkeley);

Associate Professors:
- J. M. Barlow, Ph.D. Tennessee; N. W. Dye, Ph.D. Tennessee; E. A. Ellef, M.S.W. Tennessee; D. S. Freeman, Ph.D. Tennessee; M. G. Johnson, Ph.D. Johns Hopkins; R. J. Kendliakas, Ph.D. Tennessee; K. A. Lawler, Ph.D. North Carolina; S. Loucks, Ph.D. Tennessee; J. W. Lounsberry, Ph.D. Michigan State; A. McIntyre, Ph.D. Yale; W. G. Morgan, Ph.D. Tennessee; M. J. O'Connell, Ph.D. Tennessee; R. S. Saudargas, Ph.D. Florida State; C. S. Travis, Ph.D. California (Davis).

Assistant Professors:
- L. T. Laurence, Ph.D. Tennessee.

Part-time
The Department of Psychology offers the Doctor of Philosophy degree with concentrations in clinical, school, community, social, developmental, experimental, cognitive, physiological, and comparative psychology, psycholinguistics, psychometrics, and learning. The department does not normally admit students to the Master's program; however, a Master's may be earned as part of the doctoral program. For detailed information, write to the Department of Psychology.

THE DOCTORAL PROGRAM
Requirements for the Ph.D. are:
1. During the first year, students are expected to complete a one-year sequence in statistics, with options offered either by the Departments of Psychology, Statistics, or Educational and Counseling Psychology.
2. All students must, before beginning the second year of study, achieve a score at the 85th percentile or more on the Psychology portion of the GRE.
3. By the end of the second year, each student is expected to have attempted the doctoral comprehensive examination, a mandatory, broad essay exam covering general psychology. Students are allowed at least two attempts to pass this exam.
4. After passing the comprehensive exam, and upon the positive recommendation of the appropriate program committee and the Department, students are approved to undertake doctoral study with supervision provided by a doctoral committee.
5. An examination in the student's area of concentration is required.

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, upon referral by a physician.

3720 Ethology and Sociobiology (3) Evolutionary approach to understanding 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/NC only, E
4120 Topics in Social Psychology (3) Intensive analysis of selected research topics. Prereq: 3120 or Sociology 3130. (Same as Sociology 4120.)
4230 Sensory Processes and Perception (3) Survey of sensory and perceptual processes with emphasis on audition and vision. Prereq: 3150. Recommended: 2520. F
4239 Laboratory in Sensory Processes and Perception (3) 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 (3) Survey of major approaches to understanding human personality and its development. Prereq: 2540; 3550 or 3560.
4610 Group Processes (3) Study and experience of theory and techniques of group processing and facilitation. Those participating in 4610 are expected to continue in 4620 and 4630. Prereq: 3616-26 and consent of instructor. F
4620-30 Seminar in Group Processes (3, 3) Didactic and laboratory experience for those qualified for further training as group facilitators. Prereq: 4610 and consent of instructor. W, Sp
4640 Psychological Tests and Measures (3) Theory and construction of individual and group measures; survey of various methods of assessment of intelligence, personality, special abilities, and educational achievement. Prereq: 3150. F, Su
4650 Symbolic Processes (3) 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 (3) Theories and descriptions of phonology, syntax, and semantics as applied to psychology and related disciplines. Recommended: 4650 or linguistics background.
4670 Cognitive Development (3) Theory and research on development of language and thinking in children and adolescents. Prereq: 3210 or 3550.
4710 Physiological Psychology (3) 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 the 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
4770 Psychology and the Law (3) Physiological aspects of the legal system. Prereq: Junior standing.
4830 History and Systems of Psychology (3) Evolution of field of psychology, focusing on classic schools of thought and recent developments. Prereq: 9 hrs of upper-division psychology.
4850 Learning Theories (3) Classic and current views on learning and cognition.
4860 Programmed Learning (3) (Same as Curriculum and Instruction 4860.)
4870 Contemporary Research in Behavior of Women (3) Study of interaction of cultural and biological factors in determining the behavior of women, with emphasis on physiological mechanisms involved. (Same as Women's Studies 4870.) Sp
4880 Afro-American Psychology (3) 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
5030-70 Seminar in Psychology (3, 3, 3) (Same as Management 5030-70.) May be repeated. Maximum 18 hrs.
5040 Psychology and the Law (3) Psychological aspects of the legal system. Prereq: Junior standing.
5050 Advanced Social Psychology (3) Interaction and orientation in social and psychosexual identity and models for social behavior in human and animal behavior. Prereq: 3210 or 3550.
5060 Experimental Social Psychology (3) Interaction and orientation in social and psychosexual identity and models for social behavior in human and animal behavior. Prereq: 3210 or 3550.
5110 Clinical Aspects of Human Sexuality (3) Nature of sexuality; societal views; psychosexual identity, application, intimacy and isolation including psychosexual and psychosexual identity and models for decisions. Intended for graduate students in clinical psychology, social work, and community and mental health professions. Prereq: Consent of instructor.
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: 5120 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, E
5319 Field Work in School Psychology: Level 1 (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: Consent of instructor. May be repeated. Maximum 6 hrs. 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, supervisors, etc.) Includes token economies and strategies for self-control.
5350-60-70 Seminar in Psychology (3, 3, 3) May be repeated. Maximum 18 hrs.
5400 Psychophysics and Scaling Methods (3) Prereq: One course in statistics
5420-30-40 Advanced Psychological Statistics (3, 3, 3) Must be taken in sequence. W; Sp; Su; F
5450 Human Problems in Administration (3) (Same as Management 5450.)
5490 Continuing Education in Mental Health (1-4) Topics of interest to persons in mental health and allied fields. Workshop, seminar, or lecture; topix and format to be announced. Graduate standing or consent of instructor. May be repeated. Maximum 12 hrs.
5500 Fundamentals in 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 or graduate-level statistics and 5500 or consent of instructor.
5530 Issues in Applied Psychological Measurement (3) Applications of measurement in community and organizational research. Prereq: Statistics 5505-70 or equivalent and consent of instructor.
5540 Probability Models in Psychology (4) Introduction to use of probability models in theory of binary test items, differential psychology, comparison of different populations in specific psychological parameters, individual choice behavior, and testing of psychological hypotheses in human and animal behavior; reliability theory and regression theory. Prereq: 1 qtr calculus or consent of instructor.
5550 Advanced Social Psychology (3) Interaction between individual and group, theories of group behavior. Prereq: 3120.
5580 Theories of Personality (3)
5581 Psychodynamic Approach to Clinical Psychology (3) Basic concepts. Selected theorists with exam-
5879 Practicum in Psychological Appraisals (3) Prereq: 5869.
5950-60 Theory and Practice of Consultation (3, 3) Issues in consultation, models of consulting process, and evaluation of consulting techniques. Must be taken in sequence. Coreq: 5956-69 and consent of instructor. (Same as Educational Psychology 5950-60.) W; Sp
5956-69 Practicum in Psychological Appraisal (2, 2) Coreq: 5850-60-70. Prereq: Consent of instructor. Must be taken in sequence. (Same as Educational Psychology 5956-69.) S/NC only. W; Sp
6000 Doctoral Research and Dissertation (3-15) P/ NP only: E
6050 Seminar on Methods of Social Research (3) (Same as Sociology 6050.)
6089 Internship in Community Psychology (1-6) Supervised employment at departmentally approved internship sites. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.
6099 Internship in School Psychology (1-6) Supervised employment at departmentally approved internship sites. Prereq: Consent of instructor. May be repeated. Maximum 18 hrs. S/NC only.
6100 Seminar in Community Psychology (3) Evaluation, research, intervention, and systems for services in communities. Prereq: 5702.
6150 Seminar in Program Evaluation (3) Techniques for designing and conducting research to evaluate effectiveness of programs. Prereq: Statistics 5950-60-70 or equivalent and consent of instructor.
6159 Practicum in Program Evaluation (3) Designing, conducting, and analyzing results of program evaluation in schools or community setting. Prereq: 6150 and consent of instructor.
6250-60-70 Seminar in Industrial and Organizational Psychology (3, 3, 3) (Same as Management 6250-60-70).
6310 Seminar in Motivation and Emotion (3)
6320 Seminar in Research Methods (3)
6330 Seminar in Learning (3)
6340 Seminar in Developmental Psychology (3)
6350 Seminar in Thinking (3)
6370 Seminar in Theoretical Psychology (3)
6380 Seminar in Industrial 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 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) Recent developments in field in relation to their impact on experimentation and systems of thought. Prereq: M.A. in psychology or equivalent.
6405 Seminar in Psychopathology (3) Prereq: Consent of instructor.
6410-20-30 Psychotherapy (3, 3, 3) (Same as Educational Psychology 5950-60-70)
Religious Studies


Associate Professors: J. L. Fitzgerald, Ph.D. Chicago; M. Levering, Ph.D. Harvard.

Assistant Professor: M. Harris, 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 described under Philosophy.) Graduate courses in religious studies further provide opportunity for students in a variety of disciplines to pursue work in religious studies as a graduate concentration.

3060-70-80 History of Western Religious Thought and Institutions (4) 3060—First Century to Fifth Century. 3070—Sixth Century to Fifteenth Century. 3080—Sixteenth Century to 1900. (Same as History 3060-70-80.) A

3411 The Renaissance (3) (Same as History 3411.)

3412 The Reformation (3) (Same as History 3412.)

3440 Religion of Primitive Peoples (3) (Same as Anthropology 3440.)

3605-06 Professional Responsibility (4, 4) (Same as Philosophy 3605-06.)

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

3680 Buddhist Philosophy and Religion (4) (Same as Philosophy 3680.) F, W

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

3800 Philosophy of Religion (4) (Same as Philosophy 3800.) F, Sp

4111-21 Modern Religious Philosophies (4, 4) Examination of the religious implications of major thinkers and movements. 4111—Nicolas of Cusa to Hume, 4121—Hume and the nineteenth century. Prereq: Consent of instructor. May be repeated. 9 hrs of philosophy other than logic. (Same as Philosophy 4111-12.)

4200 Classical Indian Systems of Philosophy: The Moksaka Tradition (4) Basic writings and philosophical principles of the traditions of Samkhya, Yoga, and Vedanta. Prereq: 3650 or 3660. (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 the first-century Pales-
tine Judaism; analysis of what the Apostle Paul made of the tradition of Jesus and of about Jesus. Recommended prereq: 2510 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.

4500 Topics in American Religion (4) Prereq: One of the following: 3510, 3520, 4410, or consent of instructor. May be repeated. Maximum 8 hrs.

4540 Development and Underdevelopment (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: Consent of instructor. May be repeated. Maximum 12 hrs.

4640 Topics in Early Christianity and Hellenistic Religions (4) Selected figures, issues, and institutions. Seniors and graduate students only, except by consent of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

4670 Topics in Eastern Religions (4) Selected figures, issues, and institutions. Seniors and graduate stu-
dents only, except by consent of department. Prereq: 3650-60-71-72. May be repeated. Maximum 12 hrs.

4810-20 Readings and Research in Religious Studies (3-4, 3-4)

4840 Readings in Selected Languages Related to Religious Studies (3-4) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

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

5105 Foreign Study (1-12) See page 104.

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

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

5310-20 Topics in Religion and Society (4, 4)

5335 Orientation to Medical Ethics (4) (Same as Philosophy 5335.)

5365 Applied Ethical Theory (4) (Same as Philosophy 5365.)

5910-20 Topics in the History of Religion (4, 4)

5660 Topics in Afro-American History (3) (Same as History 5680.)

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

Romance Languages

MAJORS

DEGREES

French

M.A., Ph.D.

Spanish

M.A., Ph.D.

Professors:

Y. M. Wasburn, (Acting Head) Ph.D. North Carolina (Chapel Hill); P. E. Barrett, Ph.D. California (Berkeley); C. W. Cobb, Ph.D. Tulane; J. C. Elliott, M.A. Illinois, W. H. Heflin, Ph. D. Florida State; T. B. Irving (Emeritus), Ph.D. Princeton; F. D. Maurino (Emeritus), Ph.D. Columbia; M. Petrovska, Ph.D. Kentucky; C. Pinsky, Ph.D. California, (Berkeley); J. O. Swain (Emeritus), Ph.D. Illinois, A. M. Mazzocco-Digi, Ph.D. Minnesota; G. E. Wade (Emeritus), Ph.D. Chicago State; A. H. Wallace, Ph.D. North Carolina, (Chapel Hill).

Associate Professors:

W. F. Eyres (Emeritus), Ph.D. Wisconsin; E. J. Campion, Ph.D. Yale; R. M. DeRycke, Ph.D. Illinois; M. H. Handelsman, Ph.D. Florida; K. D. Levy, Ph.D. Kentucky.

Assistant Professors:

A. S. Allen, Ph.D. California (Berkeley); D. M. DiPucchio, Ph.D. Kansas; C. K. Duncan, Ph.D. Florida; F. Perez-Pineda, Ph.D. Pennsylvania State; C. V. Rogers, Ed.D. Georgia; B. S. West, Ph.D. North Carolina, (Chapel Hill); J. J. Wood, Ph.D. Southern California.

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. Inquiries should be addressed to the Head of the Department.

THE MASTER'S PROGRAM

Thesis Option:

1. Completion of a minimum of 36 quarter hours of which 24 must be taken in courses numbered above 5000, including 5011 (French or Spanish, as appropriate). If the student chooses to divide his/her work into a major and minor (French-Italian, Spanish-Portuguese, etc.), at least 27 hours must be taken in the major.


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

4. A final oral examination covering the thesis.

Non-Thesis Option:

1. Completion of 45 quarter credits of which 33 must be in courses beyond 5000, including 5011 (French or Spanish, as appropriate). If the student chooses to divide his/her work into a major and minor (French-Italian, Spanish-Portuguese, etc.), at least 36 hours must be taken in the major.

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

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

THE DOCTORAL PROGRAM

Course Work and Residence: A dissertation (36 credit hours), and minimum of 81 credit hours in course work beyond 5000. At least 12 hours of work must be passed at the 4000 level and the rest in courses above 5000, including a minor of at least 12 hours in courses above 5000. All students must complete the series in methods of research (5151-61-71) for a total of 3 credits. No fewer than 54 quarter hours should be taken in courses pertaining to the student's major field. The minor shall consist of at least 18 hours of which at least 12 hours must be numbered above 5000 and the rest above 4000, and should represent a meaningful complement to the student's area of specialization. In addition, 9 hours of courses above 4000 in a related discipline are required. This requirement may be waived in favor of additional course work in the major field.

Language Requirements: Students are expected to demonstrate written and oral fluency in Spanish as well as knowledge of two other foreign languages. One of these must be French; the second one should be chosen from such languages as German, Italian, Portuguese, Arabic or Hebrew in accordance with the student's field of concentration. Proficiency in Latin shall be required of all students specializing in an area related to philology or the medieval period.

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

French

3010-20-30 Elements of French for Upper Division and Graduate Students (3, 3, 3) Elements of lan-
guage, elementary and advanced readings. Open to graduate students preparing for language examina-
tions, 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) 4003—Simultaneous translation into and from English; 4002—Consecutive translation to and from English; 4003—Simultaneous translation from English into and vice versa, on a 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 Theatrical French (1-3) Performance in one or more French plays. Prereq: Intermediate French or equivalent and consent of instructor. May be repeated with consent of department. A

4160-70-80 Advanced Conversation (2, 2, 2) Intensive training in prepared and spontaneous conversations. Subjects range from travel and current events to literary and national cultural. Prereq: Completion of 9 hrs of courses on 3000 level; F; W; Sp

4210 Phonetics (3) Prereq: 2130, 2520, or equivalent. I

4220-30 Advanced Grammar (3, 3) Prereq: 2130, 2520, or equivalent. W, Sp

4250 Introduction to Descriptive Linguistics (3) Phonetics and phonemics, morphology and syntax. Types of languages, linguistic groups, dialects and dialect geography. Application of descriptive linguistics—field linguistics, dialect study, its practical use in learning languages and in language teaching. Introduction to transformational grammar. Prereq: 9 hrs of upper division English or 9 hrs of upper division courses in a modern or ancient language (exclusive of German and French 3010-20-30, courses in literature in translation, and general courses in Latin and Greek requiring no knowledge of these languages), or consent of department. (Same as German, Russian, Spanish, and Linguistics 4250). 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) 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 wishes to graduate. Oral 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 Techniques in Literary Analysis (3) Required for either Plan A or Plan B of M.A. program. Intensive course in explicatio de texte. F

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

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

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

5110-20-30 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/NC only. A

5210-20-30 French Literature of the Sixteenth Century (3, 3, 3) A

5211-21-31 Seventeenth Century French Literature (3, 3, 3) Detailed analysis of French poems, plays, and prose works of seventeenth century. 5211—Descartes and Pascal; 5221—Classical French theatre; 5231—French prose writers of the seventeenth century. 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

5310-20-30 French Directed Readings (3, 3, 3) E

5350-60-70 The Philosophes (3, 3, 3) Textual analysis of the works of Voltaire, Diderot, Rousseau, and other eighteenth-century writers. A

5410-20-30 The French Novel (3, 3, 3) A

5450-60 Lyric Poetry of the Nineteenth Century (3, 3, 3) 5450—German and English influences on French Romanticism and the generation of poets of "le ma de siècle." 5460—Victor Hugo; the Parnassians. A

5470 Baudeelaire and the Symbolists (3) Les Fleurs du mal et Petitpois en prose with emphasis on theories of color and "correspondences" and their influence on Symbolist school. A

5610-20-30 Trends in Contemporary French Literature (3, 3, 3) A

5650-60 Advanced Syntax and Stylistics (3, 3) Readings and written imitations of modern literary styles in forms of compositions, sketches, and original stories. A

5670 Problems in Linguistics: Romance Language (3) Topics vary. Prereq: 4250 or consent of instructor. May be repeated with consent of department. (Same as Spanish 5670). A

5710-20 Seminar in French Literature (3, 3) Topics vary. May be repeated with consent of department. Su

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 Language (4, 4) Prereq: Intermediate Italian or equivalent. Recommended for literature majors. F, W

4200 Italian Drama in English Translation (3-4) Twentieth-century theatre: operatic drama, the Grotesco, 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 Danze e Medieval Culture (3, 3, 3) Readings and lectures in English for students majoring in or minorin in Italian. (Same as Comparative Literature 4050-66-70). A

4220 Petrarch (3) Prereq: 3130, 3520 or equivalent. A

4230 Boccaccio (3) Prereq: 3130, 3520 or equivalent. A

4410-20 Literature of the Rinascimento (3, 3) From Pulci to Tasso, the Quattrocento and the Cinquecen- to. 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

4620 Contemporary Poetry (3) Prereq: Intermediate Italian or equivalent. A

4630 Contemporary Prose (3) Prereq: Intermediate Italian or equivalent. A

4760 Italian Folklore (3) Folk arts, music, traditions, rituals and lore of Italy from Middle Ages to present. (Same as Anthropology 4760).

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

5610-20-30 Readings in Italian Literature (3, 3, 3) Topics vary and may be repeated with consent of department. A

5710 Seminar in Italian Literature (3) Topics vary and may be repeated with consent of department. A

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) May be repeated with consent of instructor. F, W, Sp

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

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

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

Spanish

4115 Cervantes (3) Life and works of Cervantes, Don Quijote, and other works: introduction to Cervantes criticism and bibliography through the centuries. Prereq: Third-year literature course in Spanish or consent of instructor.

4125 The Comedia (3) Golden Age dramas: works by Lope de Vega, Tirso de Molina, Alarcón, and Calderón de la Barca. Prereq: Third-year literature course in Spanish or consent of instructor.

4135 Generation of "98 (3) Books of Granjel and Lain Entralgo on the Generation; readings from Unamuno, Gariet, Baroja, Azorín, Valle-Inclán, Antonio Machado, Jiménez, Benavente and Ortega y Gasset. Prereq: Third-year literature course in Spanish or consent of instructor.

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. Topics range from travel and current events to literature and aspects of national culture. Prereq: Completion of 9 hrs of course 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). F

4260 Introduction to Historical and Comparative Linguistics (3) (Same as French, German, Russian, 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.
4420-30 Latin American Civilization (3, 3) Prereq: Intermediate Spanish or equivalent. W, Sp
4510 Special Topics in Nineteenth Century Spanish Literature (3) Prose, poetry and theatre in Spain in the nineteenth century. Genre, movement, or combination of several literary aspects. Prereq: Intermediate Spanish or equivalent. May be repeated with consent of department. Maximum 9 hrs. A
4810-20-30 Topical Survey of Spanish American Literature (3, 3, 3) 4810—Prose fiction: major examples of the nineteenth century. Genre, movement, or combination of several literary aspects. Prereq: Intermediate Spanish or equivalent. May be repeated with consent of department. Maximum 9 hrs. 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
5011 Techniques in Literary Analysis (3) Required for any Plan A or Plan B of M.A. program. An intensive course in explicatio de texte. F
5101 Foreign Study (1-12) See page 104. E
5102 Off-campus Study (1-12) See page 104. E
5103 Independent Study (1-12) See page 104. E
5110-20-30 Old Spanish (3, 3, 3) Medieval Spanish language and literature. A
5121 College Teaching of Romance Languages (3) Seminars, demonstrations, and practical applications of pedagogical methods and procedures for teaching and evaluating basic language skills, cultural aspects, and beginning literature. Prereq: 4120 or 4270 or equivalent. May be repeated. S/NC only. A
5151-61-71 Bibliography and Methods of Research (1, 1, 1) (Same as French and Italian 5151-61-71.) S/NC only. A
5211-20-30 Seminar in Latin American Literature (3, 3, 3) May be repeated with consent of department. A
5270 The Contemporary Novel (3) Civil War and post Civil War period. A
5300 Directed Readings (3) E
5310 Special Topics in Spanish or Spanish American Literature (3, 3) May be repeated. A
5340 Problems in Hispanic Culture (3) Evolving 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 6 hrs. A
5550-60 The Golden Age Theatre (3, 3) 5550—Introduction to Spanish Theatre, Lope and Tirso. 5560—Castro, Alarcon, Moreto and Calderon. 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, Arevalo, and Rufo. A
5633 Twentieth-century Latin American Theatre and Film (3) Readings from works of Carlos Sotorzano, Rodolfo Usigli, Coronado Nale Roxlo, Roberto–Rene Marques and Sebastian Salazar Brodeny. Presentation of films as adaptations of classics such as Don Quijote, Lazarillo, Don Segundo Sorbrent, as well as exponents of experimental cinema of today. A
5640 Latin American Women Writers (3) Feminine point of view, modern image of woman, main/secondary relationships and society as context for woman’s destiny. Readings from poetry and fiction, including such authors as Alfonsina Storni, Delmira Agustini, Gabriela Mistral, Silvina Bullrich, Silvina Ocampo and Rosario Castellanos. A
5660-60 Advanced Syntax and Stylistics (3, 3) Readings and written imitations of modern literary styles in compositions, sketches, and original stories. A
5700 Problems in Linguistics: Romance Languages (3) (Same as French 5760). A
5810-20-30 Spanish Lyric Poetry (3, 3, 3) A
6000 Doctoral Research and Dissertation (3-15) P/NP only. E
6210-20-30 Seminars in Spanish Language (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
S., Ph.D.
Professors:
T. C. Hood, (Head), Ph.D. Duke; D. M. Betz, Ph.D. Michigan State; J. A. Black, Ph.D. Iowa; D. J. Champion, Ph.D. Purdue; D. Hastings, Ph.D. Massachusetts; D. R. Ploch, Ph.D. North Carolina; N. Shover, Ph.D. Illinois; S. Wallace, Ph.D. Minnesota.
Associate Professors:
The Department of Sociology offers programs leading to the Master of Arts and the Doctor of Philosophy degrees.
For a full statement of departmental requirements, students are referred to the Department Graduate Manual.
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 22. Those interested in the non-thesis option should obtain details from the department.
THE DOCTORAL PROGRAM
Specific requirements for the degree of Doctor of Philosophy in Sociology include:
1. A minimum of 108 credit hours following the Bachelor’s degree, exclusive of credits for the Master’s thesis, is required. Of this number, 36 hours shall be allocated to doctoral research and dissertation. A maximum of 12 hours credit outside the major may be taken in related fields, with the approval of the student’s committee.
Exclusions 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 graduating, the candidate will be required to pass an oral examination on the doctoral dissertation. At the oral examination the candidate will be expected to show a thorough knowledge of sociological theory and methodology related to the research.
All registration for 3000- and 4000-level courses requires the consent of the instructor.
4030 Society and Law (4) General treatment of social origins and consequences of law and legal process. Particular emphasis is placed on problems of law and social change, and on the development of legal sanctions. Some attention is paid to law and law-like phenomena in formal organizations and primitive societies.
4110 Population Problems (4) Demographic factors and social structure; trends in fertility, mortality, population growth, migration, distribution, and composition; population policy.
4120 Topics in Social Psychology (4) (Same as Psychology 4120.)
4160 Theory of Attitudes and Values (4) Organization, functions and measurement of attitudes and values; approaches to attitude change; and relationships to attitudes, values and behavior.
4330 Urban Ecology (4) Examination of public, private, collective, and individual space. Classical school of ecology, its neoclassical followers, social area analysis, and cognitive symbolic ecology emphasized.
4410 Educational Sociology (3) (Same as Curriculum and Instruction 4410.)
4500 Criminology (4) Systematic inquiry into causes and control of crime and criminals: causation.
4520 Criminal Justice II: Corrections (4) Historical development of institutions and programs: juvenile training schools, prisons, probation, and parole. Analysis of operation and impact. Evaluation research and application to correctional programs. Recommended prereq: 4500.
4530 Community Organization (4) Structure; functioning; change and development and important community studies are reviewed and discussed. Emphasis on sociological analysis, not on the implementation of change.
4540 Development and Underdevelopment (4) Critical examination of theories which attempt to explain historical development in modern world. In depth examination of development issues in selected regions of the world. (Same as Religious Studies 4540.)
4560 Formal Organization (4) Analysis of bureaucratization process, division of labor, delegation of authority, channelled communication under a system of rationality.
4730 Sociology of Aging (4) Roles and statuses change with age relative to major social institutions, impact that rapidly increasing number of older people have on society; effect of society on older people.
4820 American Minority Groups (4) Minority groups
and social structure in American society; analysis of intergroup relations with attention given to both past and present relationships of selected groups to broader society.

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

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

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

5210 Introduction to Sociological Theory (3) F

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

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

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

5320-30 Social Statistics (3, 3) General survey of parametric and nonparametric procedures in analysis of sociological data; assumptions underlying procedures, advantages, disadvantages, and special applications. Must be taken in sequence. F; W

5350-60 Statistical Analysis in the Social Sciences I, II (3, 3) Topics include multiple regression, analysis of variance, analysis of covariance, ordinal and nominal measures of association, sampling, significance tests, and confidence limits. Extensive use of social science computing packages.

5470 Foundations of Social Psychology (3) Current and classical theoretical perspective 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.

5520 Crime, Law, and Social Control (3)

5560 Demographic Techniques (3) Life tables, standard rates, and survey techniques of population analysis.

5600 Seminar in Community (3)

5680 Historical Demography (3) Family reconstitution, aggregate analysis, strategies for examining documents containing information on population. Research emphasized in finding historical patterns of change in fertility, mortality, migration and different types of family structure.

5710 Seminar in Collective Behavior and Social Movements (3) A

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 on theoretical and conceptual approaches in study of intergroup relations.

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 relationship to individual and society; technology and occupations; organizational and administrative problems; social organization and occupations.

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

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

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

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

5940 Social Theories of Sport (3) (Same as Physical Education 5940.)

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 6050.)

6220 Sociological Theory I (3) Prereq: S410 or consent of instructor.

6230 Sociological Theory II (3) Prereq: S410 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: S503-10 or consent of instructor.

6350 Field Research (3) Prereq: S503-10 or consent of instructor.

6360 Field Research Practicum (3)

6410 Tutorials in Advanced Topics (3) Individual instruction. Prereq: Consent of department. S410 and 6420 may be repeated in any combination for a maximum of 18 hrs.

6420 Special Topics (3) Topic of special interest or student-initiated courses which will not be regularly offered. Prereq: Consent of instructor. S410 and 6420 may be repeated in any combination for a maximum of 18 hrs.

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. A

6640 Seminar in Environmental Sociology (3)

6650 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 the world; fertility rates and national growth; controversies on control of vital rates of growth. Prereq: S565 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.

6680 Theory and Research in Human Migration (3) Prereq: S565 or consent of instructor.
M. L. Armbrester, cant must have completed undergraduate acting/dramaturgy, and design/technical concentrations in acting/directing, playwriting/dramaturgy, and design/technical production.

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 as well as a written comprehensive exam at the conclusion of coursework. All M.F.A. applicants must submit letters of recommendation. 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) Speech 5010 and 5140.
(2) Above courses with any of the following: 4222, 4560, 5570, 5750, and 5770.
(3) One course from the following: 4560, 4571, 4591, 4930.
(4) One course from the following: 5210, and 5440.
(5) At least 18 of the required 45 hours (including thesis hours) must be in either Speech or Theatre courses numbered 4000 or above. Two-thirds of the total hours must be at the 5000 level or above. No courses in Theatre may be counted toward the speech concentration.

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.

MASTER OF FINE ARTS DEGREE CURRICULUM

At least 90 quarter hours, 60 of which must be at the 5000 level or above are required for the degree of Master of Fine Arts in Theatre, which is normally to be completed in three consecutive years of full-time residence. Theatre 5110 is required the first quarter of residence. Also required are Theatre 3611, 3252-53-54, and at least 6 hours in dramatic theory and criticism. 3252-53-54 may be waived by proficiency examination. Students passing this examination must complete 12 hours in advanced theatre history and dramatic theory/criticism, including at least one course from each of the two areas. In addition to the core requirements listed above, each area of concentration has specific requirements:

**Acting**
- (1) one quarter of 5610, representing a significant project.
- (2) Theatre 5670-71-72-73-74-75-76-77-78.
- (3) One course in directing.
- (4) Two hours each in voice and dance.

**Directing**
- (1) one quarter of 5610, representing a significant project.
- (2) Theatre 4441-42.
- (3) 6 hours of 5630.

**Playwriting**
- (1) one quarter of 5610, representing a significant project.
- (2) Theatre 4951-52.
- (3) 18 hours of 5250.
- (4) 6 hours of 5610.

**Dramaturgy**
- (1) one quarter of 5610, representing a significant project.
- (2) Three courses in dramatic theory/criticism.
- (3) Theatre 5330, 4441-42.
- (4) 3 hours of 5630.
- (5) 18 hours of 5710.
- (6) 12 hours in an arts and humanities area.

**Design/Technical Production**
- (1) Theatre 4611.

Students in the MFA program are evaluated annually by jury performance or portfolio submission. Continuance in the program is with the approval of the faculty committee for the MFA program. Satisfaction completion of the comprehensive examination is prerequisite to entry into the third year. Thesis and oral defense (Theatre 5990, 9 hours minimum) must be completed satisfactorily before the degree is conferred.

**REQUIREMENTS FOR SECOND MASTER'S DEGREE**

Students admitted to the MFA program who have already earned a Master's or a doctoral degree may apply up to 15 credit hours from the previous graduate program to the MFA degree, with approval of the student's committee, the Dean of the College of Liberal Arts, and the Dean of The Graduate School. 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 (8 years) established for completion of the MFA degree.

**Speech**

4222 Theories of Argumentation (4) Conceptual bases of argumentation from classical to contemporary theorists. Prereq: 2331 or consent of instructor. Sp

4351 Communication and Conflict (3) Communication as significant factor in development, management, and resolution of conflict at interpersonal, small group, organization, or societal levels. Prereq: consent of instructor.

4560 History of Rhetorical Theory (4) Western rhetorical theory from Plato to present.

4560 Rhetoric of the Women's Rights Movement (4) Historical and critical study of public addresses in campaign for women's rights from the 1850s to present. F

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

4611 Advanced Phonetics (4) Phonetic aspects of contemporary dialects of English language. Prereq: Consent of instructor.

4930 Studies in American Public Address (4) May be repeated. Maximum 12 hrs.

5010 Research in Speech Communication (3) Survey of methods and representative studies in speech communication.

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

5440 Organizational Communication (3) May be repeated. Maximum 9 hrs. F

5911 Directing the Forensic Program (4) Philosophy and methods of directing cocurricular and extracurricular forensic activities in high schools and colleges: competitive and noncompetitive approaches to directing debate, oral interpretation and public speaking events. (Same as Curriculum and Instruction 5911.) Sp

**Exercise and Theatre**

4640 Ensemble Interpretation (4) Oral interpretive techniques of choral reading, readers theatre and chamber theatre. F, W

5000 Thesis (1-5) 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

5110 Introduction to Graduate Research in Speech and Theatre (2) F

5120 Directed Reading and Research (2) May be repeated. Maximum 9 hrs. E

5160 Theory and Production Techniques of Oral Interpretation (4) Literacy, psychological, communicative, and aesthetic approaches to collection, adaptation, and oral presentation of literature. W, Sp

**Theatre**

3214-15 Technical Theatre (4, 4) Special techniques in scenery and property construction; stage management; scenic and technical theatre practice. Prereq: 2211-21, or consent of instructor. Must be
ing examination. Students must take this examination during the winter quarter of the first year and may repeat the examination the following winter quarter if unsatisfactory scores are received. Competency must be exhibited within this two-year period for a student to continue in the program.

Preparation for thesis or dissertation: During the second year of study, the student must pass an oral defense examination and a special research problem in each of two faculty members' laboratories will determine the student's preparation for thesis or dissertation study.

THE DOCTORAL PROGRAM

Special requirements in Zoology are as follows: (1) course requirements shall be determined by the candidate's faculty committee; (2) the comprehensive examination will be an oral and written examination in zoology and in allied fields in which the candidate has had training; (3) the candidate for the Ph.D. degree must possess a reading knowledge of at least one foreign language in which there exists a sizeable amount of literature relevant to the major field of study. The student has the option of demonstrating a reading knowledge of this foreign language by (a) passing the official reading examination given by the language department or (b) earning at least a C in the third quarter of a one-semester course in that language. The requirement for the first language must be fulfilled before the student can take the comprehensive examination. The student's faculty committee may require of the student any level of training or proficiency in a second foreign language but may not require that the student take the official language examination in the second language.

3050 Comparative Vertebrate Embryology (5) Developmental morphology of selected vertebrates. 2 hrs and 3 labs. F, Sp
3060 Comparative Vertebrate Anatomy (5) Phylogeny and anatomy of organ systems. Dogfish shark and cat primarily used in laboratory. 3 hrs and 2 labs. W
3110 General Entomology (3) Introduction to insects; basic structure, development, behavior; classification of insect orders and representative families; interpretation and use of keys. Prereq: Biology 3130 or consent of instructor. 3 hrs and 2 labs. F
3150 Invertebrate Zoology (5) Biology of invertebrates (except insects) with emphasis on ecology and behavior. Prereq: Biology 3130. 3 hrs and 2 labs. W
3220 Physiology of Reproduction (3) (Same as Animal Science 3220). F, Sp
3320 Histology (4) Study of animal tissues. Prereq: Biology 3120. 2 hrs and 2 labs. F
3410 Bioethics (3) Relationship between biological discoveries and human values. Open discussion of selected dilemmas arising from new knowledge about medicine, behavior, resources, and technology. Sp
4007-4017 Minicourse in Zoology (2 hrs each) Selected advanced topics in zoology, concentrated in time and subject matter. Consist departmental listing for actual topics offered. Prereq: As posted. May be repeated. E
4050 Developmental Biology (4) Experimental morphogenesis at least A in the third quarter of selected effects and related topics with examples drawn primarily from invertebrates and vertebrates. Prereq: 3650. 2 hrs and 2 labs. W
4120 Undergraduate Research Participation (2) Experience in active research projects under supervision of staff member. Consent of instructor. E
4140 Practicum in Zoology (1-3) Participation in practical application of zoology in community institutions, government organizations and industry. Approximately 1-3 hrs involvement per week. Prereq: Biology 3110, 3120, 3130 and senior standing: E
4190 Mammalogy (4) Classification, evolution, distribution, reproduction, populations, and behavior. 2 hrs and 2 labs or field periods. F
4200 Ichthyology (5) Classification, collection and identification, distribution, life histories, and economic importance of fishes. Prereq: Consent of instructor. 2 hrs and 2 labs or field periods. F
4210 Cell Physiology (5) Development of modern concepts in cell physiology from point of view of information and control which examines kinetics and integration of cellular activities. Prereq: Cell biology, or any physiology, and organic chemistry. Recommended prereq: Biochemistry. 3 hrs and 1 lab. Sp
4250 Environmental Physiology (4) Physiological mechanisms in animal kingdom and relationships to animal ecology and to survival of animals in diverse environments. Prereq: Biology 3120-30, 2 yrs chemistry. W
4260 Comparative Animal Physiology Laboratory I (1) Coreq: 4250. W
4260 Comparative Animal Physiology II (3) Sensory, effectors and integrative physiology. Prereq: 3080. Sp
4260 Comparative Animal Physiology Laboratory II (1) Prereq: 3080 and consent of instructor. Coreq: 4260. Sp
4270 Immunology (3) (Same as Microbiology 4270.)
4280 Comparative Endocrinology (5) Comparative analysis of the physiology and morphology of endocrine glands in vertebrates. Their role and interaction in maintenance of the organism and species. Prereq: 3080 or equivalent. W
4290 Herpetology (4) Classification, distribution, life histories, collection and identification of amphibians and reptiles, primarily of local species. 2 hrs and 2 labs or field periods. Sp
4300 Ornithology (4) Morphology, physiology, behavior, reproduction, populations, evolution, field identification. 2 hrs and 2 labs or field periods. F
4320 Microtechnique (4) (Prereq: 3320 recommended. 2 hrs and 2 labs. W
4330 General Cytology (4) Study of cellular organelles at the light and electron microscope levels and the functioning of these organelles. Prereq: Biology 3120. Sp
4369 General Genetic Laboratory (2) Mainly Drosophila experiments designed to illustrate basic principles of inheritance. Prereq: Biology 3110. W
4380 Organic Evolution (3) Modern concepts of animal evolution. Prereq: Biology 3110. F
4390 Human Genetics (3) Principles and problems of inheritance in humans. Sp
4410 General Parasitology (4) Parasitic relationship: ecological, evolutionary, economic, cultural, and historical. Prereq: Biology 3130 or consent of instructor. 3 hrs. and 1 lab. F, Sp
4510 The Culture of Animal Cells (2) A course designed to teach advanced students animal tissue and organ culture methods. One lecture and one laboratory per week. Prereq: Biology 3110-20, and permission of instructor. F
4650 Introduction to Aquatic Ecology (4) Physiological nature of invertebrates. Biotic communities are described; interrelationships explored. Prereq: Chemistry 1110-20-30, Biology 3130. 2 hrs and 2 labs. F
4700 Arachnology (4) Biology of spiders, mites, scorpions, and relatives. Prereq: 3110 or 3150. 2 hrs and 2 labs. W
4720 Comparative Animal Behavior (4) Methods and principles. (Same as Psychology 4720.) F
4729 Comparative Animal Behavior Laboratory (4) Laboratory and field studies. Coreq: 4720. (Same as Psychology 4720.) F
4810-4820 Insect Morphology and Taxonomy (4, 4) 4810-10 Internal morphology and classification of both generalized and specialized forms. 4820—taxonomy of major orders. 4830—taxonomy of minor orders and immature forms. Prereq for 4820-30: 3110 or consent of instructor. 2 hrs and 2 labs. W; F; Sp; A
4940 Physiology of Exercise (4) Functions of body in muscular work; physiological aspects of fatigue, and physical fitness. Prereq: 2920-30 or 3080. 3 hrs and 1 lab. F, Sp
5000 Thesis (1-15) P/NP only. E
5017 Colloquium in Ethology (1) (Same as Psychology 5017.) S/NC only.
5050 Zoology Seminar (1) Advanced topics or controversial issues in zoology. May be repeated. Maximum 6 hrs. All senior Zoology majors encouraged to enroll. Required of all second-year graduate students. S/NC only. F, W, Sp
5070 Zoopelagik Ecology (4) Secondary productivity in aquatic systems. Prereq: 4660 or equivalent. Su
5080 Graduate Research Participation (3) Advanced research techniques studied under supervision of staff research director whose research area coincides with interests of student. Open to all graduate students in good standing. Prereq: Consent of department and research director. May be repeated with consent of department. S/NC only. E
5110-30 Special Problems (2, 2, 2) E
5180 Fresh Water Invertebrate Zoology (4) Ecology and taxonomy of fresh water invertebrates exclusive of insects. Laboratory and field study. Prereq: 3150.
5280 Insect Physiology (4) Functions and interrelationships of systems relative to metabolism, growth, coordination, movement, and reproduction. Prereq: 4810. 1 yr general chemistry or consent of instructor. 2 hrs and 2 labs. W, A
5290 Quaternary Problems (4) (Same as Zoology 5290 and Botany 5290.)
5350 Biometry (3) Statistical methods used in analysis of quantitative biological data. Prereq: 1 qr statistics or consent of instructor. F
5410 Advanced Parasitology (4) Life cycles, techniques of collection, preservation, and identification of parasitic worms and protozoa. Prereq: Consent of instructor.
5610-20 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 classes 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
5570 Animal Populations (3) Characteristics and methods of study of animal populations.
5660 Physiology of Development (3) Chemical aspects of growth, morphogenesis, and cyto-differentiation. Recommended prereq: Biochemistry 4110-20. F
5730 Population Biology (4) Ecology and genetics of natural populations of plants and animals. Prereq: Biology 3110 and 3130. (Same as Botany 5730.)
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. Su

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 Neuronanatomy (3) (Same as Psychology 5760.)

5820 Methods of Taxonomy (4) Classification of animals; rules of nomenclature; problems in priority; preparation of keys, descriptions, and figures. Prereq: Consent of instructor. W

5840 Aquatic Insects (4) Taxonomy and biology of aquatic insects, emphasis on immature forms. 2 hrs and 2 labs. Sp

5860 Geographic Distribution of Animals (4) Distribution patterns of vertebrate and invertebrate animals in all major habitats. Prereq: Consent of instructor.

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.

6210 Seminar in Physiology (2) Two physiology courses or consent of instructor. May be repeated. Maximum 6 hrs.

6310 Seminar in Cytology (2) May be repeated. Maximum 6 hrs.

6350 Seminar in Developmental Biology (2) Internal regulation in differentiating cells. Prereq: 3050, 4050, Biochemistry 4110-20. W

6510 Seminar in Genetics (2) Prereq: General genetics. May be repeated. Maximum 6 hrs. F

6550 Seminar in Aquatic Biology (2) Prereq: Any 2 of 4200, 4660, Botany 5681, 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
Robert L. Summit, Dean
Reid I. Collmann, Associate Dean

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 the Department of Medical Biology listed here, the Knoxville Unit has several clinical departments with faculty dedicated to graduate and postgraduate 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.

Medical Biology/Memorial Research Center

Professors:
C. B. Lozzio, (Acting Chairman) M.D. Buenos Aires (Argentina); W. Farkas, Ph.D. Duke; J. E. Fuhr, Ph.D. St. John's (New York); C. C. Congdon (Emeritus), M.D. Washington (St. Louis); J. P. Chen, Ph.D. Pennsylvania State; P. W. Wigler, Ph.D. St. John's (New York); C. C. Congdon (Emeritus), M.D. Washington (St. Louis); J. E. Fuhr, Ph.D. St. John's (New York); C. C. Congdon (Emeritus), M.D. Washington (St. Louis).

Associate Professors:
R. Carroll, Ph.D. Cornell; W. T. Hanna, M.D. Medical College (Virginia); P. W. Wigler, Ph.D. California (Berkeley); C. J. Wust, Ph.D. Indiana (Bloomington).

Assistant Professor:

The Department of Medical Biology of The University of Tennessee College of Medicine-Knoxville Unit was formed from the faculty of The University of Tennessee Memorial Research Center and Hospital in 1978. The Research Center was established in 1958. Its faculty has research, education, and service interests in cancer, blood dis-
College of Nursing

Sylvia E. Hart, Dean
Barbara M. Reid, Associate Dean for Student Affairs
Dorothy B. Stephens, Assistant Dean for Clinical and Business Affairs

MAJOR DEGREE
Nursing M.S.N.

ADMISSION REQUIREMENTS
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 a 3.0 or higher;
   b. who have had at least two years of full-time clinical practice experience following completion of a baccalaureate nursing program;
   c. who are Tennessee residents;
   d. who are currently employed in underserved health service areas and who can demonstrate their commitment to return to those areas following completion of the program;
   e. who are currently employed as nurse educators in programs preparing registered nurses; or
   f. who are currently employed as directors of nursing service.
4. Ordinarily one year of full-time clinical practice experience should be completed prior to applying for admission to the program.

DEGREE REQUIREMENTS
In addition to The Graduate School Requirements for Advanced Degrees, the following courses are required in the M.S.N. program designed to prepare associate degree graduates for advanced practice in nursing:

- 1. Students must complete 60 quarter hours of graduate level coursework with a cumulative GPA of 3.0 or higher.
- 2. The 60 credit hours must include the following components:
  - Core requirements: 23 hrs
  - Clinical concentration: 20 hrs
  - Role preparation option: 11 hrs
  - Electives: 6 hrs

3. A Master's thesis is not required, but those students who wish to complete a thesis as a part of their program may substitute the thesis for the 6 elective hours.

4. All students must successfully complete a comprehensive final examination, written (or written and oral) for the non-thesis option and oral (or oral and written) for the thesis option.

5. Students may choose either primary care nursing, secondary/tertiary care nursing or parent-child 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 5129-30 and 5310. Students selecting the parent-child nursing option must complete 5220, 5255, and either 5230 or 5245. A special track in the M.S.N. program designed to prepare associate degree graduates for advanced practice in nursing will be discontinued in 1987.

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, management, or advanced clinical practice. Students selecting the teaching option must complete 6 hours of graduate level courses in education and 5830. Students selecting the management option must complete 6 hours of graduate level management courses and 5730. Students selecting the advanced clinical practice option must complete 5560 and 5680 or their clinical option is primary care, 5320 and 5340 if their clinical option is secondary care, 5520 and 5540 if their clinical option is community mental health, or 5265 and 5270 if their clinical option is parent-child nursing. 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.
9. If a student’s clinical laboratory performance for any undergraduate or graduate nursing course is determined unsatisfactory, the grade for that course will be an ‘F’ regardless of any grades related to the theoretical component of the course.

10. If a student’s clinical laboratory performance for any undergraduate or graduate nursing course is characterized by unethical or unprofessional behavior, the student will be required to withdraw from the program.

11. A student will be required to withdraw from the program if a grade of ‘D’ or ‘F’ is received for any required undergraduate or graduate nursing course.

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, and Vice Provost and Dean of the Graduate School.

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:

- Core requirement
  - 17 hrs
- Clinical concentration option
  - 20-30 hrs
- Role Preparation option
  - 6-11 hrs
- Electives
  - 2-9 hrs

Total
- 45-60 hrs

4330 Nursing in the Specialties (2-4)

Application of principles from behavioral, physical, social and nursing sciences to solution of nursing problems. Exploration of community issues, concerns, and community intervention employed in all phases of nursing to solution of nursing problems. Exploration of nursing topic of special interest to student. Prereq: Consent of instructor. Max: 6 hrs. E

5215 Secondary/Tertiary Nursing of Adults (6)

Role of clinical nurse specialist. Development of clinical nurse specialists and families to optimal health; utilization of leadership strategies in clinical decision making in acute and chronic care; clinicalündergraduate or graduate behavioral sciences. E

5555 Applied Pharmacology (3)

Advanced pharmacological principles applied to clinical practice in primary, secondary, and tertiary settings. Prereq: 3110 and 5101 or equivalent. F

5070 Theories of Nursing (3)

History of nursing theory; examination of selected nursing concepts, theories, conceptual frameworks and philosophies and their relationship to nursing education and nursing practices. F

5103 Independent Study in Nursing (1-4)

In-depth exploration of nursing topic of special interest to student. Prereq: Consent of instructor. Max: 6 hrs. E

5120 Secondary/Tertiary Nursing of Adults (6)

Role of clinical nurse specialist. Development of clinical nurse specialists and families to optimal health; utilization of leadership strategies in clinical decision making in acute and chronic care; clinicalündergraduate or graduate behavioral sciences. E

5150 Nursing in Secondary Care Settings (4)

Application of physiological, psychosocial, developmental, and nursing theories and concepts to care of hospitalized adults; utilization of assessment criteria to develop nursing diagnosis, orders, intervention and evaluation of outcomes. For MSN students in ADN teaching track only. Prereq: 5010, 5030, 5070. 3 hrs and 3 labs. W

5125 Nursing in Secondary Care Settings (4)

Application of physiological, psychosocial, developmental, and nursing theories and concepts to care of hospitalized adults; utilization of assessment criteria to develop nursing diagnosis, orders, intervention and evaluation of outcomes. For MSN students in ADN teaching track only. Prereq: 5010, 5030, 5070. Physical assessment course. Coreq: 5015. 1 hr and 3 labs.

5130 Secondary/Tertiary Nursing of Adults (6)

Continuation of 5120 with further exploration of role of clinical nurse specialists; application of theories and concepts to nursing care of hospitalized adults with emphasis on analysis and utilization of nursing and health related research findings in delivery of health and nursing care. Prereq: 5020, 5120. Prereq or coreq: 5210. 3 hrs 3 hrs and 3 labs. Sp

5210 Applied Nursing Research (4)

Utilization of research process to identify and investigate common nursing problems; critical assessment of nursing research literature; development and critique of nursing research proposals. Prereq: 4440 or equivalent, graduate level statistics course. W

5220 Parent-Child Nursing (4)

Care of childbearing and child-rearing families; health promotion and recognition of threats to health of mothers and children; child-bearing or child-rearing families in acute care or community settings. Prereq: 5010, 5030, 5070. 4 hrs and 2 labs W

5225 Advanced Parent Child Nursing (6)

Continuation of 5220. Role of clinical specialist in working with childbearing or childrearing families, application of integration of physiological, psychosocial, and nursing theories and care of childbearing or childrearing clients and families. Prereq: 5220. Coreq: 5210. 4 hrs and 2 labs. Su

5252 Nursing Care of Mothers and Children (4)

Application of physiological, psychosocial, and nursing theories and concepts to nursing care of pediatric or maternity clients and families. For MSN students in ADN teaching track only. Prereq: 5010, 5030, 5070 and physical assessment course. Coreq: 5015. 1 hr and 3 labs.

5255 Parent-Child Nursing Field Work I (8)

Advanced clinical practicum opportunities to develop and refine decision making and application of the nursing intervention for selected health problems.

5265 Parent-Child Nursing Field Work II (9)


5270 Parent-Child Nursing Seminar (2)

Issues and problems in delivering high quality parent-child nursing care; theories and concepts from 5680 as they affect role of parent-child clinical specialist. Prereq: 5680 Coreq: 5265.

5310 Secondary/Tertiary Nursing Seminar (2)

Advanced clinical practice with opportunities to apply newly acquired nursing skills to more complex clinical nursing situations.

5320 Secondary/Tertiary Nursing Field Work II (9)

Continuation of 5310. Prereq: 5310 and 5101 or equivalent. Application and refinement of nursing skills needed to provide high quality nursing care to acutely and chronically ill patients.

5340 Secondary/Tertiary Nursing Seminar (2)

Identification of issues and problems involved in delivery of secondary/tertiary nursing care; further analysis and exploration of theories and concepts included in 5680 as they affect role of nurse in secondary/tertiary clinical specialist. Coreq: 5320. Prereq: 5680.

5410 Principles of Community Mental Health (3)

Exploration of historical and legislative mandates that impact community mental health; discussion of nursing and other mental health care provider roles within current mental health care delivery systems.

5450 Family Centered Primary Care Nursing I (6)

Primary care nurse and health care management of individuals and families in middle and later life stages of development; application of nursing process with emphasis on selected nursing, physiological and psychosocial theories. Prereq: 5010, 5030, 5070. 4 hrs and 2 labs. W

5460 Family Centered Primary Care Nursing II (6)

Primary care nurse and health care management of individuals and families in middle and later life stages of development; application of the nursing process to management of selected episodic and chronic health problems. Prereq: 5020, 5450. Prereq or coreq: 5210. 4 hrs and 2 labs.

5480 Community Mental Health Nursing: Individual (3)

Application of nursing process within systems framework, to therapeutic intervention with individuals experiencing mental health problems; study of psychopharmacological issues; analysis of special clinical problems. Prereq: 5010, 5030, 5070. 2 hrs and 1 lab.

5485 Psychosocial Nursing Assessment and Intervention (4)

Application of psychosocial concepts and theories to care of hospitalized clients experiencing mental health problems and nursing intervention. For MSN students in ADN teaching track only. Prereq: 5010, 5030, 5070 and physical assessment course. Coreq: 5015. 1 hr and 3 labs. Su

5490 Community Mental Health Nursing: Family (3)

Application of nursing process, utilizing communication and systems theories in therapeutic work with families experiencing mental health problems; current models of parent education. Prereq: 5020, 5480. Prereq or coreq: 5210. 2 hrs and 1 lab. Sp

5500 Community Mental Health Nursing: Group (3)

Study of group leadership and group dynamic theory; utilization of leadership strategies in both structured and unstructured group processes. Prereq: 5480, 2 hrs and 1 lab. Sp

5510 Community Mental Health Nursing Field Work I (6)

Clinical practice and group process in a community setting providing opportunities to apply mental health nursing knowledge in planned interactions with individuals and groups at primary, secondary and/or tertiary care levels. Community and mental health systems assessment. Su

5520 Community Mental Health Nursing Field Work II (9)

Clinical practice for graduate student choosing functional concentration of advanced clinical practice. Objectives identified by student to meet specific learning and practice needs. Prereq: 5510. F

5540 Community Mental Health Nursing Seminar (2)
Identification of issues and problems involved in delivery of community mental health nursing care; further analysis and exploration of theories and concepts included in 5680 as they affect the role of nurse as community mental health clinical specialist. Prereq: 5680. Coreq: 5520. F

5550 Primary Care Nursing Field Work I (8) Placement in selected off-campus primary health care delivery site for purposes of applying newly acquired knowledge and developing clinical skills necessary to function as a nurse practitioner. Prereq: 5480. Coreq: 5680. Su

5560 Primary Care Nursing Field Work II (9) Continuation of 5550 with further emphasis on acquisition of nurse practitioner skills coupled with ability to function more autonomously. Prereq: 5550. F

5630 Teaching Strategies and Practicum (6) Analysis and application of curricular and teaching modalities; field placement with supervised opportunities to provide both classroom and clinical instruction to undergraduate nursing students. Prereq: 6 hrs approved education courses and 5310, 5510, 5550, or 5255. 2 hrs and 3 labs. F

5632 Directed Study in Technical Nursing Education (5) Philosophy, history, and contemporary issues in technical nursing and nursing education; teaching strategies for adult learner in community college; in-depth investigation of selected topics. Prereq: 9 hrs approved education courses and 5630. Su

5660 Primary Care Nursing Seminar (2) Issues and problems involved in delivery of primary nursing care; further analysis and exploration of theories and concepts included in 5680 as they affect role of nurse as primary care provider. Prereq: 5680. Coreq: 5560. F

5680 Advanced Nursing Seminar (3) Theories of leadership, motivation, power, conflict, authority, change and decision making and their application to advanced clinical nursing practice; examination and analysis of role of nurse as health care provider and client—family advocate. Prereq or coreq: 5310 or 5550 or 5510. Su

5730 Management Strategies and Practicum (5) Analysis and application of managerial and supervisory theories and strategies; field placement in nursing service facility with supervised practice in nursing service administration. Prereq: 6 hrs approved management courses and 5310, 5510, 5550, or 5255. 2 hrs and 3 labs.

5770 Special Topics (1-3) 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. E

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. E
School of Architecture

Roy F. Knight, Dean
William J. Lauer, Associate Dean
Jon Coddington, Assistant to the Dean

Professors:
R. F. Knight (Dean), M.Arch. Harvard;
J. W. Fortey, P.E. Doctorate d'Universite de Toulouse (France); F. Grieger, M.Arch. Pennsylvania;
M. R. Keao, M.S. Tennessee;
F. Lizzi, Ph.D. Pennsylvania; D. K. Ruth, M.Arch. Harvard; W. S. Shiel, M.S. Arch. Columbia;
J. S. Watson, M.Arch. Pennsylvania;
L. M. Wodehouse, Ph.D. St. Andrews.

Associate Professors:
M. D. Herz, B.Arch. Columbia; S. A. Kinzy, M.Arch. Illinois;
W. E. Martella, B.Arch. California (Berkeley); M. S. Moffett, Ph.D. Massachusetts Institute of Technology;
V. Narancic, B. Arch. Belgrade; J. S. Rabun, M.A. Texas;

Assistant Professors:
C. H. Bovill, M.Arch. Hawaii; J. Coppington, B.Arch. Tennessee; L. D. Grieve, B.Arch. Tennessee;
W. C. Gerard, M.Arch. Virginia; J. E. Reno, M.Arch. California (Los Angeles);
D. A. Roberts, B.Arch. Ball State; P. Vandebrouk, B.Arch. Tennessee;
L. Wells-Bowie, M.Arch. California (Berkeley); D. L. Wooley, M.Arch. Washington Univ.

4101 Community Form (3) Patterns of community development. Selected historical and contemporary examples. Basic urban design issues and exemplary design approaches through lectures, readings, essays, and sketch studies. F

4430 Architecture and Preservation (6) Rehabilitation, restoration, and adaptive uses of existing buildings.


4807 Tennessee Architecture (3) History of settlement patterns and building in Tennessee. F

4811 Special Topics in History, Theory and Criticism (1-4) Special topics in history-related subjects. May be repeated. Maximum 8 hrs.

4815 Criticism Seminar (3) Theories, function, and techniques of architectural criticism. Sp

4830 Introduction to Preservation (3) History and theory of architectural preservation and restoration. F

4831 Preservation Technology (3) Techniques of preservation: dating, methods of analysis, history of materials and technology used in old buildings. W

4832 Descriptive Analysis of Historic Buildings (3) Identification and analysis of characteristic elements of buildings from various architectural periods with emphasis on American architecture. Survey techniques. Sp

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. F, W, Sp

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) (Same as Interior Design 4940.) Interior Design is the primary department.

4950 Environment and Code (4) (Same as Interior Design 4950.) Interior Design is the primary department.
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 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 concentration 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. A course in physical chemistry is offered by the School in order to meet the last 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 37831.

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 (5150); Molecular Genetics (5170); Cell Biology (5180-90); Mammalian Physiology (5200); and Statistics for Biologists (5740).

2. Three quarters of Biomedical Sciences (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. Passing 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 work 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 and is interested in applications from students with M.S., D.V.M., or M.D. degrees who would like to enter the graduate school for a period of approximately one year, or who would like to use the program as an introduction to graduate study in the life sciences. The Master of Science degree is awarded to students for their advanced accomplishments in the course of their graduate work, and is not intended as a first step toward the Ph.D. degree.
Sciences primarily to fill the need for such a degree within the Oak Ridge National Labo-
ratories; however a limited number of stu-
dents from other institutions may be
accepted if qualified and as space is availa-
bile.

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 (5150); 
Molecular Genetics (5170); and Mammalian 
Physiology (5200). Additional credits may be
obtained (6 to 15 credit hours) with elec-
tives. 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
graduate courses including a minimum of
physical chemistry. Students spend a quarter in each of three or four
long laboratory conducting research in different areas of
biomedical science. Required of all first-year stu-
dents.

430-60-90 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.

5150-20-30-40 Special Topics in Biomedical Sci-
ences (3, 3, 3, 3) Tutorials or formal lectures. Potential
topics include x-ray diffraction and crystallography;
established biophysics; physical chemistry of mac-
molecules; computer science; patholo-
y; cytology and cytochemistry; mammalian genetics; human genet-
ics; 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 in-
terpretation of statistical methods in data analysis. Random
variables, density functions, expected values, dis-
tributions, statistical presentation of data; estimating
means and variance; confidence intervals; tests of significance
for comparing samples; analysis of variance; con-
tingency tables; chi-square tests; correlation and
association; linear regression. Prereq: Introductory
statistics or consent of instructor.

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

6200 Nucleic Acid Chemistry (3) Chemistry of nucleo-
tide-derived materials including alkylation, solvolysis,
oxidation-reduction, polymerization, synthesis, den-
aturation and other structure perturbations. Reaction
of nucleic acids in above systems with emphasis on
relationship of structure and reactivity. Prereq: 5110-

6220 Enzyme Regulation and Genetics (3) Kinetics of
catalysis; inhibition by product, substrate and deadend
inhibitors; stimulation and inhibition of allosteric
enzymes, types of feedback regulation; role of sub-
units in enzyme regulation; multifunctional enzymes.
Prereq. 5110-20.

6240 Chemistry and Metabolism of Lipids (3) Nomen-
lature, 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 bio-
chemistry of mamms; comparative aspects, particular
lipid pathways in bacteria and yeast. Prereq: 5110-
20.

6251 Molecular Biology of RNA (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. Recent advances in me-
chanisms at molecular level using biological and genetic
techniques. Prereq. 5110-20 or consent of instruc-
tor.

6370 Viral Carcinogenesis (3) History of viral oncolo-
gy and descriptive catalog of tumor viruses. Biology of
normal and transformed cells. DNA tumor viruses;
replication cycle; transformation; genetics; natural his-
tory; RNA tumor viruses; endogenous and exogenous
states; genetics; induction; transformation; natural history.

6280 Chemical and Physical Carcinogenesis (3) His-
tory and epideidemiology. Natural and
metabolism of chemical carcinogens. Radiation and site-specific carcinogenesis.
Graduate School of Library and Information Science

Ann E. Prentice, Director

MAJOR DEGREE
Library Science M.S.L.S.

Professors:

Associate Professors:

Assistant Professors:
M. H. Karrenbrock, Ed.D. Georgia; M. S. Stephenson, Ph.D. North Texas.

The Graduate School of Library and Information Science provides a program leading to the preparation of librarians and information scientists for work in all types of libraries and information centers. The program of study includes a graduate curriculum leading to the degree of Master of Science in Library Science.

Through a graduate level general purpose program with emphasis on the effective management of information resources in multiple settings, students learn to:
1. Examine critically the role and function of libraries and other information agencies in 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 information;
3. Understand and apply the principles of management to the library and other information agencies;
4. Assume individual and collective responsibility for the well-being and development of their profession and of professional service.

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 general examination 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. 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.

MASTER OF SCIENCE IN LIBRARY SCIENCE

The program leading to the degree of Master of Science in Library Science involves a total of 51 quarter hours of graduate courses, 18 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.

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 may extend the period required for the degree. Similar opportunities exist with some other libraries and information agencies in the Knoxville area. Work opportunities in a scientific-technical environment are available through subcontracts with Oak Ridge National Laboratory and the Department of Energy. 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.

The SREB Academic Common Market applies to applicants from Arkansas, Georgia, West Virginia, and Virginia.

Information on financial assistance is available from the Director of the Graduate School of Library and Information Science.

4140 Libraries and Librarianship (3) Librarianship as an occupation; its organization, responsibilities, problems and prospects. F, W, Su

4150 School Library Administration (3) Objectives, functions, and place of school library; relationships to local and state services; cooperative planning for quarters and materials; evaluation. (Same as Curriculum and Instruction 4150.) W, Su

4160 School Library Media Program Management (3) Attitudes, knowledge and skills necessary to manage a school library media program at building and district levels. Curricular services and role of school library media program in curriculum development. Application of technology to program implementation. Prereq: 4150 or consent of instructor. Sp

4270 Organization of Library Collections I (3) Acquisitions, cataloging and maintenance of library collections. F, W

4310 History of the Book (3) History of writing and various methods of bookmaking from earliest times through 19th century. W

4320 Adult Materials and Reading Interests (3) Fiction and subject categories, popular and standard; evaluation of materials to meet adult interests; consideration of selection aids. F, W, Su

4330 Introduction to Reference Materials (3) Basic information sources and services for all libraries. F, W, Su

4750 Utilization of Instructional Media (3) (Same as Curriculum and Instruction 4750 and Vocational-Technical Education 4750.) 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 be repeated. S/NC only. E

5110-20-30 Problems in Library Science (3, 3, 3) May be repeated with consent of school. E
5140 Research Methods in Library Science (3) Research methods applicable to librarianship. Process and conduct of research; analysis of published research. W, Sp, Su

5210 Sources and Services for the Social Sciences (3) English and non-English literature and bibliographical sources in education, economics, political science, history, geography, anthropology, psychology, and sociology; organization of collections for optimum use. Prereq: 4330. W

5220 Sources and Services for the Natural Sciences (3) English and non-English literature and bibliographical sources in mathematics, physics, astronomy, chemistry, geology, biology and medicine; organization of collections for optimum use. Prereq: 4330. Sp

5230 Sources and Services for the Humanities (3) English and non-English literature and bibliographical sources in language and literature, fine arts, music, philosophy and religion; organization of collections for optimum use. Prereq: 4330. Su

5240 Organization of Library Collections II (3) Construction and maintenance of library catalog as retrieval instrument; indexing and subject analysis theory, comparative classification with emphasis on Library of Congress system, and problems in reclassification. Prereq: 4270. F, Sp

5245 Technical Services Management (3) Issues and developments in larger collections: departmental organization and procedure, cooperative programs, national and international bibliographic standards, catalog automation programs. Prereq: 4270, 5240. May be taken concurrently with 5240 with consent of instructor. F

5250 Government Publications I (3) Acquisition, organization and utilization of U.S. federal government publications, legislative, executive and judicial branches. Prereq: 4330 or consent of instructor. F

5260 Government Publications II (3) Acquisition, organization and utilization of publications of state and local governments in U.S.; publications of foreign governments and intergovernmental organizations; United Nations, UNESCO. Prereq: 4330 or consent of instructor. W

5270 Legal Bibliography (3) Introduction to literature of Anglo-American jurisprudence. Use of reports, statutes, administrative regulations and decisions, treatises, periodicals, and indexes as bibliographic tools. Sp

5300 Library Management (3) Management and organization concepts applicable to libraries and librarians. F, Sp

5310 Multitype Networks (3) Organization, structure, governance, planning, evaluation, and services in state, regional, national, and international networking of information. W, Sp

5330 Academic Libraries (3) Persistent and current problems. Topics vary depending upon needs and interests of group. W

5360 Special Libraries and Information Centers (3) Development and present status, scope and objectives, administration and organizational problems, acquisition, organization, and use of information. W

5370 The Library in the Community (3) Public library as social agency; role in education and communication systems of community. F

5380 Seminar in Library and Information Science (3) Advanced study of varying topics. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5400 Library Facilities (3) Problems inherent in planning and construction of library quarters. Interrelation of buildings with library services, architectural and technical considerations, and staff, materials, and user space requirements. Sp, Su


5510 Nonbook Resources (3) Selection, processing, storage and utilization; films, video technology, sound recordings and microforms as information media. Prereq: 5500 or consent of instructor. F, Sp

5515 Serials (3) Serials collections: selection, acquisition, bibliographic control, process, storage, maintenance, and public service. Prereq: 5500 or consent of instructor. W

5530 Contemporary Publishing (3) Creation, production, marketing, and distribution of materials acquired by libraries, with special attention to various types of publishers. F

5540 Archives and Manuscripts (3) Problems involved in acquisition, organization, description, storage, preservation, and utilization. Prereq: Consent of instructor. W

5550 Records Management for Information Professionals (3) Functional elements and objectives of records management within organizations, emphasizing control of creation, disposition, storage, retrieval, protection, and disposition regardless of medium. Prereq: 4330, 4270, or consent of instructor. Sp

5605 Development of Children's Literature (3) Children's literature from earliest times to 20th century. Representative titles of particular periods. W


5625 Resources for Young Adults (3) Critical survey of library materials for young adults with emphasis on personal, vocational and recreational needs and interests. Evaluation, selection, and utilization for school and public libraries. W

5635 Library Services and Programs for Youth (3) Philosophy and objectives of public and school library services for children and young adults. Reading, listening and viewing guidance for individuals and groups. Program planning, implementation and evaluation. Prereq: 5615 or 5625 or consent of instructor. Su

5645 Traditional Literature and Oral Narration (3) Nature of traditional materials and principles of collection; reference sources for folk literature; history and techniques of storytelling; use of traditional materials with all age groups. F

5691 Advanced Production of Audiovisual Software (3) (Same as Curriculum and Instruction 5691.)

5700 Automation of Library Processes (3) Computer concepts and operations; applications to basic library operations: acquisitions, catalogs, circulation and serials. Prereq: 4270, 5500, or consent of instructor. F, W, Su

5710 Introduction to Information Science (3) Content and method of information science; application of research findings to general library practice. F, Su

5715 Information in Society (3) Characteristics of an information society, nature of knowledge and information, use and effect of media. W

5720 Information Systems Analysis and Design (3) Examination and evaluation of tools and methodologies in library/information center systems planning and implementation. Role and training of systems analyst, systems study from planning through implementation and evaluation, and related topics. Prereq: 5700 or consent of instructor. W

5725 Organization of Materials for Information Storage and Retrieval (3) Principles and techniques in organization and description of materials for input to information storage and retrieval systems: indexing, abstracting, document representation, thesaurus construction and maintenance, related topics. Prereq: 5710 or consent of instructor. W

5730 Information Retrieval Systems Laboratory (3) Comparative capabilities of various types of information retrieval systems; analyzing performance of systems to arrive at generalizations with respect to theory, design and operation of information retrieval systems. Sp

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. Sp
The Graduate School of Planning offers a program of studies leading to the professional degree of Master of Science in Planning. Students take a core curriculum in the theory, techniques and practice of urban and regional planning. Each student also selects a concentration in one of the following areas: land use planning, transportation planning, analytical methods in planning, regional planning and development, real estate development planning, environmental planning, economic development planning, or other faculty approved specialty.

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 Graduate School of Planning is accredited by the Planning Accreditation Board, a joint undertaking of the American Institute of Certified Planners and the Association of Collegiate Schools of Planning. All inquiries about the program should be addressed to the Director of the School.

Admission Requirements: 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 a supervisor or other person familiar with the work of the applicant should also be provided. All applicants must submit a statement of career goals. Graduate Record Examination scores are not required, but applicants are encouraged to submit them.

The M.S.P. degree is approved for SREB Academic Common Market participation in Arkansas, Kentucky, South Carolina and West Virginia.

THE MASTER'S PROGRAM

Each student will be required to demonstrate competence in individual research. This may take either of two forms.

Option I—Complete a thesis for 9 hours credit;

Option II—Complete a major study with acceptable documentation. In order to be eligible for the major study option, the student must have completed at least 24 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). 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 the topic, problem or issue and the approach to the study.

Each student will be required to complete a minimum of 72 hours credit of which 48 hours must be in courses offered in planning.

The following courses are the required core curriculum for the M.S.P. degree: 5001, 5060, 5100, 5110, 5130, 5140, 5141, 5150 or 5155, 5160, 5280, 5285, 5340, 5400, and 5465.

Each student is required to develop an area of specialized competence in addition to the core curriculum. After selecting the area of concentration, usually by the end of the second quarter, the student takes a prescribed set of courses in the subject area. Further enhancement of the concentration is gained by taking added elective courses in the subject and by focusing the thesis or major study on the subject. Specialty courses are drawn from the School curriculum and from other departments in the university.

A student may propose an individualized specialty program, consisting of at least 12 hours of coursework, subject to approval of the student's committee. 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 nine credit hour synthesis project course sequence. It normally requires two academic years to complete the program. Transfer credits from other institutions or programs may be accepted, up to a maximum of 15 quarter hours; subject to approval of the School and The Graduate School.

4100 Survey of Planning (3) History of city development and of planning with special attention to the U.S. experience in urban and other levels of planning. State of the art, the process, the comprehensive plan, implementation devices. Planning issues in society. Not for credit for M.S.P. degree. F

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

5001 Thesis and Major Paper Proposal Writing (1) Preparation of thesis or major paper proposal. 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 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 (3) Communications in planning operations and in planning process.

5060 Planning Graphics (1) Graphics in planning: presentation techniques, mapping, three dimensional modeling and land form analysis.
5110 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, formation and 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

5120 Planning Research Methods (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

5140 Urban and Regional Analysis (3) Past, present and possible future patterns of urban and regional structures drawing on contemporary theories, models, and empirical research.

5141 Statistics for Planners (4) Applications of basic descriptive and inferential classical and nonparametric 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

5150 Microcomputer Applications in Planning I (3) Microcomputer in planning and government: hardware and software available for development and implementation of planning related applications; evaluation of microcomputer hardware and software.

5151 Microcomputer Applications in Planning II (3) Intermediate-level study in use of microcomputers tailored to specific interests of students; intensive study of one or two selected aspects of microcomputer applications: programming, graphics, modeling and simulation, or data base management; microcomputer application development using appropriate tools. Prereq: 5150.

5155 Computer Concepts in Planning I (3) Mainframe computers in data management and analysis; fundamental computer concepts.

5156 Computer Concepts in Planning II (3) Intermediate-level study in computer concepts, tailored to specific interests of students; in-depth study of computer programming, graphics, data base management, or information systems; computer application development. Prereq: 5155.

5160 Planning and Utilities (3) Planning for adequate water supply and sewage waste disposal in the urban environment. Environmental impact of utilities on area development, and problems of utility service policies.


5170 Planning for Historic Preservation (3) Planning for preservation, restoration and conservation of historic buildings, areas and sites as related to comprehensive planning process. National, state, and local government regulations, construction of sites, legislative needs, financing and administrative organizations.

5175 Environmental Planning (3) Role of planners and planning in maintenance of balance between natural and built environment. (Same as Ecology 5175.)

5180 Planning Analysis and Forecasting (4) Methods of quantitative analysis and modeling in urban and regional studies. Population, employment, and economic base studies with emphasis on forecasting techniques. Prereq: 5130. Sp

5190 Development Planning in the Third World (3) Seminar on urban and regional development in Third World nations. Population growth, settlement patterns, economic, land framework of integrated resource management. (Same as Ecology 5180.)

5230 Urban and Site Design (3-4) Principles of design of residential subdivisions and some components of physical community such as shopping centers, institutional complexes, central business districts. Problems of reviewing alternative designs against each other or written regulations. Extensive laboratory experience. Prereq: 5060. F, Sp, Su

5270 Planning and Transportation (3) (Same as Civil Engineering 5270.)

5280 Planning Methods (6) Preparation of comprehensive plans. Tooling up studies and preparation of integrated plans for land use, public facilities and transportation.

5285 Planning Methods II (3) (Sequence to 5280.)

5300 State and Regional Planning (3) Theory and practice of planning at state, sub-state, and metropolitan levels.

5315 TVA, Planning and Development (3) Review and evaluation of TVA's record and achievements as the nation's leading experiment in river basin planning and development.

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

5345 Impact Assessment (3) Process, principles and methods associated with assessment of impact of projects or programs.

5360 New Towns (2) Historical development of planned 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.

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

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.

5400 Legal Aspects of Planning (3) Legal basis for planning and guiding community development. Legal tools of planning. Prereq: 5110.

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

5440 Planning and Land Use Controls (3) Development and administration of zoning, subdivision regulations, and related devices. Prereq: 5400.

5455 Urban Revitalization (3) Goals, principles and strategies for restoring and revitalizing cities. Review and analysis of historic, current, and proposed public and private programs aimed at urban revitalization. Physical building and restoration activities as related to financial and administrative requirements. Relationship between construction oriented activities and economic and social development programs is emphasized. Prereq: 5110 or consent of instructor.

5465 Planning and Property Development (3) Process of urban physical growth and change with emphasis on functioning of private sector real estate development and its relationship to planning. Partnership roles of public and private sectors in urban development and redevelopment. Prereq: 5440. F

5470 Economic Development Planning for Urban Areas I (3) Planning process employed in changing economic base of cities and regions, including institutional and organizational problems.

5475 Economic Development Planning for Urban Areas II (3) Application of principles learned in 5470 to specific case studies. Prereq: 5470.

5500 Synthesis (9) Problem-oriented experience to integrate knowledge from previous courses. Interrelationships stressed; student required to use judgment in evaluation and creation of plans and policies addressed to real world situations. Extensive laboratory experience. Prereq: Required planning courses or consent of faculty. F, W

5670 Social Planning (2-3) Theory, philosophy and implications of programs for planned social change. Consideration of major social planning issues in diverse fields of service: aging, corrections, education, health, social services. Prereq: Consent of instructor. (Same as Social Work 5670.) F

**Effective January 1986, the Graduate School of Social Work became the College of Social Work. Academic program offerings include the Baccalaureate in Social Work, the Master of Science in Social Work, and the Ph.D. with a major in Social Work.**

Ben P. Granger, Dean
Lou M. Beasley, Associate Dean, Nashville Branch; Roger M. Nooe, Associate Dean, Knoxville Branch; Nellie P. Tate, Associate Dean, Memphis Branch; Paul M. Campbell, Acting Director, Office of Continuing Social Work Education

### MAJOR DEGREES

**Social Work**  
M.S.S.W., Ph.D.

**Professors:**  
B. P. Granger (Dean), Ph.D.; Brandeis; L. M. Beasley, Ph.D., Denver; M. H. Bloch, M.S., Ohio; State; R. C. Bonovich, D.S.W., Washington (St. Louis); G. W. Frye, Ed.D., Columbia; H. Hayama, D.S.W., Pennsylvania; T. McLaren (Emeritus), M.S.S.W., Tennessee; K. K. Mullins, Ph.D., Chicago; R. M. Nooe, D.S.W., Tulane; B. Orchard (Emeritus), M.S. Western Reserve; H. Rubenstein, Ph.D., Chicago; S. W. Spencer (Emeritus), M.S. New York School of Social Work.

**Associate Professors:**  
W. J. Bell, D.S.W. Tulane; M. Cetingok, Ph.D., Washington; C. T. Cruthirds, D.S.W., Tulane; C. Faver, Ph.D., Michigan; M. G. Feit, Ph.D., Pittsburgh; A. E. Moses, D.S.W., California (Berkeley); R. B. rowen, Ph.D., Arizona; N. P. Tate, Ph.D., Brandeis; H. H. Vaughn, Ed.D., Memphis State; A. R. Wachter, M.S.S.W., Tennessee; C. S. Wilke, Ph.D., St. Louis; F. G. Zerbock, M.S.S.W., Wisconsin.

**Assistant Professors:**  
P. M. Campbell, D.S.W., Alabama; J. Charping, Ph.D., Peabody; S. S. Chipungu, Ph.D., Michigan; J. C. Collier, M.S.W., Tulane; T. C. Faust, M.S.S.W., Tennessee; A. R. Ford, M.S.W., Atlanta; V. A. Gales, M.S.S.W., Tennessee; J. Jennings, Ph.D., Michigan; D. C. Johnston, M.S.W., California (Berkeley); G. Lowry, M.S.S.W., Tennessee; N. Lunn, M.S.S.W., Tennessee; P. Shaddock, Ph.D., Case Western Reserve; M. P. Strong, M.S.W., Tulane.

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 and a program leading to the Doctor of Philosophy. The Master's curriculum is offered in all three branch locations.

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 dual program in Social Work and Divinity is offered by the UTK School of Social Work, Nashville Branch and the Divinity School of Vanderbilt University.

A special bulletin describing the facilities, admission, fees, and degree requirements is available from the School of Social Work, Henson Hall, Knoxville, Tennessee 37996-3333.

**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.

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.

**ADVANCED STANDING/ACCELERATED PROGRAM**

The University of Tennessee School of Social Work has a special advanced standing/accelerated program which enables eligible candidates to complete the M.S.S.W. degree in four quarters. This advanced standing/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 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
accredited program is through the regular admission process. Applications should be filed 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. Course work can be completed over a three- or four-year period.

THE PROFESSIONAL FOUNDATION

The professional foundation is a 36-quarter hour sequence of five basic areas required of all students before entering either of the concentration programs. As the initial phase of the school educational program, the foundation 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, administrators, and planners.

Credit Hours

Fall Quarter, First Year 5070 Social Work Research I 3
5110 Social Welfare Policy and Services I 3
5210 Human Behavior and Social Environment I 3
5410 Social Work Practice I 3
5910 Field Practice 3

TOTAL QUARTER HOURS 15

Winter Quarter, First Year 5080 Social Work Research II 2
5120 Social Welfare Policy and Services II 2
5220 Human Behavior and Social Environment II 3
5420 Social Work Practice II 3
5920 Field Practice 4

TOTAL QUARTER HOURS 15

Spring Quarter, First Year 5110 Social Welfare Policy and Services I 3
5210 Human Behavior and Social Environment 3
5410 Social Work Practice I 3
5910 Field Practice 3

TOTAL QUARTER HOURS 15

THE REQUIRED CONCENTRATION

Upon completion of the foundation curriculum (at the beginning of the third quarter), each student selects a concentration in either social work treatment or social welfare administration and planning and devotes the final four quarters of the program to required concentration courses and electives. Students must take 15 hours in their required concentration. Students may take courses in the other required concentration as electives. Although each branch offers a variety of elective courses, not every elective is offered every year at every branch.

Spring Quarter, First Year Credit Hours

5930 Field Practice 4
5125 Social Work With Oppressed Populations 2
Specialization Courses and Electives 8

TOTAL QUARTER HOURS 14

Fall Quarter, Second Year Specialization Courses and Electives 12
Winter Quarter, Second Year 5940 Field Practice 8
Specialization Courses or Electives 2 or 3

TOTAL QUARTER HOURS 10 or 11

Spring Quarter, Second Year 5950 Field Practice 8
Electives 3 or 6

TOTAL QUARTER HOURS 11 or 14

AREAS OF SPECIALIZATION

Social Work Treatment: The social work treatment concentration provides the educational basis for practice with individuals, families, and groups in order to enhance their social functioning, ameliorate problems, and prevent social dysfunction. The specialization attempts to develop a thorough knowledge of the theory and methodology basic to varied individual, family, and group methods applicable in the treatment of diverse client problems.

Social Work Administration and Planning: The social welfare administration and planning concentration provides the educational basis for leadership in the design, implementation, and continued delivery of effective and efficient human service programs at local, regional and state levels. This concentration emphasizes theory and skills related to administration and planning, and permits consideration for students pursuing careers in leadership roles in social welfare program administration and planning practice and implementation, and continued delivery of 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 administration and planning practice and between each of them and their social policy, programmatic, organizational and community context.

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 or better 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 written comprehensive examination.

7. Credits to be counted toward the degree must be earned within six years from the beginning date of the earliest course applied toward the degree, except in cases where permission to update courses has been granted.

8. The minimum number of credit hours required for a degree shall be 79 hours including a maximum of 36 S/NC hours.

9. Performance at a satisfactory level in field practicum, which is designed to teach professional practice skills.

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 admission requirements of The Graduate School and The University of Tennessee School of Social Work, and if previous courses are equivalent to required or elective courses offered here. The University of Tennessee School of Social Work allows a maximum of 45 credit hours of graduate course work taken at another accredited institution to be transferred into the student's Master's program. Such work must have been taken for graduate resident credit and passed with a B or better. In addition, it must be part of an otherwise satisfactory graduate program (B average) and be approved by the branch director and the dean. This course work must be completed within the six-year period prior to the receipt of the degree. In addition, S/NC credit earned for the field practicum is also accepted.

THE DOCTORAL PROGRAM

The UT School of Social Work offers a Doctor of Philosophy degree with a major in Social Work. This newly approved Ph.D. program began 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 method to improve and extend the knowledge base of social work practice and commitment to reflect this attitude, and competence 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 administration 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. Therefore, students will be assigned to one of the three Branches for an internship and to complete dissertation research under the supervision of qualified faculty.

Requirements for admission to the doctoral program are being developed. Inquiries and requests for admission should be sent to: Doctoral Program Admissions, UT School of Social Work, Henson Hall, Knoxville, TN 37996-3333, (815) 974-3175.

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.

5000 Thesis (1-15) F/N/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/NC only. E

5070-80 Social Work Research I, II, I (3), 2 Research methodology as applied to problems in social welfare research. Designs for investigation; construction; data collection, analysis, and presentation; and research reporting. F, W

5081 Evaluative Research in Social Work (2-3) Advanced research course. Topics include sociopolitical, methodological, and statistical aspects of evaluative research; research design and methodology appropriate to evaluative research, and utilization of research findings. Prereq: Completion of foundation or consent of instructor. Sp

5082 Practicum in Social Work Research (3-9) Supervised practice in application of research methods and tools to social welfare program. Project may be generated by faculty, students, or social welfare agency or organization. Prereq: 5070-80 and consent of faculty member conducting investigation. S/NC only. Sp

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 or study on research on problems of special significance to social work practice. Permission of major professor. May be repeated. F, W, Sp

5110 Social Welfare Policy and Services I (3) Interests of social welfare profession in development of contemporaneous social, state, national, and international levels of organization. Contribution of social work professionals can make to formal policy-making. Scope, development, and growth of social welfare services are explored, 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 theories of complex organizations applied to social welfare service delivery settings. Transformation of collective social welfare resources into divisible and indivisible social welfare benefits through organized instrumental action of professional nature. W

5125 Social Work with Oppressed Populations (2) Professional role in working with individuals and groups in American society oppressed by distinguishing characteristics, i.e. age, gender, socio-economic class, religion, race, health status, handicap conditions, ethnicity and race. Sources, patterns of expression, consequences for oppressed and oppressor, and conditions for alleviation of oppression. Prereq: Completion of foundation or consent of instructor.

5130 Social Policy Analysis (2-3) "Policy science" techniques are considered for appropriateness in assessing social, political, and economic implications of social welfare issues. Prereq: Completion of foundation or consent of instructor. Sp

5161 Social Welfare Seminar (2-3) Problem area or field of practice identified as especially relevant to understanding and solving social problems. In-depth knowledge about social policy or condition and interrelationships among problem definition, social policy, social work, and social work practice. Fields such as health, mental health, child and family welfare, mental retardation, education, correction, economic development, income maintenance, and aging. Prereq: Completion of foundation or consent of instructor. May be repeated. Maximum 9 hrs. F, W, Sp

5210-30 Human Behavior and Social Environment I and II (3, 3) Individual, family, small group, and group in context of functions, structures, roles, and processes. Human systems conceptualized along functional-dysfunctional development continuum. Stress, development and maturation, adaptive and maladaptive mechanisms. Open systems approach to understanding interrelations of psychological, biological, social, and personal variables with emphasis on implications of culture, race, ethnicity, and age. Prereq: Completion of foundation or consent of instructor. May be repeated. Maximum 6 hrs. Sp

5300 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/NC only.

5310 Human Behavior and Social Environment (2-3) Deepens and extends student's knowledge of range of adaptations, disabilities, and deviant behavior from optimum social functioning through pathology. Prereq: Second-year status. May be repeated.

5311 Imaginative Perspectives on the Human Condition (2-3) Examination of usefulness to social work students of literature, art, and poetry, which illuminate and expand knowledge and appreciation of every person's humanness. Adaptive 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 foundation or consent of instructor.

5312 Psychopathology and Social Deviance (2-3) Theories of and recent research in etiology of psychophysiology. Theories of mind and social variance. Categorical approach to psychopathology examined and differentiated from other approaches to human behavior. Prereq: Completion of foundation or consent of instructor. F

5313 Deviant Behavior of Children and Youth (2-3) Deviant behavior and conduct disorders in children and youth, etiology, symptomatology, and range of social service interventions. Prereq: Consent of school of social work dean. Prereq: Completion of foundation or consent of instructor. F

5315 Human Sexual Problems (2-3) Desensitization and resensitization of personal and social attitudes toward sexual behavior, clinical problems and approaches to make social workers better able to deal with clients with sexual problems. Prereq: Completion of foundation or consent of instructor. F

5317 Social Work and Black Families (2) Historical and contemporary theories regarding Black families, emphasis on family as a system. Framework to assess and plan for Black families within service delivery systems. Prereq: Completion of foundation or consent of instructor. F

5410 Social Work Practice I (3) Basic theory, values and beginning skills development general to social work intervention at various system levels. Comprises classroom skills and laboratory experiences. F

5420 Social Work Practice II (3) Assessment, planning, methodology and skills development fundamental to social work intervention. Combines classroom skills and laboratory experiences. W

5440 Family Therapy in Social Work Practice (2-3) Application of practice theory to assist in acquiring skills in treatment of family as unit. Prereq: Completion of foundation or consent of instructor. W

5443 Seminar on Behavior Therapy (2-3) Behavior modification methodology applied to clinical assessment, choice, generalization, and maintenance of treatment interventions, skill in evaluating data on effectiveness of treatment interventions. Prereq: Completion of foundation or consent of instructor. May be repeated. Maximum 6 hrs. Sp

5444 Social Work Practice with the Poor (2-3) Problems, issues, and dilemmas of practice in social services with poor and attributional analysis of programs which make that practice possible. Prereq: Completion of foundation or consent of instructor.

5460 Social Work Treatment with Individuals and Families (3) Social work, literature, social casework as method of social work practice and as form of interpersonal treatment. Prereq: Completion of foundation or consent of instructor.

5470 Contemporary Treatment Modalities: Individual and Family (2-3) Well-established and developing treatment modalities in terms of essential concepts. Differential facets and theory-based linkages. Prereq: Completion of foundation or consent of instructor. F

5480 Special Topics in Social Work (2-3) Treatment with individuals and small groups. Prereq: Completion of foundation or consent of instructor. May be repeated. Maximum 9 hrs. F, W, Sp

5560 Social Work with Children and Families (3) Development of knowledge and skills to use group methods in social work practice; organization and forming groups, structuring group tasks and experiences, group process, enabling problem-solving effectiveness, facilitating transfer of change, and evaluating individual change and group effectiveness. Prereq: Completion of foundation or consent of instructor. Sp

5561 Interpersonal Skill Development (2-3) Training group employed to enhance interpersonal competence in application of human relations skills in social work practice. Prereq: Completion of foundation or consent of instructor.

5570 Comparative Methods of Group Treatment (2-3) Comparative analysis and critical review of theory and methodology of some of major group treatment modalities with emphasis on theory-base, leadership, techniques and procedures, and research. Prereq: Completion of foundation or consent of instructor. A

5801 Social Work in Rural Communities (2-3) Characteristics of rural populations and rural community analysis. Outline and analysis of rural social services and delivery systems. Prereq: Consent of school of social work dean. Generalist concept and occupational function in rural areas. Prereq: Completion of foundation or consent of instructor. W

5802 Community Organization (2-3) Using behavioral and social science knowledge about communities and organizations to assist in development of resources to meet human needs. Prereq: Completion of foundation or consent of instructor. Sp

5870 Social Planning (2-3) (Same as Planning 5670) F

5871 Planning and Management of Change in Social Welfare (2-3) Theories and models of change such as planned change, conflict, and evolutionary change in relation to organization design, planning, operation, and management of social welfare services. Prereq: Completion of foundation or consent of instructor. F

5872 Organizational Design of Social Welfare Agencies (2-3) Special problems of organization structure and operational patterns to new tasks, objectives, and mandates. Planning and design techniques for new programs and projects. Prereq: Consent of school of social work dean. Prereq: Completion of foundation or consent of instructor. F

5901 Macro Social Work (3) Social work, literature, social casework as method of social work practice and as form of interpersonal treatment. Prereq: Completion of foundation or consent of instructor. Sp

5902 Community Organization (2-3) Using behavioral and social science knowledge about communities and organizations to assist in development of resources to meet human needs. Prereq: Completion of foundation or consent of instructor. Sp

5970 Social Planning (2-3) (Same as Planning 5670) F

5971 Planning and Management of Change in Social Welfare (2-3) Theories and models of change such as planned change, conflict, and evolutionary change in relation to organization design, planning, operation, and management of social welfare services. Prereq: Completion of foundation or consent of instructor. F

5972 Organizational Design of Social Welfare Agencies (2-3) Special problems of organization structure and operational patterns to new tasks, objectives, and mandates. Planning and design techniques for new programs and projects. Prereq: Consent of school of social work dean. Prereq: Completion of foundation or consent of instructor. F

Course Listing/Graduate School of Social Work
Supervision in Social Work (2-3) Dual roles of supervisor in various settings distinguished from consultation and from direct practice. Responsibility and accountability to client system, supervisee, and executive. Problems of middle management position of supervisor. Differences and similarities in supervision of various levels of personnel. Goal, tasks, techniques, and processes in relation to individual and group supervision and field instruction. Prereq: Second-year status or consent of instructor.

Consultation in Social Work (2-3) Constellation of roles, relationships, and behaviors required of consultant. Consultation as distinguished from supervision, administration, and direct practice. Types of consultation in relation to various roles and levels of responsibility. Processes and practices of consultation and dilemmas and pitfalls of consultant’s position. Prereq: Second-year status or consent of instructor.

Management of Human Resources in Social Welfare (2-3) Personnel function in administration of human services programs and agencies. Personnel recruitment, selection, appointment, and supervision; staff development, training and evaluation; salary and benefit systems; employer-employee relations; and fair employment practices. Prereq: Completion of foundation or consent of instructor. W

Education and Training in Social Welfare (2-3) Philosophies and practices of teaching and learning related to adults in social work and social welfare. Distinctions between teaching, training, and education; unique aspects of adult learning; measurement issues; models and styles of education. Prereq: Completion of foundation or consent of instructor. W

Social Welfare Administration and Planning (3) Topics significant to managerial-planner role such as decision making, budgeting, planning, and programming. Prereq: Completion of foundation or consent of instructor. Sp

Seminar in Social Welfare Administration and Planning (3) To assist students in acquiring specific administrative and planning techniques appropriate for social welfare delivery systems. Prereq: Completion of foundation or consent of instructor. W

Information Systems and Decision Making (2-3) Decision-making in human services organizations, utilization of information in policy formulation, delivery of services and evaluation of organizational performance. Information generation, collection, processing, storage, retrieval, and utilization in relation to management control, evaluation and forecasting. Prereq: Completion of foundation or consent of instructor. F

Financial Management for Social Welfare Administration (2-3) Centralized decision making relating to allocation of scarce resources in social services organizations. Technical aids to budgetary choice, and other aspects of financial management examined for utility, parsimony, and feasibility. Prereq: Completion of foundation or consent of instructor. F

Social Aspects of Illness (2-3) Social, economic, and emotional problems arising from or related to illness and disability as they affect individual, family, and community. Services needed to obtain optimum results from medical care. Lectures, discussion, illustrative case material. Sp

Drugs: Use and Abuse (2-3) Survey and analysis of social, cultural, medical, and psychological factors underlying alcoholism and drug abuse, recent research and treatment innovations, social work with user and family. Prereq: Completion of foundation or consent of instructor. Sp

Social Work Treatment for Marital Adjustment (2-3) Theories regarding social and cultural values and personality processes which gain expression in marriage, concepts regarding contemporary marriage styles, problems in marriages, and appropriate treatment approaches. Prereq: Completion of foundation or consent of instructor. Sp

Law and Social Work (2-3) Basic principles of law as they relate to social work practice; organization of courts; legal aid societies; and other problems of legal nature that affect social work. Sp.

Social Gerontology (2-3) Physical, psychological, and social aspects of aging; economic and health status of aging; older person and family; community programs for aging; retirement—phenomenon of modern society. Sp

The Roles of Women (2-3) Roles and statuses of women; emphasis on contemporary American scene. Empirical research as well as popular literature. Assessed and achieved facets of women’s statuses. A

Graduate Seminar in Public Health (1-2) (Same as Public Health 5900, Nursing 5900, Nutrition and Food Science 5910, and Physical Education 5900.) S/NC only.

Field Practice (2, 4) Instruction and supervised practice in methods of social work with individuals, groups and communities. Prereq: Admission to the School; 5410 concurrently or prior to 5910; 5420 concurrently or prior to 5920. Must be taken in sequence. Required course. S/NC only. F; W

Field Practice (4, 4-8, 4-8) Specialized instruction and supervised practice methods of social work treatment, administration, and planning in community health and welfare programs and agencies. Prereq: Admission to the School. Must be taken in sequence. S/NC only. Sp; W; Sp

Integrative Seminar (2) Integration of two-year MSW program; current issues in profession and pressing social problems. Symposium, discussions, simulations, and gaming situations to prepare graduates to assume positions of responsibility and leadership within profession. Graduating student helped to plan toward continuing his/her education and professional development. S/NC only. Sp

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

Proseminar in Social Work Research (1) May be repeated. Maximum 6 hrs. S/NC only.


Evaluation Research on Social Work Practice, Programs, and Social Policy (3) Techniques and strategies for analysis of social policy and its impact on individuals and population groups; techniques for evaluating processes and outcomes of social work practices.

Directed Study in Social Work Research (2-3) Advanced individual study, under faculty guidance, of social work practice issues. Prereq: Completion of Ph.D. foundation courses or consent of instructor. May be repeated. Maximum 9 hrs.

Research in Social Service Settings (2-3) Advanced research, under faculty supervision, of practice issues in community agency. Prereq: Completion of Ph.D. foundation courses or consent of instructor. May be repeated. Maximum 9 hrs.

Philosophical and Historical Perspectives of Social Work (3) Social, cultural, economic and political contexts for development of social work profession and modern welfare system.


Seminar on Areas of Practice (3) Comparative analysis of knowledge requirements for service delivery in specific areas of practice.

Issues in Social Work Knowledge Building (2-3) Advanced seminar on theory and model building in direct intervention, administration and planning. Prereq: Completion of Ph.D. foundation courses or consent of instructor. May be repeated. Maximum 9 hrs.

Advanced Seminar in Areas of Practice (3) Impact of social contexts on service delivery in selected area of practice. May be repeated. Maximum 9 hrs.

Seminar/Practicum in Social Work Education (2-3) Curriculum issues and teaching methods; classroom experience in social work teaching.
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