The Graduate School

# GRADUATE BULLETIN

2020-2021

# Contents

# Vision, Mission, & Value Statement

## Mission

The University of Kentucky is a public, land grant university dedicated to improving people's lives through excellence in education, research and creative work, service, and health care. As Kentucky's flagship institution, the University plays a critical leadership role by promoting diversity, inclusion, economic development, and human well-being.

## Vision

The University of Kentucky will be one of the nation's 20 best public research universities.

## Values

The University of Kentucky is guided by its core values:

- Integrity
- Excellence
- Mutual Respect and Human Dignity
- Diversity and Inclusion
- Academic Freedom
- Shared Governance
- Work-life Sensitivity
- Civic Engagement
- Social Responsibility

## Compliance with Regulations

The University of Kentucky is committed to a policy of providing educational opportunities to all qualified students regardless of economic or social status, and will not discriminate on the basis of race, color, religion, sex, marital status, beliefs, age, national origin, sexual orientation, or physical or mental disability. Compliance with Title IX of the Educational Amendments of 1972, which prohibits sex discrimination, and with Title IV of the Civil Rights Act of 1964 is coordinated by Mr. Terry Allen, Affirmative Action Office, 8 Administration Building, 859-257-8927.

Efforts to comply with the laws and regulations applicable to people with disabilities are also coordinated by the Affirmative Action Office, as required by Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. Questions concerning compliance with regulations may be directed to UK's Affirmative Action Office, or to the Director of the Office of Civil Rights, U.S. Department of Education, Washington DC.

The University is in compliance with the Drug-Free Workplace Act of 1988 and the Drug-Free Schools and Communities Act Amendment of 1989. Questions may be directed to the Vice President for

Student Affairs or the Office of the Director of Human Resources Services. Questions about admissions to the University should be directed to the appropriate admissions office.

## Accreditation

The University of Kentucky is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award associate, baccalaureate, masters, and doctorate degrees. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097, call 404-679-4500, or online at www. sacscoc.org for questions about the accreditation of the University of Kentucky.

# Graduate School Calendar

## Graduate School Admissions Deadlines

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| March 15, 2020 | Deadline for international applications to be submitted to the Graduate School for the 2020 Fall Semester |
| July 24, 2020 | Deadline for applying for admission to the Graduate School for the 2020 Fall Semester |
| August 15, 2020 | Deadline for international applications to be submitted to the Graduate School for the 2021 Spring Semester |
| November 30, 2020 | Deadline for applying for admission to the Graduate School for the 2021 Spring Semester |
| April 10, 2020 | Deadline for applying for admission to the Graduate School for the 2021 Summer Session |
| February 1, 2021 | Deadline for international applications to be submitted to the Graduate School for the 2021 Fall Semester |
| July 23, 2021 | Deadline for applying for admission to the Graduate School for the 2021 Fall Semester |

## Graduate School Registration Deadlines

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|---|---|
| April 27, 2020 – August 14, 2020 | Registration for new program graduate students for the 2020 Fall Semester |
| May 4, 2020 – August 14, 2020 | Registration for new program graduate students for the 2020 Fall Semester |
| January 6 – 11, 2021 | Registration for new program graduate students |
| January 7 – 11, 2021 | Registration for new program graduate students |
| March 29, 2021 – June 20, 2021 | Priority registration and add/drop for the 2021 Fall Semester and the 2021 Summer Session |

## Graduation Deadlines

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|---|---|
| September 10, 2020 | Last day for doctoral candidates for a December degree to submit a Notification of Intent to schedule a final examination in The Graduate School |
| November 1, 2020 | Last day for filing an application for a December 2020 undergraduate or graduate degree online in myUK |

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| November 5, 2020 | Last day candidates for a December 2020 degree can submit a request to schedule a final examination in the Graduate School |
| November 24, 2020 | Last day candidates for December 2020 degree to submit thesis/dissertation (ETD) for formal review by the Graduate School |
| December 4, 2020 | Last day for candidates for a December 2020 degree to have thesis/dissertation (EDT) accepted by the Graduate School for those students who first submitted on November 24 |
| February 20, 2021 | Last day for doctoral candidates for a May 2021 degree to submit a Notification of Intent to schedule a final examination in the Graduate School |
| March 20, 2021 | Last day for filing an application for a May 2021 undergraduate or graduate degree online in myUK |
| April 8, 2021 | Last day for candidates for a May 2021 degree to submit a request to schedule a final examination in the Graduate School |
| April 30, 2021 | Last day candidates for May 2021 degree to submit thesis/dissertation for formal review to The Graduate School |
| May 7, 2021 | -- Last day for candidates for a May 2021 degree to submit final revised thesis/dissertation (EDT) for acceptance by the Graduate School for those students who first submitted April 30 |
| June 1, 2021 | Last day for filing an application for an August 2021 undergraduate or graduate degree online in myUK |
| June 2, 2021 | Last day for doctoral candidates for the August 2021 degree to submit a Notification of Intent to schedule a final exam in the Graduate School |
| July 22, 2021 | Last day for candidates for an August degree to sit for the final examination in the Graduate School |
| July 29, 2021 | Last day for candidates for an August degree to submit thesis/dissertation for formal review to the Graduate School |
| August 5, 2021 | Last day for candidates for an August 2021 degree to submit final revised thesis/dissertation |

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| | (EDT) for acceptance by the Graduate School for those students who first submitted July 29 |

## Graduate School Funding Deadlines

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| August 15, 2020 | Student insurance effective date for eligible funded graduate students. |
| August 21, 2020 | Last day to enter GSAS information for RA/GA/TA for Fall 2020 semester. |
| August 26, 2020 | Last day for students to accept GSAS forms. |
| October 12, 2020 | Mid-term; grants must be active to re-charge for RA tuition and health insurance. |
| January 1, 2021 | Student insurance effective date (Spring/Summer) for eligible funded graduate students |
| January 15, 2021 | Last day to enter GSAS information for RA/GA/TA for Spring 2020 semester |
| January 20, 2021 | Last day for students to accept GSAS forms. |
| March 8, 2021 | Mid-term; grants must be active to re-charge for RA tuition and health insurance. |

# Administration

**Eli Capilouto, Sc.D., D.M.D., M.P.H.**

**University President**

**David W. Blackwell, Ph.D.**

**University Provost**

**Brian A. Jackson, Ph.D**

**Interim Dean of the Graduate School**

**Kevin D. Sarge, Ph.D.**

**Associate Dean**

# Graduate School Staff

**Office of the Dean**

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| Brian A. Jackson, Ph.D. | Interim Dean | Brain.jackson@uky.edu | 257-7132 |
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**Office of Graduate Admissions & Recruitment**

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**Office of Graduate Student Professional Enhancement**

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**Office of Graduate Academic Services**

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| David Robinson | STEPS Research Associate | d.robins4@uky.edu | |

# The Graduate School

## Research at the University of Kentucky

The University of Kentucky is the major graduate and research institution of the Commonwealth, and the major land-grant university in the state. As such, it offers substantial programs in both basic and applied research. These research efforts are the life blood of graduate education programs that prepare new researchers who will continue to expand the boundaries of human knowledge and to seek answers to pressing problems of our complex society. Applied research programs in areas such as agricultural sciences, arts and sciences, business and economics, engineering sciences, mathematical sciences and physics, medicine, and mining and minerals serve the Commonwealth and the nation by addressing critical issues influencing the quality of life and economic well-being of our citizenry.

University faculty and research staff have expertise in many areas including the basic biological, medical, physical, and social sciences; the creative arts and the humanities; and engineering. These individuals conduct research that ranges from the investigation of philosophical and ethical dilemmas raised by advances in science and technology to the practical application of basic knowledge in agriculture, energy, rehabilitation, and information retrieval, as well as in the economic development of the Appalachian region.

A significant aspect of research conducted at the University is the concern for its practical application for the betterment of society. Many of the techniques developed and ideas conceived in the laboratory and in advanced study evolve into technological developments of major significance.

Most research programs at the University are supported through federal, state and private sources. Application for such support and the fiscal administration of the monies received are overseen by the Office of Sponsored Projects Administration (OSPA). Programmatic organization and administration of research is provided by the various research institutes and multi-disciplinary centers and, in the case of individual faculty projects, by the regular departmental, school, and college structures.

## The Graduate School

The University of Kentucky began offering graduate work in 1870 and awarded its first graduate degrees in 1876. The Graduate School became a distinct unit in the University organization in 1912. The mission

of the Graduate School is to promote advanced study, graduate instruction, and research by the faculty and students of all colleges and departments. The total graduate resources of the University are merged under the Graduate School for the purpose of promoting the acquisition of knowledge in an atmosphere of free and lively inquiry. Graduate work is offered in most colleges in the University. A general description and tabulation of courses for each of the various programs is given in the Graduate Degree Programs section of this bulletin.

# The Graduate Faculty

The Graduate Faculty consists of the Dean of the Graduate School, Associate Deans of the Graduate School, and Full and Associate Graduate Faculty Members. As the chief University agency for the promotion of the ideals of graduate study, it determines the policies of the Graduate School and makes recommendations to the University Senate and to the President, or to other administrative officials as appropriate. All rules affecting graduate work and the inauguration of new graduate programs must be approved by the Graduate Faculty. Any proposed change in the rules of the Graduate Faculty must be included in the agenda of its meeting and circulated to the Graduate Faculty at least 10 days prior to the meeting at which it is to be considered.

Any faculty member, regardless of specific title series of appointment, is eligible for consideration for membership on the Graduate Faculty. New Graduate Faculty members may be proposed to the Dean of the Graduate School at any time by the college deans and department chairs concerned, or in the case of persons not attached to a college faculty, by the Provost of the University. Eligibility qualifications are as follows:

- The doctor's degree or its equivalent in scholarly reputation.
- The rank of assistant professor (or equivalent) or higher.
- Scholarly maturity and professional productivity as demonstrated by publications, editorial services, research surveys, creative work or patents, and research in progress at the time of appointment.
- Demonstrated participation in graduate teaching and research in the program.

The Dean of the Graduate School is responsible for appointing and monitoring the progress of Associate Members of the Graduate Faculty. Associate members are authorized to teach graduate courses, direct master's theses, and serve on and co-chair doctoral committees. Associate membership is limited to a term of three years with reappointment possible after departmental review. There is no category for at-large graduate faculty membership.

Appointment to Full Graduate Faculty membership is made by the Provost and/or the Dean of the Graduate School after consultation with the Graduate Council when appropriate. Full members of the Graduate Faculty are particularly responsible for:

- Guidance of graduate student research and study to its completion. The finished work should meet or exceed accepted standards for publication, dissemination or performance within the particular discipline.
- Participation in the formulation of graduate curricula and policy.

In unique instances, an advanced assistant professor may be nominated by his or her chairperson for full membership in the Graduate Faculty. To be considered for this status by Graduate Council, a nominee must meet the following criteria:

- An associate member of Graduate Faculty who is an assistant professor may be put forward for full membership by the individual's department chairperson or Director of Graduate Studies (as appropriate) after a minimum of 2 years of employment at UK.
- The individual must show the appropriate level of scholarly research and productivity and important contributions to the department's graduate program, including graduate teaching.

After review by the Dean of the Graduate School, appropriate cases will be placed on the Consent Agenda of the Graduate Council for approval. Atypical cases may either be turned down by the Dean or brought to the Graduate Council for full discussion. Once Full Graduate Faculty status is attained, membership is continuous unless a change in status is recommended by a graduate program to the Dean of the Graduate School, who will present the recommendation to the Graduate Council.

On recommendation of the Director of Graduate Studies and with the approval of the Dean of the Graduate School, persons who normally do not hold academic appointment in the University, but who have demonstrated an interest in collaborative participation in its graduate programs, may be appointed as Auxiliary Graduate Faculty Members. They should hold the terminal academic degree in the field and possess a record of research or creative experience that would warrant their inclusion on advisory committees to assist graduate students in conducting research. Auxiliary Graduate Faculty may serve only as nonvoting members of the advisory committee.

Administrative officers assigning teaching and other duties to members of the Graduate Faculty who are taking an active part in the graduate program (i.e., are heavily engaged in directing theses and dissertations, carrying on productive research, etc.) should make appropriate reduction in the duties required of such faculty members.

## Teaching at the Graduate Level

Courses intended for graduate studies at the University must be taught by faculty members who have the terminal degree in the discipline or a closely related discipline. These courses are designated by the numbers 400G - 799. The terminal degree in most cases is the doctorate. Ideally, these courses should be taught by Graduate Faculty members. If a program needs to assign a person without a terminal degree to teach a graduate level course, they must first petition the Dean of the Graduate School, explaining the unique circumstances and qualifications supporting this assignment. A copy of the diploma or transcript of each faculty member must be kept in the personnel file.

Courses that have both undergraduate and graduates in the courses are usually designated as 400G or 500 level courses. In all courses with a mixed student population, there must be a clear differentiation in the syllabus of course requirements and grading criteria for graduate students and undergraduates. Copies of these syllabi must be retained by the College.

## The Dean of the Graduate School

The Dean of the Graduate School is charged with administering the policies adopted by the Graduate Faculty and the University Senate relating to graduate studies. The dean presides over all meetings of

the Graduate Faculty and calls meetings of this faculty whenever it is advisable or whenever requested to do so by one-fourth of the membership. Recommendations are made by the dean to the Graduate Faculty regarding the requirements for advanced degrees, the regulations necessary to insure a high standard of graduate work and all other aspects of the graduate program. The graduate programs are administered in the interest of efficient instruction and the highest attainment possible on the part of each graduate student. The dean is responsible for determining and certifying to the Registrar candidates who have fulfilled requirements for advanced degrees. The President, the Executive Vice President for Research, the Provost, and the Dean of the Graduate School shall be ex officio members of all committees of the Graduate School.

## The Graduate Council

The Graduate Council approves or disapproves proposals concerning courses offered for graduate credit, and advises and lends assistance to the Dean in executing the policies and regulations determined by the Graduate Faculty. Specifically, the Council:

- Evaluates department requests relating to proposed graduate programs.
- Reviews existing programs and curricula.
- In cooperation with the Dean, initiates recommendations to the Graduate Faculty (this procedure is not intended to prevent a faculty member from bringing any recommendation or request directly before the Graduate Faculty).

The Graduate Council is composed of 21 members and the Dean of the Graduate School, who serves

as chair. There are nineteen faculty and two student representatives. Associate deans serve in a non-voting, ex officio capacity. Members representing a college or a combination of colleges are elected by the Graduate Faculty in the respective colleges. The term of office of the elected members is three years and that of the graduate students is one year. Members may not succeed themselves until three years have elapsed following the completion of their last term. A majority of the Graduate Council constitutes a quorum for the transaction of business.

The composition of the Graduate Council is as follows: two members from the College of Agriculture; four members from the College of Arts and Sciences; one member from the College of Business and Economics; two members from the Colleges of Communications and Information Studies, of Social Work and the Graduate Centers (Patterson and Martin Schools); two members from the College of Education; one member from the College of Engineering; one member from the Colleges of Design and of Fine Arts; one member from the Colleges of Health Sciences, Nursing, and Public Health; two members from the College of Medicine; one member from the Colleges of Pharmacy and Dentistry; two members appointed by the Dean of the Graduate School; and two student members selected by the Graduate Council. The membership of Graduate Council for 2020-21 is as follows:

- **Emily Bacchus,** Political Science, 2023
- **Vincent Cassone,** Biology, 2023
- **John Selegue,** Chemistry, 2021

- **Justin Wedeking,** Political Science, 2022
- **Brian Murtha,** Marketing and Supply Chain, 2021
- **Namjoo Choi,** School of Information Science, 2022
- **Anthony Limperos,** Communication & Information, 2022
- **Molly Fisher,** STEM Education, 2023
- **Debra Harley,** Early Childhood, Special Education, and Counselor Education, 2023
- **Timothy Taylor,** Civil Engineering, 2022
- **Donna Kwon,** Musicology, 2021
- **Johanna Hoch,** Athletic Training & Clinical Nutrition, 2022
- **Steven Van Lanen,** Pharmaceutical Sciences, 2022
- **Rolf Craven,** Pharmacology & Nutritional Sciences, 2023
- **David Orren,** Toxicology, 2022
- **Bert Guillou,** Mathematics, 021
- **Abhijit Patwardhan,** Biomedical Engineering, 2021
- **Darryl Dedelow,** *Student Representative,* 2021
- **Keerthan Raghavendra Rao,** *Student Representative,* 2021
- **Melinda Wilson,** *Senate Council, Ex-Officio*, Physiology, 2021

## Directors of Graduate Studies

The Dean of the Graduate School, with the advice of the college dean(s) and the approval of the President, may recommend to the Graduate Faculty the areas of graduate study and research into which the University may be divided. The logical unit for an area is a department or center. By common consent, however, certain departments may be grouped into a single area to offer a graduate program and in exceptional cases a department may be divided into two or more areas to offer programs in the respective areas. Directors of Graduate Studies (DGSs) are the local representatives of each graduate program. They provide for the program's administration and act as the official liaison with the Graduate School. Directors of Graduate Studies are responsible to the Graduate Faculty of their program and to the Dean of the Graduate School for the recruitment, admission, advising, and examination of students in their program. In addition to Directors of Graduate Studies for specific programs, some colleges have designated individual faculty members as Associate Deans for Graduate Studies to serve as the local extension of the Graduate School at the college level.

Directors of Graduate Studies are appointed by the Dean of the Graduate School after consultation with the respective Graduate Faculty and administration in a program. The DGS is normally a tenured faculty member, holding the rank of Associate Professor or above, and is a full member of the Graduate Faculty. Upon the appointment of each Director of Graduate Studies, the Dean of the Graduate School shall draw the attention of the appointee to the existence and location of the official University policies and guidelines that affect graduate faculty, graduate students, and student applicants.

The Director of Graduate Studies reports directly to the Dean of the Graduate School or to the Dean's designee on all matters relating to graduate education in the program. The DGS is responsible to the Dean of the Graduate School for the administration of the specific graduate program, including maintenance of records, administration of graduate program funds, admission of graduate students, any affiliated University Scholars Program, fellowships, program requirement changes and new programs, advising and registration, appointment of advisory and examination committees, and other degree requirements related to the graduate program. Additionally, the DGS serves as the focal point for dissemination of information from the Graduate School.

The Director of Graduate Studies serves as program advisor to each student until the student has a thesis or dissertation director. The DGS then recommends that the thesis or dissertation director be appointed the student's advisor or committee chair. In areas where these are not required, the DGS is the advisor of all students not writing theses. All student schedules should be endorsed by the student's advisor. If it is desirable, a DGS may recommend that additional advisors in the program be appointed. A DGS who is to be absent from the University for as long as a semester must inform the Dean so that a substitute may be appointed. A complete list of current Directors of Graduate Studies can be found at https://gradschool.uky.edu/dgs

## Establishment & Modification of Graduate Programs

An area that wishes to establish a new graduate program or modify an existing program must submit a request to the Graduate Council, which in turn will make a recommendation to the Graduate Faculty. For information on the steps involved in this process see: http://gradschool.uky.edu/submit-program-graduate-certificate-or-academic-policy-proposal.

## Graduate Student Professional Development

The Graduate School provides graduate student development activities with three main foci: teaching assistant (TA) development, professional development and organizational development.

Teaching assistant development activities include the following:

- University-wide TA and International TA orientations and microteaching sessions
- Language screenings for TAs whose native or primary language is not English
- Pedagogy workshops and special events throughout the academic year
- Multidisciplinary teaching-related courses (GS 610, GS 620, GS 630)
- Consultations on teaching-related issues
- Classroom observations and feedback
- Coordination of mandatory SACS-related documentation on TA credentialing (observations, evaluations, preparation, departmental orientations)
- Organization and facilitation of a TA developers learning community
- Coordination with outside agencies and organizations concerned with TA issues

These efforts occur in conjunction with departmental TA orientations, in-service activities, and supervision. Some departments require TA participation in workshops and/or departmental or centralized teaching courses.

Graduate student professional development efforts include the following:

- Preparing Future Faculty courses (GS 610, 620, 630, 640, 650, 695 and 699)
- Workshops, consultations and e-resources
- Work with colleges and universities in the region to provide professional development and employment opportunities for UK graduate students
- Coordination with departmental graduate student development efforts and national efforts and programs (AAC&U, CGS, POD

Organizational development efforts include changes in institutional culture that can support more effective graduate student professional development. This work involves collaborating with a variety of groups and developing mechanisms, programs, grants, materials and other support that can help leverage cultural change. Two examples of organizational development-focused activities are these:

- The Graduate Certificate in College Teaching and Learning, a 12 credit hour coherent integrated approach to helping graduate students, postdoctoral scholars, current faculty and others develop and document the skills needed as part of a conscientious preparation for the full range of faculty responsibilities at a range of institutional types.
- The TA Developers Faculty Learning Community, a group of faculty and staff members who supervise, develop and/or assess TAs.

## Graduate Centers

The Graduate School administers two multidisciplinary Graduate Centers.

**The Patterson School of Diplomacy and International Commerce**

The Patterson School of Diplomacy and International Commerce offers an interdisciplinary master's degree which can be tailored to meet the career needs of individual students. The program is especially useful for students desiring careers in any of the non-academic fields in foreign affairs such as international banking, commerce and journalism, or service with governmental agencies or international organizations. To assure the interdisciplinary character of the degree, students may concentrate their work in a specific geographical area or focus on certain aspects of international affairs. In addition, the Patterson School serves in an advisory capacity to Ph.D. programs in departments offering internationally-oriented doctoral degrees in various colleges on campus. For more information see the Patterson School web-site at: https://www.uky.edu/pattersonschool/

**Martin School of Public Policy & Administration**

The Martin School offers four multidisciplinary degree programs—the Master of Public Administration, the Master of Public Policy, the Master of Public Financial Management, and the Ph.D. in Public Policy

and Administration—and engages in research and public service activities. The disciplines represented by the School's faculty are management, finance, economics, industrial engineering, political science, and health administration. The research and public service components of the Martin School offer the School's faculty, staff, and graduate students the opportunity to engage in interdisciplinary research on public policy issues. For more information see the Martin School web-site at: https://martin.uky.edu/

# Graduate Admissions

## Kentucky Residency

According to law, the University of Kentucky and all other state-supported institutions of higher education assess tuition on the basis of Kentucky or non-Kentucky residency. The policy for determining residency is established by the Commonwealth of Kentucky Council on Post Secondary Education (see Residency Policy at http://www.uky.edu/registrar/residency). Students who are unsure of their residency status should check with the Registrar's Office before applying for admission.

## The Academic Common Market

Kentucky is a participating state in The Academic Common Market, an interstate agreement among 16 primarily Southeastern states for sharing academic programs. Students who qualify for admission may enroll in a specific program in another Academic Common Market state on an in-state tuition basis. At present, the agreement has been limited to less-common graduate programs. For information, write: Southern Regional Education Board, 130 Sixth Street N.W., Atlanta, Georgia. For information about University of Kentucky programs in the Academic Common Market, contact the Academic Common Market Institutional Coordinator, Office of the Registrar, 100 Funkhouser Building, University of Kentucky, Lexington, KY 40506-0054, Phone: 859.257.3256, E-mail: smcgurk@uky.edu, https://www.uky.edu/registrar/academic-common-market.

## Admission Procedures

The University of Kentucky is committed to a policy of providing educational opportunities to all qualified students regardless of economic or social status, and will not discriminate on the basis of race, color, religion, sex, marital status, beliefs, age, national origin, sexual orientation, or physical or mental disability.

Students seeking admission to the University of Kentucky Graduate School must satisfy the following requirements:

- Students seeking admission to the Graduate School must have obtained a baccalaureate degree, prior to the start of the term for which s/he is admitted, from a fully accredited U.S. institution of higher learning or from a recognized foreign institution. An accredited U.S. institution is one that is accredited by the appropriate regional agency (Accrediting Commission for Community and Junior Colleges Western Association of Schools and Colleges, Higher Learning Commission, Middle States Commission on Higher Education, New England Association of Schools and Colleges Commission on Institutions of Higher Education, Northwest Commission on Colleges and Universities, Southern Association of Colleges and Schools Commission on Colleges, WASC Senior College and University Commission). A recognized foreign institution is an institution that is recognized by that nation's Ministry of Education or similar authority as a postsecondary, academic degree-granting institution.

- An overall grade point average of 2.75 on undergraduate work and 3.00 on all graduate work is required by the Graduate School. Individual departments may require higher grade point averages. Upon admission students must have official transcripts sent by each institution of higher learning previously attended directly to the Graduate School. To be official, records must bear the Registrar's signature and/or official seal of the issuing institution. A summary of credits transferred and recorded on the transcript issued by the institution granting the degree will not suffice.
- Applicants must submit scores on the verbal, quantitative and analytical writing portions of the aptitude section of the Graduate Record Examination (GRE) unless their chosen program is listed below**. This rule may be waived in individual cases upon recommendation of the Director of Graduate Studies in the individual department or program. However, in cases where waivers are granted, the GRE scores must be submitted before the end of the first semester of graduate study. The advanced portion of the GRE may be required by individual programs. Test scores must be sent directly to the University of Kentucky Graduate School from ETS.

Domestic applicants (U.S. citizens or resident aliens) must pay a $65 application fee. This must be paid by credit card at the time of on-line application submission.

** No GRE or GMAT is required for admission to:

- Accounting (MS for UK students only)
- Applied Behavioral Analysis (MS)
- Applied Environmental and Sustainability Studies (MS)
- Applied Mathematics (MS)
- Art Studio (MFA)
- Arts Administration (MA)
- Biology (MS, PhD)
- Business Administration (MBA for Greek cohort)
- Communication Sciences and Disorders (MS)
- Creative Writing (MFA)
- Digital Mapping (MS)
- Educational Leadership (M Ed)
- Educational Policy Studies (MS)
- Entomology (MS, PhD)
- Geological Sciences (MS, PhD)
- Higher Education (MS, PhD)
- Educational Policy Studies (MS)
- Educational Policy Studies Measurement & Evaluation (EdD)
- Educational Sciences- Educational Evaluation & Policy (PhD)
- Educational Sciences - Cultural & Philosophical Inquiry (PhD)
- Information Communication Technology (MS)

- Instructional Systems Design (MS)
- Integrated Biomedical Sciences (PhD)
- Integrated Plant & Soil Sciences (MS, PhD)
- Interdisciplinary Early Childhood Education (MS Ed)
- Library Science (MS)
- Manufacturing Systems Engineering (MS)
- Mathematics (MA, MS, PhD)
- Music
    - Conducting (MM, DMA)
    - Music Education (MM)
    - Music Theory & Composition (MM, MA, DMA, PhD)
    - Music Therapy (MM)
    - Musicology (MA, PhD)
    - Performance (MM, DMA)
    - Sacred Music (MM)
- Pharmaceutical Sciences (PhD)
- Public Administration (MPA)
- Public Financial Management (MS)
- Psychology (MA, MS, PhD)
- Rehabilitation Counseling (MRC)
- Research Methods in Education (MS)
- Retailing & Tourism Management (MS)
- Social Work (MSW.)
- Special Education (MS Ed)
- Supply Chain Management (MS)

**For holders of M.D., D.M.D., D.D.S., Pharm.D., D.V.M., D.O., D.N.P., D.Sc., or Ph.D. degrees, no GRE or GMAT is required for admission to:

- Business Administration (MBA)
- Clinical and Translational Sciences (PhD)
- Dentistry (M.S. for domestic students only)
- Public Administration (for PharmD students applying to this program)
- Public Health (MPH)
- Toxicology and Cancer Biology (PhD)

**No GRE or GMAT is required for admission in the following categories: Graduate certificate, Professional/Graduate dual degree programs (for example Pharm.D./MPA), Post-baccalaureate, University Scholars (all programs), Fifth Year, Rank I, and other certifications.

Completed applications must be received no later than one month before the beginning of the term the applicant intends to begin graduate work (see Calendar). Some programs maintain earlier deadlines for admission. The application and information is at http://gradschool.uky.edu/admissions

## International Applications

The following additional requirements apply to international applicants:

- An international applicant must typically hold a four-year bachelor's degree (exceptions to this rule include countries in the European Union, Canada, Australia and New Zealand), have excellent grades and rank in the top quarter of their classes (for Indian students: a first-class record is normally expected although high second-class holders in non-science areas may be considered if they can offer further evidence of having been in at least the top 10 percent of their graduating class). When credentials are submitted in support of any application, they should be either the original documents or certified copies (i.e., copies certified or attested as "true copies" by a notary public). An official translation must be attached to these records if they are in a language other than English. Credentials should include a record of all degrees earned, detailing all subjects taken and grades obtained. Grades must be listed in the indigenous system.
- The University of Kentucky requires a minimum score of 79 on the internet-based Test of English as a Foreign Language (TOEFL) for all applicants whose native language is not English (see www.toefl. org). Permanent residents who graduate from US institutions or schools outside the US in English-speaking countries such as Australia, Great Britain, and English-speaking Canadian provinces, are not required to take the TOEFL. Permanent residents who graduate from other institutions outside the US must provide TOEFL scores. Test scores must be sent directly to the University of Kentucky Graduate School from ETS. Applicants may also utilize the International English Language Testing System (IELTS) to satisfy the language requirement. A minimum mean band score of 6.5 is required.
- Entering international students must certify that they have at least $51,219* available for each 12-month period of study. It is estimated that this amount will cover the cost of tuition, fees, books and supplies, room and meals, health insurance and incidentals, for a single person.

Applicants must certify $7,350* per year for their spouse and $5.040* per year for each additional dependent. An I-20 (or IAP-66) is issued to applicants who have been academically accepted only upon receipt of the required financial information (*subject to change without notice).

International applicants must pay a $75 application fee.

Complete international applications must be received by April 15 for the fall semester and September 15 for the following spring semester.

Upon arrival, admitted international students:

- must have on hand a minimum of $1500, or $2000 if bringing dependent(s). Self-supported students must have on hand at the beginning of each registration $19,440 to pay for tuition and fees, room and board, and health insurance.
- must obtain a tuberculin screening test and reading, and complete a health history form from the Student Health Service before registration will be allowed. This should be done as soon as possible following arrival on the University campus (See also Health Services).

## Support Services for the International Student

**International Student Services:** International Students and Scholars Services division, part of the International Center, is the focal point for international student services. It orients students to a new educational system and to American culture, and provides a continuing source of information, counsel and friendship through their stay. The Office is charged with the responsibility of interpreting immigration regulations, which affect international students and scholars. It also sponsors cross-cultural programs on campus and in the community designed to encourage communication and understanding between Americans and internationals. Among the programs offered are the Cosmopolitan Club, Welcome and Orientation Week, and the International Hospitality Program. The International Center is located in Bradley Hall.

**Health Services:** The University has an excellent health care clinic for outpatient care that is of special importance to international students (see section on Health Services). All international students on F-1, F-2, J-1 and J-2 visas are automatically enrolled in the University of Kentucky student insurance plan. Students who have purchased health insurance in their home country may be eligible for a waiver. Because of the extremely high cost of health care, it is imperative that a student have insurance for himself or herself, spouse and children. Health insurance application forms can be obtained in Bradley Hall.

**Program in English for International Students:** The English department sponsors the Center for English as a Second Language. The center offers eight-week terms of study; students may join in June, August, October, January or March. Students receive 160 hours of intensive English instruction in an eight-week period. No college credit is given for the course of study, but students are given certificates of completion for the Center's program. Sometimes students are admitted to the Graduate School contingent upon successful completion of the program. The center is authorized under federal law to enroll nonimmigrant alien students. For further information go to https://esl.as.uky.edu/ or write to The Center for English as a Second Language, 1235 Patterson Office Tower, Lexington, KY 40506.

**Sponsored International Graduate Students:** International graduate students who are financed and monitored by sponsoring agencies, can be provided with special placement, advising and management services. Literature describing these services is available from the Office of International Affairs. The sponsoring agency is assessed a fee of $300 per semester per student for these special services.

# Special Admission Categories

## Conditional Admission

Students wishing to pursue an advanced degree who are temporarily ineligible for regular graduate admission status may be recommended by the Director of Graduate Studies for conditional admission status in the following cases:

- Receipt of a final undergraduate transcript showing an awarded Bachelor's degree.
- Receipt of official GRE (or equivalent) scores.

These requirements will be monitored by the Graduate School and must be met prior to the date set for priority registration during the first semester of enrollment. Students will not be allowed to priority register if these requirements are not met.

Programs will also have the option to recommend that students be admitted "conditionally" for other reasons including:

- Completion of deficiencies, such as taking specific required undergraduate courses
- Program review upon completion of a specified number of hours of course work

These requirements will be monitored by the program; the Graduate School should be notified when they have been met so that the student's status can be changed to regular admission. Approval to proceed with the doctoral qualifying examination or the master's final examination will not be granted to student's remaining in conditional status.

## Post-Baccalaureate Graduate Student

Students who hold a baccalaureate degree from a fully accredited institution of higher learning and who wish to pursue graduate study without a degree objective may apply for admission as post-baccalaureate graduate students. Note that post-baccalaureate status is not a form of probationary admission to a degree- granting graduate program. Post-baccalaureate students may take graduate courses for graduate credit. Permission to enter any graduate class as a post-baccalaureate student will be granted only if the student meets the prerequisites for that course and if space is available.

An application for admission to the Graduate School as a post-baccalaureate graduate student should be filed in the Admissions Office at least two weeks in advance of the registration date for the term in which the student plans to enroll. An overall undergraduate grade point average of 2.50 or better and 3.00 on all previous graduate work (both on a 4.00 point scale) are required by the Graduate School for admission. GRE scores are not required.

A post-baccalaureate student who later wishes to apply to enter a degree-granting graduate program must have a 3.00 or better grade point average on all course work, graduate or undergraduate, attempted as a post-baccalaureate. A standard application form must be presented to the Graduate School requesting admission to a specific program.

## University Scholars Program (Combined Bachelor's/Master's or Doctoral Degree)

The University Scholars Program offers particularly gifted and highly motivated students the opportunity of integrating their undergraduate and graduate courses of study in a single continuous program culminating in both a baccalaureate and a master's or doctoral degree. The total number of hours for the combined program may be as many as 12 less than the total required for the bachelor's and the master's or doctoral degrees separately. The requirements for the bachelor's degree are unaffected.

Application to the program should be submitted at the end of the student's junior year. Applicants should have completed at least 90 credit hours of work toward the bachelor's degree, or be eligible for senior standing in the semester they are admitted to the program. The master's program should be in the field of the undergraduate major (there are some exceptions made), and the undergraduate grade point average must be at least a 3.50 in the applicant's major field and 3.20 overall. University Scholars may take no more than 16 credit hours per semester, except by recommendation of their Director of Graduate Studies and by approval of the Dean of the Graduate School. Students must have an undergraduate advisor and a graduate advisor. A jointly planned program must be prepared for each student.

Applicants must submit both a Graduate School application and a University Scholars Form: http://gradschool.uky.edu/university-scholars-program. Students must register in the Graduate School for fall work taken following admission to the University Scholars Program. The primary classification

of University Scholars will be undergraduate until they have completed all requirements for their undergraduate degree, and undergraduate tuition rates will be applied to the 12 hours (or less) of graduate level coursework designated for dual credit in this program. University Scholars cannot receive Graduate School support until they have completed the credit hours required for their undergraduate degree.

The following graduate degree programs currently offer University Scholars opportunities through participating undergraduate programs:

| Resulting Graduate Degree | Participating Undergraduate Program(s) |
|---|---|
| MAC in Accounting | BS in Accounting |
| MS in Agricultural Economics | BA in Agricultural Economics from the University of Kentucky or Georgetown College |
| MA in Anthropology | BA in Anthropology |
| MA in Art History and Visual Studies | BA in Art History |
| MS in Biomedical Engineering | Biosystems & Agricultural Engineering<br>BS in Electrical Engineering |
| MS in Chemical Engineering | BS in Chemical Engineering |
| PhD in Chemical Engineering | BS in Chemical Engineering |
| MS in Civil Engineering | BS in Civil Engineering |
| MA in Classics | BA in Modern and Classical Languages, Literatures, and Cultures – Classics option |
| MS in Computer Science | BSCS in Computer Sciences |
| MS in Counselor Education | Kentucky State University Graduate |
| MA in Diplomacy and International Commerce | BA in Agricultural Economics |
| MSEE in Electrical Engineering | BSEE in Electrical Engineering<br>BSCOE in Computer Engineering |
| MA in English | BA/BS in English |
| MS in Family Sciences | BS in Family Sciences |
| MA in French | BA in Modern and Classical Languages, Literatures and Cultures – French and Francophone Studies option |
| MA in German | BA/BS in Modern and Classical Languages, Literatures and Cultures – German Studies option |
| MA in Hispanic Studies | BA/BS in in Spanish |
| MA in History | BA in History |
| MA in Linguistic Theory and Typology | BS/BA in Linguistics |
| MS in Manufacturing Systems Engineering | BS in Electrical Engineering<br>BS in Mechanical Engineering |
| MSMSCE in Materials Science and Engineering | BSMAE in Materials Engineering |
| MA/MS in Mathematics | BA/BS in Mathematics |
| PhD in Mechanical Engineering | BSME in Mechanical Engineering |
| MS in Medical Sciences | BS in Agricultural Biotechnology |
| MS in Mining Engineering | BS in Mining Engineering |
| MM in Music Performance | BM in Music Performance |

| | |
|---|---|
| MS in Nutrition and Food Systems | BS in Dietetics<br>BS in Hospitality Management and Tourism |
| MA in Philosophy | BA/BS in Philosophy |
| MS in Physics | BS in Physics |
| MPH in Public Health | BA in Public Health |
| MS in Retailing and Tourism Management | BS in Nutrition and Food Systems |
| MSW in Social Work | BA in Social Work |

## Graduating Seniors as Part-Time Students

Seniors at the University of Kentucky lacking no more than 6 credit hours for graduation and having an undergraduate average of at least 2.75 on all work attempted may register in the Graduate School in conditional status with the consent of the undergraduate college dean, the appropriate Director of Graduate Studies, and the Dean of the Graduate School. The total load of such students may not exceed 12 credit hours. Graduate credit will be allowed for each credit hour of graduate work beyond the six or fewer credit hours needed to complete undergraduate requirements. Requirements for the undergraduate degree must be completed during the semester in which the student is allowed to register for part-time graduate work. Students applying for admission to the Graduate School under these conditions must fill out a petition form listing the course or courses to be taken to complete the undergraduate requirements https://gradschool.uky.edu/graduating-seniors-part-time-graduate-students.

## Non-Degree Certification Students

The University of Kentucky offers admission to students pursuing course work applicable toward non-degree certification. These include Rank I Certification and Fifth Year Certification through the College of Education. This is a separate type of admission, which differs from post-baccalaureate status. Minimally, the Graduate School requires applicants for certification to meet the same admission requirements as for post-baccalaureate status, but the unit often imposes additional and more rigorous requirements for admission. It is best to consult with the Director of Graduate Studies in the specific area for which certification is sought prior to applying. Certification students who later wish to transfer credits into a master's or specialist program at the University of Kentucky may do so. The requirements and limitations are the same as for any transfer of credits into such a program.

## Visiting Students

Students who are enrolled in a graduate program at another institution and plan to attend the University of Kentucky as a Visiting Student must submit the following form (https://gradschool.uky.edu/visiting-students) when filing an application (transcripts are not required). Visiting Student admission is for one semester only and credit earned in that status is not applicable to a University of Kentucky degree.

### Leave of Absence

Enrolled graduate students at the University of Kentucky that sit out for one or more semesters will need to complete a new application and pay the application fee in order to be considered for readmission. In many instances this requirement can be avoided by requesting a “leave of absence”. In addition to avoiding the application process, this status will allow the student to priority register in preparation for their return to UK.

Procedurally, students should contact their Director of Graduate Studies (DGS) to seek approval for the leave prior to the beginning of the semester in question. If approved, the DGS will contact their Graduate School admissions officer who will modify the record accordingly. No more than two consecutive and four total semesters in leave of absence status may be requested. International students considering a leave of absence are strongly encouraged to discuss their plans with the Office of International Affairs, Department of Immigration Services prior to making a formal request.

### Postdoctoral Fellow

Postdoctoral fellowships are available in many research programs. Information concerning the terms of these fellowships is available in the individual departments. Postdoctoral fellows are required to register with the Graduate School through their departments.

## Dual Degree Programs

### B.S. Engineering/M.B.A.

The College of Business and Economics and the College of Engineering offer the opportunity to obtain the Bachelor of Science in Engineering (B.S.) and Master of Business Administration (M.B.A.) degrees in a five- year dual degree program. In addition to regular engineering courses, prerequisite undergraduate courses in accounting, economics, and statistics are taken during the first three years of study to prepare students for management, economics, business, and finance M.B.A. courses. The students’ senior year marks the beginning of the graduate M.B.A. courses and interaction with non-engineering M.B.A. students. During the summer prior to the fifth year, the students participate in study abroad designed expressly for the program, thereby enhancing and broadening their cross-cultural experience.

### B.S. Engineering/M.P.A.

The Martin School of Public Policy and Administration and the College of Engineering offer the opportunity to obtain the Bachelor of Science in Engineering (B.S.) and Master of Public Administration (M.P.A.) degrees in a five-year dual degree program. Typically, students will enroll in the College of Engineering as freshmen and take courses required for the B.S. degree through the junior year. During the senior or fourth year, students will begin to take M.P.A. courses. In the fifth year, students will take M.P.A. classes exclusively. Students must complete an internship in the summer following the fifth year of course work.

## J.D./M.A. In Diplomacy

The University of Kentucky offers a year and half, 30-hour Master of Arts (M.A.) degree in Diplomacy through the Graduate School. The College of Law offers a three-year, 90-hour Juris Doctorate (J.D.). The J.D./M.A. dual degree is the only one of its type offered in the Commonwealth. It permits students to gain both degrees in a total time period of one semester less than if the degrees were earned independently. For information, contact the Director of Graduate Studies in the Patterson School of Diplomacy and International Commerce or the College of Law.

## M.S. in Manufacturing Engineering and B.S. In Electrical or Mechanical Engineering

The College of Engineering offers an opportunity to receive a Bachelor of Science in Electrical or Mechanical Engineering and a Master of Science in Manufacturing Systems Engineering. The dual degree program is structured to appeal to engineering students who plan a career in manufacturing and is especially structured to allow students to be involved in engineering co-op employment while pursuing the dual degree.

Upon completion of their sophomore year in Electrical or Mechanical Engineering, students should apply to the Graduate School to be conditionally admitted into the program. Full admission would require formal application to the Graduate School and a minimum GPA of 3.00 and completion of their junior year. Students must have a strong interest in manufacturing, and preference will be given to students who will be in a co-op work program.

## J.D./M.B.A.

The College of Business and Economics and the College of Law offer the opportunity to obtain the Master of Business Administration (M.B.A.) and Juris Doctor (J.D.) degrees in a dual degree program. Both schools recognize that some aspects of business and law are compatible and interrelated. Consequently, students can usually obtain both degrees in less time than if the degrees were pursued separately. As a result, students gain marketable skills and specialized employment opportunities in less time than might otherwise be required. Students interested in the J.D./M.B.A. program must apply to both the College of Law and the Graduate School.

## J.D./M.P.A.

The University of Kentucky offers a two-year, 45-hour professional Master of Public Administration degree through the Graduate School. The College of Law offers a three-year, 90-hour Juris Doctorate. The M.P.A. program has been professionally reviewed and recognized by the National Association of Schools of Public Affairs and Administration. The College of Law is accredited by the American Bar Association and is a member of the Association of American Law Schools. The J.D./M.P.A. dual degree is the only one of its type offered in the Commonwealth. It permits students to gain both degrees in a total time period of one year less than if the degrees were earned independently. For information, contact the Director of Graduate Studies in Public Administration or the College of Law.

## M.D./M.B.A.

The University of Kentucky M.D./M.B.A. program is designed to provide students with the necessary educational foundation so that they not only are prepared to begin practice as doctors, but also to assume managerial responsibility in a variety of health care settings. The integrated, sequenced program of study consists of the full, four-year Kentucky Medical Curriculum and foundation business courses followed by M.B.A. courses. The program may normally be completed in five years. Students interested in the program must apply to both the College of Medicine and the Graduate School.

## M.D./M.P.H.

The University of Kentucky M.D./M.P.H. combined degree provides well-trained physicians with additional skills and knowledge in public health policies and procedures, enabling them to provide service to individuals within the context of a healthy community and its unique population characteristics. With careful planning, the M.D. and M.P.H. tracks can be completed in five years. Students interested in the program must apply to both the College of Medicine and the Graduate School.

## M.D./PH.D.

Students combining studies toward a Ph.D. degree and an M.D. degree in one of the established programs of the Graduate School must be admitted to both programs. Before applying for admission to the Graduate School, applicants should consult with the Director of Graduate Studies of the graduate area of interest. Copies of the guidelines for students wishing to pursue the combined M.D./Ph.D. degrees may be obtained in the office of the Associate Dean for Academic Administration in the Graduate School.

## PHARM.D./M.B.A.

The College of Business and Economics and the College of Pharmacy offer the opportunity to obtain the Master of Business Administration (M.B.A.) and Doctor of Pharmacy (Pharm.D.) degrees in a dual degree program. Students can usually obtain both degrees in four years plus three summers instead of the five and one-half years required if the degrees were pursued separately. The dual degree program is designed to provide students with the necessary educational foundation so that they not only are prepared to begin practice as a pharmacist, but to assume managerial responsibility in a variety of health care settings. A student desiring admission into the dual degree program will be required to apply formally and independently to both programs.

## PHARM.D./M.P.A.

The University of Kentucky offers a two-year, 45-hour professional Master of Public Administration degree through the Graduate School. The College of Pharmacy offers a four-year, 158-hour Doctor of Pharmacy. The Pharm.D./M.P.A. dual degree is the only one of its type offered in the Commonwealth. The dual degree program permits a student to gain both degrees in a total time period less than if the degrees were earned independently. The dual degree program is highly desirable for persons seeking careers in state and federal regulatory and administrative agencies, the pharmaceutical industry,

managed care organizations, and academia. For information, contact the Director of Graduate Studies in Public Administration or the College of Pharmacy.

## PHARM.D./M.P.P.

The University of Kentucky offers a two-year, 40-hour Master of Public Policy degree through the Graduate School. The College of Pharmacy offers a four-year, 158-hour Doctor of Pharmacy. The Pharm.D./M.P.P. dual degree is the only one of its type offered in the Commonwealth. The dual degree program permits a student to gain both degrees in a total time period less than if the degrees were earned independently. The dual degree program is highly desirable for persons seeking careers in state and federal regulatory and administrative agencies, the pharmaceutical industry, managed care organizations, and academia. For information, contact the Director of Graduate Studies in Public Administration or the College of Pharmacy.

## PHARM.D./M.P.H.

The University of Kentucky currently offers a 42-credit hour professional Master of Public Health (MPH) degree through the University of Kentucky College of Public Health. The University's College of Pharmacy offers a four-year, 158 credit hour Doctor of Pharmacy (Pharm.D.) degree. The Pharm.D./MPH dual degree program is one of fewer than ten of its type offered in the nation. The dual degree program permits a student to gain both degrees in a total time period less than if the degrees were earned independently. The dual degree is thought to be highly desirable for persons seeking careers in state and local health departments, the pharmaceutical industry, managed care organizations, and academics.

## PHARM.D./M.S. In Economics

The College of Business and Economics and the College of Pharmacy offer the opportunity to obtain the Master of Science (M.S.) in Economics and Doctor of Pharmacy (Pharm.D.) degrees in a dual degree program. The dual degree program permits a student to gain both degrees in a total time period less than if the degrees were earned independently. Individuals grounded in both economic analysis and clinical skills provide an increasingly important and unique interface between practitioners and managers to balance clinical decision making with financial realities. The dual degree is highly desirable for persons seeking careers in government, the pharmaceutical industry, institutional settings, managed care organizations, pharmacy benefit management organizations, and academia. A student desiring admission into the dual degree program will be required to apply formally and independently to both programs.

## PHARM.D./M.S. Physician Assistant Studies

The dual program of study affects the total number of minimum required hours and calendar years required. From the perspective of the MSPAS program, approved Pharm.D. course work serves as MSPAS elective courses. From the College of Pharmacy perspective, the MSPAS coursework satisfies 8 hours of required electives. Applicants must meet the independent admission standards of the College of Pharmacy, the MSPAS Program, and the Graduate School. Students must be admitted to the

Graduate School prior to MSPAS coursework, which would begin in the spring semester of the third year of the PharmD program.

### PHARM.D/M.S. Pharmaceutical Sciences

Under the dual degree program, 2 current PharmD courses will count towards graduate credit (PHS 951 Cardiopulmonary and Renal Pharmacology [5 credit hours] and PPS 966 Pharmacotherapy III [5 credit hours]. Other graduate courses will be taken to account for the 8 credit hours of elective credits needed for the PharmD curriculum.

## Collaborative Degree Programs

### University of Kentucky/Lexington Theological Seminary, Double Competency Program

The Lexington Theological Seminary and the University of Kentucky have established a double-competency program to educate qualified students whose career interests are social work and the ministry. The mutual recognition of certain courses between Lexington Theological Seminary (LTS) and the College of Social Work makes possible the shortening of the overall time required to acquire both degrees separately. Interested students should contact the Director of Graduate Studies in Social Work.

### University of Kentucky/Asbury Theological Seminary, Double Competency Program

Asbury Theological Seminary and the University of Kentucky have established a double-competency program for students whose interests are social work and the ministry. The mutual recognition of certain courses between the College of Social Work and Asbury Theological Seminary makes possible the shortening of the overall time required to acquire both degrees separately. Interested students should contact the Director of Graduate Studies in Social Work.

### University of Kentucky/Asbury Theological Seminary, Double Competency Program

Asbury Theological Seminary and the University of Kentucky have established a double-competency program for students whose interests are social work and the ministry. The mutual recognition of certain courses between the College of Social Work and Asbury Theological Seminary makes possible the shortening of the overall time required to acquire both degrees separately. Interested students should contact the Director of Graduate Studies in Social Work.

### Collaborative Curriculum Leading to the Master of Music in Sacred Music

The UK School of Music offers the Master of Music with an emphasis in Sacred Music; this degree involves the completion of core course work at the University of Kentucky, as well as 6-9 credits of course work at an accredited seminary or other appropriate institution. One option available to the student involves a collaborative curriculum between the University of Kentucky and Lexington Theological Seminary leading to the award of the Master of Music from UK, and the Master of Arts in Church Music from Lexington Theological Seminary. Interested students should contact the Director of Graduate Studies at the University of Kentucky, School of Music.

# Doctoral Programs with Other Universities

Cooperative doctoral programs in education are offered between the University of Kentucky and other state universities including Eastern Kentucky University (EKU), Morehead State University (MoSU), Murray State University (MuSU), the University of Louisville (UL), and Western Kentucky University

(WKU). These programs permit qualified candidates to complete up to one year of graduate work above the master's degree at the cooperating university. A minimum of 18 credit hours of course work, the qualifying examination, and the dissertation must be completed at the University of Kentucky, and a minimum of one academic year must be spent in full-time residence on the Lexington campus. The work of each candidate is directed by an advisory committee composed of faculty from both institutions.

Persons interested in these programs should confer with the Dean of the Graduate School at the cooperating university, or with the appropriate Director of Graduate Studies in the College of Education at the University of Kentucky. Admission will depend upon academic standing, scores on standardized examinations, personal references, and other relevant factors.

There are additional cooperative doctoral programs in the following areas:

- Geology UK/EKU
- Physics UK/UL
- Higher Education UK/UL
- Rehabilitation Sciences UK/EKU/MuSU/WKU
- History UK/WKU

# General Regulations

## Registration & Classification

All students expecting graduate credit must be enrolled in the Graduate School. Graduate students will conform to the general registration schedule of the University and may not enter later than the last allowable date set by the Registrar. Before registering, graduate students should obtain approval of their proposed schedule from their advisor(s).

## Changes in Graduate School Requirements

When Graduate School or degree program requirements are changed after a course of study has begun, the students shall have the option of fulfilling either the old or the new requirements. If students elect to fulfill the old requirements but find that necessary resources (e.g., courses, instruction in particular skills) are no longer available, they may make reasonable substitutes with the approval of the Dean of the Graduate School upon recommendation of the Director of Graduate Studies.

In the event that students interrupt their work on a graduate degree (i.e., are not enrolled) for one calendar year or more, the Dean of the Graduate School shall determine, upon recommendation of the Director of Graduate Studies, whether the old requirements or the new requirements shall apply. In the event students have not completed the requirements for the graduate degree five years after the effective date of a change in degree requirements, the new requirements shall apply unless determined otherwise by the Dean of the Graduate School.

## Student Responsibility

It is the student's responsibility to be informed concerning all regulations and procedures required by the course of study being pursued. In no case will a regulation be waived or an exception granted because a student pleads ignorance of the regulation or asserts that information was not presented by advisors or other authorities. Therefore, the student should become familiar with the Graduate School Bulletin, including 1) the section presenting the requirements for degrees and 2) the specific program offerings and requirements.

The Director of Graduate Studies in the student's major program should be consulted concerning course requirements, any deficiencies, the planning of a program, and special regulations. Programs may have degree requirements that are not listed in the Bulletin. It is to be noted that the Dean of the Graduate School interprets the Graduate School Bulletin. Only the Graduate Council may waive requirements stated in this Bulletin.

## Confidentiality of Student Records

In accordance with the Family Education Rights and Privacy Act (FERPA) of 1974, University of Kentucky students have the right to review, inspect, and challenge the accuracy of information kept in a cumulative file by the institution unless the student waives this right in writing. Records cannot be

released other than in emergency situations without the written consent of the student, except in the following situations:

- to other school officials, including faculty within the educational institution or local educational agency, who have legitimate educational interests
- to officials of other schools or school systems in which the student intends to enroll, upon condition that the student be notified of the transfer, receive a copy of the record if desired, and have an opportunity for a hearing to challenge the content of the record

to authorized representatives of 1) the Comptroller General of the United States , 2) the Secretary of Education of the United States, 3) an administrative head of an education agency or 4) state educational authorities

- in connection with a student's application for, and receipt of, financial aid
- when the information is classified as "directory information." The following categories of information have been designated by the University as directory information: name, address, telephone listing, e-mail address, photographs, date and place of birth, major field of study, participation in officially recognized activities and sports, weight and height of members of athletic teams, dates of attendance, degrees and awards received, enrolled hours, and the most recent previous educational institution attended by the student. If you do not wish such information released without your consent, you should notify the Student Records Office in writing.

Questions concerning this law and the University's policy concerning release of academic information may be directed to the Student Records Office of the Graduate School.

## Graduate Courses

All courses numbered 500 through 799 may be counted for credit toward a graduate degree provided they are approved as an appropriate part of the student's graduate program by the student's graduate advisor or committee. Courses numbered 400G to 499G carry graduate credit for non-majors only. Courses numbered at the 800 or 900 level and offered by a professional practice program (Medicine, Dentistry, Law etc.) are normally not accepted for credit toward a graduate degree. Exceptions can be made if permission is granted by the Graduate Council to a program to offer specific professional courses as part of its academic program. Prior approval to take a course must be obtained from the Director of Graduate Studies, the Dean of the Graduate School and the dean of the professional college. Without such approval, professional courses may not be counted toward satisfying degree requirements. Courses numbered at the 600 or 700 level should be taught by members of the Graduate Faculty or by such other instructors as are approved by the Dean of the Graduate School.

## Add/Drop & Withdrawal

The Graduate School follows the rules of the University Senate as administered by the Registrar's Office.

## Academic Load

The total semester or term academic load of a student is the sum of all credits and credit equivalents (e.g., graduate language courses, undergraduate courses, courses audited, etc.) being carried. The normal academic load of a graduate student during any semester or summer is nine credit hours or equivalent. Under no circumstances may it exceed 15 credit hours or equivalent. For the student who is a full-time teaching assistant or whose service to the University requires approximately 20 hours per week, the academic load shall not exceed 10 hours. This maximum may be increased to 12 hours for students with lighter service loads upon recommendation of the Director of Graduate Studies and approval of the Dean of the Graduate School.

Students satisfactorily completing nine course credits, or equivalent, of graduate level work during a semester or summer are classified as full-time students by the University. Those completing less than these amounts are classified as part-time. Full-time students who fall below the minimum full-time equivalent as the result of failing or dropping one or more courses are reclassified as part-time students for that semester or term.

## Grades & Grade Point Average

The official grades of graduate students are recorded in the Office of the Registrar. The following scale applies to grading in graduate courses:

| | | |
|---|---|---|
| A | High achievement | 4 grade points per credit |
| B | Satisfactory achievement | 3 grade points per credit |
| C | Minimum passing grade | 2 grade points per credit |
| E | Failure | 0 grade points per credit |
| I | Incomplete | See explanation (1) below |
| S | Satisfactory | See explanation (2) below |
| U | Unsatisfactory | See explanation below |

D grades may not be awarded to graduate students. Graduate courses (400G-799) may not be taken Pass/Fail.

1. A grade of I (incomplete) may be assigned to a graduate student if a part of the work of a course remains undone and if there is a reasonable possibility that a passing grade will result from completion of the work. All incompletes (I grades) must be replaced by a regular final letter grade within 12 months of the end of the academic term in which the I grade was awarded or prior to the student's graduation, whichever occurs first. If an I grade has not been replaced within the allowable period, the University Registrar shall change the I grade to a grade of E on the student's permanent academic record and adjust the student's grade point average accordingly, unless otherwise approved because of exceptional circumstances by the Dean of the Graduate School upon recommendation of the Director of Graduate Studies in the student's program. Instructors who assign an I grade must file with the student's Director of

Graduate Studies information which includes 1) the name of the student, 2) the course number and hours of credit, 3) the semester and year of enrollment, 4) specific information on the work to be completed before a final grade can be assigned, and 5) the time frame in which the specific requirements are to be met (not to exceed 12 months). Graduate students should consult with their Director of Graduate Studies concerning procedures relative to the awarding of I grades and the conditions under which they may be removed. All I grades must be resolved to a regular letter grade before a student may sit for the final examination, or the qualifying examination for doctoral students. Exceptions to this rule will be considered in unusual circumstances, and require the approval of the Director of Graduate Studies and the Dean of the Graduate School.

2. A grade of S (satisfactory) may be recorded for students in graduate seminars, independent work courses, and research courses which extend beyond the normal limits of a semester or summer term. This grade may not be given to a student in a course carrying credit if the student has done unsatisfactory work or failed to do a reasonable amount of work, in which case a grade of U (unsatisfactory) will be assigned. The project must be substantially continuous in its progress. All S and U grades must be removed prior to the final examination (or qualifying examination for doctoral students), except for those given in Residence Credit 748, 749, 767, 768, and 769, or in graduate courses which carry no credit. Once a grade other than I, S, or U has been reported to the Registrar's Office, it may not be changed unless an error was made at the time the grade was given and recorded, and then only upon the written unanimous approval of the instructor, the Registrar, and the Dean of the Graduate School.

An overall average of B (3.00) on all graduate work in the program must be attained before an advanced degree may be awarded. Graduate-level courses (numbers 400G-799) are computed in the graduate grade- point average, with the exception of 400G courses in the student's program.

## Repeat Option

A student may repeat a graduate course and count only the second grade as part of the graduate GPA. This action will be initiated by petition of the Director of Graduate Studies to the Dean of the Graduate School, and may be used only once in a particular degree program or in post-baccalaureate status.

## Transfer of Credits

Directors of Graduate Studies may request transfer of credit for coursework taken in post-baccalaureate status at the University of Kentucky either into a master's/specialist degree program or into a doctoral degree program. There is no restriction on the number of transferrable hours. The transfer of credit for coursework taken in post-baccalaureate status at another regionally accredited university is restricted to a maximum of 9 hours (or 25% of the credit hours needed to fulfill either master's/specialist degree requirements or doctoral pre-qualifying coursework requirements).

The following rules also apply to credit transfer:

- Course credits applied toward a previously awarded graduate degree cannot be transferred.

- Transfer of independent work, research, thesis, or dissertation credit is not permitted.
- Short courses lasting fewer weeks than the number of credits may not be transferred.
- A student must have been in graduate status at the time the courses were taken.
- A student must be in good academic standing at the time of transfer.
- Only courses assigned a B grade or better can be transferred.
- Courses must have been taken no more than 10 years (masters) or 8 years (doctoral) prior to the semester the transfer is requested.
- Transfer of external credit cannot be applied to a graduate certificate unless it is specified and justified in the initial request to establish the certificate (or at the time of renewal).

The doctoral transfer policy would NOT apply in cases where a prior master's degree is being used to satisfy 18 hours of the pre-qualifying residency requirement.

## Scholastic Probation

When students have completed 12 or more semester hours of graduate course work with a cumulative GPA of less than 3.00, they will be placed on scholastic probation. Students will have one full-time semester or the equivalent (9 hours) to remove the scholastic probation by attaining a 3.00 cumulative GPA. If probation is not removed, students will be dismissed from the Graduate School. Students who have been dismissed from the Graduate School for this reason may apply for readmission after two semesters or one semester and the summer term. If they are accepted by the program, admitted students will have one full-time semester or the equivalent (9 hours) to remove the scholastic probation by attaining a 3.00 cumulative GPA. Exceptions to this policy can be made only by the Dean of the Graduate School. Students placed on scholastic probation are not eligible for fellowships or tuition scholarships and may not sit for doctoral qualifying or final examinations, or master's final examinations.

## Termination

The Dean of the Graduate School may terminate enrollment in a particular program for the following reasons:

- Scholastic probation for three enrolled semesters
- Having failed twice the final examination for the master's or doctoral degree or the qualifying examination

In cases where the student's Advisory Committee recommends termination after the qualifying examination has been passed, the Graduate Faculty in that program will meet to vote on the recommendation. When the Graduate Faculty of that program concurs and the student dissents, the student will have an opportunity to meet with the Graduate Faculty of the program, after which a second vote will be taken and a final recommendation will be made to the Dean of the Graduate School.

Each program sets specific requirements and standards of performance, evaluative procedures and criteria, and procedures for terminations of all students. The student should be informed of these criteria at the time of enrollment by the Director of Graduate Studies of the program.

## Assessment of Doctoral Student Progress

All programs are required to assess the progress of their doctoral students. The Graduate Faculty of each doctoral program will define good progress to completion of the doctoral degree. This information will be included in the program's Graduate Student Handbook. The consequences of lack of good progress may also be included in the handbook. Each doctoral student's good progress toward the degree will be reviewed (at least) annually by either the Graduate Faculty in the program, the doctoral advisory committee, or other graduate education committee. Each student will be informed in writing of the results of that meeting by the Director of Graduate Studies or the chair of the advisory committee, or their designee.

## Examinations for Graduate Credit

A special examination for graduate credit in a student's program requires the approval of the Dean of the Graduate School. Students must complete the Special Examination form (available in the Registrar's Office) and have it approved and signed by the Director of Graduate Studies and the Dean of the Graduate School. Students must be enrolled in the Graduate School during the semester they wish to sit for a special examination.

## Students Changing Programs

Students who plan to change programs must submit a new application (and fee) to the Graduate School and be formally admitted by the Director of Graduate Studies in the new program.

## Off-Campus & Short Courses

Short courses are defined as courses of less than a term in length. A short course may not carry more credits than the number of weeks during which it is offered. Two short courses of four weeks or less may not be taken simultaneously. Instructional standards for off-campus and short courses should be the same as those established for on-campus and regular courses. A comprehensive final examination will normally be required to assess the student's capability for scholarly thinking in the subject matter area. Practicum or laboratory short courses should require other experiences of comparable rigor.

## Distance Learning Graduate Programs

A number of departments offer selected courses or entire graduate degree programs off campus or via the Internet. Instruction is provided by various distance-learning technologies and/or on-site meetings of students with faculty. The Graduate School provides coordination and support for the off-campus sites and assures a high standard of graduate work. The school assists with: student recruitment; administration of the distance learning graduate program sites; liaison among students, programs, and UK support units; and liaison with the cooperating regional universities. For more information see https://www.uky.edu/academics/online-programs .

Graduate degree programs to be delivered at distance learning locations (either on site or via technology) shall be reviewed by the Graduate Council prior to their submission for appropriate review at higher levels. Distance learning graduate degree programs shall be reviewed periodically and their effectiveness assessed during regular institutional unit reviews, or, when circumstances warrant, by a special review process initiated by the Dean of the Graduate School.

## Independent Study Programs (Correspondence Courses)

No graduate credit is given for courses taken by correspondence.

## Concurrent Degree Programs

Concurrent enrollment for degree purposes in more than one graduate program is permitted with the approval of Directors of Graduate Studies in the programs and the Dean of the Graduate School. No more than nine hours of coursework may be common to concurrent degree programs. Subsequent to the receipt of a doctoral degree, a student is not eligible to receive a master's degree based on the work which led to the doctorate, unless an en-passant master's program has been approved. Concurrent Degree Program forms can be located at https://gradschool.uky.edu/studentforms

## UK Students as Visitors

University of Kentucky graduate students who attend another graduate school as a Visiting Student must have the permission of their University of Kentucky advisor and the Graduate School before the courses are taken in order to transfer credits earned (see Transfer of Credits). Visiting Student status may be granted only to a student who is in good standing in a degree program.

## Graduation (Commencement)

Graduate degrees may be conferred at the close of either semester or summer session; Commencement exercises are held in May and December. Students who are eligible to receive degrees at the end of the summer session or the fall semester may participate in the December Commencement exercises. Appropriate academic regalia must be worn. To be eligible to receive a degree, a student must submit an on-line "Application for Degree" form via: https://myuk.uky.edu/irj/portal . Applications must be received in the Graduate School within 30 days of the start of the semester in which the student expects to complete their work (or within 15 days of the start of summer session).

## Diplomas

Diplomas for graduate students are ordered after certification of the degrees has been completed. If a letter of certification is needed, the Graduate School will provide one upon written request or by coming in person to Room 106 of The Gillis Building.

## Outstanding Accounts

The Registrar's Office will not release the diploma or official transcript until all outstanding accounts due to the University have been cleared.

## Advanced Degrees for Faculty Members

Members of the faculty having a rank higher than that of Instructor may not be considered as candidates for degrees in the discipline in which they are employed and hold academic rank.

# Requirements for Master's Degrees

## On Campus Residence

There is no Graduate School-wide sustained residence requirement for master's degrees at the University of Kentucky. However, students are advised to review the requirements for the programs in which they are interested and consider carefully the spirit of resident graduate work as discussed in the section on doctoral residency. Students who contemplate continuing in a doctoral program should take into account at the outset the residence requirements for the doctoral degree.

## Foreign Language Requirement

Many programs require a reading knowledge of a foreign language for the master's degree. Accepted languages for fulfillment of this requirement are those currently taught at the University of Kentucky, subject to approval by the Director of Graduate Studies. Other languages may be recommended by the major advisor and approved by the Dean of the Graduate School on the recommendation of the Director of Graduate Studies. The Director sends this recommendation to the Dean. The following options may satisfy the language requirement:

- completion of one of the accelerated graduate level language courses (011 courses) with a grade of B or better
- completion of the fourth semester of a foreign language with a grade of B or better at an accredited college or university
- completion of a more advanced foreign language course (beyond the fourth semester level, with all course work and readings in the target language) with a grade of B or better at an accredited college or university
- completion of an accelerated graduate level language course for reading knowledge with a grade of B or better, at another accredited university
- transfer of a language taken to satisfy the requirements for a master's degree at another accredited university
- completion of special examinations given for graduate reading courses with a grade of B or better. Forms may be obtained from the Registrar's Office, Funkhouser Building. Other types of special examinations are scheduled in the Graduate School
- completion of a placement test administered by the foreign language programs of the University, and testing to a level beyond the fourth semester of foreign language study, which is the equivalent of a grade of B or better. This method may be appropriate for students with significant life experience in the foreign language culture, and requires the approval and recommendation of the Director of Graduate Studies
- with the approval of their program, students who are non-native speakers of English may satisfy the foreign language requirement by presenting a TOEFL score of 550 or above (the equivalent score on the computer version of the TOEFL is 213 and on the internet-based test is 79) or a IELTS score of 6.5 or above.

## Course Work Requirements

Graduate students are eligible to take regular courses which meet as organized classes and independent-study or research courses in which each student carries on investigations independent of class meetings. Independent study or research courses must not duplicate thesis work; thesis work must be done in addition to the minimum course requirements. At least two-thirds of the minimum requirements for the master's or specialist degree must be in regular courses, and at least half of the minimum course requirements (excluding thesis, practicum, or internship credit) must be in 600- or 700-level courses. Exceptions to this rule may be made only with the approval of the Council.

Candidates for the master's degree must have a major area (defined usually as an academic department) and must take at least two-thirds of the course work in this area. The other one-third may be taken in this area or in related graduate areas. In Agriculture and Education, only one-half of the work must be in the major area. When the establishment of major topics seems to require it, the Graduate Council may, on recommendation of the appropriate Director of Graduate Studies, authorize courses taught outside the major to count toward the major requirement.

## Thesis/Non-Thesis Option

The Graduate Faculty authorizes all graduate programs to satisfy the master's requirements by either of two options, thesis (Plan A) or non-thesis, (Plan B). The thesis option (Plan A) requires a thesis to be developed under the direction of a full or associate member of the Graduate Faculty. Collaborative effort by two or more graduate students is not forbidden. However, there must be enough independent effort to enable each student to make a separate contribution and to prepare an individual thesis. Before the final examination, the thesis director and the appropriate Director of Graduate Studies must indicate to the Graduate School that the student's thesis satisfies all requirements of the Graduate School and is complete in content and format with the exception of pagination, and that the student is ready to be examined. Any modification in the thesis which the final examination committee specifies must be made before the degree is conferred.

Master's candidates working on their theses may register for up to 12 credits of course number 768 in the appropriate department. Plan A master's degree candidates who are in residence and receiving financial support from the University and/or utilizing University resources while working on the thesis must be enrolled in the Graduate School. Candidates not enrolled in course work to meet degree requirements must be enrolled in their department's course number 748 or 768 each semester.

The non-thesis option (Plan B) requires that six or more graduate credit hours of course work be submitted in lieu of a thesis. A student may follow this option with approval of the program concerned. Students should consult their advisor for any additional requirements established for Plan B in their area of study.

## Final Examination

A Final Examination (oral and/or written) is given to all candidates for master's degrees not later than eight days before the last day of classes of the semester in which the degree is to be awarded. The

examination is scheduled by the Dean of the Graduate School and the report is returned to the Dean upon completion of the examination, which in no case may be later than two weeks after the start of the examination. The examining committee consists of at least three qualified faculty members recommended by the Director of Graduate Studies and appointed by the Dean of the Graduate School. At least two committee members (including the chair or co-chair) must be members of the Graduate Faculty, and at least one of the two must be a full member of the Graduate Faculty. It is expected that at least two members of the committee will be from the student's program/department.

The request for a final examination must be filed at least two weeks prior to the date of the examination; https://ris.uky.edu/cfdocs/gs/MastersCommittee/Student/Selection_Screen.cfm . Students on scholastic probation are not eligible to sit for the final examination. Class must be in session for the student to sit for the exam. If the candidate fails the final examination, the committee may recommend to the Dean of the Graduate School the conditions under which a second examination may be administered. Insofar as it is practicable, the same examining committee gives this examination. In all decisions the majority opinion of the committee prevails. If the committee is evenly divided, the candidate fails. A third examination is not allowed.

## Master's Thesis

Theses must be prepared in conformity with the instructions published by the Graduate School. Detailed instructions can be found at www.gradschool.uky.edu/thesdissprep.shtml. The thesis in its final form must be received in the Graduate School within 60 days of the Final Examination. Theses must be presented to and accepted in the Graduate School by the last day of the semester if a student plans to graduate that semester. Theses submitted by candidates become the physical property of the University of Kentucky.

The University protects the authors' rights by placing certain restrictions upon the use of theses. All master's theses must be submitted in electronic format. Instructions are available at http://gradschool.uky.edu/ thesis-dissertation-preparation. To view the current collection of ETD's, go to http://uknowledge.uky.edu/gradschool

## Time Limit for Master's/Specialists Degrees

Students enrolled in a master's/specialist program 6 years to complete all requirements for the degree, but still have the opportunity to request extensions up to an additional four years for a total of ten years. Extensions up to two years may be approved by the Dean of the Graduate School. Requests for extensions longer than two years must be considered by Graduate Council. All requests should be initiated by the Director of Graduate Studies. No activity completed more than ten calendar years preceding the proposed graduation date as appropriate will be considered for graduation.

Programs may opt to shorten or extend the required time to complete the master's/specialist program. Petitions must be submitted to Graduate Council for approval. The program should be able to demonstrate that the six-year time limit would be detrimental to the progress of their students or to the program itself. If the request is to extend the time limit, the program must demonstrate how

students will remain current in the field over this extended time period. Any approved change in the time limit would apply to all students in the program.

- A program may submit an appeal to the Graduate Council to allow a time-to-degree terminated student to be readmitted and pursue the degree without re-taking all required coursework. The appeal should:
- Provide an explanation for the failure to initially complete the degree on-time.
- Provide a detailed description of the requirements that must be fulfilled in order to receive the degree.
- Provide confirmation that the appeal was approved by the majority of the program graduate faculty.

# Requirements for Doctoral Degrees

## Doctor of Philosophy (Ph.D.) Degree

The Ph.D. degree is intended to represent the demonstration of independent and comprehensive scholarship in a specific field. Such scholarship must be manifested by both the student's mastery of subject matter and capacity to do research. Every applicant for the Ph.D. degree must select a major area of study. The major area is one in which the student's efforts are concentrated. Some programs also require one or more minor areas. Minor(s) must be approved by the student's advisory committee. The degree of Doctor of Philosophy is conferred upon a candidate who, after completing graduate work devoted to study of a special field of knowledge, 1) passes comprehensive examinations in the chosen field and the dissertation subject, 2) presents a satisfactory dissertation, and 3) shows evidence of scholarly attainment. Students should note that some doctoral programs have degree requirements that may exceed the minimum requirements of the Graduate Faculty.

## The Major Professor and the Advisory Committee

The Director of Graduate Studies, or designee, serves as advisor to beginning graduate students until the advisory committee is appointed, normally not later than upon completion of 18 credit hours of graduate work. The advisory committee must be appointed at least one year prior to the qualifying examinations. The major professor and advisory committee are appointed by the Graduate Dean after consultation with the appropriate Director of Graduate Studies. The dissertation director, when selected, serves as the major professor. The advisory committee also provides advice to the student and specifically sets requirements (within applicable program, Graduate School and University regulations) which the student must meet in pursuit of the doctorate. In addition to advising and program planning, the advisory committee is also involved in the administration of the qualifying examination, the supervision of the preparation of the dissertation, and the administration of the final examination.

The advisory committee has a core of four members. This core must include a minimum of two faculty members from the graduate program (with one being the major professor as chair or co-chair), and one representative from outside the graduate program. All members of the core must be members of the Graduate Faculty of the University of Kentucky1 and three (including the major professor) must possess full Graduate Faculty status.

[1]*Faculty members from other institutions may serve on dissertation committees if they meet the requirements for appointment as associate members of the UK Graduate Faculty.*

The request to form (or modify) an advisory committee is accomplished via https://ris.uky.edu/cfdocs/gs/DoctoralCommittee/Selection_Screen.cfm . All decisions of the advisory committee are by majority vote of its Graduate Faculty members. Advisory committee decisions must be reported promptly to the appropriate Director of Graduate Studies who will be responsible for transmitting them to the Dean of the Graduate School.

## Residency Requirements

The purpose of a residency requirement is to encourage doctoral students to experience contact with the academic community: colleagues, libraries, laboratories, on-going programs of research and inquiry, and the intellectual environment that characterizes a university. Such experience is generally as important as formal class work in the process of intellectual development. While the residency requirement is, by necessity, given in terms of full or part-time enrollment, the intent of the requirement is to ensure that the student becomes fully involved in an essential part of scholarly life. Exceptions to the normal residency pattern may be made with the approval of the Dean of the Graduate School upon the written recommendations of the student's advisory committee and the Director of Graduate Studies, which clearly demonstrate that the principle of residence is preserved. The ultimate goal of these requirements is to lead students to scholarly accomplishment, not solely to amass semester hours or time spent.

## Pre-Qualifying Residency

Students must complete the equivalent of two years of residency (36 credit hours of graduate coursework*) prior to the qualifying examination. An awarded master's degree from the University of Kentucky or from another accredited school may satisfy 18 of this 36-hour pre-qualifying requirement. Such requests should be made by the DGS to the Senior Associate Dean of the Graduate School. For students with extensive prior graduate work, a waiver of additional pre-qualifying residency hours may be appropriate. Requests should be submitted in writing by the DGS to the Dean of the Graduate School and should include a detailed justification and evidence that the student's Major Professor and Advisory Committee support the request.

**some programs require more than 36 hours of graduate coursework prior to the qualifying examination.*

## Post-Qualifying Residency

Students are required to enroll in a 2-credit hour course after successfully completing the qualifying examination, XXX-767; Dissertation Residency Credit. The Graduate School will provide a scholarship for the out-of-state portion of the (2) credit hours associated with a 767 course and the student will only be responsible for the in-state tuition rate plus mandatory fees*. Students must remain continuously enrolled in this course every fall and spring semester until they have completed and defended the dissertation. This will constitute full-time enrollment. Students are required to complete a minimum of two semesters of 767 before they can graduate.

**UK employees (0.75 FTE or higher) enrolled in the Employee Education Program (EEP) are not eligible for this out-of-state tuition scholarship.*

## Foreign Language Requirement

Some doctoral degree programs require a reading knowledge of one or more modern foreign languages for the doctorate. Accepted languages for fulfillment of this requirement are those currently

taught at the University of Kentucky, subject to approval by the Director of Graduate Studies. Other languages may be recommended by the major advisor and approved by the Dean of the Graduate School on the recommendation of the Director of Graduate Studies. The Director sends this recommendation to the Dean. For more information, see the Master's Degree Foreign Language Requirement. Any language requirement(s) must be satisfied before the applicant may sit for the qualifying examination.

## The Qualifying Examination

A qualifying examination consisting of both written and oral components is required of all doctoral students. Its purpose is to verify that students have sufficient understanding of and competence in their fields to become candidates for the degree. In most programs, the advisory committee prepares and administers an individual qualifying examination; typically, that committee also judges the results of the examination. A majority vote of the core of the advisory committee is required for successful completion of the qualifying examination. Programs that give uniform, written qualifying examinations to all of their candidates shall have rules (filed with the Dean of the Graduate School) governing the role of the advisory committee in the preparation, administration, and evaluation of the qualifying examination. The examination is usually given after four semesters of graduate work or the equivalent, and after fulfillment of pre-qualifying residency.

The request to schedule the qualifying examination must be submitted a minimum of two weeks in advance via: https://ris.uky.edu/cfdocs/gs/DoctoralCommittee/Selection_Screen.cfm . The results of the examination must be reported by the Director of Graduate Studies to the Graduate School within 10 days of its conclusion. If the result is failure, the advisory committee determines the conditions to be met before another examination may be given. The minimum time between examinations is four months. A second examination must be taken within one year after the first examination. A third examination is not permitted.

XXX 767, residency credit will be applied for a qualifying examination taken at any time during the first semester of enrollment in this course. Classes must be in session for the student to sit for the exam.

## Pre-Qualifying Time Limit

Students are required to take the qualifying examination within five years of entry into the program. Extensions up to an additional three years may be requested. Extensions up to twelve months may be approved by the Dean of the Graduate School upon receipt of a request from the Director of Graduate Studies. Requests for extensions longer than twelve months must be considered by Graduate Council and will require the positive recommendation of the Director of Graduate Studies, the chair of the student's doctoral advisory committee, and a majority vote of Graduate Faculty in the program. If the qualifying examination has not been passed at the end of five years, or at the end of all approved time extensions the student will be dismissed from the program.

This new time limit applies to all programs, but the graduate faculty of a doctoral program (or group of programs) has the option to petition Graduate Council for a shorter or longer time limit. If approved, this modification will then apply to all doctoral students in that program.

## The Final Examination

The Final Examination includes a defense of the dissertation and may be as comprehensive in the major and minor areas as the advisory committee chooses to make it. It is conducted by an expanded advisory committee chaired by the Director of Graduate Studies or someone designated by the Director. The Dean of the Graduate School and the President of the University are ex officio members of all final examination committees. The examination is a public event and its scheduling is published and announced beforehand. Any member of the University community may attend.

At least 8 weeks prior to the final examination, the Graduate School should be notified of the intent to examine via: https://ris.uky.edu/cfdocs/gs/DoctoralCommittee/Selection_Screen.cfm . At this time the Graduate Dean appoints an Outside Examiner as a core member of the advisory committee. The specific time and date of the examination must be designated by the Graduate School at least two weeks prior to the actual examination using the above link. All members of the committee except the outside examiner must have an opportunity to suggest revisions prior to scheduling the Final Examination. Thus, most revisions should have been completed at an earlier time. The final examination must take place no later than eight days prior to the last day of classes of the semester in which the student expects to graduate. Final examinations are public events and must take place while the University is officially in session. They may not be scheduled during the periods between semesters or between the end of the second summer session and the beginning of the fall semester.

The following are Graduate School procedures for conducting the Final Examination:

- At the outset of the Examination, the DGS or committee chair should verify that the Examination Card has been brought to the examination room. If this is not the case, the committee chair or DGS must call the Senior Associate Dean's office at the Graduate School (859-257-2441) to determine if the examination may proceed.
- The Examination may not begin until all voting members of the committee are present (these names are listed on the examination card)
- One or more members of a master's or doctoral committee may participate remotely in an Examination if a video-conference connection can be established (this option does not apply to the Outside Examiner assigned to final doctoral defenses). The DGS should identify the committee members participating in this fashion on the qualifying or final examination request form. Under exceptional circumstances, the remote participation option may also be extended to the student.
- An Examination may be cancelled prior to its official start for substantive reason with no permanent consequences for the student. The student has not failed the examination in this case because it was never officially begun. Substantive reasons can include a missing committee member, a sudden difficulty in the candidate's personal life that may affect

performance, or a (late) opinion on the part of one or more committee members, for example that the dissertation is not ready to defend. In such cases, the committee may hold an open or closed discussion to review the issues at hand and reach a decision on whether to hold the examination or not. Furthermore, the candidate does have the right to cancel the examination prior to its start. If the examination is cancelled, it must be formally rescheduled with the Graduate School in the standard fashion. A minimum two-week interval is required for re-scheduling the examination

- Once the examination has begun, all committee members must remain present for the duration of the process. In cases in which a committee member is participating remotely, if the connection is lost, the examination process should be immediately suspended and not re-started until connection is again fully established.
- Once the examination has begun, it must be carried through until its end. A formal vote must be taken and recorded on the examination card, along with the signatures of all (voting) members. There are only two outcomes possible; by majority vote, Pass or Fail. The only suspensions permitted are short ones to permit the candidate or committee members to refresh themselves.
- If an emergency situation should arise during the course of an examination, the committee chair or DGS should immediately call the Graduate School (859-257-2441) to seek guidance.

[1] *Remote participants may record their vote in one of two ways; a copy of the examination card may be faxed/e-mailed to them for decision and signature and returned to the DGS OR they may e-mail Dr. Cleo Price directly with their vote at cprice@uky.edu.*

In all decisions, the majority opinion of the Graduate Faculty members of the advisory committee prevails. If the advisory committee is evenly divided, the candidate fails. In the event of failure, the advisory committee recommends to the Dean of the Graduate School conditions under which the candidate may be re-examined, if re-examination is deemed appropriate. When conditions set by the Dean of the Graduate School have been met, the candidate may be re-examined. The minimum time between examinations is four months. A second examination must be taken within one year after the first examination Should any vacancies on the Committee occur between the two examinations, the Dean of the Graduate School shall appoint replacements. A third examination is not permitted.

## The Dissertation

Each student must present a dissertation which represents the culmination of a major research project. The dissertation must be a well-reasoned, original contribution to knowledge in the field of study and should provide evidence of high scholarly achievement. Dissertations must be prepared in conformity with the instructions published by the Graduate School. Specific formatting instructions can be found at https://gradschool.uky.edu/electronic-dissertation-preparation . The dissertation in its final form must be received in the Graduate School within 60 days of the final examination. If this deadline is not met, the candidate may be required to undergo a second examination. All doctoral dissertations must be submitted in electronic format. Instructions are available at

https://gradschool.uky.edu/electronic-dissertation-preparation . To view the current collection of ETD's, go to http://uknowledge.uky.edu/gradschool/ .

## Time Limit for Doctoral Degrees

All degree requirements for the doctorate must be completed within five years following the semester or summer session in which the candidate successfully completes the qualifying examination, but extensions up to an additional 5 years may be requested for a total of 10 years. All requests should be initiated by the Director of Graduate Studies and accompanied by a letter of support from the student's advisor. Extensions up to one year may be approved by the Senior Associate Dean of the Graduate School. Requests for extensions longer than one year must be considered by Graduate Council. All requests should be initiated by the Director of Graduate Studies and must include a recommendation on whether or not a retake of the qualifying examination should be a requirement of the extension. If requested, failure to pass the re- examination will result in the termination of degree candidacy; a second re-examination is not permitted. Failure to complete all degree requirements within 10 years of initially taking the qualifying examination will also result in the termination of degree candidacy.

- A program may submit an appeal to the Graduate Council to allow a time-to-degree terminated student to be readmitted and pursue the degree without re-taking all required coursework. The appeal should:
- Provide an explanation for the failure to initially complete the degree on-time.
- Provide a detailed description of the requirements that must be fulfilled in order to receive the degree.
- Provide confirmation that the appeal was approved by the majority of the program graduate faculty.

## Assessment of Good Progress for Doctoral Students

The Graduate Faculty of each doctoral program is required to define good progress toward completion of the doctoral degree. This information should be included in the program's Graduate Student Handbook (it is recommended that the consequences of lack of good progress are also included in the handbook). Each doctoral student's progress toward the degree will be reviewed (at least) annually by either the Graduate Faculty in the program, the doctoral advisory committee, or the graduate education committee. Students will be informed in writing of the results of that meeting by the Director of Graduate Studies or the chair of their designee. These reports should not be forwarded to the Graduate School.

# General Information

## Tuition & Fees

To see the current Tuition and Fees for graduate students, including those that are specific to certain programs, courses, etc., please go the University of Kentucky Registrar's page https://www.uky.edu/registrar and click on the "Tuition and Fees" tab.

## Fellowships & Assistantships

Financial assistance is available in the form of fellowships and assistantships, as well as research funding. A fellowship is a non-service award made to superior students to assist in the pursuit of an advanced degree. An assistantship is an appointment to perform specified teaching or research duties. The University of Kentucky honors the following Resolution Regarding Graduate Scholars, Fellows, Trainees and Assistants Adopted by the Council of Graduate Schools in the United States:

"Acceptance of an offer of financial support (such as a graduate scholarship, fellowship, traineeship, or assistantship) for the next academic year by a prospective or enrolled graduate student completes an agreement that both student and graduate school expect to honor. In that context, the conditions affecting such offers and their acceptance must be defined carefully and understood by all parties." "Students are under no obligation to respond to offers of financial support prior to April 15; earlier deadlines for acceptance of such offers violate the intent of this Resolution. In those instances in which a student accepts an offer before April 15, and subsequently desires to withdraw that acceptance, the student may submit in writing a resignation of the appointment at any time through April 15. However, an acceptance given or left in force after April 15 commits the student not to accept another offer without first obtaining a written release from the institution to which the commitment has been made. Similarly, an offer made by an institution after April 15 is conditional on presentation by the student of a written release from any previously accepted offer. It is further agreed by the institutions and organizations subscribing to the above Resolution that a copy of this Resolution should accompany every scholarship, fellowship, traineeship, and assistantship offer."

### Fellowships

There are non-service fellowships available in all areas of graduate work. The majority of these fellowships carry a tuition scholarship and student health insurance as well as a stipend. Tenure may be from one to three years, depending on fellowship type. While fellowships are formally awarded by the Graduate School, nominations for most fellowships are made by the department in which a student is enrolled or seeks to enroll. To see the Fellowship awards offered by the Graduate School please go to https://gradschool.uky.edu/fellowships.

Almost all fellowships are awarded beginning with the fall semester. Departments make fellowship nominations at the beginning of the spring semester for the next academic year, so students interested in a fellowship should work with their DGS to ensure submission of applications and all supporting

documents before that time. Later applicants have a reduced chance of obtaining a fellowship. Notification regarding awarding of fellowships comes from the Graduate School by early May.

### Assistantships

Approximately 1500 teaching or research assistantships are available from departments and other units of the University. In addition to an assistantship stipend, full or partial tuition scholarships and student health insurance are available for most assistantship holders. The majority of assistantships are awarded beginning with the fall semester. Students interested in an assistantship should submit applications to obtaining an assistantship. Most assistantship decisions are made by April for the coming academic year.

Notification of an assistantship comes from the department. Questions about the availability of positions and the status of assistantship applications should be addressed to the Director of Graduate Studies in the department a student seeks to enter

## Student Loans

U.S. citizens and eligible non-citizens may apply for federally supported loans and work-study assistance. To be considered, complete the Free Application for Federal Student Aid (FAFSA), available in the UK Student Financial Aid Office, 128 Funkhouser Building, Lexington, KY 40506-0054, 859-257-3172; fax 859-257-4398. Students may also apply online at https://studentaid.ed.gov/sa/fafsa or go to https://www.uky.edu/financialaid/.

## Health Services

### University Health Service

Not all graduate students are required to pay the health fee. Only full-time students in nine hours or more pay the mandatory health fee via their student account. For all other students, including those in zero and two-credit hour courses, the health fee is optional. Full-time graduate students who have paid the health fee have access to University Health Service (Student Health) at little or no cost. Part-time and zero or two-credit hour students may access University Health Service by voluntarily paying a health fee or by being seen on a fee-for service basis. To use University Health Service in the summer, all students must pay the summer health fee or pay on a fee-for-service basis. All voluntary requests for the health fee should be made to Student Account Services. Services related to hospitalization, surgical procedures, accident care and any other health care provided outside University Health Service, are not covered by the health fee. The University, including University Hospital, assumes no responsibility for a student's medical expenses.

The convenience of an on-campus health care facility, a low-cost prepaid plan for outpatient services, and a student group health insurance plan are designed to make UK's total health plan attractive and economical for graduate and professional students, both full-time and part-time.

All full-time students must pay the student health fee in fall and spring semesters which entitles them to medical and mental health care at the University Health Service. For students who attend either of

the summer sessions, the health fee is optional. Part-time students may prepay the student health fee or may use the health service on a fee-for-service basis; the health fee may be paid at the Student Billing Office.

The University Health Service is located on S. Limestone Street. The clinic is staffed by physicians, nurse practitioners, psychiatrists, and other health professionals. Spouses of eligible students are eligible to receive their primary care at the University Health Service. They are charged for all services rendered. Children and other family members are not eligible. Services covered by the health fee include: unlimited visits to clinicians for illness or injury, some laboratory services and x-rays ordered by the health service clinician as part of evaluation for an illness or injury, some medications, allergy shots and immunizations, and visits to the professionals in the Mental Health Service. For additional information, contact the University Health Service at 859-323-2778.

## Health Insurance

Services related to hospitalization, surgical procedures, accident care, and any other health care provided outside the University Health Service, are not covered by the health fee. The University of Kentucky strongly endorses the belief that students should have health insurance, either provided by their parents' policy or by an independent insurance company. The University, including the University Hospital, assumes no responsibility for a student's medical expenses.

## Health Insurance Requirements for International Students

The University of Kentucky has a mandatory health insurance program for all international students. International students who are in F-1 and J-1 visa status will be charged for the health insurance plan along with their tuition and fees. Students who have purchased health insurance in their home countries or who are covered as a dependent on a U.S. plan may be eligible for a waiver. J-2 dependents who enroll in classes will be charged for the health insurance along with their tuition and fees. International students on a J-1 or F-1 visa are required to purchase health insurance for all of their dependents. International students with questions about health insurance should contact the health insurance coordinator in the Office of International Affairs at 859-257-4067 ext. 238.

## Health Plan Coverage for Graduate TA, RA, GA, & Institutional Fellows

Health plan coverage is provided to all enrolled and degree-seeking graduate students with full-time teaching, research, or graduate assistantships, full-time fellowship recipients, or a combination of these positions. The Student Health Plan Office administers this program. The health plan is provided to eligible graduate students at no cost. The student health plan is a preferred provider organization (PPO), and UK Hospital and UK College of Medicine physicians are the in area preferred providers. When receiving treatment away from UK, students can expect higher out-of-pocket costs. Additionally, the plan is an illness and injury plan only; it does not provide for preventive care or coverage of treatment in the absence of illness or injury, except as specifically provided in the policy.

## Student Health Plan

The student insurance plan is a preferred provider organization (PPO), and UK Hospital and UK College of Medicine physicians are the preferred providers. When receiving treatment away from UK, you can expect significantly higher out-of-pocket costs. Additionally, the plan is an illness and injury plan only; it does not provide for preventive care or coverage of treatment in the absence of illness or injury, except as specifically provided in the policy. The annual policy provides year-round coverage. Students may also purchase coverage for their spouse and/or children. The premium may be paid annually, semi-annually, or quarterly by check, Visa, or MasterCard. Student enrollment may be continued from one year to the next by reenrolling within 14 days from the enrollment date. Although students are encouraged to enroll at the beginning of the school year, enrollment is available throughout the policy year. Information packets for the upcoming school year are available in mid-July at the University Health Service. For further information and enrollment dates, call 859-323-5823, ext. 230.

## Counseling & Testing Center

The University Counseling and Testing Center has a staff of licensed psychologists whose primary function is to address the emotional/psychological issues of both undergraduate and graduate students. Some typical concerns of graduate students include feelings of depression, anxiety, stress due to the demands of graduate school, quality of interpersonal relationships, loneliness and isolation, grief, time management, refinement of critical thinking skills, career and life planning, and other issues of a personal nature.

All counseling sessions are free, voluntary, and confidential. The services are available by appointment to fee-paying students enrolled for at least six semester hours. Graduate students enrolled for thesis or dissertation hours also are eligible. In addition to counseling with individual students, the Center offers couples (significant others) and group counseling. General counseling groups are ongoing and reconstituted each semester. Participants work on a variety of issues. There are also special focus groups such as Bridges (a support group for graduate African-American women), an eating disorders group, and a discussion group for LD/ADHD. Appointments and further information may be obtained by calling 859-257-8701 or by coming to the Center, 301 Frazee Hall.

# Student ID Card (UKID)

All students admitted to the University (both full-time and part-time) are expected to obtain a student ID card (UKID). This is a permanent card, which becomes valid each semester when fees are paid. The first ID card is provided without cost. Students who lose their UKID should report the loss immediately to the UKID Office (859-257-1378), the Diner/Plus Account Office (859-257-6159), or any Food Service location. The UKID is the property of the University of Kentucky and is to be returned to the Dean of Students upon termination of student status.

## Disability Services

Students with disabilities should call or stop by the Disability Resource Center, 407 Multidisciplinary Science Building, 725 Rose Street, or call 859-257-2754. The staff will assist students with information about accessible parking, bus services, and/or special needs.

## Housing

The UK Apartment Housing Office operates apartments for single graduate students and student families. The apartments are rented on a 12-month lease agreement basis. For more information, contact UK Graduate and Family Housing, 300 Alumni Drive, Apt. 156., Lexington, KY 40508; 859-257-3721; e-mail ukapthousing@uky.edu; or see https://www.uky.edu/housing/about-graduate-family-housing .

# Graduate Certificates

A Graduate Certificate is an integrated group of courses that is designed to have a very clear and focused academic topic or competency as its subject area. Often, a Graduate Certificate may meet a clearly defined educational need of a constituency group, such as continuing education or accreditation for a particular profession; respond to a specific state mandate; or provide a basic competency in an emerging, usually interdisciplinary, area. A Certificate is not a graduate degree program (it is typically between 9 and 15 credits), but it does provide the student formal recognition of the mastery of a clearly defined academic topic.

Graduate Certificates are becoming an increasingly important component of the total range of graduate educational opportunities offered by a modern, comprehensive research university. Often, Certificates are pursued by students who are also pursuing a graduate degree in a traditional discipline, or who may already have earned one or more graduate degrees. Programs or groups of faculty who wish to establish a new Graduate Certificate at the University of Kentucky should consult the Guidelines for Graduate Certificates.

Although formal admission to a specific Graduate Certificate is handled by the Director of the Certificate, a student seeking to pursue a Graduate Certificate must also apply to and be enrolled as a graduate student at the University of Kentucky. Some Certificates may require concurrent enrollment in a degree-seeking program of study, however, many students will be enrolled only in the Graduate Certificate program of study. More information on admission requirements and specific plans of study for a particular Graduate Certificate can be obtained via the contacts below. Note that admission to or completion of a Graduate Certificate does not guarantee subsequent admission to a graduate degree program; that is a separate process, and different criteria prevail.

## Advanced Materials Characterization

In the four course Advanced Materials Characterization Certificate (AMCC) students will explore techniques for characterizing and analyzing the atomic-through-mesoscale structure of materials and their surfaces. Students will learn the fundamental principles and limitations of a range of techniques, to prepare samples, and to operate state-of-the-art equipment. The program provides direct, hands-on experiences to both on-campus and distance learning participants by leveraging internet-based remote operation of characterization equipment in the UK Electron Microscopy Center.

## Anatomical Sciences

The graduate certificate in Anatomical Sciences will provide a coherent integrated approach to helping graduate students, postdoctoral scholars, residents and others develop and document the skills needed in order to effectively teach the anatomical sciences. This 12 credit-hour certificate, including a required 3 credit-hour supervised practicum experience, provides basic competency in graduate-level anatomical sciences instruction and provides participants with documentation of their abilities. The certificate is accessible to participants from a wide range of disciplines and backgrounds and will

provide practical, hands-on anatomy course work and instructional mentoring. The certificate will produce graduates who are highly competitive in the job market, as the numbers of individuals able to provide graduate-level instruction in the anatomical sciences is well above crisis level.

## Applied Environmental and Sustainability Studies

The online Graduate Certificate in Applied Environmental and Sustainability Studies prepares graduates for positions in the corporate, government, and non-governmental worlds as a sustainability manager, corporate sustainability specialist, or one of many other fast growing environmental and sustainability professions.

Students take a total of 12 credit-hours of graduate coursework. This consists of 9 credit-hours in Environmental and Sustainability Studies and a methods/skills elective. The curriculum is available here.

## Applied Nutrition and Culinary Medicine

The Graduate Certificate in Applied Nutrition and Culinary Medicine is an online, 12-credit program. This unique graduate certificate is a collaborative effort across the Colleges of Medicine, Health Sciences, and Agriculture, Food and Environment, leveraging faculty expertise from biomedical, clinical and applied sciences. Core coursework explores nutritional approaches to various disease states and practical culinary strategies to bridge dietary recommendations with application. Elective courses allow students to tailor their graduate certificate to the needs of their practice or discipline, while also presenting the latest research concerning drug and nutrient interactions, approaches to community program development, and the physiologic basis for (or against) various dietary supplements. This graduate certificate aims to provide a better understanding and appreciation for the importance of nutrition education for health professionals (physicians, nurses, physician assistants, physical therapists and medical professionals in postgraduate training, etc.) in multiple disciplines, and to recognize the importance of engaging registered dietitians to enhance health outcomes in patients. Post baccalaureate students interested in graduate nutrition education that meet the prerequisite requirements will also be considered for admission.

## Applied Statistics

Statistical data analysis is ubiquitous in all areas of science, engineering, medicine, agriculture and education. Research and professional success in these disciplines often depends on using the latest advances in applied statistics. Multidisciplinary research projects involving a substantial component of applied statistics are becoming a frequent venue of expanding the borders of knowledge. This certificate will train graduate and professional degree students in the use of applied statistics in their own field. The students will be able to use this enrichment to become more productive professionals, to further research in their own areas and to engage in multidisciplinary research relying on applied statistical techniques.

## Assistive and Rehabilitation Technology

The graduate certificate in assistive and rehabilitation technology is a collaborative effort between the Department of Early Childhood, Special Education, and Rehabilitation Counseling and the Department of Rehabilitation Sciences in the College of Allied Health and the Human Development Institute. Students may choose an emphasis from either special education or rehabilitation counseling. Both emphases will require three foundation courses, one related elective and one practicum course for a total of 15 graduate hours. The content of the certificate is broad. Major areas include Assistive Technology Devices, Assistive Technology Assessment and Coordination of Assistive Technology Services.

## Autism Spectrum Disorders

The College of Education offers a graduate certificate in Autism Spectrum Disorders (ASD). The certificate is a collaborative effort between the department of special education and rehabilitation counseling, and the department of educational, school, and counseling psychology in the College of Education and the Department of Communication Sciences and Disorders in the College of Health Sciences. The primary purpose of this 15-credit hour certificate is to provide special education teachers and related personnel from across the state with advanced credentials that will allow them to implement evidence-based and research-based strategies. The certificate will accomplish the following:

- efficiently and effectively equip professionals to meet federal and state demands for quality
- provide professionals with the knowledge and skills to identify, use, and recommend research-based practices for students who have ASD, including students from culturally and linguistically diverse backgrounds
- provide personnel with knowledge and skills to work collaboratively with district and school-level teams.

The specialized five course ASD graduate certificate program will include competencies in the following areas:

- implementing evidence-based and research-based instruction
- using data from formal and informal assessments to guide instruction, and
- serving as specialists in district and school-wide programs to support students with autism in improving areas of communication, socialization, behavior, and access to the general education curriculum

## Baroque Trumpet

The certificate in Baroque Trumpet will complement existing programs in music education, music performance, and musicology. This new certificate program is needed because, currently, there is no Baroque trumpet component of any of these programs. Students in these programs study modern instruments. Their applied study (MUP 512, 612, 712, etc.) is on modern instruments, they are

assessed (in the form of a jury) on their modern instruments, and all instruction is on modern instruments. The Baroque trumpet is an entirely different (and arguably much more difficult) instrument. The Baroque trumpet is an 8-foot long instrument with no valves.

## Biostatistics

The graduate certificate in Biostatistics (GCB) is a 15-credit hour graduate certificate that allows students studying in programs outside the department of biostatistics to learn a basic background in the design and analysis of biomedical studies. The courses included in this certificate will provide students with an introduction to methodological applications in public health and medical research; skills that will be necessary for completing quantitative components of research projects and attractive to future employers.

## Child Welfare Practice

The Child Welfare Practice graduate certificate is a specialization that prepares students for advanced practice with children and families who experience abuse and neglect. Both public and private child welfare settings will be examined with special emphasis on improving outcomes for these children and families. The certificate course work focuses on the complex factors that contribute to maltreatment and neglect, and emphasizes intervention strategies including evidence-based practices and process models. This is a post-baccalaureate certificate, so students do not need to be enrolled in a graduate program to apply.

## Clinical and Translational Science

The graduate certificate in Clinical and Translation Science will serve as the entry point for graduate-level training in clinical and translation science. The curriculum is designed to establish knowledge-based and skill-based competencies in communication, professionalism, critical thinking and synthesis of knowledge, planning, management and assessment and leadership in five areas; CTS methods and technologies, scientific knowledge, measurement and statistics, research integrity and collaboration and team building. The certificate will be available to:

- faculty members at the University of Kentucky who are planning to participate in clinical and translational research but lack previous training and the skills necessary for clinical and translational research
- professionals in postgraduate training at UK, including residents and fellows in the college of medicine, college of pharmacy and college of dentistry
- graduate students in health-related PhD and MS programs
- project managers and other staff members interested in contributing to clinical and translation science
- professionals practicing in the community

## Clinical Social Work

The Clinical Social Work graduate certificate prepares students for advanced practice in clinical social work. The certificate is designed to move students from the broader foundation of generalist social work practice to an advanced level of clinical knowledge and skills including application of social work practice in a variety of clinical settings. This certificate in Clinical Social Work examines psychopathology, assessment and evidence-informed treatment strategies and will provide an educational foundation to help prepare practitioners who seek clinical social work positions.

## Cognitive Science

The cognitive science certificate provides students with the opportunity to study the information processing aspects of the mind. Participating faculty come from various departments in the College of Arts and Sciences (Anthropology, Biology, Linguistics, Philosophy, Psychology, and Statistics), as well as from the College of Engineering (Computer Science) and the College of Medicine (Anatomy, Behavioral Science, and Neurology). The graduate certificate is open to all graduate students at the University of Kentucky.

## College Teaching and Learning

The graduate certificate in College Teaching and Learning provides a coherent, integrated approach to helping graduate students, postdoctoral scholars, current faculty, and others develop and document the skills needed as part of conscientious preparation for the full range of faculty responsibilities at a range of institutions of higher education.

## College, Career, and Civic Life Teaching and Learning

The graduate certificate in College, Career, and Civic Life Teaching and Learning provides a coherent, integrated approach to helping graduate students, postdoctoral scholars, current faculty, and others develop and document the skills needed as part of conscientious preparation for the full range of faculty responsibilities at a range of institutions of higher education.

## Computational Fluid Dynamics

The graduate certificate in Computational Fluid Dynamics (CFD) is available, in principle, to all graduate students in engineering and the mathematical, physical and biological sciences. CFD is a generally recognized sub-discipline of fluid dynamics, complementing use of theory and experimentation in the analysis of fluid behavior from sub-micro scales to intergalactic cosmological distances. CFD is highly interdisciplinary and areas of current interest include biological flows (e.g. Air in respiratory systems and blood in circulatory systems of animals), flows in porous materials (e.g. Remediation of contaminated ground water, extraction of oil from marginal deposits) and combusting flows (e.g. For higher energy conversion efficiencies and less pollutant production). Thus, competency in the use of CFD is becoming critical to the advance of science and technology in the 21st century and it has become an essential engineering tool in industrial environments ranging from aerospace to food preparation and pharmaceuticals.

## Developmental Disabilities

The graduate certificate in Developmental Disabilities prepares professionals from a broad range of disciplines to play a leadership role in providing services and supports for people with developmental disabilities and their families. An emphasis is placed on developing skills in the field of disability research. The course work emphasizes a life span and interdisciplinary perspective with an emphasis on promoting self-determination, community integration and inclusion. In addition to a broad, interdisciplinary perspective, students acquire a basic foundation in a number of specific, topical areas such as specialized health care services and financing, inclusive education, behavioral supports, employment and community living options, advocacy, legislation, assistive technology, organizational development and theory, group facilitation, and research proposal development. All courses are taught by an interdisciplinary faculty. Students have the opportunity to participate in a practicum and work directly with individuals with developmental disabilities and their families. Students also complete a research project under faculty supervision. Three didactic courses (HDI 600, 602 and 604) and one practicum course (HDI 603) are required for the certificate. In addition to the required courses, two or three hours of elective course work is also required; either HDI 601, HDI 605 or one elective from outside HDI courses and those courses required in the student's degree program.

## Digital Mapping

The New Maps Plus graduate certificate in digital mapping is designed to serve the expanding landscape of mapping. This includes new professional sites and applications where maps are made by various people (from small business owners to non-profit managers to marketers) using all kinds of (often freely available) software and websites. Admissions requires a bachelor's degree but no prior GIS or mapping experience is necessary. Holders of the graduate certificate will be able to:

- Identify the appropriate applications of different forms of geospatial data, analytical techniques and mapping software platforms.
- Gather, integrate, transform and analyze geospatial data from multiple sources.
- Create static and interactive maps and visualizations in accordance with prevailing and rigorous cartographic standards.
- Develop basic web-based programs and scripts utilizing web standards to enhance user interaction with maps.
- Identify and implement appropriate applications of design components to maximize the usability of maps.
- Construct a publicly-available online portfolio of data, code, maps and accompanying explanations on an online sharing platform such as Github.

## Distance Education

In response to increasing student demand, a large number of postsecondary institutions and agencies in public health, government and private business are developing distance learning programs. However, distance education requires a unique set of skills for course program development,

management, support, and delivery. To prepare current and future faculty and administrators, the University of Kentucky offers a graduate certificate in distance education through the collaborative efforts of the Department of Early Childhood, Special Education and Rehabilitation Counseling and the Department of Curriculum and Instruction within the Instructional Systems Design (EISD) program and Distance Learning Programs.

## Diversity and Inclusion

The graduate certificate in Diversity and Inclusion is an online, 12 credit hour certificate designed for a wide range of professional backgrounds in recognition of our increasingly diverse world and workplaces. The certificate provides both the knowledge and tools to develop, promote, and support inclusive environments through 8-week, online courses designed by faculty. Skills and knowledge gained through the certificate are highly sought after by today's employers and would be beneficial to business administrators, health care professionals, government employees, educators, and non-profit organizations.

## Engineering in Healthcare

The Engineering in Healthcare graduate certificate offers didactic education and optional hands-on research experience in the application of engineering principles to healthcare problems. This 5 course/15 credit-hour (minimum) certificate is designed for students with a Bachelor's degree in engineering, chemistry, math or physics. Completion of the program will help students to:

1) distinguish themselves academically from their competition to professional school programs
2) engage in relevant educational experiences (including research) in the "gap year" between undergraduate studies and professional school
3) provide the foundation for enduring academic success by helping improve academic preparedness for professional school curricula
4) explore Biomedical Engineering as an adjunct (or primary) healthcare career option without formally committing to the master's degree program.

Students who complete this certificate have the option to apply most of the credits earned towards the Master's degree in Biomedical Engineering.

## Eurhythmics

The University of Kentucky Eurhythmics certificate, typically earned with three years of satisfactory engagement in the summer institute workshops, features courses that apply to the music teacher's work with students of all ages using an approach to music education created by Emile Jaques-Dalcroze. Additionally, successful completion of the University of Kentucky eurhythmics certificate can serve as an entry into study for the internationally-recognized Dalcroze certificate. The Dalcroze approach has three branches: eurhythmics trains the body to respond kinesthetically to rhythmic and dynamic concepts. Solfège trains the ear, eye, and voice in pitch, melody, and harmony. Improvisation enables students to respond to concepts according to their own invention, through movement, voice, and at an instrument.

## Executive Educational Leadership

The Graduate Certificate in Executive Educational Leadership is designed for school system leaders. The courses (EDL 676, EDL 677, EDL 678, EDL 682) correspond to the Kentucky Superintendent Licensure program and thus are a good fit for district-level leaders. In particular, this program is useful for private school and international school system leaders such as the role of Headmaster.

## Explosives and Blasting

The graduate certificate in Explosives and Blasting offers a formal education in the use of explosives for commercial applications such as mining and civil engineering. Those disciplines require the use of explosives to fracture and remove the rock, to extract valuable minerals or to emplace infrastructure. The curriculum is designed for mining and civil engineers or other engineering or related professionals that need to increase their knowledge in explosives and blasting. Significant areas include a review of basic concepts of explosives and blasting, advanced blast design, instrumentation for blasting, and the environmental aspects of blasting. The Explosives and Blasting Graduate Certificate is authorized to be delivered via online or hybrid format to students who are physically located in SARA member states and territories. Students who are residents of Kentucky have a waiver of 12 months towards the state blasting license.

## Family and Consumer Sciences

The Family and Consumer Sciences graduate certificate program provides students with the knowledge and skills to positively impact the quality of individual and family life. The coursework provides students with the ability to amplify critical-thinking skills to address problems in diverse family, community, and work environments. Program graduates will enhance capacity-building skills that empower individuals and families to thrive in an ever-changing society. The 12-hour certificate is available to graduate students, as well as to practicing professionals and may be taken as a stand-alone program or as a part of a graduate degree program. The Family and Consumer Sciences graduate certificate is designed to partially meet the elective concentration component of the MS in Science Translation and Outreach.

## Fundraising and Development

The graduate certificate in Fundraising and Development is designed to provide critical fundraising education to those who are currently working or seeking employment in nonprofit organizations. Nonprofit organizations across the United States are dependent on educated and skilled fundraisers. According to the National Center for Charitable Statistics there are more than 1.5 million registered nonprofit organizations – nearly all dependent on raising contributed income through fundraising efforts. Educational institutions, health, human services, relief agencies, arts and religious organizations are all reliant on donated funds to serve their beneficiaries. Therefore, knowledgeable fundraisers are needed to direct these efforts. Competition for fundraising has resulted in a strong job market and created a greater need for skilled and educated fundraisers.

## Gender and Women's Studies

The graduate certificate in Women's Studies is intended to provide students with a coherent, interdisciplinary grounding in current gender and women's studies scholarship and to create an intellectual community among faculty and graduate students who share scholarly interests in gender and women's studies. The graduate certificate in women's studies may be taken to complement a student's disciplinary program, or it may be taken independent of the pursuit of any disciplinary graduate degree. For full information on this curriculum, please see our web page: https://gws.as.uky.edu/gws-graduate-certificate

## General Radiological Medical Physics

The field of Radiological Medical Physics is the study of the use of radiation to diagnose and treat human diseases and is a relative newcomer in medically-related scientific disciplines. The first "radiological physics" practitioners were trained in the basic sciences, typically physics. Dedicated radiological medical physics education programs are a recent phenomenon. These programs strive to combine the scientific and medical aspects of the field but they remain small and few in number. To help meet the demand for workers in radiological medical physics, it has been common over the past 40 years to accept persons with closely related scientific backgrounds into the field and provide them with on-the-job training. Even today, a large fraction of practicing radiological medical physics have degrees in fields other than radiological medical physics. Many of these are leaders in the field and their contributions have been and will remain very important. Their work experience has traditionally provided the pathway into certification for these radiological medical physicists. However, given the recent changes adopted by the medical physics education community, these potential outside candidates must document completion of a basic core curriculum in radiological medical physics in addition to a Ph.D. Degree received in a closely related discipline in order to qualify for certification by the American board of radiology (ABR) in radiological physics. The curriculum credit hours required for the graduate certificate in radiological medical physics totals 16.

## Gerontology

The graduate certificate in Gerontology is an interdisciplinary curriculum offered by the Sanders-Brown Center on Aging. The certificate is a part of Sanders-Brown's complete range of research and educational activities that prepare both graduate students and practicing professionals from many disciplines to assume key roles in improving the quality of life for older adults and furthering our understanding of the aging process. Its interdisciplinary focus makes it possible for students to tailor their course work to support their own fields of interest.

## Global Health

The goal of the graduate certificate program in Global Health is to provide a general foundation in the understanding of global health issues and the complex multiplicity of factors that affect them, and to provide some basic tools in health assessment methods to measure their impact. Given the widespread globalized nature of our world today, there is an increasing need for understanding the impact of

globalization on health, both in terms of health patterns common across regions, and in terms of how what were once considered focal, limited local issues can transcend national and continental borders. The program is designed to prepare students for the increasing demand for international, interdisciplinary skills in the areas of public health prevention, health care and other health-related disciplines. The global health certificate will include a minimum of 15 credit hours - 12 of classroom coursework and 3 based on a required international internship course. The program is housed in the college of public health, but it is intended to be multidisciplinary and open to a variety of graduate students in any of the health sciences or other disciplines across campus. It is also available to professionals or other college graduates interested in obtaining this additional training.

## Health Coaching

Health Coaching has been defined as, "…the practice of health education and health promotion within a coaching context, to enhance the wellbeing of individuals and to facilitate the achievement of their health-related goals" (Palmer et al., 2003). Health coaches help clients identify their goals, develop an action plan, and help put the plan into action while giving support and helping to motivate clients toward success. The Department of Kinesiology & Health Promotion at the University of Kentucky proposes a new 15-credit graduate certificate in health coaching designed to meet the supplemental education needs of current health promotion professionals and those training to become health promotion professionals. The graduate certificate would be open to any students who are already are or will be enrolled in a degree program, or those who simply apply for postbaccalaureate (non-degree) status in order to complete the certificate, are eligible to apply for admission.

## Health Communication

The graduate program in Communication offers a certificate in Health Communication that is available to (a) students in the Ph.D. And M.A. programs in communication, (b) students in other doctoral programs at the university and (c) post baccalaureate students. The certificate program is aimed primarily at individuals interested in developing specialized knowledge and research expertise in health communication that could be applied within both academic and nonacademic settings. Students are expected to have a background in social or behavioral science prior to entering the program. To earn the certificate, students must complete CJT 671 and 771 and either CJT 780 (section focusing on a health communication topic) or a graduate course in medical informatics, for a total of 12 credit hours.

## High Performance Coaching

The University of Kentucky Department of Kinesiology and Health Promotion offers a Graduate Certificate in Health Coaching. Health Coaching has been defined as, "…the practice of health education and health promotion within a coaching context, to enhance the wellbeing of individuals and to facilitate the achievement of their health-related goals." The aim of the Graduate Certificate curriculum is to provide a foundation in current behavior change theories/models, motivational interviewing, as well as understanding of current health issues. Students may complete the certificate as a complement to a graduate disciplinary degree program or as a stand-alone curriculum. Students who are currently enrolled as a graduate student in a department at the University of Kentucky are

encouraged to apply for the Health Coaching Graduate Certificate program early in their graduate studies. Students who are enrolled in the M.S. in Health Promotion program are eligible to count up to 9 credit hours from their program, requiring them to take six additional credit hours (on top of their M.S. curriculum) to complete the graduate certificate.

## Historic Preservation

The graduate certificate in Historic Preservation is now available to both graduate students and practicing professionals. Certificate students have a choice of three areas of concentration: preservation and design; preservation and economic development; and preservation and planning. The certificate requires 12 credit hours, and is a great way to gain an advantage in an increasingly competitive job market. The certificate consists of two core courses, and two courses from the area of concentration. The graduate certificate may be earned concurrently with a master's degree in any other field, such as architecture, interiors, history, anthropology, engineering, or business. It may also be earned by professionals who already possess a bachelor's degree in another field. Previous design experience or education is not a requirement for acceptance into the certificate program. Knowledge of the values and legal framework that drives preservation decisions is useful to numerous professions in today's world. Certificate students will learn preservation principles, tools, and techniques that will allow them to apply their base knowledge within a historic context.

## Human Technology Interaction

The certificate in Human-Technology Interaction brings together students in the social, behavioral, and health sciences with students in the design professions. It is intended specifically for:

1) those in the social, behavioral, and health sciences who would like to learn how their disciplinary knowledge can be used to enhance the safety, productivity, and satisfaction of people interacting with both "high-tech" and "low-tech" systems
2) those in the design professions who would like to apply principles derived from the study of human abilities, limitations, and preferences to the design of new or modified technology. Students from engineering, instructional systems design, architecture, graphic design, computer science, and other design fields are welcome to apply
3) those interested in exploring career options in ergonomics, human factors psychology, or usability engineering.

The certificate requires 15 hours of graduate work, including two foundation courses, two elective courses, and one practicum or research experience.

## Improving Healthcare Value

The Graduate Certificate in Improving Healthcare Value is an inter-disciplinary program and will be led by a small team composed of senior faculty members from the College of Public Health, the College of Business and Economics, and the College of Engineering. This certificate is intended to create educational opportunities for UK graduate students in a range of disciplines, for UK HealthCare staff, and for other healthcare workers to enhance their knowledge and skills related to improving the value

(quality and cost) of health care services provided by hospitals, health systems, and academic medical centers.

## Inclusive Education

The Inclusive Education Graduate Certificate responds to the critical and growing need for general education teachers to have adequate support in serving the students with disabilities in their classrooms. This 5-course program prepares general educators, educational leaders, and other school personnel to team with specialists to design and deliver effective accommodations, modifications, and interventions within general education settings.

## Instructional Coaching

The graduate certificate in Instructional Coaching prepares veteran educators to lead job-embedded professional development efforts in P-12 schools. The two required courses (ELS Leadership in Communities of Practice, EDL 638 Instructional Coaching and Mentoring) and an elective course (ELS 600 Leadership in Learning-Centered Schools, EDL 669 Leadership for Creative Problem Solving, or ELS 624 Leadership Practicum) provide leadership development focused on facilitating teacher teams, coaching novice and veteran teachers, solving problems creatively, and supporting adoption of innovation and renewal initiatives. This certificate is one of four offered by the Department of Educational Leadership Studies.

## Instructional Communication

The 12-credit hour graduate certificate in Instructional Communication is designed to help students achieve instructional communication competency that can be applied in a wide range of contexts. Specifically, this program will:

1) provide students with a multi-faceted view of instructional communication theory and research methods
2) prepare to students to effectively plan, lead and assess communication effectiveness in diverse instructional contexts
3) provide students with the knowledge and skills to be competitive in a knowledge and technology-driven society.

## International Education

The graduate certificate in International Education will prepare graduate students for careers in international education, including but not limited to education abroad, international student services, and placement in other international organizations which support the exchange of students. The field of international education is a critical component of the internationalization of higher education in the united states and abroad. This certificate is designed for any graduate student (or admitted postbaccalaureate student) wishing to enhance their graduate degree. The proposed curriculum includes a combination of nine hours of core courses and six hours of elective coursework. In preparing to complete their certificate, students must identify a regional concentration, and are encouraged to

participate in some form of professional or experiential learning opportunity to acquire skills in management, program development, and/or assessment. Although the certificate does not require language coursework as part of the curriculum, participants are also required to describe their language proficiency relative to their professional and regional concentration so that they are aware of and prepared to be competitive in the field.

## Latin American, Caribbean, and Latino Studies

This certificate is directed primarily at graduate students whose intended academic and/or professional careers in research, teaching, and public or private sectors incorporate a focus on the geographical and cultural region of Latin America, the Caribbean, and the populations of Latin American and Caribbean descent living in the united states, Europe, and other parts of the world. It provides graduate students with the skills and knowledge to connect Latin American, Caribbean, and Latino topics to their research agendas. It is pursued concurrently with, the regular MA and PhD degree programs of participating departments. To be awarded the graduate certificate in Latin American, Caribbean, and Latino/a studies, the student must successfully complete four courses amounting to 12 graduate credit hours with an overall GPA of 3.0 or higher.

## Latin Studies

The Latin Studies certificate curriculum, consisting of a sequence of four courses in Latin language and literature, aims at two groups of students in particular. First, it is aimed at graduate students who need strong Latin skills for any academic discipline in which Latin is important, including not only classics, but also history, philosophy, theology, etc., and who are already engaged in, or hope to undertake advanced study in one or more of these fields. The certificate curriculum will offer to such students an interdisciplinary opportunity to gain a superior command of Latin in a highly concentrated format, but in a relatively brief period of time. Second, it is aimed at the training of new Latin teachers for the high school level and even pre-high school instruction. The Latin studies certificate curriculum will be highly useful for those interested in teaching Latin, because it will provide a much deeper immersion in Latin language and literature than what has so far been usual for students seeking careers as Latin teachers, and will ensure that all who complete it acquire not merely reading skills, but also considerable active command of the language.

## Leadership for Deeper Learning

The graduate certificate in Leadership for Deeper Learning examines the systemic changes to teaching and learning within schools. The courses within the certificate (EDL 662 Leading for Next Generation Learning, EDL 664 Assessment Leadership, ELS 620 Leading Action Research and Inquiry 1) focus on inquiry learning, project-based learning, performance assessments, competency learning models, and a variety of other components of systems of teaching and learning that provide deeper, more equitable learning opportunities for students in educational organizations. This certificate is one of four offered by the Department of Educational Leadership Studies.

## Lean Systems

Lean Systems is a proven technique for reducing waste, improving productivity, and increasing the bottom line found to be effective across many industries, businesses, and organizations. Companies spend a lot of money educating their current employees and place a high premium on new graduates who have already acquired knowledge in the field. The graduate certificate in lean systems is based on the Toyota production system (TPS) and requires 12 credit hours of coursework.

## Liberal Studies

There is a persistent and growing demand among employers for workplace professionals who possess strong communication, research, and critical thinking skills beyond those attained as undergraduates. These skills can be difficult for people to continue developing after completion of the initial Bachelor's degree.

Drawing on the Liberal Arts disciplines, the Online Graduate Certificate in Liberal Studies offers students the possibility to develop proficiencies from among a cluster of significant employment-related skills, such as critical and complex thinking, clear writing and communication, effective collaboration, research, cultural literacy, and awareness and sensitivity to the context and historical attributes of key issues in today’s society.

The certificate's flexible curriculum allows students to easily tailor highly individualized programs of study to their own pace. The certificate will augment students' career and professional opportunities by helping them to become better decision makers; more effective strategists and thinkers; better leaders and team members; more socially and historically aware citizens; and more adept writers and communicators.

The Graduate Certificate requires 12 credit hours of coursework including one core course (PHI 522 Advanced Critical Thinking) and three additional courses from the list of approved courses (students must take courses from at least two of the five fields of inquiry).

## Manufacturing Systems

Competitive markets require manufacturing organizations to be increasingly efficient, innovative and sustainable. Highly skilled manufacturing engineers with advanced technical knowledge and capabilities are essential to the success of these organizations. The Manufacturing Systems certificate program is designed to develop manufacturing engineers with the knowledge, skills and attitude required for value creation by designing, manufacturing and managing more sustainable products, processes and systems. The certificate is structured as a four course program with all courses available entirely online. It provides graduate level qualifications for engineers and manufacturing professionals in industry who are interested in expanding their qualifications with less of a time investment than is required for a full master’s degree.

## Military Behavioral Health

The graduate certificate in Military Behavioral Health curriculum will benefit students by enhancing their understanding and appreciation of cultural and environmental factors that affect individual and family functioning for military and veteran populations. They will gain skills in assessment, intervention, and prevention of psychosocial problems typically encountered by this population. In order to earn the graduate certificate students must complete a total of 12 credit hours. Students will complete three designated 3 credit hour courses, SW 530 responding to military and veteran populations {appendix I), and SW 738 independent work with military populations (appendix II}, FAM 759 special topics: working with military families. Eligibility is limited to students who hold, or are pursuing, a graduate degree in the counseling professions. These include social work, family sciences, clinical psychology, and educational, school and counseling psychology. Graduate and post-graduates from other human services disciplines may petition the advisory board for acceptance to the certificate. Exceptions will be evaluated by the advisory board on a case-by-case basis. The board will consider exceptions based on assessment of the applicant's academic and vocational history. All applicants must apply to the certificate director for admission.

## Musculoskeletal Injury Management

The Graduate Certificate in Musculoskeletal Injury Management is designed to provide advanced education and clinical experience for credentialed clinicians (i.e. Athletic Trainers, Physical Therapists, Occupational Therapists, Physicians, Physician Assistants, etc.) that manage injuries in physically active populations. Graduates from our program will emerge as advanced clinicians with post-professional knowledge and clinical experience that will be highly competitive for positions providing healthcare services in a variety of employment settings (i.e. traditional athletics, physician's clinic, out-patient rehabilitation setting, occupational setting). Students will receive focused coursework that provides advanced didactic education related to mechanisms of musculoskeletal injury and current evidence for clinical management of these conditions. We will couple this with hands-on laboratory learning that will advance the learners knowledge, skills and abilities related to evaluation and treatment of musculoskeletal injuries. Students enrolled in this certificate program who hold the athletic training credential may be eligible for an Athletic Training Fellowship. These Fellowships will provide students the opportunity to work as an Athletic Trainer with one of our clinical partners to provide athletic training services in a variety of settings, including collegiate, high school and middle school athletics.

## Music Theory Pedagogy

The graduate certificate in Music Theory pedagogy is intended primarily for DMA. (Doctor of Musical Arts students who wish to gain experience and expertise in theory pedagogy in order to strengthen their background for increased marketability in higher education. Students desiring admission into this certificate curriculum will be interviewed by a committee consisting of members of the theory faculty and a music faculty member outside of theory. The interview will include an appraisal of the student's keyboard proficiency, sight-singing and aural skills, and understanding of theoretical concepts. The student's scores on graduate entrance exams in music theory will also be assessed. It is assumed that

any student granted admission into the certificate curriculum would have been accepted as a student in the Graduate School.

## Next Generation Teaching and Learning

Next Generation Teaching and Learning incorporates 21st century skills (collaboration, communication, technology, critical thinking, problem solving and performances of learning), is a current direction in educational endeavors in a variety of learning environments from k-12 classrooms and teacher professional development to museums and after-school programs. This certificate combines required next generation foundations and assessment components with specialty electives, representative of cutting-edge innovative pedagogy. The certificate comprises 12 hours of graduate coursework as follows: nine (9) credit hours of required course work comprised of three (3) hours of the next generation learning foundations course, three (3) hours of an internship choice, three (3) hours of a course on data-driven decision making and a final three (3) chosen from specialty course options. A key purpose of the certificate work is a demonstration of research to practice knowledge and skills, through implementation and assessment of next generation pedagogy in a field setting.

## Nonprofit Management

The Graduate Certificate in Nonprofit Management is designed to provide skills to support graduate students and professionals in leading, directing, and managing organizations in the nonprofit sector. The certificate benefits students seeking careers in the nonprofit sector, professionals currently working in the nonprofit sector, and government employees transitioning to the nonprofit sector. The certificate includes 12 credit hours comprised of three mandatory classes and one elective focused on unique aspects of the nonprofit sector including management, finance, and organizational operations. The graduate certificate can be obtained as a stand-alone program but can also be integrated with other degrees offered by the Martin School of Public Policy and Administration. The certificate also offers flexibility as students may complete the program partially or fully online. Two of the required courses are offered in the traditional, face-to-face modality each fall, so students can choose to take those sections or the online sections. The spring courses are only offered online. For more information visit https://martin.uky.edu/

## Orff Schulwerk

Orff Schulwerk is the music approach created by composers Carl Orff and Gunild Keetman. The Schulwerk is a way to teach and learn music using poems, rhymes, games, songs, and dances as basic materials. The University of Kentucky offers Schulwerk teacher training courses, mostly in the summers, taught by Orff experts. Training is given at levels 1, 2, 3 and advanced master's courses in different topics such as curriculum design, and composition. The graduate certificate in Orff Schulwerk is a twelve-hour curriculum in four components:

1. Orff teacher training level one (MUS 560/561, 2-4 credits).
2. Orff teacher training level two (MUS 560/561, 2-4 credits).
3. Orff teacher training level three (MUS 560/561 2-4 credits)

    a. Or Orff master courses (prerequisite: Orff teacher training level 2)
4. Certificate project (MUS 767 1-3 credits) (prerequisite: Orff teacher training level 2)

Each student must take all four of the components, each at two credits minimum, for a total of 12 credit hours. Each component is offered at variable credits. All credits earned in this certificate may be applicable towards the Master of Music in Music Education degree (M.M.M.E.) or the rank i in music education program. Admission requirements are the same as those in effect for post-baccalaureate status, and approval of the certificate director. The certificate is awarded upon completion of the certificate curriculum within five years, and with a minimum of 3.0 GPA.

## Physiology Teaching

The graduate certificate in Physiology Teaching provides a mechanism for students to document their competency in the basic skills necessary to teach a comprehensive physiology course. The certificate will be accessible to participants enrolled in a wide range of biomedical disciplines, but it will be especially valuable to medical science graduate students that anticipate a career in academic physiology. This 15-hour certificate is significant in that many doctoral programs in the medical sciences emphasize preparation for a research-oriented career but do very little formal instruction related to education and teaching. Our department has historically placed a high emphasis on the training of graduate students for both research and teaching careers. This certificate will recognize and document that emphasis for the students that choose to complete the certificate requirements. As research in physiology becomes more specialized, utilizing molecular and cellular approaches, there is a very real and distinct demand for physiology instructors that have experience in all levels of physiology teaching, especially systems physiology.

## Positive Youth Development

The graduate certificate in Positive Youth Development (PYD) is designed to provide students with a background in PYD frameworks and how these can be used to create intentional learning experiences in non-formal educational situations. This 12 credit-hour certificate includes 9 hours of required courses and 3 hours in an elective selected by the student. Completion of this program provides basic competency in the science of PYD at the graduate level along with documentation of their abilities. The certificate is accessible to participants from a wide range of disciplines and backgrounds and is available fully online. The certificate will provide students with the knowledge base they need to demonstrate an understanding and commitment to PYD principles and their intentional inclusion in non-formal learning experiences.

## Power and Energy

The purpose of the proposed graduate certificate in Power and Energy is to provide students with state of the art knowledge in power and energy areas and produce well trained graduates in Power and Energy areas. It is anticipated that there will be a substantial shortage of power and energy professionals in the national labor force in the near future. To help train more power and energy engineers, the department of energy (DOE) issued a call for proposals on power and energy workforce

training in December 2009. The college of engineering submitted a proposal and was awarded a grant to create a Power and Energy Institute of Kentucky (PEIK)to train the next generation of power and energy professionals. As part of the proposal, we have proposed to offer a graduate certificate in power and energy. In close collaboration with industry, the institute will combine existing UK College of Engineering power engineering courses with newly created courses to provide students with an attractive, clearly-marked pathway into the power engineering workforce.

## Power Systems

The online Graduate Certificate in Power Systems is designed to provide students with the core knowledge and latest advancements in power systems analysis, modeling, operation, control, optimization, and integration of renewable energies, and produce well trained graduates in this specialty. Students will learn the theory in various aspects of power systems and master the tools and techniques for planning and operating power systems and solving real-world problems.

The credits earned through this certificate will count towards the MS or PhD degree in electrical engineering if the students decide to continue their graduate studies at UK.

## Professional and Technical Writing

The Graduate Certificate in Professional and Technical Writing provides immediate workplace skills and knowledge in organizational writing, manual writing, policy writing, technical writing, grant writing, and technical legal writing. It is designed for working professionals who are interested in continuing their education in professional and technical writing. All courses are online, and the certificate can be completed in a flexible and timely manner.

## Public Financial Management

The Martin School of Public Policy and Administration offers a fully online Graduate Certificate program in Public Financial Management. This program is attractive to students desiring an introduction of class offerings in public financial management. The online 12 credit hour Graduate Certificate program in Public Financial Management fills an additional niche as an alternative for those who are not interested in seeking a full master's program in that area. Students may apply the coursework towards the corresponding Master's in Public Financial Management upon completing the graduate certificate. The graduate certificate includes 4 mandatory courses (PA 631, PA 632, PA 625, PA 627) focused on public financial management, public funds management, and governmental accounting and auditing. The courses are offered annually, allowing students to complete the certificate in two semesters. The Graduate Certificate in Public Financial Management is designed to meet the current and expanding national demand for well-trained financial managers for public and non-profit organizations. The curriculum can also be a desirable means of professional development training for employees in the public sector. The Graduate Certificate in Public Financial Management is approved by the Kentucky Department of Education to qualify for mandatory continuing education credits for school finance/budget officers. For more information about this program visit https://martin.uky.edu/.

## Research Methods in Education

The RMinE Graduate Certificate provides students with the ability to specialize in education research methods that can be applied to a host of disciplines, e.g., social sciences, physical sciences, K-12 instruction/administration, and business. The certificate combines 12 hours of core courses and 3 hours of elective coursework for a total of 15 hours. Students will receive a foundation in a range of approaches to research, including quantitative methods, assessment, evaluation, and measurement, which can be applied at the introductory level to their specific fields. The program is open to all University of Kentucky students admitted to the Graduate School who want to demonstrate they have completed rigorous coursework in research methods.

## Risk Sciences

The graduate certificate in Risk Sciences provides the foundational understanding of risk and crisis communication and the opportunity to develop practical application of this knowledge. Organizations and entities of various sizes are becoming keenly aware of the need for effective communication in risk and crisis contexts. This certificate will prepare students to meet this need. The certificate will require twelve credit hours, including risk communication, crisis communication, training and consulting, and knowledge management. Research implications (both theoretical and practical), lessons learned, and new theories of community risk communication will be included in the curriculum.

## School Social Work

The graduate certificate in School Social Work is designed to prepare social workers to practice school social work, a specialized field of practice. The program also meets the Kentucky education professional standards board mandated requirements for school social work certification. The certificate program is available to: (1) UK degree seeking graduate students in the master of social work program, and (2) post-baccalaureate (non-degree) students who already hold the MSW degree from a CWSE accredited social work program. The minimum credits required are 17 for the MSW program students and 9 for post-baccalaureate students who hold the MSW. Applications for admission are evaluated, and students' progress is monitored and approved by a committee made up professors from the Colleges of Social Work and Education.

## School Technology Leadership

The graduate certificate in School Technology Leadership is conceptually framed around the international society for technology in Education's National Educational Technology Standards for Administrators (NETS-A). Students who engage in this graduate certificate will typically be educational administrators at all levels who want to learn how to support technology-suffused education and lead digital-age schools. This certification is focused on creating skills and dispositions for individuals committed to making systemic and lasting changes in schools, districts, states, and nations.

## Social Theory

This certificate offers students systematic multidisciplinary training in social theory. It augments, and is pursued concurrently with, the regular MA and PhD Degree programs of participating departments. In total, the certificate requires ten hours of course work, can be pursued in tandem with regular degree programs, and is open to all graduate students at the University of Kentucky.

## Sport, Fitness, and Recreation Management

This 12-credit graduate certificate in Sport, Fitness, and Recreation Management is designed for current professionals to increase their understanding of leadership skills and principles. The graduate certificate will offer students the opportunity to be a part of the University of Kentucky tradition, while also advancing a knowledge base in leadership principles including but not limited to: legal issues, policy & governance, and historical foundations of athletics.

## Stream and Watershed Science

The Stream and Watershed Science graduate certificate provides students with an understanding of the complex physical, biological and social systems involved in stream and watershed related issues. The certificate has an interdisciplinary focus and is administered by faculty in Biosystems and Agricultural Engineering with an advisory committee consisting of faculty representatives from the College of Agriculture, Food and Environment, College of Arts and Sciences, and College of Engineering; the Center for Applied Energy Research; the Gatton College of Business and Economics; and the Graduate School. Students may earn the certificate while making normal progress towards attainment of an MS, MA or PhD degree or while enrolled in post-baccalaureate status.

## Structural Engineering

Expand and deepen your expertise in structural engineering analysis and design. The online Graduate Certificate in Structural Engineering is designed to provide all engineering students with core knowledge in prestressed concrete, steel structures and matrix structural analysis. The courses will be beneficial to current engineering students and practicing engineers.  The Certificate offers three (3) courses, 3-credit hours each, to provide technical skills required to develop more sustainable and resilient infrastructure. The courses can be applied toward graduate degrees in civil or other engineering fields. Additionally, each course can provide significant professional development hours that potentially satisfy a state's Engineering professional licensing requirements.

## Teaching English as a Second Language

The objectives of the 12-credit hour graduate certificate are three-fold:

1. Prepare teachers skilled in supporting the development of English language learners
2. Provide candidates with a rigorous introduction to the core disciplines in English language teaching: linguistics, language acquisition and pedagogy
3. Provide candidates with field-based experiences and in-class teaching opportunities in order to develop practical knowledge and skills of second language classroom teaching practices.

## Teaching in Culturally and Linguistically Diverse Classrooms

The graduate certificate in Teaching in Culturally and Linguistically Diverse Classrooms addresses increasing demand to prepare teachers to better address the learning needs of K-12 classrooms with increasing cultural and linguistic diversity among students. Certificate coursework takes a comprehensive approach to supporting English Learners and other historically under-served populations by addressing aspects of cultural and linguistic diversity across the curriculum within a regular classroom context. Coursework supports students in developing a knowledge base, planning, and application of strategies related to language and literacy development, second-language acquisition, classroom relationships, family collaboration, assessment, instruction, discourse, and socio-political consciousness.

## Telehealth

This one-year 9-credit online interprofessional certificate methodically prepares you to be a leader in the development, implementation, and evaluation of telehealth models. Course content will cover information relevant to telehealth use across generations and associated contexts of care (e.g., medical, schools, home). Upon completion of the certificate, you will be able to:

1. Implement telehealth in a variety of settings with diverse patient populations across the lifespan in accordance with professional ethics and state and federal rules and regulations.
2. Train support personnel to assist the healthcare provider and patient during a telehealth encounter.
3. Develop, market, and evaluate a telehealth program considering multiple levels, including consumer, provider, organization, community, and policy.
4. Use interprofessional practices within a telehealth model.

## Tobacco Treatment Specialist

The Tobacco Treatment Specialist Graduate Certificate provides extensive knowledge and counseling skills training for treating tobacco dependence, the number one cause of preventable death and disease. The certificate content is divided into three 3-credit hour courses (NUR 621, 622 and 623) and is valuable to persons working in healthcare, including behavioral health, health promotion and prevention, and public health. Participants will critically review the literature on tobacco products and use, health effects, treatment, prevention, and policy. The certificate is an extension of the accredited BREATHE Tobacco Treatment Specialist Training. Successful completion of this program will provide participants with a certificate that can be used as eligibility to apply for a national certificate in tobacco treatment practice.

## Vocal Pedagogy

In order to increase marketability in higher education and be prepared to meet the challenges of teaching voice in the 21st century, the graduate certificate in Vocal Pedagogy is intended primarily for students pursuing a Master of Music (MM) and Doctor of Musical Arts (DMA) degrees in voice and choral conducting who wish to gain more experience and expertise in the science and art of teaching.

The proposed certificate could also be pursued by: 1) college and high school choral conductors interested in vocal health and production; and 2) graduate students in communication disorders in the College of Health Science looking to increase their knowledge and understanding of the singing voice. Many new openings in higher education look favorably toward those candidates with secondary areas of expertise and especially pedagogical training. This certificate could be pursued concurrently with the regular MM and DMS degree program of the school of music. The certificate requires the completion of 15 credit hours.

# COLLEGE OF AGRICULTURE, FOOD, AND ENVIRONMENT

# Agricultural Economics

## College of Agriculture, Food & Environment

The Department of Agricultural Economics provides programs leading to the degrees of Master of Science and the Doctor of Philosophy. Graduate Faculty in the department provide areas of emphasis in agricultural policy, price analysis, agricultural marketing, agribusiness, farm management, domestic and international economic development, and resource and production economics. Students must complete a core of courses in agricultural economics, economics and statistics.

Students holding degrees in agricultural economics are employed by academic institutions, local, state, and federal agencies that deal with agriculture, natural resources and economic development; private firms in the agricultural and business sectors; and agencies and governments of foreign countries. These agricultural economists conduct research, develop extension services, teach classes, and serve as managers and administrators in various types of firms and agencies.

**Admission Requirements**
Students entering the M.S. program are expected to have at least one course in each of the following areas: intermediate microeconomics, intermediate macroeconomics, calculus, and statistics. An undergraduate degree in economics is advantageous, as is a good background in mathematics. There are no minimum GPA or GRE requirements beyond those of the Graduate School, but such information, along with letters of recommendation, is used qualitatively in the admission decision.

Students entering the Ph.D. program are expected to have the following courses: at least a two-course calculus sequence, M.S. level microeconomic theory, M.S. level macroeconomic theory, and statistics theory. Some of these courses may be taken during the student's first semester. A Master's degree in a relevant discipline is generally required for entry into the Ph.D. program. In exceptional cases a student may be admitted directly to the Ph.D. program with only a Bachelor's degree. There are no minimum GPA or GRE requirements beyond those of the Graduate School, but such information, along with letters of recommendation, is used qualitatively in the admission decision.

**Admission Requirements**
The master's program is offered in either Plan A or Plan B. The thesis option (Plan A) requires a minimum of 24 hours of graduate credit, a research thesis and an oral final exam. Plan B requires a minimum of 36 hours of graduate credit and an oral final exam. In addition to the course work requirements, students in the Ph.D. program are required to take a comprehensive examination in microeconomics administered by the Department of Economics. Students also must complete a second-year research paper requirement as part of the preliminary examination requirements. The student must defend a dissertation prospectus during the preliminary oral examination. The ability to conduct original research in agricultural economics, documented through the completion of a dissertation, is required.

Graduate students have considerable flexibility to structure their program with respect to course work and research topics consistent with individual interests. Each student has a major professor and an advisory committee to assist in course work selection and in the thesis and dissertation research.

A graduate handbook is available that provides information regarding program content, degree options and available financial assistance.

# Course Descriptions

AEC 503 PRICE THEORY AND APPLICATIONS. (3)
This course uses calculus to develop core concepts in microeconomics and show how they can be applied to agricultural and natural resource issues. A central objective of this course is to link mathematical techniques with economic analysis to show students that calculus provides an efficient way to study producer and consumer behavior. Prereq: AEC 303 and MA 113. [Offered in fall only.]

AEC 510 INTERNATIONAL TRADE AND AGRICULTURAL MARKETING. (3)
A study of institutional, economic and cultural factors that influence aggregate agricultural trade and exports of individual agribusinesses. Macro issues of agricultural trade policies are examined along with elements of international marketing for agricultural products. Prereq: AEC 303 (or equivalent) and AEC 305. [Offered in fall only.]

AEC 531 AGRICULTURAL PRICE ANALYSIS. (3)
The course links calculus-based microeconomic theory, industry-specific pricing systems, and empirical analysis of agricultural and food markets ranging from farm inputs to the consumer level. Students gain experience with tools and techniques used in empirical analysis of supply and demand. Prereq: AEC 503 and (ECO 391 or STA 570). [Offered in spring only.]
AEC 532 AGRICULTURAL AND FOOD POLICY. (3)
This course surveys a variety of current public policies that influence the agricultural and rural economies. Students are exposed to the conflicting views of those concerned with food and agricultural policy issues in an international economy. Economic principles are used to evaluate alternatives in terms of the general welfare of society. Prereq: AEC 303 and AEC 305. [Offered in spring only.]

AEC 545 RESOURCE AND ENVIRONMENTAL ECONOMICS. (3)
This is an advanced level course focused on economic analysis. It will help students frame natural resource and environmental problems so that they can be analyzed and solved. Major topic areas include water resources, fisheries, energy (and other non-renewable resources), agriculture, and pollution. Policy instruments such as pricing, emission fees, and tradable permits will be covered in detail. Prereq: AEC 303 or AEC 445G or consent of instructor. (Same as NRE 545.) [Offered in fall only.]

*AEC 580 SPECIAL PROBLEMS IN AGRICULTURAL ECONOMICS. (1-3)
Directed independent study of a selected problem that generally is sustained over an entire semester, requires data analysis, and results in a significant written product suitable for publication. May be repeated to a maximum of six credits. Prereq: Consent of instructor, director of undergraduate or graduate studies and completion of a proposed plan of learning objectives and outcomes prior to registration. [Offered in fall, spring and summer.]

*AEC 590 INTRODUCTION TO QUANTITATIVE ECONOMICS I. (3)
An introduction to mathematical approaches to economic theory. Emphasis on linear models, constrained optimization, and techniques used in comparative statics. Prereq: ECO 401 and MA 213, or graduate status, or consent of instructor. (Same as ECO 590.) [Offered in fall only.]

AEC 606 ADVANCED AGRICULTURAL MARKETING. (3)
A critical examination of objectives and results of various types of research in market organization, marketing functions, price analysis, markets over time, space and form, market information, commodity promotion programs, quality standards, and macroeconomic linkages to marketing. Prereq: AEC 624 and ECO 601 (may be concurrent). [Offered in fall only.]

AEC 610 INTERNATIONAL TRADE IN AGRICULTURAL PRODUCTS. (3)

This course analytically examines current empirical research in the area of agricultural trade. Prereq: ECO 601, AEC 624 and ECO 671. [Offered in spring only.]

AEC 620 ADVANCED PRODUCTION ECONOMICS I. (3)
An advanced treatment of production economics with emphasis on flexible product and factor price situations, factor demand functions, multiple product production, and poly-periodic production theory. Prereq: ECO 601. [Offered in fall only.]

AEC 622 ADVANCED AGRIBUSINESS MANAGEMENT STRATEGIES. (3)
This course integrates knowledge of economics, econometrics, business administration, finance, accounting, marketing, decision making, and research methodology. The focus is on analytical skills and scholarly academic research. Prereq: AEC 422, ECO 601 or AEC 603,
an introductory course in econometrics, or consent of instructor. [Offered in spring only.]

AEC 624 ADVANCED QUANTITATIVE METHODS IN AGRICULTURAL ECONOMICS. (3)
This course uses statistical tools to model agricultural and economic systems. Subjects covered include: (1) the classical linear regression model, (2) statistical hypotheses tests, and (3) estimation techniques for single and simultaneous equation models. Prereq: ECO 391, STA
291 and MA 113. [Offered in spring only.]

AEC 626 AGRICULTURE AND ECONOMIC DEVELOPMENT. (3)
Analytical consideration of the role of agriculture in economic development in relation to overall development strategy at various stages of growth. Theoretical and policy issues of particular relevance to the agricultural development in underdeveloped agrarian economies with various resource, social, political and economic systems. Prereq: ECO 473G or consent of instructor. (Same as ECO 674.) [Offered
in spring only.]

AEC 640 ADVANCED AGRICULTURAL POLICY. (3)
This course focuses on development of a framework to analyze alternate paradigms of the political economy. The framework focuses on the role of institutions that modify behavior of decision makers. Agricultural and food policies are evaluated in terms of the efficient use of resources and the general welfare of society. Prereq: ECO 601 or AEC 503. [Offered in spring only.]

AEC 645 NATURAL RESOURCE ECONOMICS. (3)
Economic analysis of natural resource use and environmental issues. Discussion of criteria for public decision making, welfare economics, market failure, benefit-cost analysis, and benefit estimation, as applied to natural resources and the environment. Prereq: ECO 590 and ECO 601.

AEC 646 INTERTEMPORAL ALLOCATION OF NATURAL RESOURCES. (3)
This course teaches the application of economic theory to the analysis of solutions for current and prospective natural resource problems. Such understanding will be geared toward fashioning, selecting and implementing planning associated with land, water, air, biological and other natural resources and conservation of the natural environment in serving the needs and desires of citizens. Prereq: ECO 660 a

AEC 653 LOCAL ECONOMIC DEVELOPMENT. (3)
The course develops the capacity to employ the theories, practices and philosophies of economic development as applied to local areas. The primary geographic focus of the course is the rural south-east of the United States, but examples will be drawn from rural areas in other developed countries. Prereq: Graduate status in agricultural economics, public administration, economics, or consent of instructor. (Same as PA 653.) [Offered in spring only.]

AEC 661 PROGRAMMING MODELS IN AGRICULTURAL ECONOMICS. (3)
A study of some programming models useful in agricultural economics; includes an examination of the structure of the models themselves, economic interpretation of their components and their use in research in agricultural economics. Prereq: MA 416G and either AEC 620 or ECO 601. [Offered in fall only.]

AEC 662 QUANTITATIVE METHODS IN RENEWABLE AND NONRENEWABLE RESOURCE MANAGEMENT. (3)
Application of dynamic optimization methods to renewable and nonrenewable resource management. Includes problem formulation,mathematical problem solving, Matlab programming, simulations and optimal policies analysis. Case examples are used to demonstrate applicability and problem formulation in finance and general and partial equilibrium. Prereq: MA 113 and MA 162 or equivalent, and AEC 661 or equivalent. (Same as FOR 662.)

AEC 691 SOCIOLOGY OF FOOD AND AGRICULTURE. (3)
This seminar will analyze the transformation of agriculture and the food system in the historical context of increased globalization. Emphasis is given to key historical transitions, changing social relations surrounding production and consumption of food, and shifts in regulations and policy at the local, national, and/or international levels. Such emphases provide a framework for understanding the historical roots and future prospects for the socioeconomic problems confronting contemporary U.S. and global agriculture and food economies. Prereq: Graduate standing, or consent of instructor. (Same as CLD/SOC 691.)

AEC 724 APPLIED ECONOMETRICS. (3)
This course introduces students to the econometric models, estimation procedures, and model applications in the literature. The course includes an overview of different econometric models, model estimations using Stata and SAS, discussion of agricultural and applied economics papers applying these models, and writing mini projects and a term paper with econometric applications. Topics include discrete and limited dependent variable models, panel data models, time-series models, instrumental variables, survival analysis, spatial econometrics and other special topics. Prereq: ECO 703 or consent of instructor. [Offered in spring only.]

AEC 745 ENVIRONMENTAL AND NATURAL RESOURCE ECONOMICS. (3)
This course is a graduate-level survey of environmental and natural resource economics. Students will use mathematical models and econometric analysis to address topics including externalities and other market failures, environmental policies, management of renewable and nonrenewable resources, and non-market valuation. Prereq: ECO 701 and 703 (or equivalent courses), or consent of instructor. (Same as ECO 726.) [Offered in fall only.]

AEC 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed. [Offered in fall, spring and summer.]

AEC 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

AEC 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this

course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended. [Offered in fall, spring and summer.]

AEC 768 RESIDENCE CREDIT FOR MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours. Prereq: Consent of adviser and chairperson of department. [Offered in fall, spring and summer.]

AEC 769 RESIDENCE CREDIT FOR DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely. Prereq: Consent of adviser and chairperson of department.

AEC 780 SPECIAL PROBLEMS IN AGRICULTURAL ECONOMICS. (1-3)
Open to graduate students who have the necessary training and ability to conduct research on a selected problem. May be repeated three times for a total of nine credits. Prereq: Consent of instructor and departmental chairperson. [Offered in fall, spring and summer.]

AEC 790 RESEARCH WORK IN AGRICULTURE ECONOMICS. (3-9)
Independent research under the direction of a faculty members and the Director of Graduate Studies. Prereq: Successful completion of written portion of AEC qualifying exam and permission of Director of Graduate Studies. [Offered in fall, spring and summer.]

AEC 796 SEMINAR (Subtitle required). (3)
An extended original investigation of a specific topic designed to give students experience in methods of research and an intensive study of a particular subject in the field of agricultural economics. May be repeated to a maximum of six credits under different subtitles. Prereq: Ph.D. applicant or candidate. [Offered in fall and spring.]

# Animal & Food Sciences

## College of Agriculture, Food & Environment

The degrees of Master of Science (Plan A and Plan B) and Doctor of Philosophy are available in Animal and Food Sciences.

**Admission Requirements**
Applicants to the Master's program must have completed a four-year degree at an accredited institution of higher education, must have achieved at least a 3.00 GPA for all undergraduate courses, and must submit scores from the verbal, quantitative, and analytical portions of the Graduate Record Exam (GRE). Applicants must have completed these courses; 1 semester calculus or physics, 3 semesters biology/ physiology, 3 semesters chemistry (including 1 semester of organic chemistry or biochemistry). Additional courses in physiology, cell biology, microbiology, and anatomy are encouraged. Applicants for a Ph.D. program must be in the process of completing, or have already completed, an M.S. degree or equivalent. Applicants must complete the on-line graduate school application.

**Degree Requirements**
Programs in Animal Sciences are divided into the disciplinary areas of animal nutrition, reproduction, physiology, and food science. Special interests in beef or dairy cattle, horses, poultry, sheep and swine may be pursued within many of these areas. Programs in food science offer specialization in dairy technology, food chemistry, food microbiology, food safety, meat biochemistry, and meat processing.

## Graduate Courses

| | | |
|---|---|---|
| ASC 404g | Sheep Science | (4) |
| ASC 408g | Swine Science | (2) |
| ASC 410g | Equine Sciences | (3) |
| ASC 420g | Dairy Cattle Science | (3) |
| ASC 564 | Milk Secretion | (3) |
| ASC 601 | Mammalian Endocrinology<br>(Same As Pgy 601) | (3) |
| ASC 602 | Micronutrient Metabolism<br>(Same As Ns 602) | (4) |
| ASC 630 | Advanced Meat Science<br>(Same As Fsc 630) | (4) |
| ASC 660 | Biology Of Reproduction<br>(Same As Pgy/Ana 660) | (3) |
| ASC 664 | Advanced Animal Breeding | (3) |
| ASC 680 | Laboratory Methods In Nutritional Sciences | (4) |
| ASC 681 | Energy Metabolism | (2) |
| ASC 682 | Microbial Ecology Of Digestion | (4) |
| ASC 683 | Protein Metabolism | (2) |
| ASC 684 | Advanced Ruminant Nutrition | (3) |
| ASC 685 | Mineral Metabolism | (2) |
| ASC 686 | Advanced Nonruminant Nutrition | (3) |
| ASC 687 | Vitamin Metabolism | (2) |
| ASC 688 | Equine Nutrition | (2) |
| ASC 689 | Physiology Of Nutrient Digestion And Absorption | (3) |

| | | |
|---|---|---|
| ASC 690 | Macronutrient Metabolism In Animals | (2) |
| ASC 748 | Master's Thesis Research | (0) |
| ASC 749 | Dissertation Research | (0) |
| ASC 767 | Dissertation Residency Credit | (2) |
| ASC 768 | Residence Credit For The Master's Degree | (1-6) |
| ASC 769 | Residence Credit For The Doctor's Degree | (0-12) |
| ASC 771 | Animal Science Seminar | (1) |
| ASC 780 | Special Problems In Animal Derived Foods (Same As Fsc 780) | (1-4) |
| ASC 781 | Special Problems In Genetics And Animal Breeding | (1-4) |
| ASC 782 | Special Problems In Animal Nutrition | (1-4) |
| ASC 783 | Special Problems In Reproductive Physiology (Subtitle Required) | (1-4) |
| ASC 790 | Research In Animal Derived Foods (Same As Fsc 790) | (1-6) |
| ASC 791 | Research In Genetics And Animal Breeding | (1-6) |
| ASC 792 | Research In Animal Nutrition | (1-6) |
| ASC 793 | Research In Reproductive Physiology (Subtitle Required) | (1-6) |
| FSC 434g | Food Chemistry | (4) |
| FSC 530 | Food Microbiology | (5) |
| FSC 535 | Food Analysis | (4) |
| FSC536 | Advanced Food Technology | (4) |
| FSC 538 | Food Fermentation And Thermal Processing | (4) |
| FSC 540 | Food Sanitation | (3) |
| FSC 630 | Advanced Meat Science (Same As Asc 630) | (4) |
| FSC 632 | Foodborne Disease Agents | (3) |
| FSC 636 | Food Packaging | (2) |
| FSC 638 | Food Proteins | (3) |
| FSC 640 | Food Lipids | (3) |
| FSC 642 | Food Pigments | (3) |
| FSC 780 | Special Problems In Animal Derived Foods (Same As Asc 780) | (1-4) |
| FSC 790 | Research In Animal Derived Foods (Same As Asc 790) | (1-6) |

# Community & Leadership Development

## College of Agriculture, Food & Environment

The Department of Community and Leadership Development offers the Masters of Science degree in Community and Leadership Development (CLD). The program's interdisciplinary base and range of engaged experiences support the growth of knowledgeable, skillful, and creative leaders. Graduates are therefore prepared to address the needs and concerns of communities of place, of interest (e.g., non-profit organizations) and of practice (e.g., schools and advocacy organizations). Coursework and training are grounded in the philosophical foundations of leadership, community, community communication, social science inquiry and formal and non-formal educational scholarship and practice.

The CLD graduate program accommodates a wide variety of individuals from diverse settings such as administration, nonprofit organizations, communications, public service, schools, adult education, social services and Cooperative Extension. The program is organized around a strong experiential education, learner-centered core, designed to be practical, engaging and thought provoking. Through the selection of enrichment areas that draw upon courses from across the university, students have considerable flexibility in planning a program that will meet their individual professional goals.

The Community and Leadership Development Master's requires the following core courses:

- CLD 620 Graduate Study in CLD (1)
- CLD 686 Research Design (3)
- CLD 684 Statistical Analysis in CLD or Qualitative Research Methods course (3)
- CLD 630 Individual and Group Dynamics (3)
- CLD 610 Experiential Education: Process and Practice or
- CLD 670 Community Engagement (3)

One of the following:

- CLD 671 Advanced Methods of Teaching
- CLD 685 Advanced Community Development Theory and Practice
- CLD 675 Theoretical Foundations of Communication and Community
- CLD 660 Advanced Leadership Theory and Practice (3)
- CLD 768 Thesis or
- CLD 758 Creative Component (Non-Thesis Option) (3)

Total (19)

Students will then complete a minimum of an additional 11 hours of graduate course work within a supporting enrichment area. Students will work with their Advisory Committees to identify the courses that best suit their professional interests. Sample of Enrichment Areas:

- Community Development
- Leadership Development
- Non-formal (Community-based, Agency-based)
- Agricultural Education and other Agricultural areas of interest (with a social science emphasis – e.g., horticulture's role in urban gardening)
- Rural Studies
- Community Communication

**Admission**
The University of Kentucky is committed to a policy of providing educational opportunities to all qualified students regardless of economic or social status. The University will not discriminate on the basis of race, color, ethnic origin, national origin, creed, religion, political belief, sex, sexual orientation, marital status, age, veteran status or physical or mental disability.

Admission to the Master's program in Community and Leadership Development is based on a combination of the following: undergraduate GPA (cumulative 2.75 and above), three letters of reference (only one letter can be written by a CLD faculty member), GRE scores the fit between the applicant's personal/professional experiences and goals and the program's focus and resources, and, in some cases, a personal interview. See the MS-CLD website http://www.uky.edu/Ag/CLD/cld-grad.html for materials required for a complete application packet.

Applicants for the MS-CLD program pursuing the MIC (Masters with Initial Certification for Agricultural Education for Grades 5-12) need to contact the CLD Director of Graduate Studies for additional admission procedures.

*Applicants for the MS-CLD program without MIC Option*
Candidates for the MS-CLD program must have a minimum undergraduate GPA of 2.75 and graduate GPA of 3.0 to be eligible for admission to the Graduate School. Graduate Record Examination (GRE) scores are required for all applicants. International students must also take the TOEFL examination, with a minimum score of 550 (213 on the computer-based test) required by the Graduate School.

Candidates for the MS-CLD program must have a minimum undergraduate GPA of 2.75 and graduate GPA of 3.0 to be eligible for admission to the Graduate School. Graduate Record Examination (GRE) scores are required for all applicants. Please note that GRE scores are one of several materials used to select students for admission. International students must also take the TOEFL examination, with a minimum score of 550 (213 on the computer-based test) required by the Graduate School.

*Applicants for the MIC Option*
Candidates in the graduate initial certification program must apply for admission to the Graduate School and to the Teacher Education Program. They must have a minimum undergraduate GPA of 2.75 to be eligible for admission to the Graduate School. In addition, they must submit passing scores on PRAXIS Core Academic Skills for Educators (CASE). A minimum 156 score on the reading portion, a minimum 150 score on the mathematics portion, and a minimum 162 score on the writing portion are required. Graduate candidates may use the GRE as the basic test requirement.

Candidates must submit an application packet and successfully complete the admission interview with program faculty. The application packet must be on file prior to the admission interview and includes the following items:
- Candidate demographic information
- Official transcripts
- PRAXIS I/GRE scores
- Standards self-assessment
- Character and Fitness Review
- Reference forms (3)
- Current resume
- Writing sample

**Application Requirements**

- Application Letter indicating motivation for pursuing MS-CLD and fit with faculty research interests and areas of practice. Students seeking department funding should indicate their interest in being considered in their letter.
- Current Resume
- Narrative accompanying resume that includes a description of applicant's experience regarding:
  - -Professional responsibilities and accomplishments
  - -Leadership development program design and implementation
  - -Specific accomplishments in leading community-based initiatives
  - -Grants awarded and implemented
  - -Professional/leadership certifications
  - -Professional trainings/courses and/or credentials
- Undergraduate/graduate transcripts
- GRE Scores
- 3 Recommendation letters (Only 1 can be written by a CLD faculty member)
- TOEFL/IELTS scores (International applicants only)

**Funding**

It is the policy of the Department to try to provide funding for as many qualified students as possible upon entry into the graduate program. Those students who do not receive funding upon entry are eligible to be considered for funding in the following year. Decisions about funding are made in yearly evaluations of graduate student progress, academic performance, and participation in departmental life (e.g., attending departmental colloquium and talks).Students must make systematic progress toward their degrees and meet professional expectations of their TA/RA responsibilities to ensure continued funding.

The CLD Department has a limited number of half-time service (20 hours per week) teaching and research assistantships to support qualified students in the Master's program. The actual number of available assistantships varies from year to year. Funding decisions are made subsequent to admission decisions. Students wishing to be considered for departmental funding need to express this interest in their Application Letter.

The Department of Community and Leadership Development has a limited number of graduate assistantships to support qualified students in the Master's program. Other units on campus also offer potential sources of funding. Those students who do not receive funding upon entry into the program are eligible for consideration in subsequent years. Decisions about funding are made in annual evaluations of student performance. Students must make systematic progress toward their degrees to ensure continued funding for the second year of study. Students will not receive more than two years of departmental support.

## Course Descriptions

CLD 517 RURAL SOCIOLOGY. (3)
A sociological study of the issues relevant to rural communities. Topics may include transformations in rural communities; the agrifood system; and the natural environment in the U.S. and the world. Prereq: Graduate student status; undergraduates with consent of instructor only. (Same as SOC 517.)

CLD 525 COMMUNITY DIVERSITY AND MEDIA. (3)
This course covers how media, both traditional news media and newly emerging digital communication technologies, relate to community diversity. Specifically, the course focuses on the relationships between media and community (power) structure, community institutions/ organizations, social movements and minority groups, urban/rural communities, gender/race/ethnicity/class and more. Prereq: Major

standing in CLD or graduate student status.

CLD 530 FUNDAMENTALS OF ORGANIZATIONAL LEADERSHIP. (3)
This course examines the existing and emerging knowledge base for leadership within organizations. Leadership and motivation of othersrequires individuals to go beyond their basic knowledge of managing others and learn how cultures, structures, and individuals in organizations interact within the system. This course highlights correlations with organizational behavior, team building, and collaborative leadership styles. In this class, students will explore organizational culture.

CLD 534 SOCIOLOGY OF APPALACHIA. (3)
A sociological study of selected social issues facing Appalachian communities, with an emphasis on placing regional political economy, society and culture in a global context. Prereq: Sociology, Anthropology or CLD senior major or minor; Appalachian Studies minor; graduate student status; or consent of instructor. (Same as ANT/SOC 534.)

CLD 560 COMMUNITY INEQUALITIES. (3)
This course focuses on the emergence and persistence of community inequalities in contemporary American society. This begins by identifying, describing, and analyzing inequalities within and among American communities and then considering the implications of these inequalities for organizational and community processes. The essential questions that will guide this course are: How do we define, measure and evaluate the differences among communities? What factors contribute to the emergence and persistence of the inequalities among communities? What are the consequences of these inequalities for the people who live in these communities? Prereq: Major standing in CLD or graduate student status.
CLD 575 SCHOOLS, COMMUNITY AND SOCIETY. (3)
This course highlights the integral relationships between contemporary and historical societal norms, distinctive communities and educational systems. Prereq: Major standing in CLD; CTE students admitted to TEP; or graduate student status.

CLD 610 EXPERIENTIAL EDUCATION: PROCESS AND PRACTICE. (3)
This course is designed for students to examine and apply theoretical and practical foundations of Experiential Education within classroom and community-based educational environments.

CLD 620 GRADUATE STUDY IN COMMUNITY AND LEADERSHIP DEVELOPMENT. (1)
This course is an introduction to the interdisciplinary field of Community and Leadership Development (CLD). CLD reflects the multidisciplinary fields of faculty in the department: Rural Sociology, Community Development, Community Communications, Leadership Development and Agricultural Education.

CLD 630 INDIVIDUAL AND GROUP DYNAMICS. (3)
This course is designed as an advanced course exploring the dynamics involved in individual and group situations. Specifically, students will explore basic psychological and social psychological processes shaping human behavior and learn to apply the knowledge of these processes in educational, organizational and community settings.

CLD 640 SCIENCE, AGRICULTURE, AND DEVELOPMENT. (3)
An in-depth examination of the interrelations between science, agriculture, and development. Both domestic and international issues are explored. Prereq: Graduate standing in the social or agricultural sciences. (Same as ANT/SOC 640.)

CLD 650 APPLIED COMMUNITY COMMUNICATIONS. (3)
Designed to familiarize students with advanced writing and editing techniques, common forms of

workplace writing, audience analysis, content analysis, and graphic design tips and tools. Discussion will include some of the larger issues surrounding community communications, such as discourse communities, bias, and ethics. Prereq: Graduate standing.

CLD 660 ADVANCED LEADERSHIP THEORY AND PRACTICE. (3)
This course has been designed to introduce the theoretical and research foundation of leadership studies through current journal articles and text chapters and also emphasizes multiple dimensions and contexts that influence leadership dynamics.

CLD 665 PROGRAM DEVELOPMENT AND EVALUATION. (3)
Course is designed to help students design, implement, and evaluate educational and social programs using a logic-based framework. (Same as SOC 665.)

CLD 670 COMMUNITY ENGAGEMENT. (3)
This course is designed as a service-learning/community engagement experience. It is organized with a field component related to the student's area of interest and an in-class experience that provides students with the opportunity to share and process their field experiences and to learn and grow from them through a variety of interactive exercises, readings, films and guest presentations.

CLD 671 ADVANCED METHODS OF TEACHING. (3)
The principles of method applied to teaching in the fields of classroom and community-based education. Prereq: Teaching experience within a classroom or community-based educational setting.

CLD 672 ADULT EDUCATION IN COMMUNITY AND LEADERSHIP DEVELOPMENT. (3)
Preparation for teaching adult classes in career and technical education including organization of classes, development of curriculum, and methods of teaching.

CLD 673 CURRENT TRENDS IN AGRICULTURAL EDUCATION. (3)
Class work pertains to current trends and significant developments in agricultural education. May be repeated to a maximum of nine credits.

CLD 675 THEORETICAL FOUNDATIONS OF COMMUNICATION AND COMMUNITY. (3)
This course is designed to explore the dynamics of community development and leadership communication within both geographic-bounded communities and communities of taste. (Same as SOC 675.)

CLD 676 SUPERVISION IN AGRICULTURAL EDUCATION. (3)
This course includes practice in teaching for observation by others, student teaching, and school visiting.

CLD 678 COLLEGE TEACHING OF AGRICULTURE, NATURAL RESOURCES AND HUMAN SCIENCES. (3)
A course designed to assist current or future college faculty in agriculture, natural resources or human science disciplines seeking to enhance the teaching skills. Topics include theories, principles and practices associated with effective teaching and learning in higher education. Prereq: Graduate Standing in the College of Agriculture.

CLD 684 STATISTICAL ANALYSIS IN COMMUNITY AND LEADERSHIP DEVELOPMENT. (3)
The purpose of this course is to develop an overview and basic understanding of descriptive and inferential statistics. As a result, students will be able to organize and summarize quantitative data; interpret data; make generalizations from sample data to populations or theory; and, read and understand research

reports.

CLD 685 COMMUNITY DEVELOPMENT THEORY AND PRACTICE. (3)
This course examines the application of our conceptual understanding of community and organizational dynamics to community development that builds upon assets and encourages local involvement. (Same as SOC 685.)

CLD 686 RESEARCH DESIGN. (3)
This course is an introduction to research design/methodology in social science research. The course emphasizes conceptualizing and working with the various components of a research inquiry and in particular how these components work together and strengthen the overall research design.

CLD 691 SOCIOLOGY OF FOOD AND AGRICULTURE. (3)
This seminar will analyze the transformation of agriculture and the food system in the historical context of increased globalization. Emphasis is given to key historical transitions, changing social relations surrounding production and consumption of food, and shifts in regulations and policy at the local, national, and/or international levels. Such emphases provide a framework for understanding the historical roots and future prospects for the socioeconomic problems confronting contemporary U.S. and global agriculture and food economies. Prereq: Graduate standing, or consent of instructor. (Same as AEC/SOC 691.)

CLD 694 THE ADMINISTRATION OF AGRICULTURAL EDUCATION. (3)
A course designed for superintendents, high school principals, and other administrators. Its purpose is to prepare administrators and
supervisors for leadership in agricultural education. (Same as EDL 694.)

CLD 748 MASTER'S THESIS RESEARCH IN COMMUNITY AND LEADERSHIP DEVELOPMENT. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

CLD 758 CREATIVE COMPONENT IN COMMUNITY AND LEADERSHIP DEVELOPMENT. (3)
This course offers a non-thesis option in Community and Leadership Development for students interested in completing a practitionerbased scholarly project. Prereq: All course work toward the degree must be completed and approval of the student's Advisory Committee is required.

CLD 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours. Prereq: All course work toward the degree must be completed.

CLD 775 TOPICAL SEMINAR IN COMMUNITY AND LEADERSHIP DEVELOPMENT. (3)
Advanced study of topics of current importance in community and leadership development such as dispute resolution, volunteer management, or advanced program design and evaluation. May be repeated to a maximum of six credits.

CLD 780 SPECIAL PROBLEMS IN COMMUNITY AND LEADERSHIP DEVELOPMENT. (1-6)
Supervised individual study on selected issues in community and leadership development. May be repeated to a maximum of six credits. Learning contract must be filed with Director of Graduate Studies.

CLD 790 RESEARCH IN COMMUNITY AND LEADERSHIP DEVELOPMENT. (1-6)
Supervised individual graduate research projects on selected issues in community and leadership development. May be repeated to a maximum of six credits. Research Learning contract must be filed with the Director of Graduate Studies.

# Entomology

## College of Agriculture, Food & Environment

The Department of Entomology offers graduate work leading to the Master of Science (Plan A -- Thesis and Plan B -- Non-thesis) and the Doctor of Philosophy degrees. Individual graduate programs are planned by students in consultation with their advisory committee and the Director of Graduate Studies. Entomology, like all agricultural and biological sciences disciplines, continues to evolve and integrate state of the art technology and new research perspectives with insect biology. Although departmental research is unified by a focus on insects and their arthropod relatives, many research groups creatively merge aspects of basic and applied biology. Graduate study and research opportunities are available in a diverse range of areas of entomology, including agricultural and urban entomology, biological control and integrated pest management, medical, veterinary, and public health entomology, pollinator biology and insect-plant relationships, forest entomology, and arachnology. Research covers many major fields of biology including behavior, biochemistry, ecology (including evolutionary, urban, landscape, and general ecology), genetics, neuroscience, molecular biology, physiology, toxicology, and systematics.

**Admission Requirements**
Minimum admission requirements include an overall undergraduate grade point average of 3.0 and an overall graduate grade point average of 3.25. Applicants whose native language is English must score at least 300 on the combined verbal and quantitative portions of the Graduate Record Examination (GRE) general test. Those whose native language is not English must have a Test of English as a Foreign Language (TOEFL) with a minimum score of 79 on the TOEFL- iBT. A minimum overall band score of 6.5 on the International English Language Testing System (IELTS) may be used in lieu of a TOEFL score. They must also have a score of 150 on the quantitative portion of the GRE. The Program requires three letters of recommendation. Meeting the minimum requirements does not guarantee admission. These minimum requirements may be waived in exceptional cases if sufficient additional evidence is presented regarding the ability of the student to do graduate work. Admission to the Graduate Program in Entomology does not automatically guarantee financial assistance to the student.

**Degree Requirements**
During their first year of graduate studies, M.S. (Plan A) and Ph.D. students are required to prepare a formal written research proposal encompassing a thorough literature review, clear statement of objectives, and materials and methods of the project. A research proposal seminar will be presented to the Department upon completion of the written research proposal. An exit seminar, usually presented during the last semester of the student's tenure, is required for M.S. (plans A and B) and Ph.D. students. August graduates will present their seminar in the preceding spring. M.S. students using the Plan B option will be required to provide a detailed outline of their practicum to their Advisory Committee. The practicum must be a minimum of 3 credit hours (maximum of 6 credit hours) and may consist of library research, special problems, internships, etc., as agreed upon by the student and major professor, and approved by the Advisory Committee.

All M.S. and Ph.D. students must satisfy the following core course requirements:
1. An undergraduate course in general entomology. Students who have not had such a course before enrolling in the Entomology graduate program must take ENT 300.
2. STA 570 (Basic Statistical Analysis) or equivalent, or a different statistics course approved by the student's advisory committee
3. Each M.S. student must take two semesters of ENT 770, Entomological Seminar, (or approved

equivalent seminars) and Ph.D. candidates must take four semesters of approved seminars.

4. Ph.D. and M.S. candidates using the Plan A option must take a minimum of one course from two of the following core areas. M.S. candidates using the Plan B option must take a minimum of one course from all three core areas.

Core Area 1: Insect Behavior, Ecology, Evolution and Systematics.

| | |
|---|---|
| ENT 564 | Insect Taxonomy |
| ENT 568 | Insect Behavior |
| ENT 607 | Advanced Evolution |
| ENT 625 | Insect-Plant Relationships |
| ENT 660 | Immature Insects |
| ENT 665 | Insect Ecology |
| ENT 667 | Invasive Species Biology |

Core Area 2: Insect Molecular Biology, Physiology and Genetics.

| | |
|---|---|
| ENT 635 | Insect Physiology |
| ENT 636 | Insect Molecular Biology |

Core Area 3: Pest Management and Applied Ecology.

| | |
|---|---|
| ENT 530 | Integrated Pest Management |
| ENT 561 | Insects Affecting Human and Animal Health |
| ENT 574 | Advanced Applied Entomology |
| ENT 680 | Biological Control |

In all cases, an equivalent graduate level course from another institution is acceptable upon approval of the Advisory Committee. Such approval will not decrease the minimum number of credits required, but simply will permit the student to take other courses.

**Course Descriptions**

ENT 502 FOREST ENTOMOLOGY. (3)
Lectures primarily address principles and concepts. Laboratories use a hands-on approach to demonstrate insect collecting and identification techniques, ecological concepts and management approaches, and use of reference materials. Prereq: A minimum of 3 credits of basic biology (BIO 103 or BIO 148 or equivalent) or consent of instructor. (Same as FOR 502.) [Offered in fall only.]

ENT 505 EVOLUTION IN AGRICULTURE, MEDICINE AND CONSERVATION BIOLOGY. (3)
An introduction to modern evolutionary theory with emphasis on its application to current problems in agriculture, the biomedical sciences, and conservation biology. Prereq: Genetics (ABT 360, BIO 304 or equivalent introductory genetics course). (Same as ABT 505.)

ENT 509 BRAINS AND BUDS: NEUROSCIENCE OF POLLINATION. (3)
Pollinators have tremendous agricultural and societal value, and to a neuroscientist, they showcase principles of cognition in the real world. Pollinator species present exquisite examples of co-evolution, physiological and dietary specialization, navigation in complex landscapes,
collective decision-making processes, and the behavioral consequences of environmental toxins and disease. In this course, we will use pollinator species (honey bees and other insects, as well as vertebrate pollinators) to explore how critical features of pollination intersect at the level of brain function, covering

important neuroscience topics including sensory ecology and evolution, neural energetics, mechanisms of addiction and reward, molecular neuroscience, cognition, and learning and memory. Prereq: Students must have at least Junior standing in a life sciences discipline, or permission from instructor. (Same as BIO 509.)

ENT 530 INTEGRATED PEST MANAGEMENT. (3)
Principles of insect damage, populations and distributions. Various types of natural and applied control, including problems of insecticide toxicity, resistance and residues. Prereq: ENT 300 or ENT 310 or ENT 320.

ENT 550 SPIDER ECOLOGY AND BEHAVIOR. (3)
Spiders are fascinating in their own right, and also are major predators in terrestrial food webs. This course examines the ecology and behavior of spiders as model predators in systems ranging from undisturbed forests and meadows to agroecosystems and the urban landscape. While focusing on spiders, the course also intertwines two general sub-themes: (1) the advantages of employing diverse approaches (e.g. field and laboratory experiments, non-manipulative observations, and meta-analyses) in ecological and behavioral research; and (2) the strengths, and limitations, of using model organisms to develop and test theory. Prereq: One year of undergraduate biology.

ENT 561 INSECTS AFFECTING HUMAN AND ANIMAL HEALTH. (3)
Discussion of arthropod parasites and disease vectors. Topics include an overview of disease transmission and public health, epidemiology, vector biology, important arthropod groups and their control. Prereq: 3 credits of basic biology (BIO 103 or BIO 148 or equivalent) or
permission of instructor. (Same as BIO/CPH 561.) [Offered in fall – odd years.]

ENT 563 PARASITOLOGY. (4)
Protozoan, helminth and arthropod parasites of man and domestic animals, emphasis on etiology, epidemiology, methods of diagnosis, control measures, and life histories. Techniques for host examination and preparation of material for study. Prereq: BIO 148, BIO 152, BIO 155 or BIO 198, or consent of instructor. (Same as BIO 563.)

ENT 564 INSECT TAXONOMY. (4)
A study of insect taxonomy including the collection, preparation, and identification of adult insect specimens. Prereq: Consent of instructor. (Same as BIO 564.) [Offered in fall – even years.]

ENT 568 INSECT BEHAVIOR. (3)
The principles of animal behavior will be stressed using insects as examples. Physiology, mechanisms, behavioral ecology and evolution of insect behavior will be covered. Prereq: One year of biology. (Same as BIO 568.) [Offered in spring – odd years.]

ENT 574 ADVANCED APPLIED ENTOMOLOGY. (4)
The objective of this course is to present the student with advanced concepts of applied entomology in a system-specific context. Each week, the insect problems associated with a different commodity/production system will be presented so as to illustrate a different broadly-based theme. Prereq: An introductory entomology course and consent of instructor.

ENT 595 ENTOMOLOGICAL SPECIAL TOPICS (Subtitle required). (1-4)
Special topics or experimental courses in Entomology for undergraduate and graduate students. Special title is required and must be approved by the chairperson of the Department of Entomology. A particular title may be offered twice at most under ENT 595. Students may not repeat under the same subtitle. Prereq: Will be set by instructor. (Offered in fall and spring.)

ENT 606 CONCEPTUAL METHODS IN ECOLOGY AND EVOLUTION. (3)
This course provides students with hands-on experience in a diverse array of conceptual research techniques used by ecologists and evolutionary biologists. The focus will be on optimization methods used for predicting animal and plant behaviors and life histories, and on methods for assessing population trends and dynamics. Mathematical techniques used will include graphical analyses, matrix algebra, calculus, and computer simulations. The latter part of the course will consist of collaborative modeling projects, in which small groups of students will work with the instructor to address an important contemporary research problem and will report their results in a public talk and a project writeup. Prereq: One year of calculus and BIO 325 or FOR 340 or ENT 665, or consent of instructor. (Same as BIO/FOR 606.)

ENT 607 ADVANCED EVOLUTION. (2)
This course covers advanced topics in evolution, concentrating on questions central to the understanding of general evolutionary processes. Phenomena occurring both within populations (e.g., selection, inheritance, population subdivision) and between populations (e.g., gene flow, competition) will be addressed. Special attention will be given to modern research approaches and techniques including quantitative genetics, measurement of selection, phylogenetic analyses of comparative data and molecular systematics. Prereq: One year of calculus, genetics (BIO 304 or BIO 461) and BIO 508 or consent of instructor. (Same as BIO/FOR 607.) [Offered in fall only.]

ENT 608 BEHAVIORAL ECOLOGY AND LIFE HISTORIES. (2)
This course uses an evolutionary approach to examine behavior and life histories. Topics addressed include: the optimality approach, constraints on optimality, kin and group selection, predator and prey behaviors, social and mating behaviors, and life history evolution. Prereq: BIO 325 and one semester of calculus; or consent of instructor. (Same as BIO/FOR 608.)

ENT 609 POPULATION AND COMMUNITY ECOLOGY. (3)
This course discusses the processes that determine population distributions and dynamics and community structure for both plants and animals. Topics addressed include: population regulation and population stability, community diversity and stability, ecological succession, population interactions (competition, predation, mutualism), coevolution, and the effects of spatial and temporal heterogeneity on population and community patterns. Prereq: BIO 325 or FOR 340 or consent of instructor. (Same as BIO/FOR 609.) [Offered in fall only.]

ENT 625 INSECT-PLANT RELATIONSHIPS. (3)
This course examines the natural history, ecology, and evolution of insect/plant relationships. Topics include mechanisms and theory of plant defense, behavioral and physiological adaptations of herbivorous insects, pollination biology, multitrophic-level interactions, causes of insect outbreaks, and applications to managed ecosystems. Critical reading and discussion of current literature is emphasized. Prereq: Two years of college-level biology. (Same as BIO 625.) [Offered in spring – odd years.]

ENT 635 INSECT PHYSIOLOGY. (4)
Study of insect physiological processes including development, digestion, reproduction, respiration, excretion, hormones and immunity. Opportunity to learn techniques used in insect physiology and molecular biology. Prereq: Consent of instructor. (Same as BIO 635.) [Offered in spring – even years.]

ENT 636 INSECT MOLECULAR BIOLOGY. (4)
Principles of insect molecular biology. Analysis of insect development, reproduction, behavior, immunity, transgenic insects and insecticide resistance at the molecular level. Hands-on experience with molecular

biology techniques. Prereq: ENT/BIO 635 or consent of instructor. (Same as BIO 636.) [Offered in spring – odd years.]

ENT 660 IMMATURE INSECTS. (3)
Bionomics, structure and classification of immature stages of insects; practice in their identification. Lecture, one hour; laboratory, six hours. Prereq: BIO 570 or ENT 564, or consent of instructor.

ENT 665 INSECT ECOLOGY. (3)
The biotic and physical factors influencing the distribution and abundance of insects and insect populations. Prereq: Consent of instructor. (Same as BIO 665.) [Offered in fall – even years.]

ENT 667 INVASIVE SPECIES BIOLOGY. (3)
This course will examine circumstances that allow introduced species to become invasive, how invasive species threaten our resources, and approaches to minimizing the incidence and impact of invasions. Prereq: Graduate standing or consent of instructor. (Same as BIO/ FOR 667.) [Offered in fall – odd years.]

ENT 670 SCIENTIFIC PUBLISHING: PROCESS AND ETHICS. (2)
An introduction to scientific publishing, including types of scientific journals, choosing where to publish, the structure of scientific papers,the peer review process, data management and archiving, post-publication promotion of research, metrics of scientific impact such as impact factors and altmetrics, and publication ethics.

ENT 680 BIOLOGICAL CONTROL. (3)
Principles related to the use of arthropods to suppress populations of arthropod pests and weeds. Includes historical perspective, ecological relationships, and contemporary issues related to the conservation and manipulation of arthropod predators, parasitoids, and herbivores. Prereq: ENT 300 or equivalent. [Offered in spring – even years.]

ENT 684 PHYLOGENETIC SYSTEMATICS. (3)
Theory and methods of phylogenetic analysis and cladistics will be explained. Applications of phylogenetic analysis, such as historical biogeography, biological classification, and testing of ecological hypotheses will be explored. (Same as BIO 684.)

ENT 695 SPECIAL TOPICS IN ENTOMOLOGY (Subtitle required). (1-4)
Special topical or experimental courses in entomology for graduate students. Special title required and must be approved by the chairperson of the Department of Entomology. A particular title may be offered twice at most under ENT 695. Students may not repeat under the same subtitle. Prereq: Will be set by instructor. [Offered in fall and spring.]

ENT 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed. [Offered in fall and spring.]

ENT 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

ENT 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this

course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended. [Offered in fall and spring.]

ENT 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

ENT 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

ENT 770 ENTOMOLOGICAL SEMINAR. (0-1)
Discussion of current research problems in entomology. May be repeated to a maximum of six hours. [Offered in fall and spring.]

ENT 780 SPECIAL PROBLEMS IN ENTOMOLOGY AND ACAROLOGY. (2-3)
Investigations of chosen insect problems, including original work. Discussion and assignment of current insect subjects. May be repeated to a maximum of six credits. Prereq: Consent of instructor. [Offered in fall and spring.]

ENT 790 RESEARCH IN ENTOMOLOGY AND ACAROLOGY. (1-6)
Independent research in entomology or acarology. May be repeated to a maximum of 12 hours. Prereq: Consent of instructor. [Offered in fall and spring.]

# Family Sciences

## College of Agriculture, Food & Environment

The Department of Family Sciences offers M.S. and Ph.D. programs in Family Sciences. For more details and to apply for one of our graduate programs, see www.fam.uky.edu/grad.

## Master of Science in Family Sciences

Areas of emphasis within the master's program are: (a) adolescent development, (b) aging, (c) couples and family therapy, (d) family finance and economics, and (e) family processes. The curriculum for each emphasis area except couples and family therapy requires a minimum of 30 credit hours, comprised of 15 credit hours of core courses (FAM 601, FAM 652, FAM 654, FAM 668, and FAM 690), 5 hours of electives, 3 hours of a data analysis or program evaluation course, 1 hour of a professional development seminar, and 6 credit hours for the thesis (Plan A) or scholarly project (Plan B).

The couple and family therapy emphasis area is accredited by the Commission on Accreditation for Marriage and Family Therapy Education (COAMFTE) and requires a prescribed curriculum totaling 53 credit hours (2 years, including one summer), comprised of 15 credit hours of core family sciences courses, 18 hours of core couples and family therapy courses, 10 hours of supervised practicum, 3 hours of a data analysis or program evaluation course, 1 hour of a professional development seminar, and 6 credit hours for the thesis (Plan A) or scholarly project (Plan B).

**Admission Requirements**

Students must have a bachelor's degree prior to admission into the master's program. Admissions are conducted one time each year; the application deadline is January 15 for admission Fall Semester of the same calendar year. Applicants must submit a statement of their academic goals for the M.S. degree and three letters of recommendation. See www.fam.uky.edu/apply/ for details.

## Doctor of Philosophy

Areas of emphasis within the doctoral program are: (a) adolescent development, (b) aging, (c) family finance and economics, and (d) family processes. The doctoral program is a research-based curriculum designed particularly for those desiring a research career in family science, including positions at colleges and universities, program evaluation positions in public and private settings focusing on individuals and the family, and administrative positions in public and private human services prevention and intervention settings.

The curriculum is competency based, but minimal coursework requirements prior to the qualifying examination include 2 years of residency and 36 credit hours, comprised of 20 credit hours of foundational courses (if not taken in master's program), 9 hours of research methods and theory, 9 credit hours of statistics, 7 credit hours of professional development, and 15 credit hours in a specialization area.

**Admission Requirements**

Master's level practitioners, educators, and researchers in the social sciences are best suited for the doctoral program. Previous research experience is desirable, but not required. Although students generally must have a master's degree prior to admission into the doctoral program, particularly outstanding applicants who have earned a bachelor's degree but not a master's degree may be considered for admission into the doctoral program.

Admissions are conducted one time each year; the application deadline is January 15 for admission Fall Semester of the same calendar year. Applicants must submit a statement of clearly developed academic and research goals for the Ph.D. degree and three letters of recommendation. See www.fam.uky.edu/apply/ for details.

For additional information, see fam.uky.edu/grad or contact the Director of Graduate Studies, Department of Family Sciences, 315 Funkhouser, University of Kentucky, Lexington, KY 40506-0054 or 859.257.7750.

## Course Descriptions

FAM 502 FAMILIES AND CHILDREN UNDER STRESS. (3)
An investigation of the stressors and crises experienced by families and their members and their efforts to cope with them. Special attention is given to prevention, management and enrichment strategies. Implications for practitioners will be drawn from conceptual frameworks and recent research. Prereq: FAM 352 and declared majors or minors in Dept. of Family Sciences or consent of instructor.

FAM 544 CULTURAL DIVERSITY IN AMERICAN CHILDREN AND FAMILIES. (3)
Study of cultural and linguistic diversity in American children and families, with special emphasis on Kentucky children and families. Consideration of implications for working with young children and families in educational settings. Study of the variations in beliefs, traditions, values and cultural practices within American society, and their effects on the relationships between child, family, and school. Prereq: FAM 352; declared majors or minors in Dept. of Family Sciences or consent of instructor.

FAM 553 PARENT-CHILD RELATIONSHIPS ACROSS THE LIFECOURSE. (3)
Exploration of the parenting process from a lifespan perspective. Current theory and research, with child-drearing application, will be emphasized. Emphasis will be on parent education methods and the changing parental role over the life cycle. Prereq: FAM 352; declared majors and minors in Dept. of Family Sciences or consent of instructor.

FAM 554 WORKING WITH PARENTS. (3)
Principles, techniques, and resources relevant to working with parents as individuals, couples, and families. Survey of related literature on parent effectiveness and parent education is included with relevant field experiences. Lecture, two hours; laboratory, two hours. Prereq: FAM 260 and six hours of 300 level or above in social and behavioral sciences or consent of instructor.

FAM 563 FAMILIES, LEGISLATION, AND PUBLIC POLICY. (3)
A study of the impact of legislation and public policies on the well being of the family. Emphasis on the involvement of individuals and families with policies and legal resources as a means for realizing satisfying life styles. Prereq: FAM 251, 352, and declared majors and minors in Dept. of Family Sciences or consent of instructor.

FAM 585 AGING AND ENVIRONMENT. (3)
Explores the elderly person's changing experience of environment. Physiological, psychological and social changes are related to adjustment within urban and rural community environments, special housing for the elderly, and long-term care environments. Prereq: Graduate or advanced undergraduate standing and consent of instructor. (Same as GEO/GRN 585.)

FAM 600 WORKING WITH MILITARY FAMILIES. (3)
This course provides an overview of military work and family connections. Students will gain familiarity with the challenges unique to military individuals and families and the resources available to address them. Topics to be covered include: theoretical approaches to understanding the impact of military work on individuals and families; demographic profiles of and organizational demands on military service personnel and their families; military service and outcomes for children and adolescents, roles and challenges of military spouses; family policy in the military (including current formal and informal support structures and emerging trends in serving military families). Prereq: Graduate or advanced undergraduate standing and 6 hours of 300 level or above courses in social and behavioral sciences or consent of instructor.

FAM 601 FAMILY PROCESSES. (3)
Advanced study of typical family functioning across the family life course from a family process perspective, including examination of how "normal" differs according to family culture, structure, and history. Prereq: Family Science major. FAM 622 THE FAMILY'S ROLE IN EARLY CHILDHOOD EDUCATION. (3)
The purpose of this course is to provide students with information related to working with young children with and without disabilities and their families. This course will focus both on presenting new information and providing opportunities for students to practice skills necessary for working with families. (Same as EDS 622.)

FAM 624 PERSPECTIVES ON HUMAN SEXUALITY. (3)
An examination and study of historical and current perspectives of sexuality as it relates to behavioral patterns, cultural attitudes, social policy and practice. Prereq: Knowledge of human behavior and personality theory highly recommended. (Same as SW 624.) FAM 640 USING THE DSM IN CFT ASSESSMENT. (3)
Students will be trained to use the Diagnostic and Statistical Manual of Mental Disorders (DSM) in family therapy assessment and practice. This will include a basic understanding of the process and procedures for diagnosing individual and family disorders, with the intent that students working with families in the context of a traditional mental health milieu will be able to make appropriate, basic diagnoses. Emphasis on assessing and treating disorders relating to family violence, child abuse, addictions, and substance abuse will be
included.

FAM 652 READINGS IN FAMILY THEORY AND RESEARCH. (3)
Entry level course for graduate study of family theory and research. Conceptual frameworks and theoretical approaches are introduced and applied to an array of contemporary family issues, as identified through extensive readings of the empirical research literature. Prereq: Family Science major.

FAM 654 THE LIFE COURSE PERSPECTIVE ON FAMILIES AND INDIVIDUALS. (3)
Individual, family, and societal growth and change through the life span are examined using a life course perspective. The life course perspective emphasizes the interplay of human development, agency, linked lives, historical context, and timing of events. These five interlocking concepts will be understood through reading life course research and applying life course principles and concepts to issues in family sciences.

FAM 658 ADOLESCENT DEVELOPMENT. (3)
A survey of theory and research in adolescent development with particular emphasis on the role of families and implications for working with adolescents. Prereq: Six hours in social or behavioral science.

FAM 660 AGING ISSUES AND FAMILY RELATIONS. (3)
The study of dynamics of family interactions and issues when some family members are elderly. Emphasis is placed on perspectives from multiple generations and across various kin categories. (Same as GRN 660.)

FAM 661 HEALTH AND FINANCIAL ISSUES OF AGING FAMILIES. (3)
This course is designed to discuss health and financial security of older adults and develop empirical research from the perspectives of economics of individual aging and family relations. Emphasis is placed on the following topics: health status of the elderly, economic wellbeing of older Americans, intergenerational transfers of time and money, family care, giving and work, living arrangements, and empirical research for aging and family. Prereq: STA 570 or equivalent, or consent of instructor.

FAM 668 ALLOCATION OF FAMILY RESOURCES. (3)
Study of the contributors to and the recipients of family resources. Emphasis on the methods of assisting families to better allocate family resources through understanding money beliefs and attitudes and practic-

ing financial planning strategies.

FAM 673 FAMILY LIFE EDUCATION. (3)
Demographic, social, economic, political, and professional issues related to emerging trends in family life education will be examined. Emphasis will be placed on the development, implementation, and evaluation of family life education curriculum materials. Prereq: FAM 690; FAM 652 or FAM 654; or consent of instructor.

FAM 685 PROFESSIONAL ISSUES IN COUPLE AND FAMILY INTERVENTION. (3)
Exploration and definition of the legal, ethical, and professional issues in the practice of couple and familyintervention. Emphasis will be on developing professional skills, attitudes, and identity for couple and family intervention.

FAM 686 THEORY AND METHODS IN COUPLE AND FAMILY THERAPY. (3)
A survey of theories and methods used in couple and family therapy. Designed to provide students with a knowledge of the theoretical bases for couple and family therapy, including an introduction to procedures used to assess, diagnose and treat couple and family dysfunctions.

FAM 687 PRE-PRACTICUM: TREATMENT MODALITIES IN COUPLE AND FAMILY THERAPY. (3)
Phases of couple and family therapy process are presented both in theory and in case study analysis. The presenting problem, history of the problem, family history, identification of dysfunctional dynamics, goals, plan of treatment, and outcome/evaluation are emphasized within the context of organizing family therapy and phases of family therapy. Prereq: Admission to the CFT master's program or consent.

FAM 690 RESEARCH METHODS IN FAMILY SCIENCES. (3)
The study of research techniques and methodological problems involved in research on the family. Emphasis is placed on research concerning interrelations between the family and its environment, development within the family, and family dynamics. Prereq: Consent of instructor.

FAM 699 FIELD EXPERIENCES IN FAMILY SCIENCES. (1-3)
Field training in a community setting related to family sciences to develop competencies in program planning, delivery, and evaluation. Student will work under the supervision of a faculty and a training site supervisor. May be repeated to a maximum of six credits.

FAM 703 ADVANCED THEORY AND RESEARCH IN FAMILY ECONOMICS AND MANAGEMENT. (3)
Advanced study of research and theories in family economics and management with special emphasis given to current issues. Conceptual frameworks developed by leaders in family economics and management are studied and applied through designing and carrying out an empirical study. Prereq: Graduate work in statistics and research methods.

FAM 740 COUPLE AND SEX THERAPY. (3)
Field training in a community setting related to family sciences to develop competencies in program planning, delivery, and evaluation. Student will work under the supervision of a faculty and a training site supervisor. May be repeated to a maximum of six credits.

FAM 745 FAMILIES AND CHILDREN IN PLAY THERAPY. (3)
This course reviews the history, theories, techniques, and methods of play therapy and its clinical application to treat children, adolescents, adults and families. Instruction will include exercises, role playing, videos, class presentations, and instructor lectures. Prereq: FAM 686 or consent of instructor.

FAM 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

FAM 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of FAM 769 residence credit following the successful completion of the qualifying exams.

FAM 752 SEMINAR IN FAMILY THEORY CONSTRUCTION. (3)
An advanced seminar focusing on the definition, evaluation and construction of family theory. Inductive and deductive theory construction strategies are surveyed, evaluated and applied. Prereq: FAM 652. (Same as SOC 752.)

FAM 759 SPECIAL ADVANCED TOPICS IN FAMILY SCIENCES. (1-3)
Intensive study of advanced family sciences topics. May be repeated under different subtitles to a maximum of six credits. Prereq: Consent of instructor.

FAM 763 PRIMARY PREVENTION IN FAMILY SCIENCES. (3)
Designed to provide students with a background in prevention science with applications in family science and child development. Topics will include primary prevention of mental health problems among families and children, principles of prevention, prevention research design, ethical issues, and national agendas in primary prevention research. Prereq: Admission to a doctoral program in the social or behavioral sciences.

FAM 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

FAM 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

FAM 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

FAM 775 PROFESSIONAL DEVELOPMENT SEMINAR. (1-3)
Orientation to policies, procedures, and possibilities in the family sciences graduate program. Prereq: Consent of instructor.

FAM 777 APPLIED STATISTICS IN FAMILY SCIENCE. (3)
Emphasis is on conducting statistical analyses and reporting results. Topics include selection of statistical approach, techniques for conducting analyses, interpretation of output, and writing the results section of a manuscript based on that output. Prereq: STA 570, FAM 690 (or equivalent) and FAM major.

FAM 784 RESEARCH PRACTICUM IN FAMILY SCIENCES. (1-3)
Doctoral student research experience in collaboration with major professor in preparation for the qualifying examination. Prereq: Consent of instructor.

FAM 785 ADVANCED PROBLEMS IN FAMILY SCIENCES. (1-3)
Intensive independent scholarship or training in family sciences. May be repeated to a max of 6 credits.

FAM 786 TEACHING PRACTICUM IN FAMILY SCIENCES. (3)
Independent doctoral student teaching experience, under faculty supervision. May be repeated to a maximum of 6 credits. Prereq: Consent of instructor.

FAM 787 SUPERVISED PRACTICE OF COUPLE/FAMILY THERAPY. (1-6)
Intensive study of skills, issues, or treatment procedures in couple and family therapy. May be repeated to a maximum of eighteen credits. Prereq: Admission to the CFT master's program.

FAM 790 ADVANCED RESEARCH METHODS IN FAMILY SCIENCES. (3)
Advanced study of quantitative research methods, including but not limited to complex study designs, model building and structural equation modeling, reliability and validity of measures, statistical power and effect size, mediator and moderator variables, and identifying appropriate statistical techniques for specific types of problems. Prereq: FAM 690 and FAM 777, or equivalents.

# Forest & Natural Resource Sciences

## College of Agriculture, Food & Environment

Students may elect to pursue the Master of Science in Forest and Natural Resource Sciences degree under Plan A, which requires a minimum of 24 semester hours of graduate course work plus an acceptable thesis, or under a non-thesis option (Plan B), which requires a minimum of 30 semester hours of graduate course work that includes an area of specialization. All Forest and Natural Resource Sciences graduate students take:

- FOR 601 (Research Methods in Forestry, taught every fall semester)
- FOR 602 (Renewable Natural Resources in a Global Perspective, taught in the fall semesters of odd-numbered calendar years)
- FOR 770 three times (Forestry Seminar, at least one section of which is taught each fall and spring semester).

A goal of the Forest and Natural Resource Sciences Graduate Program is to contribute to improved forest health and management through enhanced understanding of relevant ecological and social benefits and constraints. Consequently, a student's degree program may be directed toward any of the disciplinary or interdisciplinary fields in Forest and Natural Resource Sciences, which range from molecular to landscape and societal levels. The Program's current research has particular strengths in southern Appalachian hardwood forest ecology and management, forest hydrology and watershed management, reforestation and mine reclamation, invasive species and forest health, animal ecology and management, and human dimensions including forest policy and economics.

In addition to mentoring Master's students in the Forest and Natural Resource Sciences Graduate Program, faculty members of the Department of Forestry serve as major professors for M.S. and Ph.D. students in other academic programs. Examples of other graduate programs in which Department of Forestry students have enrolled include agricultural economics, animal science, biology, crop science, geography, earth & environmental sciences, plant physiology, and plant & soil science. Details about Ph.D. opportunities available in the Department of Forestry are available by contacting individual faculty members directly (http://forestry.ca.uky.edu/faculty).

**Admission Requirements**

Applicants for admission to the Master of Science in Forest and Natural Resource Sciences degree program must hold (by the time of enrollment in the program) an awarded four-year baccalaureate degree from an accredited institution of higher learning. Although it is not required that an applicant's undergraduate degree be in forestry or another natural resource field, a student admitted to the program who lacks essential undergraduate courses may be required by an advisory committee to take them. Applicants are expected to have an overall undergraduate grade point average of 3.00 and a minimum combined verbal and quantitative score on the Graduate Record Examination (GRE) of 1000 (if the GRE is taken prior to 1 August 2011). If the revised GRE is taken on or after 1 August 2011, the minimum expected combined score is 297. Applications are submitted online (http://www.gradschool.uky.edu/ProspectiveStudents/Admission.html). Each applicant must identify (in the personal statement) a graduate faculty member who agrees to serve as his/her major advisor and whether or not the applicant wishes to be considered for an assistantship. Applications for fall admission that are complete by February 1 are eligible to be considered for departmentally-funded research and teaching assistantships that normally begin on July 1 of the same calendar year. Research assistantships are sometimes funded by the grants and contracts of individual faculty members; applications for such assistantships may be subject to different deadlines that are established by those faculty members.

More detailed information concerning the Forest and Natural Resource Sciences Graduate Program's admission procedures, assistantships, and degree requirements may be obtained:

- at http://forestry.ca.uky.edu/forestry-graduate-program
- for your specific area(s) of interest from our individual faculty members (http://forestry.ca.uky.edu/faculty)
- by contacting the Director of Graduate Studies at (859) 257-3773

## Course Descriptions

FOR 502 FOREST ENTOMOLOGY. (3)
Lectures primarily address principles and concepts. Laboratories use a hands-on approach to demonstrate insect collecting and identification techniques, ecological concepts and management approaches, and use of reference materials. Prereq: A minimum of 3 credits of basic biology (BIO 103 or BIO 148 or equivalent) or consent of instructor. (Same as ENT 502.)

FOR 510 HERPETOLOGY. (4)
This is a 4-credit, advanced biology and/or wildlife course about amphibians and reptiles for both undergraduate and graduate students. Lectures and labs follow two concurrent themes: 1) a survey of amphibians and reptiles, with special emphasis on Kentucky species, and
2) a general analysis of amphibian and reptile biology, ecology, conservation and management. Prereq: All students enrolled in FOR 510 should have taken at least one college-level Biology course.

FOR 520 MAMMALS OF THE EASTERN UNITED STATES. (4)
Covers the evolution, taxonomy, biogeography, biology, and natural history of mammals, emphasizing North American fauna. All mammalian orders extant (and extinct) in North America will receive coverage,

FOR 570 LANDSCAPE ECOLOGY FOR NATURAL RESOURCES. (3)
Principles of landscape ecology and their applications to contemporary ecological issues. Students will learn and apply the tool of geographic information system (GIS) and spatial analysis to problems in natural resource ecology, management, and conservation. Course covers the following topics: principles of landscape ecology (e.g., patch, mosaic, and scale), quantification of landscape patterns, formation and dynamics of landscape patterns, role of disturbance, landscape models and their applications. Prereq: Any upper level course in GIS or consent of instructor. (Same as GEO 570.)

FOR 599 INDEPENDENT WORK IN FORESTRY. (1-3)
Study and independent work on selected problems related to allocation and utilization of natural resources. May be repeated to a maximum of six credits. Any combination of FOR 599 and FOR 781 cannot exceed six credits. Prereq: Senior or graduate standing and consent of instructor.

FOR 601 RESEARCH METHODS IN FORESTRY. (3)
A study of research methods, procedures, and techniques used in forestry. Major emphasis will be placed on problem analysis and methods of conducting organized research. Prereq: Graduate standing.

FOR 602 RENEWABLE NATURAL RESOURCES IN A GLOBAL PERSPECTIVE. (3)
An advanced course that examines world and transboundary issues related to renewable natural resources. Students will attend a series of lectures, discuss assigned readings, and identify issues for further study. Student research papers related to those issues will be presented and discussed in a seminar format. Prereq: Graduate standing.

FOR 603 FOUNDATIONS IN FORESTRY, WILDLIFE AND NATURAL RESOURCE SCIENCES. (3)

Foundations in Forestry, Wildlife and Natural Resource Sciences is a 3-credit, graduate level, seminar-style course focused on evaluating, discussing, and tracking the progression of the science and philosophy behind select topics in forestry, wildlife and other natural resource sciences, as well as environmental management and policy. Prereq: Graduate Standing.

FOR 605 EMPIRICAL METHODS IN ECOLOGY AND EVOLUTION. (2)
This course provides students with hands-on experience in a diverse array of modern research methods used by ecologists and evolutionary biologists, including techniques used in: molecular genetics, chemical ecology, behavioral studies, motion analyses, using high-speed video, image analyses for morphometrics and color, and field techniques in both aquatic and terrestrial systems. Lecture, one hour; laboratory, three hours per week. Prereq: BIO 325 or FOR 340 or ENT 665, or consent of instructor. (Same as BIO/ENT 605.)

FOR 606 CONCEPTUAL METHODS IN ECOLOGY AND EVOLUTION. (3)
This course provides students with hands-on experience in a diverse array of conceptual research techniques used by ecologists and evolutionary biologists. The focus will be on optimization methods used for predicting animal & plant behaviors & life histories, & on methods for assessing population trends and dynamics. Mathematical techniques used will include graphical analyses, matrix algebra, calculus, and computer simulations. The latter part of the course will consist of collaborative modeling projects, in which small groups of students will work with the instructor to address an important contemporary research problem & will report their results in a public talk & a project writeup. Prereq: One year of calculus and BIO 325 or FOR 340 or ENT 665, or consent of instructor. (Same as BIO/ENT606.)
FOR 607 ADVANCED EVOLUTION. (2)
This course covers advanced topics in evolution, concentrating on questions central to the understanding of general evolutionary processes. Phenomena occurring both within populations (e.g., selection, inheritance, population subdivision) and between populations (e.g., gene flow, competition) will be addressed. Special attention will be given to modern research approaches and techniques including quantitative genetics, measurement of selection, phylogenetic analyses of comparative data and molecular systematics. Prereq: One year of calculus, genetics (BIO 304 or BIO 461) and BIO 508 or consent of instructor. (Same as BIO/ENT 607.)

FOR 608 BEHAVIORAL ECOLOGY AND LIFE HISTORIES. (2)
This course uses an evolutionary approach to examine behavior and life histories. Topics addressed include: the optimality approach, constraints on optimality, kin and group selection, predator and prey behaviors, social and mating behaviors, and life history evolution. Prereq: BIO 325 and one semester of calculus; or consent of instructor. (Same as BIO/ENT 608.)

FOR 609 POPULATION AND COMMUNITY ECOLOGY. (3)
This course discusses the processes that determine population distributions and dynamics and community structure for both plants and animals. Topics addressed include: population regulation and population stability, community diversity and stability, ecological succession, population interactions (competition, predation, mutualism), coevolution, and the effects of spatial and temporal heterogeneity on population and community patterns. Prereq: BIO 325 or FOR 340 or consent of instructor. (Same as BIO/ENT 609.)

FOR 612 FOREST ECOSYSTEM DYNAMICS. (3)
The study of ecosystem structure and function with emphasis upon eastern deciduous forest ecosystems. Topics discussed will include energy flow, mineral cycling, the influence of disturbance upon ecosystem properties and dynamic processes in the development of ecosystems. Prereq: FOR 340 or BIO 451G and consent of instructor.

FOR 620 SPECIAL TOPICS IN FORESTRY (Subtitle required). (1-3)
Special topical or experimental courses in forestry for advanced graduate students. Special title required and must be approved by the chairperson of the Department of Forestry. May be repeated to a maximum of nine credits. Students may not repeat under the same subtitle. Prereq: Consent of instructor.

FOR 622 PHYSIOLOGY OF PLANTS I. (3)
A physiological/biochemical treatment of central topics in modern plant physiology. Topics will include: plant-cell biology, ion transport, water and translocation, respiration and photosynthesis. Prereq: BIO 430G or equivalent or consent of coordinator. Prereq or concur: BCH 607. (Same as BIO/PLS 622.)

FOR 623 PHYSIOLOGY OF PLANTS II. (3)
A physiological/biochemical treatment of central topics in modern plant physiology. Topics will include: plant hormones, an introduction to plant biotechnology, senescence and abscission, stress physiology, phytochrome-photomorphogenesis-phototropism nitrogen and sulfur metabolism. Prereq: BIO 430G or equivalent or consent of coordinator. Prereq or concur: BCH 607. (Same as BIO/PLS 623.)

FOR 662 QUANTITATIVE METHODS IN RENEWABLE AND NONRENEWABLE RESOURCE MANAGEMENT. (3)
Application of dynamic optimization methods to renewable and nonrenewable resource management. Includes problem formulation, mathematical problem solving, Matlab programming, simulations and optimal policies analysis. Case examples are used to demonstrate applicability and problem formulation in finance and general and partial equilibrium. Prereq: MA 113 and MA 162 or equivalent, and AEC 661 or equivalent. (Same as AEC 662.)
FOR 667 INVASIVE SPECIES BIOLOGY. (3)
This course will examine circumstances that allow introduced species to become invasive, how invasive species threaten our resources, and approaches to minimizing the incidence and impact of invasions. Prereq: Graduate standing or consent of instructor. (Same as BIO/ ENT 667.)

FOR 695 FIELD RESEARCH IN FORESTRY. (0)
Full-time research that requires the student to remain off-campus for extended periods. Students enrolled in this course remain in full-time academic status May be repeated to a maximum of 2 semesters. Prereq: Graduate standing in the Forestry Graduate Program. For students whose research precludes them from taking courses on campus for a semester. Registration requires (a) approval of Research Contract by a committee of at least three Forestry faculty members established to consider a particular student's Research Contract, (b) approval of Research Contract by Director of Graduate Studies, and (c) approval of Research Contract by Associate Dean for Academic Programs.

FOR 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

FOR 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

FOR 768 RESIDENCE CREDIT FOR MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours. Prereq: Consent of adviser and chairperson of the department.

FOR 770 FORESTRY SEMINAR (Subtitle required). (1)

Reports and discussions on recent research and current literature. Credit is given to those who satisfactorily present papers. Required of all graduate students. Can be repeated to a maximum of three credits. Prereq: Graduate standing.

FOR 781 SPECIAL PROBLEMS IN FORESTRY. (1-3)
Advanced study of selected problem areas in forestry. May be repeated for a total of six credits; any combination of FOR 781 and FOR 791 cannot exceed six credits. Prereq: Consent of graduate adviser.

FOR 791 RESEARCH IN FORESTRY. (1-3)
Involves original research in selected areas of interest in forestry. May be repeated for a total of six credits; any combination of FOR 781 and FOR 791 cannot exceed six credits. Prereq: Consent of graduate adviser.

# Integrated Plant & Soil Sciences

## College of Agriculture, Food & Environment

The interdepartmental graduate program in Integrated Plant and Soil Sciences offers graduate work leading to the Master of Science and Doctor of Philosophy degrees with specialization in Crop Science, Horticultural Science, Forest Science, Plant Biology, and Soil Science. Faculty members belong to the Departments of Forestry, Horticulture, and Plant and Soil Sciences in the College of Agriculture, Food, and Environment.

The IPSS M.S. program replaces the M.S. program in Plant and Soil Sciences. The IPSS PhD program replaces the PhD programs in Crop Science, Plant Physiology, and Soil Science. Students currently matriculating in any of those graduate programs should consult the 2010-2011 version of the Graduate Bulletin for applicable guidelines.

**Admission Requirements**
All students with strong training in science, including but not limited to baccalaureate degrees in agronomy, biology, chemistry, and horticulture are encouraged to apply. Admission to the IPSS Program is competitive and based on the applicant's undergraduate and graduate records, performance on standardized exams, and letters of recommendation. It is expected that applicants will meet the minimum standards established by the University of Kentucky Graduate School. Applicants will automatically be considered for departmental research assistantshIPS, which are awarded on a competitive basis.

Graduate students in IPSS have flexibility in designing course work to suit individual goals, but are expected to demonstrate competence in basic areas of plant and soil science and excellence in their chosen area of specialization as demonstrated by novel research leading to a published thesis or dissertation. So that all entering Ph.D. students are at an academic level to successfully complete course requirements, the following courses or their equivalent should have been completed prior to admission:

1. Chemistry – a first semester course in organic chemistry (equivalent to CHE 230)
2. Calculus – a first semester course (equivalent to MA 113)
3. Physics – a first semester course (equivalent to PHY 201)

For PhD students with a specialization in Soil Science, the following additional preparation is suggested:

1. Chemistry - Analytical Chemistry (equivalent to CHE 226) and Organic Chemistry (equivalent to CHE 230 or 236)
2. Introductory Soil Science with a lab (equivalent to PLS 366) and at least two additional soils courses
3. Biology, two courses in basic biology (equivalent to BIO 151/152) and two additional courses in crop science, plant biology, or microbiology
4. Statistics, including regression and experiment design (equivalent to STA 570, 671, and 672)

Students are expected to make up deficiencies in these courses within one year of enrollment.

**Degree Requirements**
For the M.S. degree, 24 hours of course work, which includes IPS 610, IPS 625, PLS 772, at least one graduate level statistics course, and an acceptable thesis. There is a non-thesis option requiring 30 hours of coursework for students who wish to make the M.S. a terminal degree. Work leading to advanced degrees must conform to the general rules and regulations of the Graduate School. Individual programs include a strong course work component and a meaningful research experience.

For the Ph.D. degree, a minimum of 36 credit hours of graduate level work of which 18 hours of course work are in residence at the University of Kentucky and includes IPS 610, IPS 625, PLS 772, at least one graduate level statistics course, and an acceptable dissertation. Additional coursework may be required by the student's dissertation committee.

Details regarding the curriculum, program areas, and areas of specialization, financial aid, faculty research interests, and the application process may be found at: www.ca.uky.edu/pss/academics/IPSs

## Graduate Courses

| | | |
|---|---|---|
| IPS 610 | Trans-Disciplinary Communication In IPSS | (1) |
| IPS 625 | Trans-Disciplinary Research In IPSS | (2) |
| PLS 450G | Biogeochemistry (Same As NRE 450G) | (3) |
| PLS 455G | Wetland Delineation (Same As NRE 455G) | (3) |
| PLS 456G | Constructed Wetlands (Same As NRE 456G) | (3) |
| PLS 468G | Soil Use And Management (Same As NRE 468G) | (3) |
| PLS 470G | Soil Nutrient Management (Same As NRE 470G) | (3) |
| PLS 502 | Ecology Of Economic Plants | (3) |
| PLS 510 | Forage Management And Utilization | (3) |
| PLS 514 | Grass Taxonomy And Identification | (3) |
| PLS 515 | Turf Management | (3) |
| PLS 520 | Fruit And Vegetable Production | (3) |
| PLS 525 | Nursery And Floriculture Crop Production | (4) |
| PLS 531 | Field Schools In Crop Pest Management | (2) |
| PLS 566 | Soil Microbiology | (3) |
| PLS 567 | Methods In Soil Microbiology | (1) |
| PLS 573 | Soil Morphology And Classification | (3) |
| PLS 575 | Soil Physics | (3) |
| PLS 576 | Laboratory In Soil Physics | (1) |
| PLS 597 | Special Topics In Plant And Soil Sciences (Subtopic Required) | (1-3) |
| PLS 599 | Special Problems In Plant And Soil Sciences (Off Campus Independent Research) | (1-8) |
| PLS 601 | Special Topics In Molecular And Cellular Genetics | (1) |
| PLS 602 | Principles Of Yield Physiology | (3) |
| PLS 620 | Plant Molecular Biology (Same As BIO 620) | (3) |
| PLS 622 | Physiology Of Plants I (Same As BIO/FOR 622) | (3) |
| PLS 623 | Physiology Of Plants II (Same As BIO/FOR 623) | (3) |
| PLS 650 | Soil-Plant Relationships | (3) |
| PLS 655 | Spatial And Temporal Statistics | (3) |
| PLS 660 | Advanced Soil Biology | (2) |
| PLS 664 | Plant Breeding I | (3) |
| PLS 671 | Soil Chemistry | (4) |
| PLS 676 | Quantitative Inheritance In Plant Populations | (3) |
| PLS 697 | Special Topics In Plant And Soil Sciences | (1-3) |
| PLS 712 | Advanced Soil Fertility | (3) |
| PLS 741 | Clay Mineralogy (Same As GLY 741) | (3) |
| PLS 748 | Master's Thesis Research | (0) |
| PLS 767 | Post Qualifying Exam Residency Credit | (2) |
| PLS 768 | Residence Credit For The Master's Degree | (1-6) |
| PLS 772 | Seminar In IPSS | (1) |
| PLS 799 | Non Dissertation Research In Plant And Soil Sciences | (1-4) |

# Nutrition & Food Systems

## College of Agriculture, Food & Environment

Graduate education leading to a MS in Nutrition and Food Systems and replacing the MS in Hospitality and Dietetics Administration. The 17 hour graduate-level core emphasizes contemporary nutrition topics, such as research methods and health behavior theories, community programming and intervention development, food systems, chronic disease diagnosis and process related to lifestyle behaviors, statistics, and a nutrition and food systems seminar. The Master of Science program prepares students for careers in community, education, government, industry, non-profit, health care or private practice settings. A student may choose the Plan A - Thesis or Plan B - Project.

***Plan A*** - Thesis requires the 17-hour core, 7 hours of electives to explore areas of personal interest, 6additional hours of research credit and a written thesis and oral defense.
***Plan B*** - Project requires the 17-hour core, 13 hours of electives, 6additional hours of special problems, 6 additional hours of research credit and a project presentation and exam.

### Core Courses

| | | |
|---|---|---|
| DHN 600 | Research Methodology in Nutrition and Food Systems | (3) |
| DHN 603 | Advanced Community Program Development | (3) |
| DHN 605 | Food Systems and Society | (3) |
| DHN 608 | Chronic Disease Management and Process | (3) |
| DHN 774 | Seminar in Nutrition and Food Systems | (3) |
| STA 671 | Regression and Correlation | (2) |

A 500-level statistics course is a pre-requisite to the graduate program and may be taken during the existing graduate program.

### Elective Courses

| | | |
|---|---|---|
| DHN 607 | Food Related Behaviors | (3) |
| DHN 784 | Special Problems in Financial Management | (3) |
| DHN 690 | Advanced Work in Dietetics | (3) |
| DHN 620 | Nutrition and Aging | (3) |
| DHN 630 | Advanced Community Nutrition | (3) |
| DHN 640 | Human Nutrition: Assessment | (3) |
| DHN 690 | Advanced Work in Dietetics | (3) |

Currently, students may choose electives outside the department with the permission from the instructor.

### Course Descriptions

DHN 510 ADVANCED NUTRITION. (3)
Application of biochemistry, physiology and nutrition to the understanding of the utilization and function of nutrients in the body as related to the structure, function and metabolic needs of cells/organ systems. Prereq: DHN 311 or BCH 401G or equivalent; PGY 206; Dietetics and Human Nutrition Majors or admission to DHN/NS graduate program.

DHN 512 MEDICAL NUTRITION THERAPY I. (4)
This course explores changes in nutrient metabolism related to biochemical and physiological alterations in disease conditions and application of the Nutrition Care Process. Content includes case study evaluations, medical nutrition therapies for disease conditions, and current research in the field. Prereq: DHN 311 and 312; plus, past or concurrent DHN 510. Enrollment is restricted to dietetics majors only.

DHN 514 DIETETICS: COUNSELING AND COMMUNICATION THEORIES AND APPLICATIONS. (3)
Counseling and communication theories are combined to study specific applications which include disease prevention, disease management and refinement of communication skills to enhance effectiveness as a practicing RD. Students will enhance their capacity to motivate others to practice healthy food behaviors. Active learners will develop a conceptual framework for future professional practice in dietetics as ethical counselors and facilitators of behavior change. Three credit hours. Prereq: DHN 403, DHN 510, DHN 512; must be taken concurrently with DHN 517. Enrollment is restricted to Dietetics majors.

DHN 515 MEDICAL NUTRITION THERAPY. (5)
This capstone course explores changes in nutrient metabolism related to biochemical, physiological, and pathophysiological alterations in disease conditions, application of the Nutritional Care Process and Model, and development of medical nutrition therapy intervention. Content includes case study evaluations, nutritional therapies for disease conditions, including enteral and total parenteral nutrition, and current research in the field. Prereq: DHN 311, 312, 403 and 510 and concurrent with DHN 514. Enrollment is limited to dietetics majors.

DHN 516 MATERNAL AND CHILD NUTRITION. (3)
Food selection for optimal nutrition during pregnancy and lactation and for infant and child development through preadolescence. Cultural, social, and psychological aspects of food selection and dietary patterns, as they relate to mental and physical development. Prereq: DHN 312 or consent of instructor.

DHN 517 MEDICAL NUTRITION THERAPY II.
This course continues study of medical nutrition therapy topics, including trauma and enteral and parenteral nutrition. Content includes more advanced case study evaluations, medical nutrition therapies, and current research in the field. Prereq: DHN 512 and concurrent with DHN 514 and enrollment is limited to dietetics majors.

DHN 518 EVALUATION OF DIETETIC ISSUES AND LEADERSHIP. (2)
Course provides opportunities for the development of competencies, attitudes and values expected of the entry level professional. Lectures, presentation of individual case studies and research projects are conducted. Opportunities are provided for transfer of theory to practice, interpretation of research, discussion of professional literature and application of leadership and communication skills in addressing issues of professional dietetic practice. This web enhanced didactic course is taught via distance learning coupled with on campus sessions. Prereq: Admission to the Coordinated Program or Dietetic Internship.

DHN 520 MEDICAL NUTRITION THERAPY I: SUPERVISED PRACTICE. (5)
Supervised practice in health care facilities. Course focuses on patient assessment, diet planning, care plan implementation, and nutritional evaluation. Fulltime medical nutrition therapy experience at an assigned facility with the opportunity to gain entry level experience while seeing a variety of patients with varied disease states. Prereq: Admission to UK DHN Supervised Practice Program (SPP).

DHN 522 FOOD SERVICE SYSTEMS MANAGEMENT I: SUPERVISED PRACTICE. (5)
Supervised practice in foodservice systems management in a variety of food service operations. Experience

involves participation in management functions including procurement, production, financial and human resources management, marketing, and training. Prereq: Admission to UK DHN Supervised Practice Program (SPP).

DHN 524 FOOD SERVICE SYSTEMS MANAGEMENT II: SUPERVISED PRACTICE. (3)
In-depth application of foodservice systems management in a variety of food systems operations. Provides variety of experience in operations, financial, and managerial aspects of food services. Prereq: Admission to UK DHN Supervised Practice Program (SPP).

DHN 526 MEDICAL NUTRITION THERAPY II: SUPERVISED PRACTICE. (3)
This course provides an in-depth clinical application of the principles of dietetics. The course will focus on the team concept of patient care and provide advanced dietetics practice with the opportunity to test and evaluate results. Prereq: Admission to UK DHN Supervised Practice Program (SPP).

DHN 528 COMMUNITY NUTRITION I: SUPERVISED PRACTICE. (1)
This course provides an introductory supervised practice in community nutrition. Experiences include public and private agencies/ organizations that provide food and nutrition services, public policy and program development, and nutrition education for various socioeconomic groups. Full-time community nutrition experience as a member of the community health delivery team at assigned community and health related agency. The student will have opportunities to manage nutrition care for population groups across the lifespan; develop community based food and nutrition programs; and develop health promotion/ disease prevention intervention projects. Prereq: Admission to UK DHN Supervised Practice Program (SPP).

DHN 530 COMMUNITY NUTRITION II: SUPERVISED PRACTICE. (2)
This course provides an introductory supervised practice in community nutrition. Experiences include public and private agencies/ organizations that provide food and nutrition services, public policy and program development, and nutrition education for various socioeconomic groups. Full-time community nutrition experience as a member of the community health delivery team at assigned community and health related agency. The student will have opportunities to manage nutrition care for population groups across the lifespan; develop community based food and nutrition programs; and develop health promotion/ disease prevention intervention projects. Prereq: Admission to UK DHN Supervised Practice Program (SPP).

DHN 591 SPECIAL PROBLEMS IN DIETETICS AND HUMAN NUTRITION. (1-3)
Intensive work on an independent project related to dietetics and human nutrition. Senior or graduate standing. May be repeated for a maximum of six credits. Prereq: Consent of instructor.

DHN 600 RESEARCH METHODS IN NUTRITION AND FOOD SYSTEMS.
Students will study accepted research methodologies and scientific approaches in human nutrition and food systems. Emphasis is placed on understanding the research methods, study design, data collection, and evaluation of various nutrition related studies. Discussions include development of research aims and hypothesis, internal review board, collecting of primary and secondary data, measurement approaches, study designs, and key considerations in developing a thesis for publication. Prereq: Admission to graduate program and selection of graduate faculty mentor with approved research topic.

DHN 603 ADVANCED COMMUNITY PROGRAM DEVELOPMENT. (3)
The course focuses on concepts and theories of program development, use of planned goals and objectives such as Healthy Communitiesgoals and objectives, use of data from national monitoring, survey and surveillance programs, and community assessment to guide decision making for program development.

Program marketing, staffing formulas, and grant writing and grant management, cost analysis and cost effectiveness reporting, and formative and summative evaluation of community programs complete the study. Prereq: Admission to graduate program.

DHN 605 FOOD SYSTEMS AND SOCIETY. (3)
Food Systems and Society tracks food from farm to table, including growing, harvesting, processing, packaging, transporting, marketing, consumption, and disposal. Policy and culture determine who eats what and who benefits and loses in any given food system. As a result food systems vary considerably across the world with each evolving to affect overall health. The course will assess sustainability of food systems and explore the ethical, economical, socio-ecological, and environmental factors that affect local, regional, national, and global food system development. Content includes case study evaluations and current research in the field. Prereq: Graduate standing.

DHN 607 FOOD RELATED BEHAVIORS. (3)
This team-taught course will provide background in topics and methods in food related behaviors to students in Nutritional Sciences and other interested students. The course will follow a problem-based learning approach, and will consist of 3 out of 4 modules in any given year. The four modules will be Social and Cultural Perspectives on Food, Psychological Perspectives on Food and Food Behaviors, Challenges to Community Food Security, and International Issues in Nutrition.

DHN 608 CHRONIC DISEASE MANAGEMENT AND PROCESS. (3)
This course focuses on the etiology and pathophysiology of nutrition-related chronic diseases and conditions including obesity, hypertension, dyslipidemia, heart disease, diabetes, and cancer. Emphasis is placed on the biochemical and physiological mechanisms involved by which nutrients impact the prevention, nutrition care process-diagnosis, assessment, implementation of care, monitoring and evaluation, and progression of chronic diseases and conditions. Prereq: Graduate standing and minimum 3 credit hours of upper level advanced nutrition or DHN 510.

DHN 610 MARKETING IN HOSPITALITY AND DIETETICS. (3)
This course overviews the discipline of marketing as it relates to the hospitality and dietetics professions. Special emphasis will be placed on the analysis of the marketing environment, marketing strategies and the diversity of marketing practices used by the hospitality industry and dietetics profession. This course will provide opportunities for students to develop appropriate marketing approaches in today's increasingly competitive and complex global marketplace. Prereq: MKT 300 or HMT 320 or equivalent course.

DHN 620 NUTRITION AND AGING. (2)
Emphasis on current research in nutrition and aging, nutrition needs of the elderly and nutrition-related diseases associated with aging. Prereq: DHN 510 and 511 or equivalent. (Same as NS 620.)

DHN 640 HUMAN NUTRITION: ASSESSMENT.(3)
Assessment of dietary, anthropometric and biochemical parameters of nutritional status in health and disease. Lecture, two hours; laboratory, three hours per week. Prereq: DHN 510, DHN 511 or equivalent. (Same as NS 640.)

DHN 648 MANAGEMENT OF HOSPITALITY AND DIETETICS ORGANIZATIONS. (3)
This course will engage students with the theories and their application in the area of leadership and management of people, resources, finances, information and internal and external customers as they relate to dietetics, food service and hospitality professions. Prereq: Admission to graduate program, DHN 346 or equivalent course.

DHN 690 ADVANCED WORK IN DIETETICS.
Evaluation of administrative practices in dietetics. This course will examine topics related to managing dietetics services including medical nutrition therapy protocols, dietetics outcomes research, parenteral and enteral support, clinical pathways, JCAHO requirements, state and institutional policy controls, reimbursement for dietetics services, in-patient and out-patient quality management, and hospital outreach programs. Prereq: Admission to graduate program. Lecture only course.

DHN 704 CURRENT TOPICS IN NUTRITIONAL SCIENCES. (1)
This course is designed to develop the student's independent thinking and critical analysis related to various nutritional sciences issues. These skills will be developed through reading assignments and group discussion related to current topics in nutrition. Prereq: Consent of instructor. (Same as CNU/NS 704.)

DHN 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed. (Same as NS 748.)

DHN 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours. (Same as NS 768.)

DHN 770 SEMINAR IN HOSPITALITY AND DIETETICS ADMINISTRATION. (1)
Investigation of recent research in Hospitality and Dietetics Administration. May be repeated to a maximum of three credits.

DHN 772 CURRENT TOPICS IN HOSPITALITY AND DIETETICS ADMINISTRATION. (2)
Faculty from different disciplines will provide in-depth coverage of selected topics in Hospitality and Dietetics Administration.

DHN 774 SEMINAR IN NUTRITION AND FOOD SYSTEMS. (3)
This advanced participatory seminar focuses on the latest in nutrition and food systems research. Students will be expected to apply their knowledge of effective scientific communication, responsible conduct of research, and methods and technologies in nutrition and food systems through weekly readings, presentations, and class discussions. Prereq: Graduate standing and upper level graduate statistics.

DHN 782 SPECIAL PROBLEMS. (1-6)
Independent advanced work on a special problem in nutritional sciences. Prereq: Consent of graduate advisor. (Same as CNU/NS 782.)

DHN 784 SPECIAL PROBLEMS IN FINANCIAL MANAGEMENT. (3)
A current events approach to the financial and accounting decision-making process in dietetics and hospitality administration. The course will prepare advanced students in dietetics and hospitality administration to analyze and make sound financial decisions in settings relevant to the dietetics profession and the hospitality industry. Prereq: Admission to graduate program, ACC 201, ECO 201 and either FIN 300 or (DHN 340, DHN 342, and DHN 346).

DHN 790 RESEARCH IN NUTRITIONAL SCIENCES. (0-6)
Research work involving original investigation. May be repeated to a maximum of 18 credits. Prereq: Consent of graduate advisor. (Same as CNU/NS 790.)

# Plant Pathology

## College of Agriculture, Food & Environment

The department offers work leading to the M.S. and Ph.D. degrees. For the Ph.D. degree, individual programs of study must conform to the requirements established by the Graduate School; a minor is not required.

**Admission Requirements**
The Graduate School's requirements for admission are likewise the minimum requirements for acceptance into the M.S. and Ph.D. programs of the Department of Plant Pathology. However, additional materials are required for application to the Plant Pathology graduate programs. Each applicant must arrange for three letters of recommendation to be sent, and must also provide a curriculum vitae and a written statement identifying the applicant's reasons for desiring to undertake studies in this department, to the Plant Pathology DGS. These materials, and those submitted to the Graduate School, are considered on a case-by-case basis by the department's Academic Program Committee, which then makes a recommendation on admission. Admission to a graduate program in Plant Pathology does not guarantee financial assistance to the student. Applicants who are admitted will also be informed of any financial offer in a contract that they must sign in order to be admitted to the Graduate School.

Required Courses for both MS and Ph.D.:

| | |
|---|---|
| PPA 400G | (3) (if not taken previously) |
| PPA 500 | (3) |
| PPA 600 | (2) |
| PPA 640 | (3) |
| PPA 641 | (1) |
| PPA 770 | (1) |

At least two from the following list:

| | |
|---|---|
| PPA 650 | (3) |
| PPA 670 | (1) |
| PPA 671 | (2) |
| PPA 673 | (1) |
| PPA 620 | (3) |
| PPA 630 | (1) |
| PPA 631 | (1) |

**Course Descriptions**

PPA 500 PHYSIOLOGY OF PLANT HEALTH AND DISEASE. (3)
First-semester graduate students and upper class undergraduates will gain a basic understanding of physiology, structure and development of plants and their associated fungi, viruses, bacteria and nematodes, and to appreciate how interactions with symbionts and pathogens influence plant health and disease. Prereq: PPA 400G (can be concurrent).

PPA 600 CRITICAL METHODS IN PLANT-MICROBE INTERACTIONS. (2)
The course will provide instruction on experimental methods commonly used in Plant-Microbe

Interaction and will train students in critical thinking, grant writing, scientific ethics and seminar presentation. Prereq: PPA 500.

PPA 601 SPECIAL TOPICS IN MOLECULAR AND CELLULAR GENETICS. (1)
Each semester five distinguished scientists visit the UK campus to deliver a series of three formal lectures each and participate in numerous informal contacts with graduate students. The emphasis is on the presentation of the most current advances (often unpublished) in selected topics in molecular and cellular genetics. May be repeated to a maximum of six credits. (Same as BIO/BCH/MI/PLS 601.)

PPA 609 PLANT BIOCHEMISTRY. (3)
The course will consider the chemical constituents of plants (with emphasis on biologically or nutritionally significant compounds unique to plants), their biosynthesis, contribution to key metabolic and defense processes and the regulation of their synthesis. Included will be discussions of photosynthesis, carbohydrates, lipids, isoprenoids and phenylpropanoids, nitrogen fixation, nitrogen and sulfur reduction and assimilation, alkaloids and additional secondary compounds, frontiers in plant biochemistry. Prereq: BCH 607 or equivalent or consent of instructor. (Same as BCH/PLS 609.)

PPA 620 FUNGICIDES, ADVANCED CONCEPTS. (3)
An in-depth exploration of diverse factors that affect field performance of fungicides, as well as environmental and toxicological dimensions of these disease-control chemicals. Prereq: Principles of Plant Pathology (PPA 400G) or the equivalent, or permission of the instructor.

PPA 630 INTRODUCTION TO GENETICALLY ENGINEERED CROPS, RISKS AND BENEFITS I. (1)
This is Part I of a two-part series of one-credit, graduate-level courses exploring GMO (genetically engineered) crops. In Part I (PPA 630), students will be introduced to what they are; and how GMO crops are similar to, and different from, other crops. In Part II (PPA 631), students will explore perceived risks and benefits to the use of these technologies. Prereq: A Bachelor's degree in any subject; a college-level course in biology or permission of the instructor.

PPA 631 INTRODUCTION TO GENETICALLY ENGINEERED CROPS, RISKS AND BENEFITS II. (1)
This is Part II of a two-part series of one-credit, graduate-level courses exploring GMO (genetically engineered) crops. In Part I (PPA 630), students will be introduced to what they are; and how GMO crops are similar to, and different from, other crops. In Part II (PPA 631), students will explore perceived risks and benefits to the use of these technologies. Prereq: A Bachelor's degree in any subject; a college-level course in biology or permission of the instructor.

PPA 640 IDENTIFICATION OF PLANT DISEASES. (3)
Recognition and identification of plant diseases and their causes and development. The course is designed to give students practical experience in dealing with a wide array of plant diseases, symptom expressions, causal agents and interactions with environmental factors encountered in the difficult task of identifying plant diseases. May be repeated to a maximum of nine credits. Lecture, one hour; laboratory, six hours. Prereq: PPA 400G or equivalent or consent of instructor. (Same as PLS 640.)

PPA 641 PLANT DISEASE, POPULATION BIOLOGY, AND BIOTECHNOLOGY. (1)
To understand implications of deployment of biotechnology and other disease management practices at the level of host and pathogen populations. Prereq: PPA 400G.

PPA 650 FUNGAL BIOLOGY. (3)
The Fungal Biology course introduces basic mycological concepts, including systematics, anatomy, cell

biology, metabolism, developmental biology, ecology, population genetics, and reproduction. There is a focus on modern molecular approaches to these concepts. Students will also learn about the use of fungi in research and biotechnology. Prereq: Undergraduate courses in biology, genetics, and chemistry.

PPA 670 PLANT BACTERIOLOGY.(1)
Bacterial mechanisms underlying pathogenesis and virulence in interactions causing plant disease, and symbiotic compatibility in mutualisms. Prereq: PPA 400G, PPA 500, PPA 600, PPA 640 can be concurrent.

PPA 671 ADVANCED PLANT VIROLOGY. (2)
Molecular basis of plant virus infection of plants. Virus replication and spread. Virus control strategies. Prereq: PPA 400G, PPA 500, PPA 600.

PPA 673 ADVANCED PLANT DISEASE RESISTANCE. (1)
Bacterial mechanisms underlying pathogenesis and virulence in interactions causing plant disease, and symbiotic compatibility in mutualisms. Prereq: PPA 400G, PPA 500, PPA 600.

PPA 700 PLANT PATHOLOGY LABORATORY VISITS. (1-3)
Semester-long rotations in Plant Pathology laboratories other than the students' "home lab". An opportunity will be provided to apply new approaches that are utilized in those labs to the students' research problems. May be repeated to a maximum of six credit hours.

PPA 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

PPA 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

PPA 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.
Reports and discussion of problems and investigations of problems in plant pathology. May be repeated to a maximum of four credits.

# Retailing & Tourism Management

## College of Agriculture, Food & Environment

The graduate program in the Department of Retailing and Tourism Management is philosophically committed to the well-being of individuals in their immediate environment. The program is designed to meet individual student interests and career objectives.

The graduate program leads to a Master of Science Retailing and Tourism Management with a formal option in HMT (Hospitality Management & Tourism) or MAT (Merchandising, Apparel and Textiles). The program is individualized to meet each student's career interests using a combination of course work, independent study, and research experience. Coursework in RTM is selected to either the HMT (Hospitality Management & Tourism) or MAT (Merchandising, Apparel and Textiles) focus.

### Hospitality And Tourism Management Formal Option And Merchandising, Apparel And Textiles Formal Option

*Thesis Option (Plan A)*
The Thesis Option (Plan A) requires a thesis to be developed under the direction of a full or associate member of the RTM Graduate Faculty. A minimum of 30 semester hours, including thesis hours, must be completed to satisfy requirements for the Thesis Option (Plan A). Instructions for the preparation of thesis and dissertations are available at http://www.research.uky.edu/gs/thesdissprep.html.

If a student selects the Thesis Option (Plan A), they must complete 6 credit hours of RTM 768. In doing so, the first 3 hours of this requirement should result in the completion of Chapters 1, 2, & 3 of their thesis and will result in an official Proposal Meeting of their committee and the approval of their topic.

The primary objective of a thesis research component is to expand the existing knowledge base. Each student completing the Thesis Option (Plan A) must present a thesis which represents the culmination of a major research project. The thesis must be a well-reasoned, original contribution to knowledge in the field of study and should provide evidence of high scholarly achievement. The major professor is the primary source of guidance in the planning and preparation of the thesis. However, other members of the Research Committee may be involved in the process as well. The following guidelines apply:

- Thesis proposal must be submitted to student's Research Committee for approval and will include Chapters 1, 2, & 3 of thesis.
- Thesis proposal must be reviewed and approved by student's Research Committee before student can begin work on thesis research and/or collect data for their thesis work.
- The official Thesis Proposal Approval Sheet must be filed with the DGS before student can proceed with the completion of their thesis.
- Student must obtain IRB approval before any thesis research data may be collected.
- Final thesis draft must be submitted at least 7 days in advance of the Final Exam.
- All members of the Thesis Research Committee must read the thesis prior to signing the Approval Form.

RTM Required Core (Thesis Option)

| | | |
|---|---|---|
| RTM/HES | 600 Research Methods in RTM | (3) |
| RTM 650 | Survey of Current Theories & Literature | (3) |
| STA 570 | Basic Statistical Analysis | (4) |

| | | |
|---|---|---|
| RTM 772 | Seminar in RTM | (3) |
| RTM 768 | Residence Credit for Master's Degree | (3) |
| RTM 768 | Residence Credit for Master's Degree | (3) |

*Non-Thesis Option (Plan B)*
A minimum of 30 semester hours, must be completed to satisfy requirements for the Non-Thesis Option (Plan B). The Non-Thesis Option (Plan B) requires six or more graduate credit hours of either RTM 690 Industry Experience in RTM or RTM 790 Research Problems to be submitted in lieu of a thesis under the direction of a Non-thesis Research or Industry Internship Committee.

When selecting to complete RTM 790, students are choosing to complete a non-thesis creative project. In a non-thesis creative project, the focus is on the application of new or existing knowledge to an identified problem. Non-Thesis Options require the completion of 6 hours (RTM 790) of research problems. The non-thesis creative project culminates in a product. The product produced must demonstrate the application of knowledge in an original manner. The process used to produce the product must be documented in written form and illustrate how the product is an application of knowledge in the field.

A Non-Thesis Option (Plan B) student may also opt to complete RTM 690 Industry Experience in RTM. This will involve the completion of an industry internship approved by the DGS and the student's Research Committee. This experience must be within the student's field of study and must include 400 work hours. The following guidelines apply to the non-thesis or internship process:

- Non-Thesis or Internship proposal must be submitted to the Non-Thesis or Internship Committee for approval and will include a written description of either the proposed research project or the proposed industry internship experience.
- Non-Thesis or Internship proposal must be reviewed and approved by Non-Thesis or Internship Committee before student can begin work on their Non-Thesis project or Internship experience.
- The official Non-Thesis or Internship Proposal Approval Sheet must be filed with the DGS before student can proceed with the completion of their Non-Thesis or Internship experience.
- Final Non-Thesis or Internship requirements must be submitted at least 7 days in advance of the Final Exam.
- All members of the Non-Thesis or Internship committee must read the submitted requirements prior to signing the Approval Form. A minimum of 30 total semester hours must be completed to satisfy requirements for the Nonthesis Option. See the Non-Thesis Proposal Approval Sheet.

RTM Required Core (Non-Thesis Option)

| | | |
|---|---|---|
| RTM/HES 600 | Research Methods in RTM | (3) |
| RTM 650 | Survey of Current Theories & Literature | (3) |
| STA 570 | Basic Statistical Analysis | (4) |
| RTM 772 | Seminar in RTM | (3) |
| RTM 690 Or MAT 790 | Industry Experience in RTM | (6) |
| RTM 690 Or MAT 790 | Research Problems in MAT | (6) |

Support Selections
Both HMT and MAT students must complete 12 hours of support selection approved by their coursework committee. Students may make selections based on whether they have chosen the HMT formal option or the MAT formal option. All Support Selections must be approved by the student's coursework committee.

RTM Support Selections (Thesis and Non-Thesis Options)

For HMT students, they may complete 12 hours of any HMT course at the 500, 600, or 700 level, or they may complete other committee approved courses at the 500, 600, or 700 level at the University of Kentucky. For MAT students, they may complete 12 hours of any MAT course at the 500, 600, or 700 level, or they may complete other committee approved courses at the 500, 600, or 700 level at the University of Kentucky.

**Course Descriptions**

RTM 600 RESEARCH METHODOLOGY IN HUMAN ENVIRONMENTAL SCIENCES. (3)
Students will study scientific techniques and accepted research methodologies in human environmental science research. Emphasis is placed on understanding the research process and developing the skills necessary to evaluate and implement research methods and design procedures. Prereq: Graduate standing. (Same as HES 600.)

RTM 650 SURVEY OF CURRENT THEORIES AND LITERATURE. (3)
An intensive survey of the theoretical and empirical literature related to areas of merchandising, apparel, and textiles and to hospitality management and tourism. Emphasis will be placed on research literature and theory building. Prereq: Graduate standing.

RTM 690 INDUSTRY EXPERIENCE IN RETAILING AND TOURISM MANAGEMENT. (6)
Supervised industry experience with a cooperative establishment in the student's formal option of study. Students will complete a 400hour, 10 week learning experience under the joint supervision of a faculty member supervisor and a qualified industry professional. Prereq: Graduate student standing. Approval of department and student's plan of work committee.

RTM 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters.

RTM 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 credit hours. Prereq: All course work must be completed before registration for the course.

RTM 772 SEMINAR IN RETAILING AND TOURISM MANAGEMENT. (3)
Current investigation of topics relevant to both retailing and tourism management. May be repeated to a maximum of six credit hours.

# Science Translation and Outreach

## College of Agriculture, Food & Environment

## Master of Science in Science Translation and Outreach

The College of Agriculture, Food, and Environment offers a fully online Master of Science (MS) degree in Science Translation and Outreach (Plan B Non-thesis option).

### Application Requirements

- A one- to two-page resume or curriculum vitae (CV)
- Personal statement describing your background and interest in the program
- Official transcript(s) for prior studies in higher education
- GRE or GMAT scores
- Three letters of recommendation

### Degree Requirements

Science Translation and Outreach students complete 12 hours of core courses and 18 hours of elective courses.

You will create your individualized plan of study with the help of a faculty committee and culminate your degree with a real-world capstone outreach project.

#### Required Coursework

- STO 601 - Program Development & Evaluation
- STO 602 - Science Literacy and Translation
- STO 603 - Research Methods
- STO 650 - Capstone in Science Translation

#### Elective Courses

In order to customize the degree to students' unique interests and career goals, STO students take 18 credit hours of elective courses. Within the College of Agriculture, Food and Environment, students may choose online courses within the following departments:

- Agricultural Economics
- Animal and Food Sciences
- Community and Leadership Development
- Dietetics and Human Nutrition
- Entomology
- Family and Consumer Sciences
- Family Sciences

- Forestry
- Horticulture
- Plant and Soil Sciences
- Plant Pathology
- Positive Youth Development
- Retailing and Tourism Management

Elective courses from other programs and colleges may be considered with the approval of a student's advisory committee and the STO Director of Graduate Studies.

To better understand the variety of suitable potential electives, STO students have recently taken:

- BAE 532 Intro to Stream Restoration
- CPH 603 Data Analysis
- CLD 685 Community Development Theory & Practice
- DHN 597 Obesity and Food Insecurity Paradigm
- ENT 561 Insects Affecting Human & Animal Health
- FCS 620 Working with Diverse Families in Culturally Sensitive Contexts
- HMT 570 Event Planning and Coordination
- PPA 640 Identification of Plant Diseases
- PYD 620 Foundations of Positive Youth Development, and many more

## Course Descriptions

**STO 601 PROGRAM DEVELOPMENT AND EVALUATION. (3)** The purpose of this course is to provide a basic understanding of program evaluation processes, concepts, and theories and to develop expertise needed to design and conduct systematic evaluations of formal and non-formal programs. The material to be covered is applicable to a wide range of topics and disciplines, including social welfare, youth development, family studies, agriculture and the environment, community/economic development, and other formal and non-formal educational programs. Such programs have a common goal of achieving their desired objectives and being held accountable for the resources they obtain from agencies and stakeholders.

Because program evaluation is part of a larger interdisciplinary content area that includes research design and methods, the course will briefly cover needs assessment and asset building, with program development also being a necessary component. The majority of the course will focus on evaluation design, methods, and implementation. A range of program evaluation and research methods will be presented, and students will be encouraged to identify those approaches that most closely match their own philosophical perspectives, as well as strategies that will be utilized by their groups, organizations and current/future employers. Students will participate in class discussions and activities, reflecting on any experience working with community programs when applicable. Web-based publications, journal articles and the assigned text readings will comprise the content of the course. Prereq: Admission to

the UK graduate school; students in good standing; Degree-seeking student in the Science and Translation program in the College of Agriculture, Food and Environment. (Same as CLD 665/SOC 665.)

**STO 602 SCIENCE LITERACY AND TRANSLATION. (3)** Students will explore, translate and interpret scientific findings into application and policy through the new Master of Science curriculum in Science Translation and Outreach. Readings will focus on basic principles and theories relevant to scientific literacy and the public perception and trust of scientific information. Where possible, we will use current controversial topics as examples. In this course, students will enhance their scientific literacy and learn to evaluate the credibility of sources of scientific information principally by:

- Examining scientific methodologies including its potential and limitations;
- Practicing critical and reflective thinking on relevant scientific issues;
- Reviewing scientific literature and evaluating its merits;
- Designing an original, evidence-based research plan on a public interest issue.

Prereq: Admission to the UK Graduate School: Student in good standing. Degree-seeking student in the Science and Translation program in the College of Agriculture, Food and Environment.

**STO 603 RESEARCH METHODS. (3)** This course provides students with foundational knowledge for scientific inquiry and the use of research to inform evidence-based practice. It covers fundamentals of understanding, analyzing, and critiquing research, through an exposure to science philosophy and techniques used to conduct scientific investigations. It covers aspects of the research process from developing a research question to writing the research report. Students will be introduced to qualitative and quantitative research design, methodology, and ethical issues associated with conducting and evaluating research. Prereq: Admission into the Graduate School; degree-seeking student in good standing in the Science Translation and Outreach program in the College of Agriculture, Food and Environment.

**STO 650 CAPSTONE IN SCIENCE TRANSLATION AND OUTREACH. (3)** Students will integrate transdisciplinary learning obtained through the Master of Science curriculum in Science Translation and Outreach. Students will: identify an issue of public interest; design an original, evidence-based project of applied research and/ or outreach to address the issue; develop an evaluation plan for the project; and, as time and resources permit, execute the project in part or in its entirety. Prereq: Admission into the Graduate School; degree-seeking student in good standing in the Science Translation and Outreach program in the College of Agriculture, Food and Environment; STO 601, STO 602, STO 603.

# Veterinary Science

## College of Agriculture, Food & Environment

The Department of Veterinary Science offers a program of study and research leading to the Master of Science (Plan A only) and Doctor of Philosophy degrees. Possible areas of concentration are pathology, genetics, immunology, musculoskeletal sciences, parasitology, reproductive physiology, pharmacology and toxicology, microbiology and virology. Individual programs of study must conform to the general rules and regulations of the Graduate School.

Students pursuing both the M.S. and Ph.D. degrees in Veterinary Science are required to take two semesters of graduate-level biochemistry/cell biology/molecular biology (selected from CHE 550 and CHE 552 or IBS 601-603, 606) and one semester of graduate-level statistics (STA 570 or STA 580), or demonstrate that they have previously taken equivalent courses. A limited number of research assistantships and fellowships are available.

**Admission Requirements**

1. This Department's deadline for applications for fall semester enrollment is February 1.
2. Review of applications begins in February and most assistantship offers are extended in March.
3. This Department does not conduct separate recruiting for spring enrollment, and only in exceptional cases will an applicant be accepted for spring enrollment. Applicants for spring enrollment are advised to first contact this Department's Director of Graduate Studies during the normal application review period.

More information is available on the Web at http://vetsci.ca.uky.edu/education

**Course Descriptions**

VS 500 ADVANCED EQUINE REPRODUCTION.(3)
A study of reproductive anatomy and physiology of the horse with emphasis on normal and abnormal reproductive function in this species. Normal reproductive management and diseases affecting the reproductive system will be considered in detail. Prereq: ASC 364.

#VS 507 ADVANCED HORSE GENETICS. (2)
Students will study peer reviewed publications about hereditary traits in horses, critically assess the discoveries and compare the results to entries in public databases such as the Online Mendelian Inheritance in Animals (OMIA). Students will choose a hereditary trait of horses, with guidance from the course faculty, review the published literature and, under the guidance of faculty members, prepare an annotated bibliography, write a short critical review of the state of knowledge and, if appropriate, provide curation for the public databases. Prereq: A basic genetics course (e.g., BIO 304, ABT 360, VS 307) or consent of instructor.

#VS 575 CURRENT LITERATURE IN VETERINARY PARASITOLOGY (1)
Advanced study of current topics in veterinary parasitology. The course is comprised of student-led discussions based upon readings taken from current literature in the discipline. Emphasis will be placed on the critical analysis and understanding of the experimental basis for current concepts in veterinary parasitology. Prereq: Undergraduate students: BIO 148 and BIO 152 or consent of instructor. Graduate students: Consent of instructor.

VS 597 SPECIAL TOPICS IN VETERINARY SCIENCE. (1-3)
Special topical or experimental courses in Veterinary Science for graduate and advanced undergraduate students. Special subtitle required and must be approved by the chair of Veterinary Science. Students may not repeat under the same subtitle. Prereq: Determined by instructor.

VS 600 ETHICS IN SCIENTIFIC RESEARCH. (1-2)
The course will commence with an overview of good laboratory practices and present them as the basis of good scientific research, along with an overview of quality assurance and appropriate practices in data analysis and data interpretation. The course will then move to the ethics of human and animal experimentation and discuss the concepts of data and intellectual property, their ownership and access to them. The problems of reviewing other workers' intellectual property such as grant applications, research papers and other intellectual property will be addressed. Prereq: Research experiences; consent of instructor. (Same as TOX 600.)

VS 690 PRACTICAL ANALYTICAL TOXICOLOGY. (3)
An evaluation of techniques for the isolation, identification, and quantitation of drugs, pesticides and other toxicants in biological samples. Concepts and theory will be presented in the lecture portion, while the laboratory will be devoted to actual sample analysis by the students. Lecture, 1 hour; laboratory, six hours. Prereq: Consent of the instructor and graduate standing in toxicology. (Same as TOX 690.)

VS 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.
College of Agriculture, Food and Environment

VS 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

VS 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

VS 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
Residence credit while completing research and writing thesis. Prereq: Completion of course requirements for the MS. May be repeated to a maximum of 12 hours.

VS 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

VS 770 VETERINARY SCIENCE SEMINAR. (1)
Required of graduate students in veterinary science. May be repeated to a maximum of six credits. Prereq: Consent of staff.

VS 777 CURRENT LITERATURE IN EQUINE REPRODUCTION. (1)
Advanced study of current topics in equine reproduction. The course is comprised of student-led discussions based upon readings taken from current and classic literature in the discipline. Emphasis will be placed on the critical analysis and understanding of the experimental basis for current concepts in

equine reproduction.

VS 781 CORRELATIVE PATHOLOGY. (1-3)
Supervised experience in the use of clinical, gross and histopathological technics in the differential and definitive diagnosis of diseases. May be repeated to a maximum of nine credits. Prereq: Pathology in D.V.M. curriculum or equivalent and consent of staff.

VS 782 ADVANCED VIROLOGY. (3)
Current trends in virology. Typical topics include DNA tumor viruses, RNA tumor viruses, persistent virus infections, and interference. Emphases of molecular mechanisms. Prereq: BIO 582. Adequate biochemistry and genetics strongly recommended, or consent of instructor. (Same as BIO 782.)

VS 785 ADVANCED VETERINARY PARASITOLOGY. (3)
Experimental methodology and host-parasite relationships of the protozoan and helminth parasites of domestic animals. Prereq: Parasitology in D.V.M. curriculum or equivalent and approval of staff.

VS 786 ADVANCED VETERINARY PATHOLOGY. (3)
Specialized instruction in techniques and interpretations of pathology and pathologic anatomy. Emphasis will be upon evaluation of lesions for understanding the pathogenesis of disease processes in the living animal. Prereq: Pathology in D.V.M. curriculum or equivalent and approval of staff.

VS 791 TECHNIQUES IN VETERINARY MICROBIOLOGY. (1-9)
Independent research in veterinary microbiology. May be repeated to a maximum of 24 credits. Prereq: Consent of staff.

VS 792 TECHNIQUES IN GENERAL VETERINARY PATHOLOGY. (1-9)
Independent research in veterinary pathology. May be repeated to a maximum of 24 credits. Prereq: Consent of staff.

# COLLEGE OF ARTS AND SCIENCES

# Anthropology

## College of Arts & Sciences

Since its inception in the 1960s, the graduate program has been nationally recognized as a leader in applied anthropology. We define applied anthropology as research with practical application and impact, but anchored in a rigorous foundation in anthropological theory and method, whether from socio-cultural, bio-cultural, medical, or archaeological perspectives. With grounding in core anthropological theory and method, we train our students to be skilled researchers who can traverse both academic and non-academic settings, bringing to their research a sound intellectual base, and skills for application and practice.

## Master of Arts in Applied Anthropology

The M.A. degree in Applied Anthropology at UK is designed to train students to apply the theories, methods, and practices of anthropology to solve real world problems, and to prepare students for careers in different domains of application or for further graduate study. The program draws on the department's considerable research strengths in a variety of areas (see website for more information), and puts strong emphasis on training in theory, application, and proficiency in qualitative and quantitative research methods and skills. The M.A. in Applied Anthropology program has three Areas of Concentration – Archaeology, Cultural Anthropology and Medical Anthropology. Students must declare their area of concentration in their program application.

**Degree Requirements**

The degree completion requires 30 credits of coursework. The M.A. degree requires a written report based on the practicum. The report is written with the guidance of a committee of three faculty members. The final examination for the Master's degree is an oral presentation of the practicum project at the annual departmental practicum colloquium. There is no foreign language requirement for the Master's degree in applied anthropology.

**Admissions Requirements**

Upon acceptance into the program, students will be provided a list of background readings to help them prepare for their graduate work. Students are strongly encouraged to read and critically consider this body of work PRIOR to entering the program.

*Archaeology Concentration*

The Archaeology concentration is aimed at preparing students for careers in applied archaeological anthropology, including cultural resource management, museum and heritage studies, and public archaeology.

Students are expected to have archaeological field school training before starting graduate school. UKY offers one archaeological field school each summer, and students who have not participated in a field school will need to take it in addition to the required hours.

Plan of Study:

| Course: | When taken: | Cr Hrs |
|---|---|---|
| ANT 525 | 1st semester | 3 |
| ANT 650 | 1st/2nd semester | 3 |
| ANT 651 | 2nd semester | 3 |
| 3 courses in Archaeology (1 can be allied profession) | 1st-3rd semesters | 9 |
| 2 courses as approved by advisor/committee (may include ANT 790) | 1-3rd semesters | 6 |

| | | |
|---|---|---|
| ANT 760 - 6 credit hours practicum in applied anthropology | 3rd semester | 6 |
| Total: | | 30 |

*Cultural Anthropology Concentration*

The Cultural Anthropology concentration is designed to prepare students for careers in various domains of application, including economic development, rural and urban development, business anthropology, public anthropology, human services, education, consulting and research, program monitoring and evaluation, and work with corporations, governmental and non-governmental organizations.

Plan of Study:

| Course: | When taken: | Cr Hrs |
|---|---|---|
| ANT 525 | 1st semester | 3 |
| ANT 601 | 1st/2nd semester | 3 |
| ANT 660 | 2nd semester | 3 |
| 3 courses in Cultural Anth (1 can be allied profession) | 1st-3rd semesters | 9 |
| 2 courses as approved by advisor/committee (may include ANT 790) | 1-3rd semesters | 6 |
| ANT 760 - 6 credit hours practicum in applied anthropology | 3rd semester | 6 |
| Total: | | 30 |

*Medical Anthropology Concentration*

The Medical Anthropology concentration is based on fundamental concerns with the study of social forces and health inequalities, and various programmatic endeavors and community-based responses to them. Participants in the program will receive training in ethnographic methods, community-based participatory research and/or program evaluation along with instruction in anthropological perspectives on health and the intersection of anthropology with public health.

Plan of Study:

| Course: | When taken: | Cr Hrs |
|---|---|---|
| ANT 525 | 1st semester | 3 |
| ANT 601 | 1st/2nd semester | 3 |
| ANT 660 | 2nd semester | 3 |
| 3 courses in Med Anth (1 can be allied profession) | 1st-3rd semesters | 9 |
| 2 courses as approved by advisor/committee (may include ANT 790) | 1-3rd semesters | 6 |
| ANT 760 - 6 credit hours practicum in applied anthropology | 3rd semester | 6 |
| Total: | | 30 |

*Requirements for all M.A. Students*

Practicum:

All M.A. students must enroll in 6 credit hours of ANT 760 (Practicum in Applied Anthropology). The practicum is expected to be the equivalent of a full time effort for at least one academic semester.

Departmental Presentation:

All M.A. students are required to write a report and to deliver a presentation at the annual departmental practicum colloquium as a condition of graduation.

## Doctor of Philosophy

The PhD program in Anthropology consists of a minimum of 36 credit hours, plus a minimum of two semesters of ANT 767. Students must fulfill any and all other requirements of the Graduate School. An entering PhD student should complete required coursework by the end of the second year, and successfully defend a dissertation proposal and successfully complete the qualifying exams as early as the fifth semester, but no later than the tenth semester, after admission to the program. Upon acceptance into

the graduate program, a student will be assigned a graduate advisor who will review and approve all first year coursework, and in consultation with the DGS, evaluate requests for transfer of up to 9 credit hours of equivalent graduate-level coursework. Following the first year, all coursework will be approved by the student's committee.

Requirements in the Ph.D. program consist of: (1) three required courses - History of Theory (ANT 610) and a theory and a methods course in the student's designated sub-discipline, to be taken in the first year when available; (2) a course in Research Design (ANT 662), (3) an approved statistics course; (4) 7 courses (21 hours) of additional coursework, of which at least 1 course must be in an anthropological subdiscipline (archaeology, biological, cultural) other than the student's designated sub-discipline. Demonstrated competence by the student in reading or speaking one or more languages may be required by the student's committee. Students must complete and successfully defend to their committee a dissertation research proposal prior to the scheduling of the qualifying exams.

## The MA/PhD Program

With the approval of the Graduate Committee and the Director of Graduate Studies, students without a Master's Degree may be admitted directly into the PhD program, and receive the MA following successful completion of the PhD qualifying exams. Students must take: (1) ANT 601, ANT 610 and ANT 660 or ANT 610, ANT 650 and ANT 651; (2) a statistics course at the 500+ level; and (3) a minimum of 15 additional credit hours of coursework in anthropology or cognate disciplines as approved by the student's committee.

Anthropology faculty members have research experience in the following areas: South and Southeast Asia, North and Sub-Saharan Africa, Middle East and North Africa, Europe, the former Soviet Union, Latin America, and North America, including the urban and rural U.S. and with specialization in studies of Appalachia. Members of the department participate in interdisciplinary research in the University's College of Agriculture, College of Medicine, College of Education, and School of Public Health. The Department of Behavioral Science includes anthropologists on its faculty, and students with interests in medical anthropology are encouraged to take behavioral science courses.

## Course Descriptions

ANT 506 SOCIOLINGUISTICS. (3)
This course is an advanced survey of current areas of research in sociolinguistics. Topics include dialectology, language variation and change, interactional sociolinguistics, language and gender, bilingualism, and language contact. Prereq: LIN 221 or LIN 222 or SOC 101 or ANT 220. (Same as LIN/SOC 506.)

ANT 507 LINGUISTIC ANTHROPOLOGY. (3)
This course is an advanced survey of current areas of research in linguistic anthropology. Topics include language and thought, cultural differences in linguistic interaction, the ethnography of communication, ritual uses of language, language and identity and cultural poetics.
Prereq: LIN 221 or LIN 222 or SOC 101 or ANT 220. (Same as LIN 507.)

ANT 515 PHONOLOGICAL ANALYSIS. (3)
This course is an investigation of the systematic properties of speech sounds in natural languages. It compares current theoreticalapproaches to the analysis of individual features and sounds as well as larger prosodic units, and identifies the dimensions of typological variation in the phonological domain. Discussion includes extensive reference to languages other than English. Prereq: LIN 221. (Same as LIN 515.)

ANT 516 GRAMMATICAL TYPOLOGY. (3)

This course examines the typological classification of languages according to their morphological and syntactic characteristics. Course work includes practical training in the writing of grammatical descriptions and in the elicitation, transcription, and analysis of data from a non-Western language. Discussion includes extensive reference to languages other than English. Prereq: LIN 221. (Same as LIN 516.)

ANT 519 HISTORICAL LINGUISTICS. (3)
This course studies the historical development of language through time and space, examining the internal mechanisms and external influences involved in language change. Change will be examined at all levels: orthographic, phonetic, phonological, morphological, syntactic, semantic, and lexical. The course will also investigate a variety of topics related to the phenomenon of language change: language classification; comparative linguistics; the reconstruction of linguistic systems; the social context of language change. Through study of these issues, students will gain insights into historical language varieties and writing systems; relationships among the world's languages; and the origins of the sounds, words, and structures of the languages we speak today. Prereq: LIN 221 and LIN 222. (Same as LIN 519.)

ANT 525 APPLIED ANTHROPOLOGY. (3)
Principles of policy research and intervention in cultural anthropology with attention to the theoretical and ethical basis of such research and intervention. Intervention techniques considered include research and development anthropology, action anthropology, community development, community advocacy anthropology and culture brokerage. Prereq: Nine hours of cultural anthropology or consent of instructor

ANT 530 ELITES IN CROSS-CULTURAL PERSPECTIVE. (3)
This course examines elites in different areas of the world paying special attention to what defines them as power holders, their sub-cultures, histories, strategies of class reproduction, and relations to subaltern groups. The class will also explore the critical perspectives gained from studying up, as well as the theoretical and methodological difficulties of doing this kind of work.

ANT 534 SOCIOLOGY OF APPALACHIA. (3)
A sociological study of selected social issues facing Appalachian communities, with an emphasis on placing regional political economy, society and culture in a global context. Prereq: Sociology, Anthropology or CLD senior major or minor; Appalachian Studies minor; graduate student status; or consent of instructor. (Same as CLD/SOC 534.)

ANT 536 GLOBAL APPALACHIA. (3)
Appalachia has always had strong global connections, environmentally, economically, and culturally. Current cultural and political economic issues in the region will be examined in comparative perspective through studying related histories and concerns of communities in Appalachia and other mountain regions, including social and economic marginalization within nation-states, resource extraction, lowwage work, migration, and environmental challenges. Students will have the opportunity to communicate directly with residents and scholars of several different global mountain regions, to consider sustainable livelihoods, identity in relationship to place, and social movements.

ANT 541 ARCHAEOLOGICAL METHOD AND THEORY. (3)
Examines the concepts, aims and methodology of archaeology as a scientific discipline within the social sciences. Attention given to the basic principles and recent advances of archaeological fieldwork and post-field analysis. Prereq: ANT 240 and six hours of cultural anthropology or archaeology courses, or consent of instructor.

ANT 543 CULTURAL RESOURCE MANAGEMENT. (3)

Introduction to the theory and practice of culture resource management as it has developed in the historic preservation movement in the United States. The history of preservation is covered along with the development of the contemporary legal tools. The implications of these for the field evaluation of sites is presented. Prereq: Nine hours cultural anthropology or archaeology, or consent of instructor.

ANT 545 HISTORICAL ARCHAEOLOGY. (3)
Historical archaeology applies archaeological methods and techniques to the remains of societies having written histories. The course introduces students to the history and theoretical development of the discipline, and to the variety of the data sources used by historical archaeologists. Particular attention is given to the ways in which historical archaeologists use material culture to address research issues of interest in anthropology, history, and other relevant disciplines. Prereq: ANT 240.

ANT 555 EASTERN NORTH AMERICAN ARCHAEOLOGY. (3)
Detailed analysis of prehistoric cultures of eastern United States with emphasis on interpretation of prehistory in Ohio River Valley. Prereq: ANT 240 and six hours of archaeology or cultural anthropology, or consent of instructor.

ANT 580 ADVANCED TOPICS IN ANTHROPOLOGY. (3)
Selected topics of theoretical or methodological importance in anthropology, with special attention to topics of contemporary relevance. Refer to Schedule of Classes for topics. May be repeated to a maximum of six credits. Prereq: Consent of instructor.

ANT 581 INDEPENDENT WORK IN ANTHROPOLOGY. (1-4)
May be repeated three times to a maximum of 12 credits. Prereq: Major in anthropology, standing of 3.0 in the department and consent
of instructor.

ANT 582 SENIOR INTEGRATIVE SEMINAR. (3)
Seminar focusing on current issues in anthropology. Purpose is to provide a format in which advanced undergraduates can integrate knowledge acquired in previous anthropological course work and evaluate the contribution of the different anthropological subdisciplines to understanding contemporary problems. Emphasis placed on oral and written communication. Prereq: Major in anthropology; senior standing.

ANT 585 FIELD LABORATORY IN ARCHAEOLOGICAL RESEARCH. (3-6)
Practical supervised training in-field in archaeological research methods and techniques, problem analysis, field laboratory procedures, recording methods. Laboratory, 20 to 40 hours per week. May be repeated to a maximum of 12 credits. Prereq: Consent of instructor.

ANT 600 PRACTICUM IN TEACHING ANTHROPOLOGY. (1)
Guided practical experience in teaching, supplemented with group discussions of teaching practice and selected reading on lecture technique, course development, test writing and other skills for participation in the professoriate. May be repeated to a maximum of three credits. Prereq: Graduate status in anthropology or consent of instructor.

ANT 601 THEORIES AND CONCEPTS IN ANTHROPOLOGY. (3)
This course is an intensive examination of the theoretical perspective in anthropology. While attention will be given to the historical foundations of anthropological theory, emphasis will be placed on contemporary concerns in anthropology as illustrated through the contributions of selected theorists. Prereq: Admission

to Graduate Program or approval of instructor.

ANT 603 HUMAN BIOLOGY IN CONTEXT OF SOCIOCULTURAL CHANGE. (3)
This course explores the relationship between society, culture, and human biology. Its thematic focus will be how cultural ideologies and social organization play out with respect to the biology of human groups, both archaeological and contemporary populations. We will pay special attention to issues of class, gender and ethnicity and focus on demographic and health-related issues. Current issues in biological anthropology, including critical analysis of evolutionary/adaptation theory and the concept of "race" in contemporary human populations will also be addressed. Prereq: First-year graduate standing in Anthropology, or permission of instructor.

ANT 604 SOCIAL ORGANIZATION, KINSHIP AND IDENTITIES. (3)
Social organization is a core component of anthropology. This seminar encompasses both historical and contemporary approaches to this central focus of the discipline. It includes the major theoretical approaches to the study of social organization and examines key concepts such as kinship and collective identity. Topics include how human groups are defined, organized, perpetuated, and change; as well as the role of individuals in broader social structures. Prereq: Graduate standing in Anthropology.

ANT 608 ANTHROPOLOGY OF FOOD AND NUTRITION. (3)
This graduate seminar explores food as fundamental to human existence in a variety of ways. We eat to maintain life – and the nutritional characteristics of human diets shape the development and health of individuals and populations. But, for the most part, humans do not eat nutrients, humans eat food, and food consumption and production is an intensely cultural, social and political activity. We will explore food and nutrition from all these perspectives. In addition to theorizing food and nutrition, we will become familiar with the methods most often used by national and global scholars and practitioners for assessing dietary and nutritional status of individuals and populations. Prereq: Graduate standing in Anthropology or permission of instructor.

ANT 610 HISTORY OF THEORY IN ANTHROPOLOGY. (3)
This course aims to give graduate students a firm grounding in the development of anthropological thought from its roots in Enlightenment social philosophy and 19th century evolutionism to the emergence of poststructuralist theory in the late 20th century. Upon completion of
this course students should be thoroughly familiar with the major theoretical schools and debates in the history of anthropology and the broader social discourses that shaped them. Prereq: Graduate standing in Anthropology or permission of instructor.

ANT 620 TOPICS AND METHODS OF EVALUATION. (3)
An examination of a subset of evaluation methods, topics, and problems. An introductory course in the area with minimal emphasis on quantitative methods. The course is designed to: provide a perspective from which evaluation studies may be viewed; and, to provide
experiences for those who will learn from or conduct evaluations. Prereq: Consent of instructor, and a basic course in statistics or research. (Same as EDP/EPE 620/SOC 622.)

ANT 621 ADVANCED TOPICS AND METHODS OF EVALUATION. (3)
An advanced course in evaluation methods and techniques with an emphasis on quantitative methodology. State of the art ideas and methods of conducting evaluation studies and analyzing data from those studies are presented. The course is designed primarily for those who are conducting or will conduct evaluation studies. Prereq: A basic course in statistics or its equivalent; EDP/EPE 620/SOC 622; and
consent of instructor. (Same as EDP/EPE 621.)

ANT 631 RESEARCH ETHICS IN THE SOCIAL SCIENCES. (1)
This course will provide students with an understanding of the ethical dimensions of social science research. Students will learn about the ethics guidelines of different social science disciplines and discuss case studies illustrating the kinds of ethical dilemmas that researchers may encounter. The course will also examine such topics as procedures of the Institutional Review Board and the protection of human subjects; ethical implications of community-based and/or participatory research; and the relationship between ethics, research methodologies, and modes of documentation.

ANT 637 SOCIOCULTURAL DIMENSIONS OF ECONOMIC DEVELOPMENT. (3)
Examination of social, cultural and economic conditions in lesser developed countries. Discussion of the various socioeconomic and cultural theories of change and developments, and of alternative policies for the world of the future. Considers the possible roles for social scientists
in policy formulation and application. Prereq: Six graduate credits in social sciences or consent of instructor. (Same as SOC 637.)

ANT 640 SCIENCE, AGRICULTURE, AND DEVELOPMENT. (3)
An in-depth examination of the interrelations between science, agriculture, and development. Both domestic and international issues are explored. Prereq: Graduate standing in the social or agricultural sciences. (Same as CLD/SOC 640.)

ANT 641 GENDER ISSUES IN DEVELOPMENT. (3)
An examination of gender issues in domestic and international development. Prereq: Graduate standing in the social or agricultural sciences or permission of the instructor. (Same as SOC 641).

ANT 645 ANTHROPOLOGY AND EPIDEMIOLOGY. (3)
This course will introduce students to the fundamentals of epidemiology, as the methodological approach, which underlies biomedical research, and will examine the ways that the methodologies of anthropology and epidemiology complement each other in the study of health and disease. The course will examine the points of similarity between anthropology and epidemiology particularly as regards the importance of examining sociocultural phenomena in order to better understand the origins of disease. The course will explore the tensions between anthropology and epidemiology in matters of methodology, exemplified by the debate over quantitative vs. qualitative approaches, as well as theoretical perspective. Prereq: Permission of instructor.

ANT 646 GLOBAL HEALTH: PEOPLE, INSTITUTIONS AND CHANGE. (3)
This course presents anthropological studies of health in an international context, attending to ways in which anthropological study can contribute to identification of issues relevant to health and development. It will have a dual focus. First, it will deprivilege western concepts and explore both indigenous and biomedical accounts of health. Topics may include culturally-defined syndromes, international medicines and health, and illness and body from an international, ethnographic perspective. Second, the course will explore the culture of international health agencies, e.g., WHO, UNICEF, etc. Prereq: Permission of instructor.

ANT 650 THEORY IN ARCHAEOLOGY. (3)
This seminar examines the development of archaeological theory with specific emphasis on the discipline of anthropological archaeology in the New World. Particular schools and trends in contemporary archaeological theory are discussed in detail. Prereq: ANT 541 or consent of instructor.

ANT 651 ARCHAEOLOGICAL DATA ANALYSIS. (3)
This course examines the manipulations of archaeological data that follow fieldwork. These procedures,

usually consisting of data processing and classification, are often undertaken in the field as data are being gathered. Data organization and analysis are the basic goals of this course. May be repeated to a maximum of six credits. Prereq: ANT 541 or consent of instructor.

ANT 652 HOUSEHOLD, COMMUNITY, AND DEMOGRAPHIC ARCHAEOLOGY. (3)
A seminar which examines the theory and methodology used by archaeologists to study population aggregates ranging from individual households to regional populations. Particular emphasis given to theoretical perspectives which integrate ecological, social and spatial analyses of population data. Prereq: Graduate standing in the Department of Anthropology or consent of instructor.

ANT 653 PREHISTORIC ECONOMICS. (3)
This seminar examines the theory and methodology used by archaeologists to study and reconstruct the economic structure of past societies. Discussion examines forms of subsistence and craft production and systems of resource distribution and exchange. Prereq: ANT 541 or consent of instructor.

ANT 654 ARCHAEOLOGY OF POLITICAL SYSTEMS. (3)
This course is designed to study the archaeology of political systems. The goals are to discuss the major trends, concepts, and perspectives in researching event and process in the evolution of political organization and social integration. A corollary goal is to examine the empirical evidence for, and archaeological correlates of, political evolution. It is not intended as a comprehensive coverage of all theories about past political systems, or as a survey of the rise and development of political forms in complex societies around the world. Prereq: ANT 541, ANT 602 or consent of instructor.

ANT 660 ETHNOGRAPHIC RESEARCH. (3)
Intensive graduate seminar designed to help students develop skills in ethnographic data collection and analysis. The aim of the course is to explore the processes through which anthropologists collect data and then transform materials of ethnographic research into analyses
and interpretations. We will give careful consideration to the process of writing and issues specific to writing ethnography. Prereq: Graduate standing in Anthropology or permission of instructor.

ANT 662 RESEARCH DESIGN. (3)
Guided individual student research covering the relationship between theory, methods, and reality: how to better design anthropological inquiry. Prereq: One year graduate work in anthropology and consent of advisor.

ANT 684 FARMING SYSTEMS RESEARCH METHODS. (3)
A critical analysis of the concepts, methods, and practices of farming systems research. Design and carry out an FSR project. Prereq: Graduate standing in the social or agricultural sciences. (Same as SOC 684.)

ANT 691 CULTURAL RESOURCE MANAGEMENT CLERKSHIP. (1-3)
Practical experience in aspects of the cultural resource management process are provided through a one-semester rotation of work in the Office of State Archaeology (OSA), Museum of Anthropology (UKMA), and the program for Cultural Resource Assessment (PCRA). Students are assigned tasks at each work assignment rotation during the semester and are evaluated on the basis of work performance and a journal summary of this experience by a committee of their supervisors. Prereq: Graduate standing in anthropology or consent of instructor.

ANT 724 ANTHROPOLOGY OF THE STATE. (3)
This seminar will offer a critical approach to the study of states and related political forms, with special

emphasis on anthropology's contributions to theorizing about the state. Drawing on temporally and spatially diverse examples of state-making, statecraft, and ideologies of the state, it will both question definitions of the state as well as engage in ethnographic exploration of past and current states. Other topics will include related political forms such as tribes, nationalist movements, empires, and multi-lateral actors. Prereq: Graduate standing or consent of instructor.

ANT 725 SEMINAR IN APPLIED ANTHROPOLOGY. (3)
Seminar discussion and individual or group research in the applications of social anthropology theory and methods to the solution of institutional, community, regional or national problems. Attention will be given to ethics, to the role attributes of the applied anthropologist, and to the history of applied anthropology. Prereq: ANT 601 or consent of instructor.

ANT 731 SEMINAR IN SOCIAL AND POLITICAL DYNAMICS. (3)
Theoretical frameworks for the analysis of political systems and processes. The seminar explores politics as action and systemic process in contemporary, prehistoric, and historical contexts. Students are expected to formulate research questions and discuss current theory in a critical fashion. Prereq: ANT 601 and 602 or consent of instructor.

ANT 732 SEMINAR IN ECOLOGICAL ANTHROPOLOGY. (3)
A study of interrelationship among populations, organization, environment, technology and symbols. The course focuses on recent anthropological contributions to the understanding of ecological relationships both now and in the past, including how people exploit the environment and how resource exploitation results in environmental change. Prereq: Completion of ANT 601 and ANT 602 or consent of instructor.

ANT 733 SEMINAR IN SYMBOLS AND MEANING. (3)
Seminar in the development of anthropological approaches to cultural meaning in actions, thought, and language from the 1960s. Includes the social structural approach to symbolism and ritual, cognitive approaches to meaning, the anthropology of experience and expression, interpretive and post-modern approaches, and topical applications of these approaches. Prereq: ANT 601 and 602 or consent of instructor.

ANT 734 SEMINAR IN ECONOMIC ANTHROPOLOGY. (3)
Theoretical frameworks for the analysis of economic systems and processes. The seminar explores the interaction between economic phenomena and other aspects of social and political organization both as action, structure, and systemic process in contemporary, prehistoric, and historical contexts. Students are expected to formulate research questions and discuss current theory in a critical fashion.
Prereq: ANT 601 and 602 (ANT 538 is recommended) or consent of instructor.

ANT 735 SEMINAR IN PRACTICE AND ACTION. (3)
Comparative analysis of various modes of social action including action research, advocacy, cultural action, and participatory action research. Foundations in social theory considered. Prereq: Admission to graduate program in anthropology or consent of instructor.

ANT 736 CULTURE, ENVIRONMENT AND DEVELOPMENT. (3)
This seminar explores the interrelationships between social processes, development and the environment. It provides the graduate student with the necessary theoretical and analytical tools to examine the social and cultural processes of environmental degradation and change.
Topics include political ecology, health impacts of development, deforestation, resource tenure systems,

environmental grassroots movements and large-scale development organizations. Prereq: Consent of instructor. (Same as SOC 737.)

ANT 737 SOCIOCULTURAL THEORIES IN THE ANTHROPOLOGY OF GENDER. (3)
Anthropological approaches to the study of gender have proliferated since the 1970s. The primary objective of this seminar is to provide participants with an overview of some of the salient "schools" that have emerged, and through comparison, critically to assess their limitations and utility for both theoretical and applied objectives. Prereq: Graduate standing in anthropology, or permission of instructor.

ANT 738 SEMINAR IN REGIONAL ARCHAEOLOGY. (3)
This course examines contemporary issues and theory in the archaeology of a particular region of the world. Students may take this course up to 9 credit hours under a different region each time course is offered. Prereq: Graduate Standing in Anthropology or permission of instructor.

ANT 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

ANT 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

ANT 750 GRADUATE FIELD STUDY IN ANTHROPOLOGY. (1-6)
Field research as part of a long-range anthropological research program for graduate interns training under direct faculty supervision. Provides student with experience conducting scientific research as research team member. Report required. Laboratory, three hours to full time. Prereq: Appropriate language fluency; preparatory area study plus consent of instructor.

ANT 760 PRACTICUM IN APPLIED ANTHROPOLOGY. (1-6)
Practical field experience in which the student applies the theory and method of social anthropology to the solution of a problem defined by the student in consultation with a community or a public or private service agency. Required of all doctoral students in Applied Anthropology. Prereq: Consent of instructor.

ANT 765 ADVANCED SEMINAR IN MEDICAL ANTHROPOLOGY. (3)
(1) Advanced history and theory of medical anthropology; (2) research design, field work, analysis of data in medical anthropology. Prereq: Consent of instructor. (Same as BSC 765.)

ANT 766 GENDER, ETHNICITY AND HEALTH. (3)
This course will bring the anthropology of gender to the study of medical anthropology. We will examine the interconnections between gender, ethnicity, and class in relation to the greater and lesser likelihood of disease. We will explore differences in health in relation to the resources available and the treatment modalities called upon by people in different social locations within the United States, and internationally. We will also look at the symbolic importance given to different phenomena related to the body, disease, and healing. This course will draw heavily upon the ethnographic literature to develop conceptual accounts of gender, ethnicity, class, and health. Prereq: Permission of instructor.

ANT 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as

continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

ANT 768 RESIDENCE CREDIT FOR MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

ANT 769 RESIDENCE CREDIT FOR DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

ANT 770 TOPICAL SEMINAR: (Subtitle required). (3)
Intensive work in particular fields of anthropology. May be repeated four times. Prereq: Graduate standing in Anthropology, or consent of instructor.

ANT 774 FOOD AND FOOD SECURITY IN A CHANGING WORLD. (3)
This cross-cultural seminar explores the biocultural interactions among food, human biology, and the social, cultural, political and economic factors that shape food-related behaviors and nutritional status of populations. Topics include the social role of food, food beliefs and ideology, the political economy of malnutrition, development strategies and food security, and methods in nutritional anthropology research. Readings and discussions are research focused and approach issues from a variety of theoretical perspectives. Prereq: ANT 601 or consent of instructor. (Same as BSC 774.)

ANT 775 CULTURES AND POLITICS OF REPRODUCTION. (3)
This course takes a cross-cultural approach to understanding how reproduction and associated phenomena (family formations and the social use of technologies) comprise arenas where broader political debates become played out, and social relations become created and contested. Ethnographic case studies include cross-cultural constructions of the body, parenthood, and kinship relations; and we examine how the state, social movements, legal/medical experts, and lay persons struggle to appropriate reproductive potentials for their own needs. Prereq: Graduate standing in Anthropology or consent of instructor.

ANT 776 SEMINAR IN DEPENDENCY BEHAVIOR. (3)
The course is designed to explore theories of dependency behavior by examining the concept of dependency as it can be applied to the study of various phenomena including alcohol use and abuse; dependence on other psychoactive substances; institutional dependency; dependency in work settings; and poverty and welfare. Prereq: Consent of instructor. (Same as SOC/PSY/BSC 776.)

ANT 790 RESEARCH PROBLEMS IN ANTHROPOLOGY. (1-6)
Intensive study in the fields of physical anthropology, archaeology and ethnology with qualified staff members. May be repeated to a maximum of nine credits. Prereq: Admission into the graduate program.

# Applied Environmental and Sustainability Studies

## College of Arts & Sciences

The online Master of Arts in Applied Environmental and Sustainability Studies prepares graduates for positions in the corporate, government, and non-governmental worlds as a sustainability manager, corporate sustainability specialist, or one of many other fast growing environmental and sustainability professions.

Students take a total of 30 credit-hours of graduate coursework (24 credits of coursework and 6 credits of either capstone research or internship). Coursework consists of three core courses (total of 9 credit hours), two skills courses (total of 6 credit hours), and three elective courses (total of 9 credit hours) to expand their skills, insights and engagement with Environmental and Sustainability Studies. This MA degree only offers non-thesis, plan B options: Upon completing these 24 credit-hours, students take two courses for three credits each to prepare and implement their final master's research project under the supervision of faculty members. The MA also offers the alternate plan B option of completing six credit hours of internship work under supervision of faculty members. All MA students will have a final oral examination.

## Admission Requirements for the Online MA in Environmental and Sustainability Studies

- CV or resume
- Statement of Purpose (2-3 pages)
- Writing Sample (optional)
- Undergraduate transcript
- A non-refundable $65 application fee ($75 for international applicants)
- TOEFL or IELTS score (international applicants only). Minimum scores are listed on the graduate school's admission page.
- GRE or GMAT scores are NOT required for admission to this program.

## Degree Requirements

### Core Courses (9 Credit Hours)

- ENS 601 Environmental and Sustainability Studies: Issues and Ideas (3 credit hours)
- ENS 602 Environment and Sustainability Policy and Governance (3 credit hours)
- ENS 603 Communicating Environmental Knowledge (3 credit hours)

## Skills Courses (6 Credit Hours)

Students choose a total of 6 credit hours from two of the skills courses listed below.

- LA/NRE 556 Contemporary Geospatial Applications for Land and Analysis (3 credit hours)
- MAP 671 Introduction to New Mapping (3 credit hours)
- STA 570 Basic Statistical Analysis (3 credit hours)
- STA 674 Regression Analysis and Design of Experiments (3 credit hours)
- STA 677 Applied Multivariate Methods (3 credit hours)

## Capstone/Internship (6 Credit Hours)

Students must complete one of two options to satisfy the non-thesis requirement for the Master's in Applied Environmental and Sustainability Studies. All students will be required to complete a one-hour oral exam.

### Plan B Option #1 Internship

Complete 6 credit hours of internship coursework:

- ENS 697 Internship in Environmental and Sustainability Studies I (3 credit hours)
- ENS 698 Internship in Environmental and Sustainability Studies II (3 credit hours)

### Plan B Option #2 Capstone

Complete 6 credit hours through a capstone research project and report:

- ENS 695 Research in Environmental and Sustainability Studies (3 credit hours)
- ENS 696 Reporting Research in Environmental and Sustainability Studies (3 credit hours)

## Elective Courses (9 Credit Hours)

Students must take an additional 9 credit hours from the approved list of courses. Other courses at the 600-level and above that relate to environmental and sustainability studies may be used to satisfy this requirement with the permission of the program director. Students may only count 6 credit hours of ENS 605 (under different subtitles) or ENS 699 (up to 3 credit hours) towards this requirement.

# Course Descriptions

**ENS 601 ENVIRONMENT AND SUSTAINABILITY: ISSUES AND IDEAS. (3)** This course will survey some of the most important environmental problems (climate change, biodiversity loss, deforestation, water scarcity) and the tools needed to analyze, understand, and respond to these problems (market-based solutions, political economy, institutional economic theories, environmental ethics). Students will also explore new scientific ideas on sustainability to better understand the contemporary environmental problems the world is facing. With rigorous thinking about the science of sustainability, students will

have the knowledge and skills so that they can help institutions, business, public policy, and individuals understand and act on key principles of sustainability. Prereq: Admission to the MA or Graduate Certificate in Applied Environmental and Sustainability Studies or permission of instructor.

**ENS 602 ENVIRONMENT AND SUSTAINABILITY POLICY AND GOVERNANCE. (3)** This course will explore the roles of governments, markets, and civil society in the creation, adoption, and implementation of environmental and sustainability rules and norms. We will evaluate leading environmental and policy strategies, including traditional state regulation, market-based incentives and regulations created by private actors (civil society and corporations/ Corporate Social Responsibility). Increasingly, the interactions between different forms of regulation figure prominently in debates about environmental and sustainability governance. We will draw upon empirical examples of governance and policy for a diverse reference set of environmental and sustainability challenges and solutions. Students will develop strong critical thinking and problem-solving skills in order to contribute to environmental and sustainability policy and governance. Prereq: Admission to online MA program or Graduate Certificate in Applied Environmental and Sustainability Studies or consent of instructor.

**ENS 603 COMMUNICATING ENVIRONMENTAL AND SUSTAINABILITY STUDIES. (3)** The course provides students an understanding of the latest scientific research in the field of environment and sustainability studies and the tools to communicate this research effectively to the public. In addition, students will learn key technical writing skills to apply knowledge in environmental and sustainability studies. For technical writing, students will develop skills for writing letters, grant proposals, reports, and presentations for specific audiences. To communicate with a broad audience about the questions central to environmental and sustainability studies, students will write short articles, record podcasts, make videos, craft memes, and author multimodal texts. Storytelling and clear description will also be emphasized across multiple platforms, which will include blogs, audio podcasts and short videos, among others. Students will build the critical skillsets necessary for technical writing as well as craft dynamic and compelling stories about environment and sustainability issues. Prereq: Admission to online MA or Graduate Certificate in Applied Environmental and Sustainability Studies or consent of instructor.

**ENS 605 SEMINAR IN ENVIRONMENTAL AND SUSTAINABILITY STUDIES (Subtitle required). (3)** Seminar in Environmental and Sustainability Studies, including, for example, environmental racism, environmental justice, sustainability ethics, environment and development, climate change and climate justice, environmental health, or environment and society. May be repeated to a maximum of six credits under different subtitles. Prereq: Admission to the online MA or Graduate Certificate in Applied Environmental and Sustainability Studies or permission of instructor.

**ENS 695 RESEARCH IN APPLIED ENVIRONMENTAL AND SUSTAINABILITY STUDIES. (3)** Students will complete a significant research project in environmental and sustainability studies that includes reviewing relevant literature and collecting data. Students will design an independent research project using recognized research methodology and will collect and analyze data under the guidance of their faculty advisor and graduate committee. A learning contract with project clearly defined must be approved by supervising faculty member. Prereq: ENS 601 and ENS 602 and ENS 603.

**ENS 696 REPORTING RESEARCH IN APPLIED ENVIRONMENTAL AND SUSTAINABILITY STUDIES. (3)** This course is part of the Plan B Capstone option for the MA in Applied Environmental and Sustainability Studies. Students will report on the significant research project in environmental and sustainability studies that they conducted in ENS 695 under the guidance of their faculty advisor. Students will complete a report on their research in a format agreed upon with their faculty advisor. Students will also create a blog post and give an oral presentation supported with visual aids (such as PowerPoint) to demonstrate their ability to apply different forms of communication in environmental and sustainability studies. A learning contract with a clearly defined scope of the work and deadlines must be approved by the supervising faculty member. Prereq: ENS 603, ENS 695.

**ENS 697 INTERNSHIP IN APPLIED ENVIRONMENTAL AND SUSTAINABILITY STUDIES I. (3)** Students pursuing the Plan B Internship option in the MA in Applied Environmental and Sustainability Studies are required to complete six credit hours of internships in order to graduate and must work 40 hours for each credit hour earned. While students are ultimately responsible for finding and completing their internships, students do receive ample support and assistance from program faculty throughout the process. The activities to be carried out during internships must be mutually agreed upon by the student, their faculty supervisor, and the host organization supervisor. Internships can be completed during spring and fall semesters or the summer after students have completed their regular course work. Prereq: ENS 601, ENS 602, and ENS 603.

**ENS 698 INTERNSHIP IN APPLIED ENVIRONMENTAL AND SUSTAINABILITY STUDIES II. (3)** Students pursuing the Plan B Internship option in the MA in Applied Environmental and Sustainability Studies are required to complete six credit hours of internships in order to graduate and must work 40 hours for each credit hour earned. While students are ultimately responsible for finding and completing their internships, students do receive ample support and assistance from program faculty throughout the process. The activities to be carried out during internships must be mutually agreed upon by the student, their faculty supervisor, and the host organization supervisor. Internships can be completed during spring and fall semesters or the summer after students have completed their regular course work. Prereq: ENS 601, ENS 602, ENS 603, ENS 697.

**ENS 699 INDEPENDENT STUDY IN ENVIRONMENT AND SUSTAINABILITY STUDIES. (3)** Supervised individual work in Applied Environmental and Sustainability Studies. A learning contract with a clearly defined project must be approved by supervising faculty member or program director. May not be repeated for additional credit. Prereq: ENS 601, ENS 602, and ENS 603 or consent of instructor.

**LA 556 CONTEMPORARY GEOSPATIAL APPLICATIONS FOR LAND ANALYSIS. (3)** This course focuses on contemporary concepts of land analysis, model development, and ancillary functions in geospatial applications. We attempt to apply concepts from the literature in this course through geospatial technologies to real world situations through individual projects that embraces place. In this course, we will address primarily landscape scale analyses such as watersheds and hydrologic characteristics, viewsheds, least cost path analysis, and enhanced land evaluation and site assessment approaches that have specific relevance to you. Prereq: LA 355/NRE 355 or permission of instructor. (Same as NRE 556.)

**MAP 671 INTRODUCTION TO NEW MAPPING. (3)** This course introduces students to both the social and technical aspects of digital mapping in the 21st century. Students will learn fundamental concepts and techniques in cartography and GIS, including file types, data classification, projections and coordinate systems and elementary analytical techniques in a range of desktop and web-based mapping platforms. In addition to providing the fundamental technical competencies necessary to create maps, students will develop the critical awareness required to effectively communicate complex social processes through maps.

**STA 570 BASIC STATISTICAL ANALYSIS. (3)** Introduction to methods of analyzing data from experiments and surveys; the role of statistics in research, statistical concepts and models; probability and distribution functions; estimation; hypothesis testing; regression and correlation; analysis of single and multiple classification models; analysis of categorical data. Prereq: MA 109 or equivalent.

**STA 674 REGRESSION ANALYSIS AND DESIGN OF EXPERIMENTS. (3)** Course begins with an applied regression module that emphasizes analysis and interpretation of real data, and statistical computing. Second part of course focuses on principles and implementation of experimental design for scientific research purposes. Standard designs presented along with the proper kinds of analysis for each. Continued emphasis on real data and statistical computing using R and/or SAS. Prereq: STA 570.

**STA 677 APPLIED MULTIVARIATE METHODS. (3)** Survey of multivariate statistical techniques important in applied research. Focus on multivariate structure-seeking methods, but attention given to important hypothesis testing applications in ANOVA and MANOVA. Emphasis on implementation using modern statistical software and interpretation of results in context. Prereq: STA 674.

# Biology

## College of Arts & Sciences

The Biology Graduate Program offers Doctor of Philosophy and Masters of Science degrees (thesis and non-thesis) in Biology, but doctoral training is strongly emphasized. Master's training is not a prerequisite for admission into our doctoral program. Applicants are selected for admission based on their overall academic record, GRE scores, letters or recommendation, prior research experience, and on their expressed interest in our graduate program training areas or the research of the Biology Department faculty members.

**Training**
Graduate students are trained through a combination of formal coursework and research experience. Research training consists of work on a research project under the guidance of one or more of our faculty members. The specific research project is chosen in consultation with the faculty mentor and typically is closely related to the research interests of that lab. A one-credit Biology Graduate Student Orientation seminar course is required for all first year graduate students admitted into the Biology program. All students must complete a set of common requirements for the Biology Graduate Program, including seminar courses, research, a qualifying exam (for Ph.D. candidates), and an exit exam (thesis defense for Ph.D. and Plan A M.S.). Additional coursework depends on the area of specialization and is determined with input from the faculty mentor and student's advisory committee and the training program. The training programs include Environmental and Evolutionary Biology (EEB), Molecular, Cellular and Developmental Biology (MCDB), and Tailored Training (TT).

**Environmental and Evolutionary Biology Training Program**
The Environmental and Evolutionary Biology group supports education and research on the interactions between organisms and their environment from an evolutionary perspective. This includes the study of micro- and macro-evolutionary processes; the physiological, developmental, and behavioral adaptations of individual organisms; predator-prey, mutualistic, and competitive interactions; and community and ecosystem relationships. Faculty members conduct research exploring both basic underlying principles and specific applied consequences of ecological interactions. The group's core philosophy is that major advances in understanding how organisms evolve and function in changing ecological systems are achieved in an interactive, interdisciplinary research environment involving diverse conceptual and methodological approaches. Students achieve this through coursework, topical seminars, weekly research seminars, and research projects guided by their major advisor and thesis committee.

**Molecular, Cellular and Developmental Biology Training Program**
Molecular, Cellular and Developmental Biology (MCDB) training focuses on fundamental cellular and developmental processes such as gene expression, cell proliferation, cell signaling, development, neural function, aging, and behavior. We apply biochemical, genetic, physiological, and molecular techniques to resolve outstanding issues in biology and use a diverse set of experimental organisms (e.g. fungi, cultured cells, and complex animals ranging from the fruit fly to mouse). Entering MCDB students rotate through two different laboratories before selecting a research mentor near the end of the first year of study. Students participate in weekly research and literature seminars and are guided in the selection of other formal course work in order to best prepare for their thesis/dissertation studies. The faculty and students in the MCDB group interact closely with each other, with colleagues elsewhere on our campus, and with scientists worldwide to achieve a stimulating research atmosphere. Our program successfully prepares students for scientific research careers in academic, industrial and governmental settings.

**Tailored Training**
The Tailored Training program provides great curricular flexibility. The principal difference between Tailored Training and training in the MCDB and EEB programs is that there are no set course requirements, other than the minimum requirements set by the Biology Graduate Program. The mentor and advisory committee work together with the student to customize a curriculum that best suits the needs, interests, and goals of the student. This may be particularly advantageous for students whose primary interests encompass areas outside of or across the other training programs. The curriculum is unique to each student, but not isolating. The student is encouraged to participate in relevant seminars, journal clubs, or other activities attended by students in the MCDB and EEB training programs or in other University graduate training programs. Students admitted through the Tailored Training option enter the Biology Graduate Program directly into the lab of their research mentor. Applicants interested in admission through this mechanism should contact the faculty member with whom they wish to train and also indicate their lab of choice in the Biology application. Faculty members offering Tailored Training will indicate this option on their web pages.

**Financial Support**
Full financial support is offered to all Ph.D. and Plan A M.S. students accepted for graduate admission; no financial aid application is required. Support may include teaching assistantships and fellowships provided by the university and department, research assistantships offered by faculty mentors, interdisciplinary traineeships and fellowships or extramural research fellowships to individual students.

**Admission Requirements**
Anyone with a bachelor's degree from an accredited college or university may apply for admission to the Biology Graduate Program at either the MS or Ph.D. levels. Applicants are generally expected to have an undergraduate grade point average of at least 3.0 (out of 4.0), a combined verbal and quantitative Graduate Record Examination score of at least 1100 (old scoring system) or 300 (new scoring system) and, for non-native English speakers, a TOEFL score of at least 550 on paper based test or 213 on the computer-based test (CBT) or 79 on internet-based test (IBT). Our GRE institution code is 1837 and Department Code is 0206. We encourage completed applications by January 1 although applications will continue to be reviewed until all positions are filled.

Prerequisite college-level coursework includes one year of physics, two years of chemistry, one semester of calculus, one year of general biology, and upper-level courses providing a working knowledge of contemporary biology. Every student entering the Biology Graduate Program is presented with the Graduate School Bulletin at orientation to familiarize the students with UK Graduate School policy. In addition, each student is provided with a copy of the Rules, Regulations & Policies for the Biology Graduate Program which describes the Departmental rules governing the Biology Graduate Program.

The Biology Graduate Program application is available online. This application and additional information about the Biology Graduate Program can be found at the Program website: http://bio.as.uky.edu/grad-program.

## Graduate Courses

| | | |
|---|---|---|
| A&S 500 | Special Topics Course (Animal Senses; Stem Cells & Tissue, Engineering; Homeostasis) | (1-4) |
| Bio 401g | Special Topics In Biology:Elementary, Middle School & High School Teachers | (1-4) |
| Bio 430g | Plant Physiology | (3) |
| Bio 452g | Laboratory In Ecology | (2) |
| Bio 494g | Immunobiology (Same As Mi 494g) | (3) |
| Bio 502 | Principles Of Systems, Cellular & Molecular Physiology (Same As Pgy 502) | (5) |
| Bio 507 | Biology Of Sleep And Circadian Rhythms | (3) |
| Bio 508 | Evolution | (3) |

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|---|---|---|
| Bio 510 | Recombinant Dna Techniques Laboratory | (4) |
| Bio 520 | Bioinformatics (Same As Inf 520) | (3) |
| Bio 529 | Developmental Biology | (3) |
| Bio 530 | Biogeography And Conservation (Same As Geo 530) | (3) |
| Bio 535 | Comparative Neurobiology And Behavior (Same As Pgy 535) | (3) |
| Bio 542 | Histology | (5) |
| Bio 550 | Comparative Physiology | (3) |
| Bio 551 | Life Cycle Ecology Of Flowering Plants | (4) |
| Bio 555 | Vertebrate Zoology | (5) |
| Bio 559 | Ornithology | (4) |
| Bio 560 | Environmental Physiology And Toxicology (Same As Tox 560) | (4) |
| Bio 561 | Insects Affecting Human And Animal Health (Same As Ent 561) | (3) |
| Bio 563 | Parasitology (Same As Ent 563) | (4) |
| Bio 564 | Insect Taxonomy (Same As Ent 564) | (4) |
| Bio 568 | Insect Behavior (Same As Ent 568) | (3) |
| Bio 570 | Invertebrate Zoology | (4) |
| Bio 575 | Plant Anatomy And Morphology | (4) |
| Bio 601 | Special Topics In Molecular And Cellular Genetics (Bch/Mi/Pls/Ppa 601) | (1) |
| Bio 606 | Conceptual Methods In Ecology And Evolution (Same As Ent/For 606) | (3) |
| Bio 607 | Advanced Evolution (Same As Ent/For 607) | (2) |
| Bio 608 | Behavioral Ecology And Life Histories (Same As Ent/For 608) | (2) |
| Bio 609 | Population And Community Ecology (Same As Ent/For 609) | (2) |
| Bio 612 | Biology Of Aging (Same As Ana/Grn/Pgy 612) | (3) |
| Bio 615 | Molecular Biology (Same As Mi/Bch 615) | (3) |
| Bio 620 | Plant Molecular Biology (Same As Pls 620) | (3) |
| Bio 621 | Topics In Modern Biology<br>(Advanced Genetics; Population Biology; Biometry; Membrane Biophysics) | (1-3) |
| Bio 622 | Physiology Of Plants I (Same As Pls/For 622) | (3) |
| Bio 623 | Physiology Of Plants II (Same As Pls/For 623) | (3) |
| Bio 625 | Insect-Plant Relationships (Same As Ent 625) | (3) |
| Bio 635 | Insect Physiology And Internal Morphology (Same As Ent 635) | (4) |
| Bio 638 | Developmental Neurobiology (Same As Ana/Pgy/Psy 638) | (3) |
| Bio 650 | Animal Physiology Laboratory (Same As Pgy 650) | (2) |
| Bio 665 | Insect Ecology (Same As Ent 665) | (3) |
| Bio 684 | Phylogenetic Systematics (Same As Ent 684) | (3) |
| Bio 685 | Advanced Immunobiology (Same As Mi 685) | (3) |
| Bio 707 | Contemporary Topics In Immunology | (2) |
| Bio 720 | Microbial Structure And Function (Same As Mi/Obi 720) | (4) |
| Bio 740 | Mammalian Radiation Biology (Same As Rm 740) | (2) |
| Bio 748 | Master's Thesis Research | (0) |
| Bio 749 | Dissertation Research | (0) |
| Bio 767 | Dissertation Residency Credit | (2) |
| Bio 768 | Residence Credit For Master's Degree | (1-6) |
| Bio 769 | Residence Credit For Doctor's Degree | (0-12) |
| Bio 770 | Seminar In Biology (Subtitle Required) | (1) |
| Bio 772 | Seminar In Microbiology (Same As Mi 772) | (0-1) |
| Bio 773 | Seminar In Plant Physiology (Same As Pls 773) | (1) |
| Bio 782 | Advanced Virology (Same As Vs 782) | (3) |
| Bio 790 | Mentoring Undergraduate Research In Biology | (1) |
| Bio 795 | Research In Biology | (1-9) |

# Chemistry

## College of Arts & Sciences

The Department of Chemistry offers the Master of Science and the Doctor of Philosophy degrees. Plan A or B may be used to satisfy the requirements for the M.S. degree. Areas of specialization in chemistry are analytical, biological, inorganic, organic, physical, and radionuclear. All candidates for the Ph.D. degree are required to serve as a teaching assistant for one semester.

**Admission Requirements**
Apart from the admissions standards set for all departments by the Graduate School, the only specific departmental requirement for admission to the Graduate Program in Chemistry is an undergraduate degree in chemistry or its equivalent (with sufficient sampling of courses pertaining to the main chemistry disciplines). The Chemistry Department asks applicants to submit three letters of recommendation, and considerable weight in each admission decision is given to these written evaluations from the applicant's instructors and mentors. A list of unofficial metrics used to rank applications can be found at the Chemistry Department's Admission webpage. Teaching Assistantships are generally only offered to entering students seeking the Ph.D. degree; entering applicants targeting a M.S. degree are usually not offered financial support. An effort is made to match applicant interests with available research programs. Applicants for whom exceptions to the above-stated policies seem warranted are subject to special consideration by the Graduate Recruitment Committee. As part of the course requirements for both the M.S. and the Ph.D. degrees, all students must normally take four "core" courses. The student selects one course which best meets career objectives in each of four of the five areas of chemistry (analytical, biological, inorganic, organic, and physical) from a pair of such courses: CHE 524 or 626, CHE 550 or 552, CHE 510 or 514, CHE 535 or 538, CHE 547 or 548, respectively.

All new graduate students must take proficiency examinations in analytical, biological, inorganic, organic, and physical chemistry. The results of these examinations are used as a guide in establishing the student's program of courses. Students who do very well on any particular examination may bypass the core course in that area.

## Doctor of Philosophy

Doctoral degrees are earned in the Department of Chemistry after a student has carried out productive and independent research on a problem that is of significant chemical interest. It is expected that the results of the dissertation work will be published in refereed scientific journals. All Graduate School requirements must be met. Subject to approval of the student's Advisory Committee, course work for the Ph.D. degree shall normally include four "core" courses and 8 credits of advanced or specialty courses. At least 3 credit hours must be in courses outside of the student's main area of interest.

The Qualifying Examination consists of a written and an oral part. The written component of the Qualifying Examination consists of a series of cumulative examinations designed to test the application of fundamental principles and reasoning to literature or research problems. Scores of 3, 2, 1, or 0 can be obtained on each examination. Examinations in the areas of Analytical, Inorganic, Biological, Organic, and Physical Chemistry are given eight times per year, and a Ph.D. student must score eight points (with half of those points requiring a score of 2 or better) within two years in order to take the oral part of the Qualifying Examination.

## Master of Science

***Plan A (Thesis):*** All Graduate School requirements must be met. In addition to four "core" courses, advanced or specialty courses relevant to a student's career objectives are taken to total a minimum of 24 credits. Successful defense of a thesis describing original research of a caliber that could result in publication in refereed scientific journals is required of all M.S. Plan A students.

***Plan B (Non-Thesis):*** Students in the Department of Chemistry may satisfy the requirements for an M.S. degree by using Plan B, a coursework M.S. degree. Students wishing to follow this plan must present for the approval of the Graduate Program Committee a program of courses that satisfies the Committee and meets all Graduate School requirements. This program of courses must meet distribution requirements within four of the five areas of chemistry and include 6 or more credits of courses outside of Chemistry that are relevant to the student's career goals.

For further information on any degree program in Chemistry, contact the Director of Graduate Studies at dgs.chemistry@uky.edu.

## Course Descriptions

CHE 510 ADVANCED INORGANIC CHEMISTRY. (3)
A course dealing with the concepts of inorganic chemistry with emphasis on atomic structure, periodicity, nomenclature, bonding, reaction mechanisms and acid-base theories. Prereq: CHE 232, CHE 226, and a physical chemistry course at or above the 400 level; or CHE 410G and CHE 412G.

CHE 514 DESCRIPTIVE INORGANIC CHEMISTRY. (3)
A course dealing in detail with descriptive chemistry of the elements and their compounds, excluding the hydrocarbons and their derivatives. Prereq: CHE 226 and CHE 232; or CHE 450G, or permission of instructor.

CHE 516 INORGANIC MATERIALS CHEMISTRY. (3)
Introduction to solid state inorganic materials chemistry, including atomic structure; optical, electronic, and magnetic properties; and characterization methods such as x-ray diffraction and electron microscopy. Prereq: CHE 440G or CHE 547 or equivalent; and CHE 410G or 510 or equivalent; or permission from the instructor.

CHE 520 RADIOCHEMISTRY. (3)
Applications of radionuclides in chemistry with emphasis on principles of radioactive decay, interactions of radiation with matter, use of isotopic tracers, activation analysis, isotope dilution analysis, hot atom chemistry and nuclear dating methods. Prereq: CHE 107, or 226.

CHE 524 CHEMICAL INSTRUMENTATION. (4)
Aspects of electronics, microcomputers, computer interfacing, and data analysis as they apply to chemical measurements and measurement systems. Lecture, two hours; laboratory, six hours per week. Prereq: A physical chemistry course at or above the 400 level or consent of instructor.

CHE 525 BIOANALYTICAL SENSORS. (3)
Theory, principles, and applications of bioanalytical sensors and sensing systems, including transducers, molecular recognition, and microfabrication. Prereq: A physical chemistry course at or above the 400 level, or consent of instructor.
CHE 526 CHEMICAL SEPARATIONS. (2)
An advanced study of the theory, instrumentation, and analytical applications of chemical separation

methods. Prereq: A physical chemistry course at or above the 400 level, or consent of instructor.

CHE 532 SPECTROMETRIC IDENTIFICATION OF ORGANIC MOLECULES. (2)
A discussion of nuclear magnetic resonance, ultraviolet and infrared spectroscopies, and mass spectrometry in the determination of the structure and stereochemistry of organic molecules. Prereq: CHE 231 and CHE 232.

CHE 533 ADVANCED ORGANIC CHEMISTRY LABORATORY. (2)
The practice of synthesis, purification, and characterization of organic compounds in the modern chemistry laboratory. Laboratory, six hours. Prereq: CHE 532.

CHE 535 SYNTHETIC ORGANIC CHEMISTRY. (3)
A general survey of organic chemistry with emphasis on synthetic methods and the synthesis of natural products. Prereq: CHE 232.

CHE 536 ORGANIC MATERIALS: ELECTRONIC AND PHOTONIC PROPERTIES. (3)
A description of relationships between molecular structure and optical and electronic properties, focusing on changes in properties moving from single molecules to aggregates to bulk solid states. Electronic structure and photonic properties of organic molecules, solid-state polymers and interfaces will be considered. Material characteristics will studied in the types of devices where organic materials show promising performance: displays, lighting, transistors, energy conversion/ storage applications, and non-linear optics technologies. Prereq: CHE 232 and PHY 213 or PHY 232, or permission of the instructor.

CHE 538 PRINCIPLES OF ORGANIC CHEMISTRY. (3)
A general survey of the field of organic chemistry. Topics emphasized are: mechanistic principles relating molecular structure to reaction outcome, stereoisomerism and its effect on chemical reactivity, and simple molecular orbital theory as required to understand aromaticity and to predict the occurrence and stereochemistry of pericyclic reactions. Prereq: CHE 232.

CHE 547 PRINCIPLES OF PHYSICAL CHEMISTRY I. (3)
An introduction to quantum chemistry and spectroscopy, emphasizing modern applications of quantum theory to the calculation of molecular properties. Practical experience with quantum chemistry software on various computer platforms is included. Prereq: MA 213; PHY 213 or 232; or consent of instructor.

CHE 548 PRINCIPLES OF PHYSICAL CHEMISTRY II. (3)
Fundamental principles of classical physical chemistry, including thermodynamics, statistical thermodynamics, and chemical kinetics. Prereq: A physical chemistry course at the 400 level or above, or consent of instructor.

CHE 550 BIOLOGICAL CHEMISTRY I. (3)
An introduction to biological chemistry. Topics include amino acids and proteins; nucleic acids and nucleotides; enzyme structure, function and energetics; metabolism including glycolysis; the tricarboxylic acid cycle; electron transport and oxidative phosphorylation; glycogen metabolism; hormone action; and other aspects of modern biological chemistry. Prereq: CHE 232.

CHE 552 BIOLOGICAL CHEMISTRY II. (3)
A further introduction to biological chemistry. Topics include lipid metabolism, biosynthesis and metabolism of nitrogen-containing
compounds, storage and utilization of genetic information, immunochemistry, and other contemporary topics in biological chemistry Prereq: CHE 232.

CHE 553 CHEMISTRY AND MOLECULAR BIOTECHNOLOGY. (3)
This course focuses on the chemical aspects of biotechnology development. Current topics in biotechnology are emphasized through extensive reading and classroom discussion of the most recent scientific literature. Biotechnology development in fields as diverse as agriculture, the environment, and medicine will be covered. Prereq: An introductory course in biology, biological chemistry, or biochemistry; and CHE 232; or consent of instructor.

CHE 555 HOMONUCLEAR NMR. (3)
This course will give students hands-on experience with modern NMR experiments that are the mainstays of chemical structural analysis and biophysical studies of macromolecules and pharmaceuticals. Lecture, two hours; laboratory, three hours per week. Prereq: CHE 232 or 236; and a physical chemistry course at or above the 400 level.

CHE 556 ELEMENTS OF NEUROCHEMISTRY. (3)
A course in the neurochemistry of the brain. Among topics to be covered: brain cell cytoarchitecture; chemical bases for: neuronal membrane transport, electrical excitability, and ion channels; axonal transport; energy metabolism; synaptic transmission; cellular signaling; Ca2+ homeostasis; neurotransmitters; oxidative stress; apoptosis and necrosis; application of neurochemical principles to the molecular bases of neurodegenerative disorders. Prereq: CHE 232 and a biological chemistry course, or consent of instructor.

CHE 558 HORMONE RECEPTORS AND CELL SIGNALS. (3)
This course starts with the general concepts on hormones and their receptors and describes how hormones interact with their receptors and generate hormone signals and responses. Prereq: BIO 315 or equivalent, BCH 401G or equivalent, CHE 550 or 552 or equivalent, or consent of instructor.

CHE 559 MOLECULAR BIOPHYSICS. (3)
Overview of intermolecular forces responsible for formulation tertiary structure and macromolecular assemblies, as well as linked equilibria, allostery and propagation of signals. Extension of these principles to explain macromolecular machines, complex molecular behavior and, ultimately, processes of life. Prereq: A physical chemistry course at the 400 level or above, or consent of instructor.

CHE 565 ENVIRONMENTAL CHEMISTRY. (3)
A study of the sources, reactions, transport, effects, and fates of chemical species in the atmosphere, hydrosphere, lithosphere and biosphere. Prereq: Two semesters of general college chemistry are required. Courses in analytical and physical chemistry are recommended, but are not required.

CHE 566 ORGANIC MATERIALS: CHARACTERIZATION AND DEVICES. (3)
A study of applications of organic materials in electronic and optical devices, focusing on appropriate material-selection, processing, and interpretation of device output. Will cover basic methods for the formation of thin films of organic molecules and polymers, various spectroscopic techniques relevant to device performance, and methods to form and measure devices such as transistors and light-emitting diodes. Hybrid organic-inorganic material systems, and complex device structures for all-organic circuitry will be discussed. Prereq: CHE 232 and PHY 213 or PHY 232, or permission of the instructor.

CHE 567 ORGANIC MATERIALS: FABRICATION LABORATORY. (2)
A laboratory course focused on the fabrication and characterization of organic and organic-inorganic hybrid electronic devices. Although a stand-alone course, the laboratory will cover practical aspects related to topics covered in CHE 536 and 566, including processing methods and characterization of optical and

electronic properties of organic materials and thin films. Prereq: CHE 536 or CHE 566, and PHY 213 or 232, or permission of the instructor,

CHE 576 POLYMER CHEMISTRY. (3)
Introduction to the theory and practice of polymer chemistry and polymer characterization. Prereq: CHE 230 and CHE 226; or permission from the instructor.

CHE 580 TOPICS IN CHEMISTRY. (1-3)
A detailed investigation of a topic of current significance in chemistry. May be repeated to a maximum of six credits. Lecture and/or laboratory: variable. Prereq: CHE 232 and a physical chemistry course at the 400 level or above, or consent of instructor.

CHE 610 CHEMISTRY OF THE TRANSITION METALS. (3)
A detailed treatment of the chemistry of the transition elements, lanthanides and actinides, including the structure of coordination complexes, bonding, reaction mechanisms and preparations. Prereq: CHE 510.

CHE 612 INORGANIC CHEMISTRY OF THE NON-METALS. (3)
A detailed treatment of the inorganic chemistry of the nonmetals. Topics include theories of bonding, spectral characteristics, reaction mechanisms, preparations, physical methods of characterization and structural determination, and applications. Prereq: CHE 510.

CHE 614 ORGANOTRANSITION METAL CHEMISTRY. (3)
A detailed treatment of the organometallic chemistry of the transition metals, including lanthanides and actinides. Topics include synthesis, structure, bonding theories, reactions, characterization by physical methods, and applications in organic chemistry and catalysis. Prereq: CHE 232, and CHE 410G or 510, and a physical chemistry course at the 400 level or above, or consent of instructor.

CHE 620 ELECTROCHEMICAL METHODS OF ANALYSIS. (3)
An intensive study of the fundamental theories and principles of electrochemistry, and their practical applications for physical and quantitative analytical measurements. Topics include potentiometric, voltammetric, amperometric, and coulometric methods. Prereq: CHE 522 or a physical chemistry course at the 400 level or above.

CHE 623 CHEMICAL EQUILIBRIUM AND DATA ANALYSIS. (3)
An advanced treatment of chemical equilibrium, sampling, and the evaluation of data obtained from chemically related measurements. Prereq: CHE 226 or 522 or a physical chemistry course at the 400 level or above.

CHE 625 SPECTROCHEMICAL ANALYSIS. (3)
An intensive study of the theory, instrumentation, and analytical applications of modern atomic and molecular spectrometric methods. Prereq: CHE 522.

CHE 626 ADVANCED ANALYTICAL CHEMISTRY. (3)
An advanced study of the theory and practice of quantitative analysis.

CHE 640 CHEMICAL CRYSTALLOGRAPHY. (3)
An introduction to modern small-molecule crystallography with emphasis on typical applications of interest to synthetic chemists. Prereq:
CHE 232 and a physical chemistry course at the 400-level or above.

CHE 643 SPECTROSCOPY AND PHOTOPHYSICS. (3)
An integrated treatment of modern spectroscopy and photophysics. Topics to include atomic spectroscopy, microwave, infrared and UV visible spectroscopy of diatomic and polyatomic molecules, lasers, creation and detection of excited states, fluorescence, phosphorescence, radiationless processes and photochemical transformations. Prereq: CHE 547 or 446G or permission of instructor.

CHE 646 CHEMICAL KINETICS. (3)
Studies of chemical reactions from the standpoint of velocity and mechanism. Prereq: CHE 442G.

CHE 664 MULTIDISCIPLINARY SENSORS LABORATORY. (3)
A multidisciplinary laboratory course with laboratory experiences in areas related to sensors and sensing architectures, typically including chemistry, chemical and materials engineering, and electrical engineering. Lecture, 1 hour; laboratory, 2 hours. Prereq: One year of college chemistry, calculus and physics. GS 660 or by consent of instructor. (Same as CME/EE/MSE 664.)

CHE 666 PROTEOMICS AND MASS SPECTROMETERY. (3)
A course in the identification, characterization, and quantification of the proteins in tissues and cells. Mass spectrometric methods are of central importance, and those techniques (including data analysis) are a major focus of the course. Prereq: CHE 232, a course in physical chemistry at or above the 400-level.

CHE 668 SYMMETRY AND CHEMICAL APPLICATIONS. (3)
An integrated treatment of fundamentals, techniques, and chemical applications of molecular symmetry and group theory. Prereq: A physical chemistry course at the 400-level, or consent of instructor.

CHE 736 TOPICS IN ORGANIC CHEMISTRY. (2-4)
Selected topics which may include heterocyclic organic compounds, natural and synthetic dyes, carbohydrates, nitrogen compounds, and recent advances in the field of organic chemistry. May be repeated to a maximum of 12 credits.

CHE 746 TOPICS IN PHYSICAL CHEMISTRY. (2-4)
Selected topics which may include photochemistry, structure of crystals, molecular spectra, nature of the chemical bond, and other recent advances in the field of physical chemistry. May be repeated to a maximum of 12 credits. Prereq: A physical chemistry course at the 400 level or above.

CHE 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

CHE 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

CHE 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

CHE 768 RESIDENCE CREDIT FOR MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

CHE 769 RESIDENCE CREDIT FOR DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

CHE 772 SEMINAR IN CHEMISTRY INSTRUCTION. (1)
A seminar for teaching assistants on the methods and techniques of effective instruction in laboratory and recitation classes in chemistry. Required of all new graduate teaching assistants. Prereq: Admission to M.S. or Ph.D. program in chemistry.

CHE 776 GRADUATE SEMINAR. (3)
Reports and discussions on recent research and current literature. Required of all graduate students. Prereq: Graduate Standing.

CHE 779 MEMBRANE SCIENCES COLLOQUIUM. (1)
Outstanding membrane scientists present their current research on biological and/or synthetic membranes. Students read a pertinent paper by the speaker prior to his/her talk and write a short paper on the talk; especially important is relevance of the main points of the talk to membrane science in general and the student's own research in particular. May be repeated to a maximum of six credits. (Same as BCH/CME/PHA/PHR 779.)

CHE 780 INDIVIDUAL WORK IN CHEMISTRY. (1-5)
Selected library and laboratory problems in conformance with the student's interest will be attacked and pursued under the direction of a suitable staff member who is proficient in the area under investigation.

CHE 790 RESEARCH IN CHEMISTRY. (1-12)
Work may be taken in the following fields, subject to the approval of the Departmental Graduate Committee: analytical chemistry, industrial chemistry, inorganic chemistry, organic chemistry, radiochemistry, or physical chemistry. May be repeated indefinitely.

# Classics

## College of Arts & Sciences

The M.A. program in Classics in the Department of Modern and Classical Languages, Literatures, and Cultures offers a degree with courses in Greek and Latin languages, literatures and cultures, as well as allied offerings in ancient and medieval history, ancient and medieval philosophy, archaeology, Greek and Roman art, Early Christian studies, and Renaissance studies. The mission of the M.A. Program is to train classicists who would become Latin teachers, or who, having obtained a solid knowledge of the classical languages (active knowledge of Latin is offered through the program), would pursue a Ph.D. degree in Classics, History, Philosophy, Divinity, or other related fields.

Normally the M.A. program is completed in two years of full-time study. It is offered under both Plan A (thesis) and Plan B (non-thesis) options. An exit reading exam is required for both plans of study.

For additional information and details about the M.A. in Classics, including an opportunity for a concurrent degree with Teaching World Languages, contact the Director of Graduate Studies, and check the web site of the program: http://mcl.as.uky.edu/ma-classics.

**Admission Requirements**
The requirements for admission to the program in Classics are (a) an undergraduate grade point average of 3.0 or above on a 4.0 scale, (b) competence in one of the classical languages (Latin or Greek) and at least basic competence in the other, and (c) a combined score of 297 (new scoring) / 1000 (old scoring) on any two of the three parts of the Graduate Record Examination (GRE). The Director of Graduate Studies may admit students with lower GRE socres or an undergraduate grade point average below 3.0 if, on the basis of a student's last two years of work, Classics grades, or general academic competence. An undergraduate major in Classics, Latin, or Greek is not required for admission, but the Program suggests that entering students should have completed at least six semesters of either Latin or Greek and four semesters of the other language. Students lacking sufficient preparation in one of the classical languages may be required to remedy such deficiencies by taking undergraduate courses.

The following documents should be submitted to the Apply Yourself online application system (https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=ukgrad) by February 1, if the applicant is seeking financial aid, or before April 30 otherwise:

1. A one page statement describing the applicant's reasons for seeking a Master's degree. If an applicant wants to be considered for financial aid (i.e., a fellowship or an assistantship), this is to be indicated in the opening sentence of the personal statement.
2. A list of Latin and Greek works read with approximate number of lines.
3. Transcripts.
4. GRE scores.
5. Three letters of reference (normally from former teachers).

## Course Descriptions

CLA 509 ROMAN LAW. (3)
An historical introduction to the development of Roman law, from the Twelve Tables through the Codex Justinianus. (Same as HIS 509.)

CLA 501 LATIN COMPOSITION. (3)
The course is designed for students with a good command of Latin morphology and basic knowledge of Latin syntax. The participants will deepen their knowledge of Latin syntax, internalize the principles of Latin grammar and usage, and develop a sensitivity to prose style. The course will involve readings from Latin authors from all periods, and exercises in Latin prose composition. It will foster familiarization with the language through exercises that will go beyond simple translation from English. English, not Latin, will be the spoken language used in this course. Prereq: Proficiency in Latin above the 300 level.

CLA 521 ADVANCED LATIN COMPOSITION AND READING. (3)
This course continues the study of Latin composition, concentrating on the compound sentence, modes of expression in subordinate clauses, and the figures of speech in rhetoric. Students will become acquainted with masterpieces of Latin prose from all periods, including Cicero, Sallust, Livy, Petronius, Pliny Minor, Einhard, Abelard, Erasmus of Rotterdam, Thomas More. This course, unlike CLA 501, will be conducted entirely in Latin, with the objective of further enhancing the students' abilities to express themselves in correct Latin prose. Prereq: Consent of instructor.

CLA 524 THE LATIN LITERATURE OF THE REPUBLIC (Subtitle required). (3)
A study of one or more works selected from the beginnings of Roman literary history to 31 B.C., the period of such writers as Cicero, Caesar, Sallust, Plautus, Terence, Lucretius, and Catallus. Texts may include prose, including history, philosophy, rhetoric and oratory, and letters, and/or poetry, including drama and satire. A particular author, work, genre, or theme is selected each time the course is offered. Textual analysis is emphasized, with lectures and class discussion on the literary milieu. May be repeated to a maximum of nine credits under a different subtitle. Prereq: CLA 301 or equivalent.

CLA 525 THE LATIN LITERATURE OF THE EMPIRE (Subtitle required). (3)
A study of one or more works selected from approximately 31 B.C. to the end of the Western Empire, the period of such writers as Livy, Tacitus, Pliny, Seneca, Virgil, Horace, Ovid, and Juvenal. Texts may include prose, including history, philosophy, rhetoric and oratory, and letters, and/or poetry, including epic, lyric, elegiac, pastoral, and satire. A particular author, work, genre, or theme is selected each time the course is offered. Textual analysis is emphasized, with lectures and class discussion on the literary milieu. May be repeated to a maximum of nine credits under a different subtitle. Prereq: CLA 301 or equivalent.
College of Arts and Sciences

CLA 528 LATE ANTIQUE AND POST-IMPERIAL LATIN LITERATURE (Subtitle required). (3)
A study of one or more works selected from Latin literature of late antiquity, or after the fall of the empire in the west, from approximately 200 AD into the Middle Ages and Renaissance. Authors and works may include early Christian Latin writers such as Augustine, late antique pagan writers such as the historian Ammianus, as well as medieval poetry, the Latin novel, medieval Christian writers, and Renaissance figures such as Erasmus. A particular author, work, genre, or theme is selected each time the course is offered. Textual analysis is emphasized, as well as the historical and cultural setting of the text and author. May be repeated to a maximum of nine credits under a different subtitle. Prereq: CLA 301 or equivalent.

CLA 611 LATIN OF ANCIENT ROME AND THE MIDDLE AGES (Subtitle required). (3)
This course is based on extensive reading of Latin texts taken from the Roman through the Medieval periods. It aims to foster close familiarization with the Latin language, cultivate an appreciation for different Latin prose styles, as well as investigate the broader historical and cultural circumstances surrounding each work. The classes will be conducted in Latin, and the assignments will involve Latin composition. May be repeated to a maximum of nine hours. Prereq: At least one course in Latin composition or permission of instructor.

CLA 612 LATIN OF THE MIDDLE AGES TO THE MODERN WORLD (Subtitle required). (3)
This course is based on extensive reading of Latin texts taken from the Medieval through the Modern period. It aims to foster close familiarization with the Latin language, cultivate an appreciation for different Latin prose styles, as well as investigate the broader historical and cultural circumstances surrounding each work. The classes will be conducted in Latin, and the assignments will involve Latin composition. May be repeated to a maximum of nine hours. Prereq: At least one course in Latin composition or permission of instructor.

CLA 624 SEMINAR IN THE LATIN LITERATURE OF THE REPUBLIC (Subtitle required). (3)
Graduate seminar in an author, a literary form, or a problem in the period of the Roman Republic. Intensive study of the Latin text(s) is accompanied by considerable attention to current scholarship and bibliography. Students will write extended papers and present oral reports in class. May be repeated to a maximum of nine hours. Prereq: Graduate standing or consent of the Classics DGS and instructor.

CLA 625 SEMINAR IN THE LATIN LITERATURE OF THE EMPIRE (Subtitle required). (3)
Graduate seminar in an author, a literary form, or a problem in the period of the Roman Empire. Intensive study of the Latin text(s) is accompanied by considerable attention to current scholarship and bibliography. Students will write extended papers and present oral reports in class. May be repeated to a maximum of nine hours. Prereq: Graduate standing or consent of the Classics DGS and instructor.

CLA 551 GREEK POETRY AND DRAMA (Subtitle required). (3)
A study of one or more works of Greek poetic and/or dramatic literature, which may include epic, lyric, tragedy, and comedy, selected from the whole of ancient Greek literature from Homer through the Roman period. A particular author, work, genre, or theme is selected each time the course is offered. Emphasis is placed both on mastering the Greek language and on literary analysis of the texts studied. Lectures and class discussions will further illuminate the literary and cultural milieu of the author or text. May be repeated to a maximum of nine credits under a different title. Prereq: CLA 252 or equivalent.

CLA 555 GREEK PROSE (Subtitle required). (3)
A study of one or more works of Greek prose literature, which may include history, biography, philosophy, satire, and the novel, selected from the whole of ancient Greek literature from Homer through the Roman period. A particular author, work, genre, or theme is selected each time the course is offered. Emphasis is placed both on mastering the Greek language and on literary analysis of the texts studied. Lectures and class discussions will further illuminate the literary and cultural milieu of the author or text. May be repeated to a maximum of nine credits under a different title. Prereq: CLA 252 or equivalent.

CLA 651 SEMINAR IN GREEK POETRY AND DRAMA (Subtitle required). (3)
Graduate seminar in Greek poetic and/or dramatic literature, which may include epic, lyric, tragedy, and comedy. Intensive study of the Greek text(s) is accompanied by considerable attention to current scholarship and bibliography. Students will write extended papers and present oral reports in class. May be repeated to a maximum of nine credits. Prereq: Graduate standing or consent of the Classics DGS and instructor.

CLA 655 SEMINAR IN GREEK PROSE (Subtitle required). (3)
Graduate seminar in Greek prose literature, which may include history, biography, satire, and the novel. Intensive study of the Greek text(s) is accompanied by considerable attention to current scholarship and bibliography. Students will write extended papers and present oral reports in class. May be repeated to a maximum of nine credits. Prereq: Graduate standing or consent of the Classics DGS and instructor.

CLA 395 UNDERGRADUATE INDEPENDENT STUDY IN CLASSICS. (1-3)
An independent investigation of a topic, usually outside of or in considerably greater depth than available in the regular course offerings,
in Greek and/or Roman language, literature, history, or culture. The course is designed for advanced
CLA 580 INDEPENDENT WORK IN CLASSICS. (3)
Courses to meet the needs of the student, including those who wish to study Medieval and/or Renaissance Latin, will be arranged in various areas. May be repeated to a maximum of 12 credits. Prereq: Major standing of 3.0 in the department or consent of instructor.

CLA 615 MANUSCRIPT CULTURES. (3)
This course examines how the vehicle of the manuscript and the circumstances of manuscript production shaped the creation, transmission, and reading of texts before the fifteenth century. Among the topics to be studied are orality and literacy, the transcription of sacred texts in Christianity, Judaism, and Islam, the political, economic, and social impacts of manuscript production and circulation, the impact of institutions (such as universities) on reading practices, contexts for the suppression, control, and alteration of texts, and the radical differences between print and manuscript cultures. (Same as HIS 615.)

CLA 616 PALEOGRAPHY. (3)
This course provides training in the skills needed to read the handwritten materials that constitute evidence for historical investigation of the production and circulation of information outside the medium of print. While the specific scripts to be studied will vary from semester to semester, depending upon whether the course is focused upon Latin paleography, Greek paleography, or vernacular paleographies, students will learn to read and transcribe manuscripts, to expand abbreviations appropriately, to recognize the chronological and geographical extent of particular scripts, to develop strategies for reading difficult scripts, to find the specialized reference works to assist them in studying handwritten materials, and to understand the historical arguments that have been constructed on the basis of analysis of scripts and the "archaeology of the book." The course also provides training in basic codicology and editorial techniques for establishing a text and recording variant readings. Prereq: Some familiarity with the language of the materials. (Same as HIS 616.)

CLA 630 SEMINAR IN CLASSICAL LITERATURE AND CULTURE (Subtitle required). (3)
This graduate seminar offers advanced, intensive study in two particular approaches to the study of Classics, requiring a broader and more inclusive approach beyond the scope of the typical Greek or Latin seminar. These are: 1) the coordinated study of works of both Greek and Latin literature, and 2) the study of a specific research area in classical studies and culture. One of these areas will be the focus of the course each time it is offered. Topics in the coordinated study of Greek and Latin literature can take various forms, such as the passions in Greek and Latin poetry, comparative Greek and Latin drama, Homer and Virgil, etc. Research in classics and culture involves extensive reading of a large body of sources and scholarship on a specific topic of current scholarly interest, along with the use of texts in the original language(s) for course assignments and papers. Appropriate competence in reading Latin and/or Greek texts is expected of all students in the course. Topics may include a focused aspect of Greek and/or Roman society, material culture, early Christianity – and its relation to classical culture, aspects of Medieval or Renaissance culture, or the ongoing influence of classical stories, ideals, and cultural forms in modern media. May be repeated for up to six credits on different topics. Prereq: Graduate standing or consent of the Classics DGS and instructor.

CLA 695 INDEPENDENT STUDY. (1-3)
Independent investigation of a problem under supervision of a graduate faculty member; or directed readings, writing, and discussion in small groups on topics outside the usual seminar offerings, guided by

a graduate faculty member. May be repeated to a maximum of nine credits. Prereq: Admission to graduate program, permission of instructor and of departmental Director of Graduate Studies.

CLA 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

CLA 768 RESIDENCE CREDIT FOR MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

CLA 790 RESEARCH IN THE TEACHING OF CLASSICAL LANGUAGES. (3)
Problems in the teaching of Latin and/or Greek in secondary and/or higher education. Objectives, methods, preparation of materials, development of curricula, or the history of the field. Prereq: CLA 530 or the equivalent.

# Creative Writing

## College of Arts & Sciences

The MFA in Creative Writing is a two-year program with a flexible and interdisciplinary approach, combining a studio/research curriculum. The UK MFA in Creative Writing places equal emphasis on fostering the artistic process of the MFA student, as well as his or her literary study and related creative or scholarly work.

**Requirements for the Master of Fine Arts in Creative Writing**

1. 24 hours of coursework following a plan drawn up in consultation with the student's advisor. Coursework must include:

- At least 9 hours of graduate writing workshop, ENG 607
- At least 6 hours of courses related to the study of creative writing genres (ex. Craft of Poetry, Craft of Creative Nonfiction, Special Topics in Poetry/Fiction/Nonfiction, courses in Creative Writing Pedagogy, Publishing, etc.)
- At least 6 hours of graduate courses designated as ENG, at the 600 or 700 levels, offered by the English department
- At least 3 hours from a focus area outside the English department

Although a course may be designated as fitting into several categories, a student may apply each course to only one. Neither ENG 609 nor ENG 691 may count toward the 24 hour requirement.

2. Students in the Creative Writing program will give a presentation of a significant portion of their own written work produced while in residence. In this public reading/performance, the student exhibits his or her work before an audience of peers, faculty, and the general public.
3. In the fall of their second year (if not earlier), students will form their thesis committee. The committee consists of their thesis director and two additional faculty members. The committee must be approved by the Director of Graduate Studies. At least two committee members (including the thesis director) must have graduate faculty status, and at least one of the two must be a full member of the graduate faculty. At least two members of the committee should be from the English department. The committee should include at least one English creative writing faculty member and one English literature faculty member. The committee must be in place and approved by the Director of Graduate Studies by the end of the fall semester of the student's second year.
4. During the spring semester of their second year, students will complete a creative thesis, under the direction of a thesis advisor. The thesis will be a substantial body of original writing—over 120 pages of fiction (short stories, novella, or novel) or non-fiction, or a collection of approximately 48 poems, or an equivalent thesis of mixed genre. While the final project usually consists of a book-length manuscript, theses that are not strictly English Department Graduate Student Handbook 2014-2015 10 print-based may also be submitted. The thesis must be approved by the student's thesis committee.
5. MFA candidates who have completed their coursework who are receiving financial support from the University and/or utilizing University resources while working on their theses should enroll in ENG 748. Please contact Catherine Sizemore, Department Manager Associate, to enroll in this residency course.
6. Toward the end of the spring semester of the second year, the student will take a ninetyminute oral examination based on the thesis. The exam may be scheduled once the committee has agreed that the thesis is ready for defense. Students should contact Catherine Sizemore, Department Manager Associate, to schedule their exam. All committee members must be present for the entire examination (in extreme cases, committee members may use conference calls or skype, but must be available and in contact with the student and the rest of the committee during the entirety of the exam).

**Important Deadlines and Paperwork for the Final Exam**

1. During the spring semester of the second year, students must submit their application for degree through MyUK. The deadline to submit the application for a Spring 2015 degree is February 20th, 2015.
2. Students must submit the Request for Final Exam to the Graduate School (http://www.research.uky.edu/cfdocs/gs/MastersCommittee/Student/Selection_Screen .cfm) at least two weeks prior to their final exam. The last day to submit this form for a Spring 2015 exam is April 9 th, 2015. The final day to sit for a Spring 2015 exam is April 23rd, 2015.
3. After successfully completing the oral examination, students will have 60 days or until the last day of the semester (May 8th, 2015), whichever comes first, to submit their final, accepted document and their ETD Approval Form to the Graduate School. Prior to final submission, students must have their thesis reviewed via UKnowledge for a first format check.

# Digital Mapping

## College of Arts & Sciences

The Department of Geography at the University of Kentucky offers two completely online programs in Digital Mapping: an 11-credit Graduate Certificate and a 30-credit Master of Science (Plan B, non-thesis).

The Digital Mapping graduate programs at the University of Kentucky offer a challenging, intensive, digital mapping curriculum that emphasizes the acquisition of technical skills — coding, GIS, web development — while also preparing students to critically address the complexity of today's information ecosystem.

These Graduate Certificate and Master of Science degree programs in digital mapping were designed with all levels of experience in mind. Whether students are new to open source software or an experienced GIS user, they will benefit from a truly unparalleled online learning experience developed by internationally-renowned faculty in a top-ranked geography department.

Students will develop the technical skills and design fluency you need to make highly sophisticated web maps that are also elegant and impactful. Perhaps even more importantly, they will learn to think critically about the social dimensions of the maps they make and the data from which they make them. Maps, after all, are powerful things: they shape what we see and what we don't, with serious implications for how we come to know the world.

## Graduate Certificate in Digital Mapping

### Admission Requirements and Application Information

Prospective applicants must meet the general requirements of the Graduate School regarding minimum undergraduate grade point average. Applications to the Graduate Certificate in Digital Mapping are accepted online via the UK Graduate School application portal: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=ukgrad. The applicant will be required to submit official transcripts for all undergraduate work. Personal statements, GRE scores, and CVs may be included but are not required for the graduate certificate application.

Admission to the Graduate Certificate in Digital Mapping occurs twice annually, during the Spring and Fall semesters. Applications are accepted until 2 weeks before the term start using custom dates detailed on the Programs page: https://newmapsplus.as.uky.edu/programs

## Certificate Requirements

After applying and being accepted to the Graduate Certificate in Digital Mapping, the student must complete the following 11 hours of coursework.

| | | |
|---|---|---|
| MAP 671 | Introduction to New Mapping | (3) |
| MAP 672 | Programming for Web Mapping | (4) |
| MAP 673 | Design for Interactive Web Mapping | (4) |
| **TOTAL CREDIT HOURS FOR CERTIFICATE** | | **11** |

## Course Descriptions

**MAP 671 INTRODUCTION TO NEW MAPPING. (3)** This course introduces students to both the social and technical aspects of digital mapping in the 21st century. Students will learn fundamental concepts and techniques in cartography and GIS, including file types, data classification, map projections spatial reference systems, and elementary analytical techniques in a range of desktop and web-based mapping platforms. In addition to providing the fundamental technical competencies necessary to create maps, students will develop the critical awareness required to effectively communicate complex social processes through maps, using industry-standard practices for distributed software development.

**MAP 672 PROGRAMMING FOR WEB MAPPING. (4)** This course introduces students to the fundamental concepts and techniques of web development and computer programming through web mapping. Students will become familiar with current web standards and proficient in manipulating the structural, stylistic and behavioral elements of web maps through programming. Students will translate these practices to achieve objectives in web cartography such as the display of a basemap, the thematic representation of data, and the employment of interaction to enhance the user's experience with the map.

**MAP 673 DESIGN FOR INTERACTIVE WEB MAPPINGS. (4)** This course integrates the principles of geographic representation and user interaction to create high-quality web maps. Students will design interactive web maps that visually communicate spatial data and provide an interface for greater user engagement with the map. The course will train students to compose interactive maps within the context of a coherent web page layout, including the development of supplementary content (such as text and metadata) to aid in visual storytelling.

# Master of Science (MS) in Digital Mapping

## Admission Requirements and Application Information

In addition to meeting the general requirements of the UK Graduate School, applicants to the Master of Science (MS) in Digital Mapping **should demonstrate some familiarity with** mapping technologies and/or coding for the web. Applications to the MS in Digital Mapping are accepted online via the UK Graduate School application portal: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=ukgrad. The applicant will be required to submit official transcripts for all undergraduate work, a personal statement, CV or resume, mapping portfolio and/or examples of coding experience, and 1-2 letters of recommendation. GRE scores may be included but are not required for the MS in Digital Mapping application.

Admission to the MS in Digital Mapping occurs three times annually. New students must start in either the Spring or Fall but returning graduate certificate students may also enter the MS during the Summer. Applications are accepted until 2 weeks before the term start using custom dates detailed on the Programs page: https://newmapsplus.as.uky.edu/programs

## MS Degree Requirements

After applying and being accepted to the MS in Digital Mapping, the student must complete the following 30 hours of coursework.

| | | |
|---|---|---|
| MAP 671 | Introduction to New Mapping | (3) |
| MAP 672 | Programming for Web Mapping | (4) |
| MAP 673 | Design for Interactive Web Mapping | (4) |
| MAP 674 | Spatial Data Analysis and Visualization | (4) |
| MAP 675 | Collaborative Geovisualization | (4) |
| MAP 701 | History of Critical Cartography | (2) |
| MAP 719 | Social Impacts of New Mapping | (3) |
| MAP 698 | Final Project Preparation | (3) |
| MAP 699 | Final Project Implementation | (3) |
| **TOTAL CREDIT HOURS FOR MS DEGREE** | | **30** |

## Course Descriptions

**MAP 671 INTRODUCTION TO NEW MAPPING. (3)** This course introduces students to both the social and technical aspects of digital mapping in the 21st century. Students will learn fundamental concepts

and techniques in cartography and GIS, including file types, data classification, map projections spatial reference systems, and elementary analytical techniques in a range of desktop and web-based mapping platforms. In addition to providing the fundamental technical competencies necessary to create maps, students will develop the critical awareness required to effectively communicate complex social processes through maps, using industry-standard practices for distributed software development.

**MAP 672 PROGRAMMING FOR WEB MAPPING. (4)** This course introduces students to the fundamental concepts and techniques of web development and computer programming through web mapping. Students will become familiar with current web standards and proficient in manipulating the structural, stylistic and behavioral elements of web maps through programming. Students will translate these practices to achieve objectives in web cartography such as the display of a basemap, the thematic representation of data, and the employment of interaction to enhance the user's experience with the map.

**MAP 673 DESIGN FOR INTERACTIVE WEB MAPPINGS. (4)** This course integrates the principles of geographic representation and user interaction to create high-quality web maps. Students will design interactive web maps that visually communicate spatial data and provide an interface for greater user engagement with the map. The course will train students to compose interactive maps within the context of a coherent web page layout, including the development of supplementary content (such as text and metadata) to aid in visual storytelling.

**MAP 674 SPATIAL DATA ANALYSIS AND VISUALIZATION. (4)** This course introduces students to advanced techniques for the quantitative analysis and visualization of spatial data. Students will become familiar with a broad spectrum of data cleaning, transformation, analysis, and visualization techniques helpful for answering in-depth questions based on geospatial data. Students will learn how to prepare raw source data and subsequently apply both global and local spatial analysis techniques, resulting in advanced, interactive data visualizations.

**MAP 675 COLLABORATIVE GEOVISUALIZATION. (4)** This course enables students to build rich, user-centered web interfaces to promote the exploration and understanding of complex spatial datasets. Students will critically engage in a variety of data sources (e.g., public data repositories, crowdsourced or volunteered data) and design interactive cartographic solutions to more effectively visualize geographic information.

**MAP 701 HISTORY OF CRITICAL CARTOGRAPHY. (2)** This course outlines key moments and arguments in the history of cartography with particular attention to the advent of digital mapping and GIScience. Students will review and discuss the epistemological and ontological tensions within the field and practice a range of philosophical approaches to cartographic representation and spatial analysis.

**MAP 719 SOCIAL IMPACTS OF NEW MAPPING. (3)** This seminar introduces social and cultural issues that have emerged alongside the growth of digital mapping and location-based services. It reviews the evolving nature of digital divides, expert versus crowdsourced knowledge, surveillance, privacy and the

ethics of big geospatial data collection and use. Students will utilize these discussions of the social impacts of new mapping to challenge and contextualize their own mapping projects.

**MAP 698 FINAL PROJECT PREPARATION. (3)** This course enables students to design and prepare a web mapping workflow for a project of their own selection. This project is the masterwork for the Master of Digital Mapping degree. Students will determine a geographic problem mapping can address, identify user needs, review relevant literatures, take on ethical concerns and collect and prepare the data necessary for the project. Students will also propose strategies for data representation, user interface and online dissemination of the project. This course will culminate with a project design presentation and critique by peers and instructors.

**MAP 699 FINAL PROJECT IMPLEMENTATION. (3)** This course takes the project design developed in MAP 698 and produces a mapping project based on this outline. Students will conduct data analysis, iteratively review and improve the map user interface, produce written documentation on methods used and findings and engage in intense testing of the mapping solution with peers and targeted end users. At the end of the course, students will make a real-time online oral presentation and defense of the project for a committee of faculty members.

# English

## College of Arts & Sciences

The Department of English offers M.A. and Ph.D. programs. For the MA degree, students can choose either the thesis option, Plan A, or non-thesis option, Plan B. MA students can choose from concentrations in Literature and Film (which are only Plan A). Students will select from both British and American literature courses for their M.A. coursework. The final oral exam of Plan B students is based on a reading list. The final exam of Plan A students is a defense of the master's thesis.

For the PhD degree, students will select from a variety of literature courses. The qualifying examinations are comprised of a presentation prepared in response to questions submitted by the student's advisory committee, an oral exam, and a defense of the dissertation prospectus.

**Requirements**

- Oral examination based on two lists (major and minor) to be taken by the end of the first semester of the third year
- Directed Study with either director or core member during the first semester of the third year
- Dissertation prospectus to be completed during the second semester of the third year
- Dissertation prospectus defended in an oral examination by the end of the second semester of the third year

*The Lists:*
In consultation with the director and the two core members, the student decides on two areas:

1. Major - which will likely but not necessarily be a historical period (70 texts)
2. Minor - which will be either historical, special topic, or genre (30 texts)

For example, the student might focus on 19th century British literature along with a special topic such as gender studies or affect or postcolonial theory. The two lists will be assembled by the student in consultation with the committee members. While it is expected that most doctoral candidates will be examined in at least one major historical period, in certain circumstances a candidate may, with the approval of the doctoral committee, petition the Graduate Committee to take qualifying exams in a recognizable area other than a historical period.

*Qualifying exam/part 1:*
A week before the exam, students will be given 2 or 3 questions formulated by their director (in consultation with the core committee) from which students will choose one. They will then prepare a twenty-minute presentation for their exam. While the presentation should not be read, students may use Powerpoint. Students are advised to focus on roughly 6 central texts for the presentation. During the next forty minutes, the committee members discuss the presentation. Students should be prepared to reference in some detail other primary and secondary texts during the question period—roughly 20. Followed by a short break, the second hour turns to the whole list (including major and minor).

*Prospectus*
This should be from 12 to 15 pages with a (minimum) 3-page bibliography.

*Oral exam/part 2:*
By the end of the second semester of the third year, the student will be tested in an oral format for 2 hours on the dissertation prospectus.

*Committee members divide the responsibilities.*
The director oversees at least one of the lists, likely the major but possibly the minor instead, while a core committee member may oversee the other list, depending on area expertise. All three members should agree on the lists.

**Admission Requirements**
Admission is based on course grades, GRE scores, three letters of recommendation, a brief (1-2 pages) statement of purpose and an analytical writing sample, preferably a critical essay. While each applicant is judged on his or her merits, normal expectations are an undergraduate GPA of 3.0 or above, a graduate GPA of 3.5 or above, and scores of at least 70-80% on two of the three sections of the GRE Aptitude test. (The subject test is not required.) Applicants for the master's program who do not have an undergraduate degree in English should contact the Director of Graduate Studies who along with the Graduate Committee will evaluate their applications on a case by case basis. This is also the case for applicants to the doctoral program who do not have an M.A. in English. The English Department only has fall admissions, and the deadline for applications is January 15th.

All applicants must also fulfill the admission requirements of the Graduate School.
A detailed and current statement of requirements for the M.A. and Ph.D. is available here: https://english.as.uky.edu/english-graduate-program.

**Course Descriptions**
*ENG 507 ADVANCED WORKSHOP IN CREATIVE WRITING (Subtitle required). (3)
For the student who has shown marked talent and commitment, this course provides a rigorous workshop among peers and includes additional attention to outside reading. Each student will produce a chapbook of poems or stories. See departmental listings for different offerings per semester. Prereq: ENG 207 and ENG 407, or the equivalent, and consent of the instructor. May be repeated with a different subtitle (different or same genre) to a maximum of 6 credits. Required for the ENG Creative Option under two different subtitles. Provides ENG Major Elective credit and ENG minor credit.

ENG 509 COMPOSITION FOR TEACHERS. (3)
A course covering the basic studies helpful to teachers of English composition at the secondary level. Focuses on the teaching of grammar,
punctuation, usage, etc., and on theme planning, correction, and revision. Students are required to do quite a bit of writing. Provides ENG Major Elective credit and ENG minor credit. (Same as EDC 509.)

ENG 512 ANALYSIS OF ENGLISH SYNTAX. (3)
Contemporary approaches to the syntactic analysis of Modern English; particular attention is devoted to Chomskyan syntactic theory. Prereq: LIN 221 or graduate standing. (Same as LIN 512.)

ENG 513 TEACHING ENGLISH AS A SECOND LANGUAGE. (3)
The course examines the current theories and methods of teaching English as a second language.
The course will include (1) language learning theory as it relates to other disciplines; (2) methods and techniques of contrastive analysis. Prereq: One course in linguistics or consent of instructor. Provides ENG Major Elective credit and ENG minor credit.

ENG 518 ADVANCED HISTORY OF THE ENGLISH LANGUAGE. (3)
This course explores the development of English from its roots in Indo-European, through Old, Middle, and Early Modern English(es), culminating with a review of the English languages of today. It focuses on the phonological, grammatical, and lexical changes of the language, as well as on the social contexts of the rise and spread of English as a contemporary world language. Special emphasis is given to a linguistically

informed understanding of how the language has changed in response to political and historical pressures. Fulfills the ENG Early Period requirement. Provides ENG Major Elective Credit and ENG Minor credit. (Same as LIN 518.)

ENG 519 INTRODUCTION TO OLD ENGLISH. (3)
An introduction to the study of the Old English language and its literature from the 8th to the 11th centuries. Emphasis on learning the basic vocabulary and grammar of Old English in the West Saxon standard written dialect. Readings include excerpts from prose and poetry the basics of Old English verse forms and alliterative poetry, and some historical and cultural background. The course is particularly recommended for students of European languages (especially German) and Linguistics; some basic background in Linguistics is recommended but not required. Fulfills ENG major Early Period Requirement. Provides ENG Major Elective credit and ENG minor credit.

ENG 570 SELECTED TOPICS FOR ADVANCED STUDIES IN LITERATURE (Subtitle required). (3)
Study of special topics that cut across the normal divisions of genre or periods, such as the relations of literature to other disciplines; metaphor and symbolism; interpretative theory. May be repeated to a maximum of six credits. Prereq: Junior standing or consent of instructor. PROSEMINARS: The purpose of the proseminar courses (600 level) is to impart through lectures and discussion both the facts of literary history and the techniques of literary analysis. They are, therefore, designed to go beyond the mere information level to techniques of contemporary literary criticism and scholarship.

ENG 600 BIBLIOGRAPHY AND METHODS OF RESEARCH. (3)
An introduction to descriptive and enumerative bibliography, textual criticism, and historical scholarship.

ENG 601 ESSAYS AND CREATIVE NONFICTION. (3)
Study and practice in nonfiction writing, including literary nonfiction, literary journalism, personal essays, and creative nonfiction. May not be repeated for graduate credit. Prereq: Admission to the graduate program or consent of instructor.

ENG 605 EDITING. (3)
ENG 605 offers instruction in the history of U.S. publishing and extensive practice in verification of sources, fact checking, copy editing,nand manuscript preparation.

*ENG 607 GRADUATE WRITING WORKSHOP (Subtitle Required). (3)
A course for experienced writers who have some knowledge of contemporary American literature. Equal emphasis on students' original work and outside reading. Each student will produce a chapbook of poems or stories and write a short introduction to it. May be repeated with the same subtitle to a maximum of fifteen credits. Prereq: Consent of instructor.

ENG 608 CRAFT OF WRITING (Subtitle required). (3)
This course examines the craft, emphasizing techniques, style, and structure. May be offered in each genre offered in the MFA degree program. At least 6 hours of courses related to the study of creative writing genres, such as: Craft of Poetry, Fiction, or Nonfiction, with emphasis on themes such as: Ekphrastic Writing, Experimental Forms, Working Class Themes, etc. Prereq: This course is open only to MFA in Creative Writing candidates or by permission of the instructor.

ENG 609 COMPOSITION FOR TEACHERS. (3)
A course in the theory and practice of teaching English composition at the college level. Required of first-year teaching assistants in the Department of English, the course is structured to match the ordering of English 101 so that the practical work of college writing and the theoretical considerations of English 609

will be mutually reinforcing.

ENG 610 STUDIES IN RHETORIC. (3)
This course introduces theories of rhetoric with readings drawn from major theoreticians and rhetoricians; applies theory to the practice of teaching college writing, with special emphasis on argumentation, the subject of English 102; and provides an opportunity for teaching assistants to get help from the teacher and from their peers in responding to and evaluating students' written work. This course, required of second semester teaching assistants in the Department of English, continues the work of English 609. Prereq: ENG 609 or equivalent.

ENG 611 LITERATURE TEACHING SEMINAR. (3)
This seminar prepares graduate students to teach literature classes at the University of Kentucky and elsewhere. It offers instruction and guidance in curriculum design, syllabus creation, reading and work exercises, and more. Students develop a portfolio of course materials and refine skills for teaching literature and film at the introductory as well as advanced levels of an undergraduate curriculum. This course is not a requirement for completing the Ph.D. degree, but it is required for graduate instructors to be approved to teach their own introductory-level literature and film classes in the University of Kentucky English Department.

ENG 653 STUDIES IN AMERICAN LITERATURE SINCE 1900. (3)
A study in depth of selected writers and movements.

ENG 656 BLACK AMERICAN LITERATURE. (3)
An in-depth study of black American literature, with concentration on major texts by major black writers. (Same as AAS 656.)

ENG 660 MODERN CRITICAL THEORY (Subtitle required). (3)
Detailed examination of one or another topic in contemporary theory of interpretation, such as literature and analytical philosophy, phenomenology and literature, structuralism, Marxism, psychoanalysis. May be repeated up to 6 credit hours under different subtitles.

ENG 681 STUDIES IN FILM. (3)
Comprehensive study of the history, theory, and criticism of film, with concentration on a series of major American and foreign films. Viewing of films outside of class is required. May be repeated up to 9 credit hours under different subtitles.

ENG 682 STUDIES IN FICTION. (3)
A study in depth of selected types of fiction.

ENG 690 STUDIES IN LITERATURE AND GENDER (Subtitle required). (3)
This course focuses on gender as a primary category for literary analysis. Topics will vary, from a group of authors, an historical period or an aesthetic movement, to a genre, a theme, or an aspect of literary theory. May be repeated under different subtitles to a maximum of six credits.

ENG 691 READINGS IN RHETORIC (Subtitle required). (1)
This reading course allows graduate students to integrate readings in Rhetoric and Composition scholarship and provides an opportunity to discuss research with faculty associated with Rhetoric and Composition. In addition to readings, students will be expected to keep a reading journal or complete a brief annotated bibliography. May be repeated to a maximum of three credits. Prereq: ENG 609 and ENG 610 or consent of instructor.

ENG 700 TUTORIAL FOR PH.D. CANDIDATES. (3)
This course allows Ph.D. candidates who have completed all course work requirements to work together under the direction of a senior faculty member in preparing for and taking the Qualifying Examination. May be repeated to a maximum of twelve credits. Prereq: Admission to the Ph.D. program and instructor's consent.

ENG 720 SEMINAR IN MEDIEVAL LITERATURE. (3)
Recent topics: medieval fiction; Chaucer and the Gothic mind. May be repeated to a maximum of six credits.

ENG 722 SEMINAR IN RENAISSANCE STUDIES (Subtitle required). (3)
Advanced work on a specific author or topic. Recent topics: Eco-Milton, Romance narrative. May be repeated to a maximum of nine credits.

ENG 730 SEMINAR IN 18th CENTURY LITERATURE. (3)
Recent topics: neoclassic satire. May be repeated to a maximum of six credits.

ENG 735 SEMINAR IN ROMANTIC LITERATURE. (3)
Recent topics: Keats; Wordsworth. May be repeated to a maximum of six credits.

ENG 738 SEMINAR IN VICTORIAN LITERATURE. (3)
Seminar in Victorian literature. May be repeated to a maximum of six credits.

ENG 740 SEMINAR IN 20th CENTURY BRITISH LITERATURE. (3)
Seminar in 20th century British literature. May be repeated to a maximum of six credits.

ENG 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

ENG 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

ENG 750 SEMINAR IN COLONIAL LITERATURE. (3)
Seminar in Colonial Literature; may be repeated to a maximum of six credits.

ENG 751 SEMINAR IN AMERICAN LITERATURE: 1800-1860. (3)
Seminar in American literature 1800-1860. Recent topics: Emerson and Melville; Hawthorne. May be repeated to a maximum of six credits.

ENG 752 SEMINAR IN AMERICAN LITERATURE: 1860-1900. (3)
Seminar in American literature 1860-1900. Recent topics: Whitman and Dickinson. May be repeated to a maximum of six credits.

ENG 753 SEMINAR IN AMERICAN LITERATURE SINCE 1900. (3)
Seminar in American literature since 1900. Recent topics: Faulkner, Wolfe, and Warren. May be repeated to a maximum of six credits.

ENG 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

ENG 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

ENG 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

ENG 771 SEMINAR IN SPECIAL TOPICS (Subtitle required). (1-3)
Seminar in special topics; includes genres and subject matters such as symbolism which cover more than one period of literature. Recent topics: symbolism and allegory. May be repeated up to 9 credit hours under different subtitles.

ENG 780 DIRECTED STUDIES. (1-6)
Independent work devoted to study and research on specific subjects and problems according to the interests and needs of individual students. May be repeated to a maximum of nine credits. Permission of chairperson required.

ENG 781 SEMINAR IN FILM (Subtitle required). (3)
Seminar in special topics in film, such as directors, genres, historical periods, film and literature, film theories, and film movements. Viewing of films outside of class is required. May be repeated under different subtitle to a maximum of nine credits.

# French and Francophone Studies

## College of Arts & Sciences

The Department of Modern and Classical Languages, Literatures and Cultures offers a graduate program leading to the M.A. degree in French according to Plan B (non-thesis) only.

**Admission Requirements**
Applicants for admission must first be approved by the Graduate School. They are then reviewed by the Director of Graduate Studies in the Department of Modern and Classical Languages, Literatures and Cultures, who consults with the French graduate faculty before returning recommendations to the Graduate School.

An applicant may be provisionally admitted without meeting all of the minimum standards if other factors, including letters of recommendation, the writing sample, and the digital-format recording indicate an ability to perform satisfactorily in graduate-level work. Presentation of a minimum Graduate Record Examination score (GRE) or a minimum Grade Point Average (GPA) does not, however, automatically guarantee admission to the program, as the final decision depends on an evaluation of all materials submitted and the faculty's assessment of the applicant's potential for successful graduate study.

In addition to ensuring that the applicant has met the admission requirements of the Graduate School, the Department carefully evaluates the following materials:

1. Evidence of completion of the equivalent of the University of Kentucky's undergraduate major in French. Applicants who fail to meet this standard may be admitted provisionally to the Master's program, but may be required to take additional undergraduate work in French. Graduate credit will not be awarded for undergraduate courses, but graduate courses taken simultaneously count in the degree program.
2. A minimum 3.25 undergraduate GPA in French on a four-point scale.
3. A statement of purpose in seeking the M.A. in French.
4. A combined score of 1700-1800 or better on the three sections of the GRE. In special cases, a student without the GRE may be accepted provisionally for the first semester, during which the examination must be taken.
5. Three letters of recommendation addressing the applicant's qualifications for graduate work in French.
6. A writing sample in French by the applicant (analytical prose, typically a graded term paper; not a creative work).
7. Non-native speakers of French must submit a digital-format recording (3-4 minutes) of themselves reading a contemporary prose passage in French (a newspaper or magazine article, not a literary work).
8. Non-native speakers of English must submit a digital-format recording of themselves reading a similar passage in English. In addition, they must fulfill the Graduate School's Test of English as a Foreign Language (TOEFL) requirement.
9. Students in post-baccalaureate programs in French or other areas at the University of Kentucky who wish to transfer to the French Master's program will be evaluated also on their post-baccalaureate course work and on recommendations from their instructors, even though admission may be delayed until the end of the semester in which they are enrolled. A maximum of six hours in post- baccalaureate course work may be transferred to the Master's program.

All application materials should be uploaded directly to the UK Graduate School's Apply Yourself program

on the application website (https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=ukgrad).

For admission in the fall semester with a Teaching Assistantship award, all materials should be received by the Department no later than February 1.

**Degree Requirements**
Students select a program from a variety of courses listed below in French literature, language, culture, and literature and the arts. Students need to take a total of ten 3-credit hour classes to complete the course requirements for the MA degree.The master's examination for each candidate is prepared and evaluated by a committee of three members of the French graduate faculty which will consider the candidate's course program in preparing the examination.

Candidates must also demonstrate a reading knowledge of another foreign language. The M.A. examination is administered in November and April. Applications for the examination should be made to the Director of Graduate Studies no later than four months prior to the date of examination. For further information concerning the M.A. program in French, consult the Director of Graduate Studies.
All courses listed below are offered on a rotating basis and not less frequently than every eighth semester

**Course Descriptions**

FR 502 INTRODUCTION TO CRITICAL AND CULTURAL THEORY: THE FRENCH CONNECTION. (3)
Introduces upper-level undergraduate and beginning graduate students to the principles of critical and cultural theory. Explores topics of language, textuality, writing, subjectivity, culture, gender, everyday life, and power through the work of primarily, but not exclusively, French thinkers such as Saussure, Barthes, Fanon, Foucault, Derrida, Lyotard, Kristeva, Baudrillard, de Certeau. Taught in English with no knowledge of French necessary.

FR 504 TOPICS IN FRENCH LITERATURE AND CULTURE (Subtitle required). (3)
Intensive study of an author, genre, period or movement of French literature or an aspect of French culture. May be repeated to a maximum
of nine credits under a different subtitle.

FR 510 LINGUISTIC STRUCTURE OF MODERN FRENCH. (3)
An introduction to the basic phonological, syntactic and semantic categories and processes of contemporary French as studied in the light of current linguistic theory and practice. Prereq: FR 306 or equivalent.

FR 550 FRANCE TODAY. (3)
A contrast between contemporary France in today's Europe and the historical image of France. The impact of the "New Quiet French Revolution" and of the new institutions on French Society. Conducted in French. Prereq: FR 306 and consent of instructor.

FR 553 TEACHING OF FRENCH. (3)
The course is designed for teachers and prospective teachers of modern foreign languages, with emphasis on French. Modern methodology, theory and practice of language pedagogy. Prereq: Permission of instructor required.

FR 570 SEMINAR IN FRENCH LANGUAGE PEDAGOGY. (1)
A general seminar in a broad range of subjects in the area of French language pedagogy. May be repeated to a maximum of two credits. Prereq: Graduate student standing in French or consent of instructor.

FR 606 LITERATURE OF THE MIDDLE AGES (Subtitle required). (3)
Special topics in French literature from the period 1050-1500. May be repeated to a maximum of six credits. Prereq: Consent of instructor.

FR 607 STUDIES IN RENAISSANCE LITERATURE (Subtitle required). (3)
Comprehensive study of selected writers. May be repeated under a different subtitle to a maximum of six credits. Prereq: Consent of instructor.

FR 609 SEVENTEENTH-CENTURY STUDIES (Subtitle required). (3)
Study of selected French writers, literary, intellectual and cultural practices of the time. May be repeated to a maximum of six credits under different subtitle. Prereq: Consent of instructor.

FR 612 STRUCTURE AND STYLISTICS OF FRENCH. (3)
A study of the history and structure of French with an emphasis on contemporary features. (Same as ENG/LIN 612.)

FR 617 EIGHTEENTH-CENTURY STUDIES (Subtitle required). (3)
Literary, intellectual and social practices and theories of the French Enlightenment. May be repeated to a maximum of six credits under different subtitle. Prereq: Consent of instructor.

FR 619 NINETEENTH-CENTURY STUDIES (Subtitle required). (3)
Study of the intellectual, literary and social practices and theories of the major movements of the century, including Romanticism, Realism, and Symbolism. May be repeated to a maximum of six credits under different subtitle. Prereq: Consent of instructor.

FR 621 TWENTIETH-CENTURY STUDIES (Subtitle required). (3)
Study of the practices and theories of the major intellectual, literary and social movements of the century, such as modernism, existentialism, the new novel, post structural and postmodern writing. May be repeated to a maximum of six credits under different subtitle. Prereq:Consent of instructor.

FR 630 FRENCH LANGUAGE, LITERATURE AND CULTURE OUTSIDE FRANCE (Subtitle required). (3)
Study of Francophone writing, currents of thought, and cross-cultural movements in Africa, the Caribbean, Quebec and elsewhere. May be repeated to a maximum of six credits under different subtitle. Prereq: Consent of instructor.

FR 768 RESIDENCE CREDIT FOR MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

FR 780 SPECIAL STUDIES IN FRENCH. (3)
Selected studies and investigations in the French language and literature, permitting the student to work in areas of special interest, and providing opportunity for original endeavor. May be repeated to a maximum of six hours. Prereq: Consent of instructor.

# Gender & Women's Studies

## College of Arts & Sciences

The Department of Gender and Women's Studies offers Ph.D., M.A. and Graduate Certificate degree programs. Students are accepted only into the Ph.D. and Graduate Certificate programs. All degree programs share a core curriculum of courses. Information about the specific requirements for each degree is available on the Department of Gender and Women's Studies website http://gws.as.uky.edu/.

Applicants for the Ph.D. degree program may be accepted from any undergraduate degree field. Applicants will be accepted into the program with or without an M.A. or equivalent advanced degree. For students without an M.A., the degree will be earned as part of their Ph.D. program.

The Ph.D. program includes required coursework and specialized coursework. The purposes of the required coursework are (1) to familiarize students with fundamental concepts, theories and frameworks for scholarly feminist inquiry, and (2) to familiarize students with different approaches to inquiry and research in gender and women's studies.

The Ph.D. program allows students to establish mentoring relationships with the faculty and their advisory committee members. The advisory committee will assist students in designing a specific program of study to prepare the student for their qualifying exams and to write their dissertation within an area of study.

The Graduate Certificate program is a 12 hour curriculum that students take as a complement to a graduate disciplinary degree program or as a stand-alone curriculum. The aim of the Graduate Certificate curriculum is to provide a coherent, graduate-level interdisciplinary grounding in Gender and Women's Studies scholarship and to create an intellectual community among faculty and graduate students who share a scholarly interest in Gender and Women's Studies.

The M.A. program is connected to the Ph.D. program and does not admit students for M.A. study only.

**Course Descriptions**

GWS 506 HISTORY OF SEXUALITY IN THE U.S. (3)
An overview of the history of beliefs about sexuality, sexual cultures and norms, and sexuality's relationship to power in American society from the colonial period to the present.

GWS 595 ISSUES IN GENDER AND WOMEN'S STUDIES (Subtitle required). (3)
Discussion, readings, and papers focusing on relevant topics in Women's Studies directed by a faculty member with expertise in the topic under study. Courses will be interdisciplinary, although they will also include materials from particular relevant disciplines. May be repeated under different subtitles to a maximum of six credits. Prereq: GWS 200 or GWS 201 or permission of instructor.

GWS 599 SENIOR SEMINAR (Subtitle required). (3)
This course provides a space for students to synthesize what they have learned about the methods and theories of GWS in a few different ways. Students will reflect on the ways in which one puts together an argument and writes as an interdisciplinary scholar on gender or women. Students will do this by writing a senior thesis and editing the theses of other students, and reading and discussing some materials which deal with research and writing in GWS. This course is a Graduation Composition and Communication

Requirement (GCCR) course in certain programs, and hence is not likely to be eligible for automatic transfer credit to UK. Prereq: GWS 400 or permission of instructor.

GWS 600 TOPICS IN GENDER AND WOMEN'S STUDIES (Subtitle required). (3)
Selected topics of theoretical or substantive interest in women's studies with special attention to topics of contemporary relevance. May be repeated to a maximum of nine credits under a different subtitle. Prereq: Graduate standing or permission of instructor.

GWS 610 WOMEN AND "MADNESS". (3)
This course explores the social construction of mental illness as it pertains to gender. We will consult narratives from different disciplines: Literature, Psychology, Cultural Studies, Anthropology, History and Feminist Theory. Our focus will concern the ways in which all women are constructed as "sick" as well as the perspectives of women who feel a sense of psychic dislocation and disability in their lives. Readings by women of color and lesbians will suggest the particular ways culture defines such women as "abnormal."

GWS 616 COLONIALISM/POST-COLONIALISM AND GENDER. (3)
This course is designed to expose students to a range of theories and debates centering on or pertinent to women, gender, and sexuality in the field of postcolonial studies. Here, the field is understood in its widest and most interdisciplinary sense, inclusive of studies of Empire, the independent so-called "Third World", and diasporas. Topics for study will include classical texts in the field, current postcolonial readings on gender and sexuality in empire, representation, trans/nationalism, and diasporas. Course credit may be used to help satisfy the international component of the Women's Studies Graduate Certificate requirements.

GWS 620 COMPARATIVE CONSTRUCTIONS OF GENDER AND SEXUALITY. (3)
This course is designed to give students an understanding of an array of diversely situated theories and debates about gender and sexuality mainly outside of mainstream U.S. culture. Countries/communities of focus will vary.

GWS 630 SEMINAR IN FEMINIST RESEARCH METHODS. (3)
This course presents a variety of research methods used by Gender and Women's Studies scholars. The course examines how research has been conducted in a range of fields within Gender and Women's Studies, presents basic skills, commonly used methods, ethical issues, and social applications.

GWS 640 HISTORY OF FEMINIST THOUGHT AND ACTION (Subtitle required). (3)
Course provides a historically organized, thematically focused examination of pioneering works of feminist argument and analysis, creative writing, art, memoir, and politics. Theme and time-period vary according to instructor, but time-span covers at least fifty years and content includes at least two national, ethnic, or geographical contexts. May be taken up to six credit hours under different subtitles.

GWS 650 FEMINIST THEORY. (3)
An interdisciplinary course addressing issues in contemporary feminist theory (such as intersections of race and gender, the body, ideology and representation, sexuality, etc.).

GWS 675 ADVANCED FEMINIST THEORY. (3)
An advanced topics course in feminist theory. Prereq: Permission of instructor.

GWS 690 GRADUATE RESEARCH IN GENDER AND WOMEN'S STUDIES. (3)
The purpose of this course is to provide graduate students the opportunity to engage in independent faculty-directed research in Women's Studies. Prereq: Written agreement of a Women's Studies Affiliated

Faculty Member, who will direct the study.

GWS 700 TOPICAL SEMINAR IN GENDER AND WOMEN'S STUDIES (Subtitle required). (3)
Intensive work in particular topics in Gender and Women's Studies. May be repeated four times with different subtitles. Prereq: Graduate standing in GWS, or consent of instructor.

GWS 710 LATIN AMERICAN AND U.S. LATINA WOMEN'S LIVES. (3)
This course employs an interdisciplinary perspective to critically examine the various identities and spaces created by, and imposed on, women in Latin America and Latinas in the U.S. We explore connections and divergences within and between these two groups of women, but begin by examining how the legacies of conquest in Latin America and the U.S. have shaped women's experiences in the past. This background will also help us understand how women's experiences have differed given the specific contexts in which their lives unravel.

GWS 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

GWS 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended. Prereq: Successful completion of the qualifying examination.

GWS 775 DOMESTIC VIOLENCE ACROSS CULTURES. (3)
This course focuses on domestic violence cross-culturally and from an interdisciplinary perspective. We discuss theories of domestic violence and how research and popular representations influence ideas regarding this phenomenon. We draw on specific experiences of intimate partner violence in different parts of Latin America, North America, Africa, Asia, and Europe. Topics include the impact of migration on women's experiences of violence, state responses and law enforcement, women's use of violence, the role of in-laws in women's experiences of violence, and women's resistance.

# Geography

## College of Arts & Sciences

The Department of Geography offers both M.A. and Ph.D. programs. Emphasis is placed on theoretical and conceptual training in the student's chosen field of interest. A variety of philosophical and methodological approaches are encouraged. The primary objective of the graduate program is to prepare students for research-oriented careers in universities, government, and industry. Emphasis in graduate seminars is on developing the background and skills necessary for original contributions to geographic knowledge. The Department is known for high quality research and graduate education in human and physical geography. In accordance with our strategic plan, and funded in part through our RCTF designation, we have also recently focused, on building a research cluster in Earth Surface Systems as well as a program in critical cartography/GIS., Program strengths include close faculty/student interaction, flexibility in designing an appropriate plan of study, and research training in seminar environments. Emphasis at both the M.A. and Ph.D. levels is placed on theoretical and methodological training and is closely integrated with both breadth and depth in substantive literatures. Student research also is empirically rich, with data regularly acquired through off-campus fieldwork. Members of the faculty are committed to assisting students in disseminating their research through publications in professional journals and presentations at conferences, and in obtaining external funding. Graduate students also gain valuable experience as instructors in undergraduate courses. Rounding out graduate students' experiences is their active participation in departmental governance and service on departmental committees.

Faculty and student research in the Department focuses on interrelated thematic clusters. Research seminars are organized around topics relevant to these clusters. The thematic content of seminars varies in accordance with the current interests of graduate students and faculty. The research clusters we presently feature are:

- Cultural and Social Geographies: Interpretation and analysis of cultural landscapes and the built environment; space and representation; the political economy of landscape production; racialized landscapes; historical geographies of settlement; questions of space and power relating to race, class, gender and their intersection; historic preservation; US roadscapes; regional imagery; popular culture; community, identity and belonging; diasporic identities; Islamic/Muslim cultural practices in the Middle East, Europe, and the United States; health care, disease, and society; the geography of aging and the life course; poverty and social policy; human behavior in space and time; spatial structure of social networks.
- Critical Mapping and GIS: Social implications of geospatial technologies; critical GIS/cartography; histories of cartography and GIS; public participation GIS, and community-based GIS; volunteered geographic information and neogeographies; mapping 2.0 and the geoweb; spatialities of user-generated content; geographies of the Internet; digital/spatial humanities. Much research in this area is organized through the New Mappings Collaboratory.
- Development Studies: Policies and practices of development; political economy perspectives on development; anti-development and postcolonial theory; household survival strategies; environmental management and sustainable development.
- Economic Geography: The political economy of urban and regional economic change; globalization, and in particular global finance: information and telecommunications, especially the economic geography of the internet; resource extractive industries; uneven development and spatial inequalities; multinational corporations, foreign direct investment, global production and commodity chains; economic clusters; alternative economies (including Islamic banking); the geography of labor

and employment; labor migration and migrant labor; theorizing the social character of economic phenomena.

- Political Ecology: On the human geography side: critical theories of nature, complexity and resilience; sustainability, the politics of environmental management and conservation policy; mega-engineering projects; environment and resource extraction; human-nonhuman relations; trade, markets, and environment; fair trade networks. Physical geographic approaches address issues related to: human influences on fluvial and soil geomorphic processes, weathering, and biogeographic patterns; bioclimatology and human climate change; urban weather modification; hydrology; earth surface systems modeling; remote sensing and geospatial applications.
- Geomorphology: Fluvial geomorphology, surface hydrology, and river science; soil geomorphology and pedology; rock weathering; cultural geomorphology; fluvial-karst interactions; applied geomorphology; stone conservation and preservation; complexity and nonlinearity in geosciences; coastal geomorphology and ecology (particularly in dunes and salt marshes); spatial variability of soils and landforms; landscape evolution.
- Biogeomorphology: Reciprocal interactions between geomorphological and biological processes; coevolution of ecosystems, soils, and landforms; soils and landforms as extended composite phenotypes and products of ecological engineering; biological weathering; bioturbation; vegetation-landform interactions in salt marshes and coastal dunes; fluvial biogeomorphology; forest biogeomorphology.
- Biogeography and Landscape Ecology: Bioclimatology; ecosystem responses to climate and environmental change; evolutionary theory; landscape phenology; species distribution modeling; ecological engineering and niche construction; quantitative landscape ecology; biophysical remote sensing; disturbance; coastal and forest ecosystems; scale and scaling theory.
- Political Geography: Questions of states, territory, and law; citizenship, faith and belonging; migration and immigration; transnationalism; post-colonial and imperial geographies; Islamist politics; feminist geopolitics; political economy of environmental movements; political economy of globalization discourses and practices; the surveillant state; geographical intelligence; urban governance; the politics of urban and regional development.
- Social Theory: Theories of human spatiality; marxist, neo-marxist, and post-marxist theory; postmodernism and poststructuralism; social ontology; practice theory; continental philosophy, feminist theory; queer theory; identity theory; race theory; geographic thought and society; geography and psychoanalysis; science and technology studies; topology; posthumanism.
- Urban Geography: The local politics of urban development; urban social fragmentation; the politics of sprawl and urban planning; urban property markets; citizenship and public space; urban space and identities relating to 'race', gender, class, and migrants and immigrants; urban historical geography; urban landscapes; racialized landscapes; historical preservation labor migration; informal employment; urban economic development.

Faculty members have regional expertise in South and Southeast Asia, Japan, the Himalayas, Mexico, the Caribbean, Central and Eastern Europe, the Middle East (particularly Turkey), the Central Asian republics, Western Europe, Canada. East Africa (Tanzania), and the U.S. (particularly the Southeast).

In addition, students have access to faculty with expertise in a variety of methodological areas including field methods; qualitative research methodologies (such as interviews; focus groups; critical ethnography; experiential methods; textual and visual methods and deconstruction) quantitative methods (especially multivariate statistics, spatial statistics, and simulation modelling; as well as GIS and remote sensing methods (such as LIDAR, participatory GIS; digital image processing; and crowd-sourced data collection).

**Admission Requirements**

In addition to the basic graduate school requirements (see the Graduate School for application procedures), the following materials should be sent by e-mail to the Department of Geography (details of

the application procedure can be found on our Departmental website):

- Three letters of reference from persons who can evaluate your potential for success in our graduate program
- Statement of your goals and objectives in which you discuss your areas of scholarly interest, any research directions you may wish to pursue, and how your interests and goals fit with the University of Kentucky's graduate program in Geography (about two pages, double-spaced)
- A curriculum vitae (if available)
- 1 official or unofficial copy of all transcripts from prior universities or other institutions

Once all these materials have arrived in the Department of Geography, the application is reviewed by the faculty members on the Department's Graduate Committee. The committee's evaluation does not place emphasis on any one element of the application rather the combination of elements must convince the Graduate Committee members that the applicant has great potential for success in our program.

The Department welcomes students with undergraduate concentrations in related fields. In some cases students without an academic background in Geography may be required to complete additional course work so as to gain appropriate foundational knowledge.

There is no official deadline for applications. However, applicants are encouraged to submit all application material before January 15th to ensure consideration for admission for the following fall semester. Admission decisions are made on a rolling basis, but decisions about financial aid usually take place in March and April.

**Degree Requirements**

Applicants for the Ph.D. in geography must conform to the general requirements of the Graduate School as set forth in the first part of this Bulletin. Requirements in the Ph.D. program consist of 1) core courses (GEO 600, 705 or other advanced methods course, 702) in the theory and methodology of geography; 2) seminars, independent study and directed research in one of the research foci noted above or in cognate disciplines; 4) a written and oral qualifying examination in theory, methodology, and the student's selected topical focus; and 5) a dissertation based on original research. A program designed to meet the professional academic goals of each doctoral candidate is outlined in consultation with the Director of Graduate Studies and the candidate's Advisory Committee.

Applicants for the M.A. degree in geography follow a broadly based program which consists of: 1) required courses (GEO 600 and 702); 2) elective courses in geography and cognate disciplines according to the student's academic goals and career objectives; and 3) the completion of a master's thesis (Plan A). The non-thesis Ph.D.-preparatory program (Plan B) consists of: 1) required courses (GEO 600, 700 or other advanced methods course, 702); 2) elective courses in geography and cognate disciplines according to the student's academic goals and career objectives; 3) a written examination; 4) a publication-quality research paper; and 5) an oral examination. The Plan A option requires 24 credit hours, the Plan B, 30 credit hours.

## Course Descriptions

GEO 505 PRACTICUM IN CARTOGRAPHY. (3)
Experience credit in which a small number of advanced students work under the direct supervision of the faculty or staff cartographer and in conjunction with other faculty members on departmental and contracted projects. May be repeated to a maximum of six hours. Prereq: GEO 305 and GEO 506 and consent of instructor.

GEO 506 INTRODUCTION TO COMPUTER CARTOGRAPHY. (3)
A basic introduction to computer-assisted cartography. Emphasis on basic computer graphics literacy and automated techniques for spatial data acquisition, storage, processing, and output. Introduction to current mainframe, workstation, and desktop mapping programs. Prereq: GEO 305 or permission of instructor.

GEO 509 WORKSHOP IN GEOSPATIAL TECHNOLOGIES. (3)
This course focuses on the development of applied GIS skills and follows a participatory workshop model with intensive, hands-on collaboration with community partners. The course covers a full range of collaborative GIS: working with team members and project partners to identify project goals, acquiring and preparing spatial data for GIS analyses, communicating with clients to assess progress, managing spatial data, and producing necessary maps and analyses. Prereq: GEO 309 or GEO 609 or consent of instructor.

GEO 530 BIOGEOGRAPHY AND CONSERVATION. (3)
An introduction to the geographic patterning of biological diversity, exploring its origins, dynamics, and present trends. Examines the interplay among physical conditions, ecological interactions, evolutionary processes, and the historical movements of organisms and land masses as they have combined to affect the distribution of species, with particular attention to the application of biogeographic knowledge to current problems of species loss and conservation. Prereq: Two semesters of introductory biology or physical geography, or consent of the instructor. (Same as BIO 530.)

GEO 531 LANDSCAPE ECOLOGY. (3)
This course explores the field of landscape ecology – the causes, development, importance of ecological processes, and the interactions of dynamic processes over broad spatial scales that can serve as foundation for decision-making and problem solving. Prereq: Six hours of physical geography or biology.

GEO 544 HUMAN POPULATION DYNAMICS. (3)
The study of human population distributions, densities, and growth patterns through analyses of the processes of fertility, mortality and mobility. Topical coverage includes the environmental, social, political, economic, and behavioral impacts on personal action and population change. Emphasis is placed on historic and contemporary meanings and influences of population diversity, with special attention given to issues of gender, race, and class.

GEO 546 TOURISM AND RECREATION GEOGRAPHY. (3)
Tourism is the world's fastest-growing economic sector, creating and transforming places, regions and broader geographies of travel, movement, and investment. The course will examine concepts, models, and theories in the study of tourism and recreation. Selected themes include major travel flows and patterns; economic, environmental, and socio-cultural impacts; mass vs. "new" (e.g., eco-tourism, adventure tourism, extreme tourism) types of tourism; heritage tourism; marketing; place boosterism; tourism and recreation planning; and the politics of tourism. Local, national, and international examples in both developed and developing countries are discussed. Prereq: GEO 152, 172,455, or consent of instructor.

GEO 550 SUSTAINABLE RESOURCE DEVELOPMENT AND ENVIRONMENTAL MANAGEMENT. (3)
A study of the theories and strategies for environmental management and sustainable development of resources. Topics covered include contemporary environmental degradation and resource use problems, political economy of resource use and environmental change, design and management of sustainable resource development, impact of sustainable development on gender issues and poverty, and environmental accounting. Prereq: GEO 130 or GEO 210 or consent of instructor.

GEO 551 JAPANESE MULTINATIONAL CORPORATIONS. (3)
A study of the giant Japanese multinational corporations in the world economy and their impact on development and environment of selected countries. Topics include: geographical organization of multinational corporate system; their locational decisions; affect of multinationals policies on the environment; and local economy. Prereq: Consent of instructor. (Same as JPN 551.)

GEO 560 INDEPENDENT WORK IN GEOGRAPHY. (3)
Individualized study and/or research intended to provide opportunities for students to explore topics in more depth than is offered in existing courses, or to address topics not covered in existing courses. Students work with a faculty supervisor in defining a specific area of study, appropriate learning objectives, and suitable evaluation criteria. Course format may range from critical reading of selected literatures to innovative research projects. Students should identify and consult with faculty supervisor well in advance of registration for this course. Prereq: Restricted to Geography majors with GPA of 3.0 or above in the department.

GEO 565 TOPICS IN GEOGRAPHY. (3)
Discussion, readings, and papers focusing on relevant topics in geography directed by a staff member having specific competence for the topics under study. Current research developments in particular geographic subfields will be stressed. May be repeated under different subtitles to a maximum of six credits. Prereq: Consent of instructor.

GEO 570 LANDSCAPE ECOLOGY FOR NATURAL RESOURCES. (3)
Principles of landscape ecology and their applications to contemporary ecological issues. Students will learn and apply the tool of geographic information system (GIS) and spatial analysis to problems in natural resource ecology, management, and conservation. Course covers the following topics: principles of landscape ecology (e.g., patch, mosaic, and scale), quantification of landscape patterns, formation and dynamics of landscape patterns, role of disturbance, landscape models and their application

GEO 707 DEVELOPMENT OF GEOGRAPHIC THOUGHT. (3)
An analytical review of the evolution of geographic thought, in terms of concepts, methodologies and scholars, emphasizing the basic literature through a series of topics.

GEO 708 GEOGRAPHIC INFORMATION SYSTEMS RESEARCH METHODOLOGIES. (3)
Following a brief overview of GIS, remote sensing, GPS, and other relevant information technologies as information collection, presentation, and analytical aids, this course will consider current developments of geographic information technologies. These include, but are not limited to, field GIS, public participation GIS, participatory information technology, collaborative environments, and spatial decision-making. Discussion of these developments will be complemented by a rigorous examination of theoretical and methodological issues. Prereq: GEO 409G or its equivalent, or consent of instructor.

GEO 709 ADVANCED GISCIENCE. (3)
This course explores advanced applications and topics within GIScience including data mining, scripting, point pattern analysis, data

interpolation, geospatial modeling and network analysis and the methodological, epistemological and ontological issues with the classification requirements and analytical capabilities of GIScience. Prereq: GEO 609 or consent of instructor.

GEO 711 CULTURAL STUDIES AND GEOGRAPHY (Subtitle required). (3)
Seminar in cultural studies and geography, including, for example, interpretation and analysis of the built environment; space and representation; the political economy of landscape production; regional imagery; media studies; popular culture; the social construction of community; historic preservation; recreation, tourism and society. May be repeated to a maximum of nine credits under different subtitles.

GEO 712 DEVELOPMENT STUDIES AND GEOGRAPHY (Subtitle required). (3)
Seminar in selected topics in the policies, practices, and processes of development, including, for example, political economy perspectives on development; anti-development and postcolonial theory; economic restructuring and transition economies; gender and development; the relations between development and migration, transportation and tourism; environmental management and sustainable development.
May be repeated to a maximum of nine credits under different subtitles.

GEO 713 ECONOMIC GEOGRAPHY: (Subtitle required). (3)
A seminar in economic geography, including, for example, global, regional, and local economic restructuring, global financial systems; foreign direct investment and trade; geography of multinational corporations; geography of labor; spaces of production and spaces of consumption; gender and economic space; space-time convergence; information and communications. May be repeated to a maximum of nine credits under different subtitles.

GEO 714 POLITICAL GEOGRAPHY: (Subtitle required). (3)
A seminar in political geography, including, for example, electoral systems; state theory; post-Cold War democratization; the geography of revolutionary change; critical geopolitics; political economy of environmental movements; political economy of globalization discourses and practices. May be repeated to a maximum of nine credits under different subtitles.

GEO 715 GEOGRAPHY AND SOCIAL THEORY (Subtitle required). (3)
Seminar in geography and social theory, including, for example, theories of human spatiality; marxist, neo-marxist, and post-marxist theory; postmodernism and poststructuralism; feminist theory; actor network theory; identity theory; geographic thought and society; technology and society. May be repeated to a maximum of nine credits under different subtitles.

GEO 717 URBAN GEOGRAPHY (Subtitle required). (3)
Seminar in urban geography, including, for example, urban morphology; urban systems; the local state; urban social fragmentation; conflicts over urban growth and development; urban transportation planning; urban historical geography; gender and urban space; race and urban space; urban landscapes. May be repeated to a maximum of nine credits under different subtitles. Prereq:Consent of instructor.

GEO 718 TOPICAL SEMINAR IN GEOGRAPHY OF ENVIRONMENT AND RESOURCES (Subtitle required). (3)
Study of selected topics on agriculture resource allocation, resource conflict, public land policy, natural hazards, environmental management, energy and biogeography. May be repeated to a maximum of nine credits under different subtitles. Prereq: Consent of instructor.

GEO 719 GEOSPATIAL TECHNOLOGIES (Subtitle required). (3)
A seminar in the social construction of geospatial technologies and the implications of their use. Topics

may include crowd-sourcing, privacy and surveillance, open source software, code/space, censorship and control, copyright and locative media usage. May be repeated to a maximum of nine credits under different subtitles.

GEO 721 TOPICAL SEMINAR IN PHYSICAL GEOGRAPHY (Subtitle required). (3)
Examination of selected topics in geomorphology, hydrology, pedology, biogeography, climatology, and earth system science. May be repeated to a maximum of nine credits under different subtitles. Prereq: Consent of instructor.

GEO 722 SOCIAL GEOGRAPHY (Subtitle required). (3)
Seminar in social geography, including, for example, race and gender, feminist geography, health care, disease and society; the geography of AIDS; the geography of aging and the life course; poverty and social policy; human behavior in space and time; population and migration studies; spatial structure of social networks; transportation of disadvantaged groups. May be repeated to a maximum of nine credits under different subtitles. Prereq: Consent of instructor.

GEO 731 EARTH SURFACE SYSTEMS. (3)
A treatment of earth surface systems from the perspective of complex systems theory. The course takes a holistic viewpoint, emphasizing interactions between the atmo-, litho-, hydro-, and biospheres and the manifestations of those signatures in soils, landforms, and ecosystems. Prereq: Consent of instructor.

GEO 740 RESEARCH INTERNSHIP (Subtitle required). (1-6)
To provide students with course credit for faculty supervised internships with governmental and non-governmental organizations. May be repeated to a maximum of nine credits.

GEO 741 TEACHING PRACTICUM. (1)
Introduction to teaching, with particular focus on pedagogical issues in geography courses. Intended to provide students with background sufficient to enable them to assume full responsibility for university and college level courses.

GEO 742 PREPARING FUTURE FACULTY IN GEOGRAPHY. (1)
Introduction to the professoriate, with particular focus on geography within the academy. Intended to provide students with background sufficient to assume responsibility as new faculty members in universities and colleges.

GEO 743 RESEARCH PROPOSALS AND GRANT WRITING. (1)
Introduction to basic geographic research proposal design standards, with particular emphasis on the requirements of granting agencies.

GEO 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

GEO 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

GEO 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the

qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

GEO 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

GEO 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

GEO 772 SPECIAL RESEARCH PROBLEMS IN GEOGRAPHY. (1-6)
Open to doctoral candidates who have the necessary training and ability to conduct research on a selected problem. May be repeated to a maximum of 12 credits. Prereq: Approval of the director of graduate studies.

# Geological Sciences

## College of Arts & Sciences

The Department of Earth and Environmental Sciences offers graduate studies leading to the M.S. and Ph.D. degrees in Geology. Students with degrees in geology, any other natural science, or engineering are invited to apply.

Admission to pursue an M.S. or Ph.D. degree requires a bachelor's degree, a minimum grade point average of 2.75, three letters of reference and results from the verbal, quantitative, and analytical Graduate Record Examination (GRE). TOEFL scores are required for international applicants. For more details, please consult Admissions Information and Assistantships and Fellowships.
Research within the Department of Earth and Environmental Sciences is funded by grants and contracts from NSF, DOE, PRF, and other federal, state, and industrial sources. Areas of graduate research are in fields covered by regular and adjunct faculty, including coal geology, hydrogeology, stratigraphy, petrology, geophysics, and tectonics.

**Admission Requirements**
Admission criteria include GPA, GRE scores, prior course work, letters of reference, previous experience, and match with faculty research interests. This program requires an undergraduate GPA of at least 3.0 on all undergraduate and graduate work.  For international applicants, we require that applicants rank in the top 25% of their graduating classes.

GRE must be taken, but there is no minimum score. Applicants who score at least 75th percentile on one category of the GRE and who have (a) an overall undergraduate GPA of 3.30, (b) a GPA of 3.60 for the last 60 credit hours of undergraduate work, or (c) a GPA of 3.80 for a completed master's degree (in each case from a US institution) are eligible for a Pirtle Fellowship, which provides $3,000 in summer salary.
Most applicants have a "standard" geology background, but strong students with backgrounds in the sciences and engineering are also admitted. Spoken English proficiency is important because many of our graduate students are employed as teaching assistants (in particular, as laboratory instructors).  For international applicants, the Graduate School requires a minimum score of 550 on the TOEFL (213 on the computerized version; 79 on the internet-based version) or 6.5 on the IELTS. We typically only consider admission to the PhD program after completion of a master's degree either here at UK or at another US or European institution. Students who are deficient in one or more respects may be admitted provi¬sionally or as non-degree students by action of the Graduate Committee. Your chances of admission are better if you've identified faculty members with whom you might work. We recommend you consult our faculty research specialties at https://ees.as.uky.edu/faculty and directly contact faculty in your areas of interest. All application materials should be uploaded directly to the UK Graduate School's Apply Yourself program on the application website (https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=ukgrad).

**Degree Requirements**
The Doctor of Philosophy in Geological Sciences requires candidates complete at least 42 hours of graduate course work, including that taken for a master's degree (which counts for 18hours). Ph.D. students must take 3 credits of EES 695-001 (Scientific Communication), unless they have already completed these requirements as a student in the M.S. program. The normal full-time load is 3 courses (usually 9-10 credits) each semester, and no more than 12 credits per semester should be taken. Individual Work in Geology (EES782) and Research in Geological Sciences (EES790) will include data collection (field, laboratory, and/

or library) and must not duplicate dissertation research. A research plan must be approved by a faculty member, who will direct the research, as well as the DGS. The faculty member who directed the research will provide a final evaluation of the project. The evaluation will be conveyed to the DGS.

The Master of Science in Geological Sciences (Plan A) requires the completion of graduate course work and a thesis. The student must complete at least 24 credit hours of graduate course work. The normal graduate load is 9-10 credits during each of the first two semesters, and no more than 12 credits is advised. Graduate courses are those in the 500, 600, or 700 series, or in the 400G series if outside the Department of Earth and Environmental Sciences. At least 16 credits must be in EES course work, including 3 credits of Scientific Communication (EES 695-001). At least 12 credits must be in the 600 or 700 series, and at least 9 of the 600- or 700-level credits must be in EES courses. At least 16 hours must be regular (non-research) courses. Full-time students who are enrolled in at least 3 hours but less than 9 hours of coursework, which is typical in the third semester of the M.S. program, should register for EES768 (Residence Credit for the Master's Degree) to reach 9 hours total.

## Graduate Courses

| | |
|---|---|
| EES 530 | Low Temperature Geochem |
| EES 645 | Tops In Petrology and Geochemistry |
| EES 741 | Environmental Clay Mineralogy |
| EES 550 | Fundamental Geophysics |
| EES 560 | Geophysical Field Methods |
| EES 625 | Topics in Geophysics |
| EES 626 | Gravity and Magnetic Methods |
| EES 670 | Exploration Seismology |
| EES 675 | Earthquake Seismology |
| EES 676 | Paleoseismology |
| EES 585 | Hydrogeology |
| EES 610 | Topics in Hydrogeology/Surficial Processes |
| EES 685 | Groundwater Modeling |
| EES 490 | Earth Dynamics |
| EES 620 | Tectonics |
| EES 624 | Advanced Structural Geology |
| EES 652 | Tectonics and Stratigraphy |
| EES 735 | Special Topics in Structure and Tectonics |
| EES 511 | Petroleum Geology |
| EES 555 | Stratigraphy |
| EES 570 | Sem In Geological Sci |
| EES 695 | Scientific Communication |
| EES 748 | Master's Thesis Research |
| EES 749 | Dissertation Research |
| EES 767 | Dissertation Residency Credit |
| EES 768 | Res Cr Masters Degree |
| EES 769 | Res Cr For Doctors Deg |
| EES 782 | Individ Work In Geology |
| EES 790 | Research In Geological Science |

# German

## College of Arts & Sciences

The general goal of graduate work in German is to provide students with a critical understanding of German culture, its language and literature and its relationship to western civilization as a whole. Specific courses are designed to acquaint students with the aims and methods of research in the fields of language pedagogy, literary and cultural history, literary theory, and historical linguistics. Students working as teaching assistants under faculty supervision have ample opportunity to develop effective teaching skills in a controlled setting.

The Department of Modern and Classical Languages, Literatures and Cultures offers a graduate program leading to the M.A. (Plan A or B) degree in German. Competence in another foreign language, normally French, in addition to German is required for graduate degrees.

**Admission Requirements**
Admission requirements include an acceptable undergraduate major in German, a satisfactory score on the Graduate Record Examination (GRE), and three letters of recommendation. Applicants lacking more comprehensive knowledge of German language and literature may be admitted with the understanding that their program must include some advanced undergraduate work in addition to those courses normally required for the M.A.

Individual programs of study are planned with consideration of the student's competencies and interests. The Department endeavors to be flexible and to accommodate career goals in teaching, government service, or research. Areas of specialization of the graduate faculty of the department afford flexible coverage in breadth and depth, with particular strength in early modern studies, the Age of Goethe, Wilhelmine and Weimar culture, contemporary literature and culture, literary theory, intellectual history, gender studies, and foreign language pedagogy. The Department serves as the editorial center for the international journal, Colloquia Germanica. The University Library has substantial holdings in all areas of German language, linguistics and literature and in supporting fields.

**Course Descriptions**

GER 507 ADVANCED GERMAN COMPOSITION AND CONVERSATION. (3)
Further development of conversational skill and practice in writing stylistically appropriate German. Study of finer points of grammar. Discussion of special topics and theme writing. Prereq: GER 308 or equivalent.

GER 515 STUDIES IN MAJOR AUTHORS. (3)
Explorations into one or several major figures of German literature. Reading of primary texts and pertinent scholarship together with an investigation of the authors' literary, social, or political significance during contemporary or later periods. May be repeated to a maximum of 12 credits. Prereq: GER 311 or GER 312, or equivalent. Instructor consent.

GER 516 STUDIES IN GENRE. (3)
One major genre or a group of related genres. Readings in genre theory and in the key texts from various periods; study of the development of forms, techniques, and ideas. May be repeated to a maximum of 12 credits. Prereq: GER 311 or GER 312, or equivalent. Instructor consent.

GER 520 SPECIAL TOPICS SEMINAR. (3)
Investigation of a topic pertinent to the advanced study of German language, literature and culture. May be

repeated once with new topic. Prereq: GER 415G, 416G, 420G or equivalent.

GER 550 MULTIDISCIPLINARY GERMAN STUDIES SEMINAR (Subtitle required). (3)
A team-taught, multidisciplinary exploration of a set of issues that effect cultural, literary, geographical, historical, political, philosophical or social developments in Germany in relation to surrounding geographical areas. The seminar will foster multidisciplinary perspectives in the study of Germany, its inhabitants, and cultural traditions, in historical, contemporary, and comparative contexts. Seminar readings in German, discussion in English. Seminar foci will vary year to year, including such topics as "Individual and Collective Identity Formations in post-Enlightenment Germany," "Constructions of German Heimat," and "Freud, Culture, Society." May be repeated to a maximum of six credits under different subtitles. Prereq: Senior standing or consent of instructor.

GER 553 THE TEACHING OF GERMAN. (3)
The course is designed for teachers and prospective teachers of modern foreign languages, with emphasis on German. Modern methodology, theory and practice of language pedagogy. Prereq: Permission of instructor required.

GER 612 STUDIES IN LITERARY THEORY. (3)
Course will explore such fundamental issues as the definition of literature, interpretation and evaluation, the reading process, and literary life from the perspective of competing theoretical systems.

GER 615 STUDIES IN MAJOR AUTHORS. (3)
Explorations into one or several major figures of German literature. Reading of primary texts and pertinent scholarship together with an investigation of the authors' literary, social, or political significance during contemporary or later periods. May be repeated to a maximum of 12 credits.

GER 616 STUDIES IN GENRE. (3)
One major genre or a group of related genres. Readings in genre theory and in the key texts from various periods; study of the development of forms, techniques, and ideas. May be repeated to a maximum of nine credits.

Note: The series of courses GER 620-630 provides a general framework for the systematic study of German literature in its cultural setting and delimits various issues to be investigated further in corresponding 700-level courses. Readings and discussions focus on documents central to the literary life of a given period and to the understanding of its institutional and biographical basis as well as its regional, sociopolitical, motivational, poetological, and ideological diversity. Each course also emphasizes critical methodology and tools of scholarship and identifies new directions for basic research.

GER 625 STUDIES IN THE 18TH CENTURY. (3)
Enlightenment to Classicism.

GER 629 STUDIES IN THE 19TH CENTURY. (3)
Romanticism to Naturalism.

GER 630 STUDIES IN THE 20TH CENTURY. (3)
Turn-of-the-century Modernism to the present.

GER 650 MULTIDISCIPLINARY GERMAN STUDIES SEMINAR (Subtitle required.) (3)
A team-taught, multidisciplinary exploration of a set of issues that effect cultural, literary, geographical, historical, political, philosophical or social developments in Germany in relation to surrounding

geographical areas. The seminar will foster multidisciplinary perspectives in the study of Germany, its inhabitants, and cultural traditions, in historical, contemporary, and comparative contexts. Seminar readings in German, discussion in English. Seminar foci will vary year to year, including such topics as "Individual and Collective Identity Formations in post-Enlightenment Germany," "Constructions of German Heimat," and "Freud, Culture, Society." May be repeated to a maximum of six credits.

GER 653 RESEARCH AND ISSUES IN TEACHING GERMAN. (1)
This course builds on GER 553, Methods of Teaching German. The course will address a range of educational issues beyond the teaching of foreign language skills as well as acquaint students with research methods in both a theoretical and practical manner. May be repeated to a maximum of four semesters. Coreq: GER 553.
Note: The course series 720-730 offers the opportunity for the more specialized and greater in-depth investigation of various topics encountered in the corresponding, but more broadly conceived, period courses of the 620-630 series. With changes in topic, each course number of the 720-730 series can be repeated a total of three times - thus enabling the student at the more advanced level to specialize within a particular period or periods.

GER 721 SPECIAL TOPICS IN GERMAN LITERARY AND CULTURAL HISTORY. (3)
This course allows for the in-depth study of specific topics in German literary and cultural history encountered in the broadly conceived period courses of the 620-630 series. With changes in topic the course may be repeated to a maximum of nine credits. Prereq: Permission of Director of Graduate Studies.

GER 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

GER 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

GER 781 INDEPENDENT STUDIES IN GERMAN. (1-3)
Course allows individual students to pursue independent research on a selected aspect of German linguistic, literary or cultural history. May be repeated once if topic changes. Prereq: Permission of Director of Graduate Studies.

SCANDINAVIAN
(Offered as required)

GER 610 OLD ICELANDIC. (3)
Rapid coverage of morphology, phonology and syntax of Old Icelandic, with some attention to linguistic affinities within the Indo-European and Germanic groups of languages. Prereq: Reading knowledge of German; consent of instructor.

# Hispanic Studies

College of Art & Sciences

## Master of Arts

**Admission Requirements**

We require a B.A. in Hispanic Studies or a related area, demonstrated fluency in Spanish and English, strong letters of reference and a representative research essay from the candidate's prior academic work. Graduate Record Examination scores are required for admission. Foreign students must pass the TOEFL with the minimum required score of 550 on the paper version of the exam, 213 on the computer version, or 79 on the Internet/IBT version. Supervised teaching experience within the department is a requirement for both the M.A. and Doctoral degrees.

**Degree Requirements**

32 credit hours total. Reading knowledge of one foreign language in addition to Spanish and/or English; successful completion of SPA 553 (Pedagogy and the Teaching of Spanish), SPA 602 (Studies in Spanish Linguistics), SPA 606 (Introduction to Cultural and Literary Theory) and SPA 770 (Introduction to Hispanic Studies). Successful completion of an additional 24 hours of credits of which 6 may be taken at the 500 level (24 credits must be taken at the 600 level or above). The M.A. is granted to a student who has successfully passed a written and oral examination after completing the required coursework. One half of the exam is designed to test the candidate's knowledge of the M.A. Reading List (located at https://hs.as.uky.edu/sites/default/files/MAReadingListFINAL2007.pdf) and the other half is based on the candidate's graduate-level coursework. A student who plans to complete only the M.A. degree (or is not admitted into the Ph.D. program) has four semesters to complete the coursework towards the MA. M.A. exams are given in August and January.

NOTE: Students who are admitted into the Ph.D. program during the fourth semester of coursework are not required to take an M.A. exam after four semesters. The M.A. degree will be conferred to them upon successful completion of the doctoral Qualifying Exam. Students who enter the program with an M.A. from another institution will be evaluated by the Graduate Studies Committee at the beginning of the third semester of coursework. If the committee deems the student's work acceptable, the student may then go on to complete the PhD requirement. If the work is deemed unacceptable, the student will be required to pass the MA exam before proceeding on to the Ph.D.

## Doctor of Philosophy

**Degree Requirements**

54 credit hours (18 courses) of which ten credits are required: successful completion of SPA 553 (Pedagogy and the Teaching of Spanish), SPA 602 (Studies in Spanish Linguistics), SPA 606 (Introduction to Cultural and Literary Theory) and SPA 770 (Introduction to Hispanic Studies). Of the remaining 15 courses, 5 must be in the major field of concentration (with two of these at the 700 level). 4 courses must be in the allied fields, and 2 in a minor field (outside the department). Additionally, the student must demonstrate reading knowledge of one language other than Spanish and English. The successful candidate will defend a dissertation prospectus, successfully complete Parts A and B of the Doctoral Qualifying Exam, and defend a dissertation.

Candidates are expected to devise a program of study and research around the major area of specialization. Two minor areas (in Hispanic literature and culture or Linguistics) and one allied field (related to the dissertation work) must be selected as support divisions for the major area. Minimum graduate credit

expectations are 24 credit hours in the combined Major and Minor areas and 12 credit hours in the Allied Fields; 6 graduate credits in each of the two remaining areas not chosen as Major, Minor, or Allied Fields. Two seminars (one in the major field) are required.

Specialization by area:
1) Medieval Spanish Studies;
2) Renaissance and Early Modern Spanish Studies;
3) Eighteenth and Nineteenth Century Spanish Studies;
4) Twentieth and Twenty-First Century Spanish Studies;
5) Colonial and Nineteenth Century Spanish American Studies;
6) Twentieth and Twenty First Century Spanish American Studies.
7) U.S. Latino Studies

The dissertation focus may combine Hispanic literature and film, Hispanic literature and Fine Arts, Hispanic literature with a second literature, literature and popular culture, or literature and theory. Students are encouraged to explore topics in Transatlantic Studies, and to make use of the programs in Social Theory, Gender and Women's Studies, Latin American Studies, Environmental Studies and Appalachian Studies in considering transdisciplinary possibilities for their doctoral theses.

The Doctoral Qualifying Examination consists of two parts. Part A is a written exam and a two hour oral exam based on the reading list and the prospectus the student has created under the supervision of the dissertation committee. The written exam is structured as follows: a take-home exam in the areas of the dissertation and the extradisciplinary Minor Field, and an additional ten hours to test the student's knowledge in his/her area of general specialization, and the additional three areas (Major and Allied Fields) on which the student has chosen to concentrate. In order to take this exam, the student needs to have submitted a written prospectus and a reading list to the dissertation committee at least two months before scheduling the exam.

Part B of the qualifying examination will take place during the semester following Part A. The student will present either a fully written introduction or a sample dissertation chapter to the dissertation committee. Acceptable Progress towards the Dissertation: The ABD student is required to establish and maintain an acceptable timeline for completing the dissertation. The Department expects that the student complete at least one dissertation chapter per semester until the dissertation is completed. It is hoped that the student will complete the dissertation within two years after the qualifying exams.

## Course Descriptions

SPA 501 SPANISH PHONETICS, PRONUNCIATION AND PHONEMICS. (3)
Introduction to Spanish descriptive linguistics with intensive study of variant speech sounds and established norms in the major cultural areas of the Hispanic world with discussions of the theory and isolation of phonemes. Prereq: SPA 210 and SPA 211, and a 300-500 level Spanish course.

SPA 506 INTRODUCTION TO COMPARATIVE SPANISH, PORTUGUESE, AND ITALIAN LINGUISTICS. (3)
An introduction to the historical development of Spanish, Portuguese and Italian from a common source, with an emphasis on the comparison of related lexical, phonological and morphological items. Prereq: Reading knowledge of Spanish or Italian (fourth semester of course work).

SPA 519 THEMES IN MEDIEVAL AND EARLY MODERN SPANISH LITERATURE AND CULTURE (Subtitle required). (3)
This course is a topics course in Medieval and Early Modern Spanish Literature and Culture. Appropriate for advanced undergraduates and MA level graduate students. May be repeated to a maximum of six credits under different subtitles. Prereq: For undergraduates: SPA 400 or permission of instructor.

SPA 529 THEMES IN MODERN AND CONTEMPORARY SPANISH LITERATURE, CULTURE AND FILM (Subtitle required). (3)
This course is a topics course in Modern and Contemporary Spanish Literature, Film and Culture. Appropriate for advanced undergraduates and MA level graduate students. May be repeated to a maximum of six credits under different topic. Prereq: For undergraduates: SPA 400 or permission of instructor.

SPA 539 THEMES IN LATIN AMERICAN LITERATURE, CULTURE AND FILM (Subtitle required). (3)
This course is a topics course in Modern and Contemporary Latin American Literature, Film and Culture. Appropriate for advanced undergraduates and MA level graduate students. May be repeated to a maximum of six credits under different subtopic. Prereq: For undergraduates: SPA 400 or permission of instructor.

SPA 553 TEACHING OF SPANISH. (3)
The course is designed for teachers and prospective teachers of modern foreign languages, with emphasis on Spanish. Modern methodology, theory and practice of language pedagogy. Prereq: Permission of instructor required.

SPA 600 HISTORY OF THE SPANISH LANGUAGE. (3)
Introduction to the historical development of the Spanish language. The central focus of this course will be the dialogic and dialectic processes that gave rise the historical, cultural, phonological, morphological and lexical transformations of the Castilian languages, with particular emphasis on the changes that Castilian underwent as it evolved from Latin into modern Castilian.

SPA 601 STUDIES IN SPANISH PEDAGOGY: (Subtitle required). (1)
A one credit course that may or may not run concurrently with the 553 course on Spanish Pedagogy. Seminar topics may include an overview of second language acquisition theories as applicable to English learners of Spanish: contemporary teaching methodologies for instructors of Spanish language, integration of technology into curriculum; issues in testing and assessment. May be repeated to a maximum of 3 credits when taught under different subtitles.

SPA 602 STUDIES IN SPANISH LINGUISTICS: (Subtitle required). (3)
Readings and discussion of issues in Spanish linguistics and the teaching of Spanish. May be repeated to a maximum of 9 credits taughtunder different subtitles.

SPA 603 SPANISH APPLIED LINGUISTICS. (3)
A survey of the many sub-disciplines that constitute Applied Linguistics, a field dedicated to the study of language-based problems. This class will expose students to issues in the Spanish-language context and will equip them with the tools necessary to critically analyze these "problems". Prereq: Introduction to Hispanic Linguistics.

SPA 604 SOCIOLINGUISTICS OF THE SPANISH-SPEAKING WORLD. (3)
An introduction to sociolinguistic theory and its application to issues related to Spanish in Spain, Latin America, and the United States. It will focus on both quantitative and qualitative research on language variation and language contact in the Spanish-speaking world. Prereq: Introduction to Hispanic Linguistics.

SPA 605 HISTORY OF THE SPANISH LANGUAGE. (3)
Offers an overview of the diachronic evolution of Spanish from spoken Latin. Topics covered include the following: Vulgar Latin and ProtoRomance, the Old Spanish phonological system, morpho-syntactic changes from Latin to Spanish. Prereq: Introduction to Hispanic Linguistics.

SPA 606 INTRODUCTION TO CRITICAL THEORY AND CULTURAL STUDIES. (3)
Survey of major trends in critical and cultural theory since the early 20th century, from Formalism and New Criticism through Cultural Studies. Required of all new graduate students.

SPA 607 SPECIAL TOPICS IN CRITICAL THEORY AND CULTURAL STUDIES: (Subtitle required). (1)
Readings and discussion of special topics in critical theory and cultural studies. May be taught in English or Spanish. May be repeated to a maximum of 3 credits when taught under different subtitles.

SPA 608 SPECIAL TOPICS IN SPANISH LITERATURE AND CULTURE: (Subtitle required). (3)
Readings and discussion in essay, film and cultural production of Spain and Spanish America. May be taught in English or Spanish. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 609 SPECIAL TOPICS IN LATIN AMERICAN AND U.S. HISPANIC LITERATURE AND CULTURE: (Subtitle required). (3)
Intensive study of an author, genre, period, or movement of Latin American or U.S. Hispanic literature, or an aspect of Latin American or U.S. Hispanic linguistics or culture. Taught in English or Spanish. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 610 STUDIES IN MEDIEVAL SPANISH LITERATURE: (Subtitle required). (3)
Readings and discussion of Spanish literature from the 13th century through the 15th century. May be repeated to a maximum of 9 credits when taught under different subtitles.
SPA 620 STUDIES IN EARLY MODERN AND BAROQUE SPANISH LITERATURE (Subtitle required). (3)
Readings and discussion of Spanish literature and culture from the 16th and 17th centuries. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 630 STUDIES IN 18TH AND 19TH CENTURY SPANISH LITERATURE: (Subtitle required). (3)
Readings and discussion of Spanish literature and culture from the 18th and 19th century. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 640 STUDIES IN 20TH AND 21ST CENTURY SPANISH LITERATURE: (Subtitle required). (3)
Readings and discussion of contemporary Spanish literature and culture. May be repeated to a maximum of 9 credits when taught underdifferent subtitles.

SPA 650 STUDIES IN COLONIAL LATIN AMERICAN LITERATURE: (Subtitle required). (3)
Readings and discussion of Colonial Latin American literature and culture. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 653 STUDIES IN SPANISH PEDAGOGY (Subtitle required). (3)
Offers students a theoretical and practical overview of L2 Spanish pedagogy as a means to empower them as language instructors who can intelligently select and evaluate pedagogical theories and practices. Students will have the opportunity for hands-on implementation of theory in their own classroom practice. Prereq: SPA 603.

SPA 654 SPANISH DIALECTOLOGY. (3)
Explore current linguistic research on Spanish dialects through the discussion and the analysis of their theoretical and empirical frameworks. Prereq: SPA 604.

SPA 655 COMPARATIVE-HISTORICAL ROMANCE LINGUISTICS. (3)
Analyzes the complex interaction of structural, social, and cultural factors in the evolution of the Romance Languages. Provides insights into which language features can be considered typically Romance, and how far languages can diverge from these typical patterns and still be considered of the same language type. Prereq: SPA 605.

SPA 660 STUDIES IN 19TH CENTURY LATIN AMERICAN LITERATURE: (Subtitle required)
Readings and discussion of 19th century Latin American literature and culture. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 680 STUDIES IN 20TH CENTURY LATIN AMERICAN LITERATURE 1900-1950'S: (Subtitle required). (3)
Readings and discussion of Latin American literature and culture through the first half of the 20th century. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 681 STUDIES IN CONTEMPORARY LATIN AMERICAN LITERATURE 1960'S TO PRESENT: (Subtitle required). (3)
Readings and discussion of contemporary Latin American literature and culture. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 685 STUDIES IN U.S. HISPANIC LITERATURE AND CULTURE: (Subtitle required). (3)
Readings and discussion of U.S. Latino literature and culture. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 690 STUDIES IN SPANISH AND/OR LATIN AMERICAN FILM: (Subtitle required). (3)
Viewings and discussion of Spanish or Latin American film, emphasizing its political, social, economics, and cultural contexts of the Hispanic world. Viewing of films (in Spanish) outside class is required. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 703 SEMINAR IN SLA THEORY IN SPANISH L2 LEARNING. (3)
Offers a closer look at the primary concepts of Second Language Acquisition (interlanguage, learner variables, SLA theory, input, output, etc.) with a particular focus on the Spanish language. The acquisition of specific Spanish L2 structures and phenomena will be directly addressed, e.g., tense/aspect, mood, clitics, etc. Prereq: SPA 603.

SPA 704 SEMINAR IN LINGUISTIC ANALYSIS OF SPANISH DISCOURSE (Subtitle required). (3)
Analysis from a sociolinguistic and discourse analysis perspective of the relationship between language and power in the Spanish-speaking world. It would imply the discussion of a theoretical framework and its application to non-canonical texts produced in Spanish. Prereq: SPA 604.

SPA 705 SEMINAR IN HISTORICAL LANGUAGE CONTACT IN THE SPANISH SPEAKING WORLD. (3)
Offers a study of language contact in the Spanish-speaking world including not only the study of bilingualism, but also explorations into subfields like geolinguistics and language planning. Prereq: SPA 605.

SPA 706 ADVANCED READINGS IN CRITICAL THEORY AND CULTURAL STUDIES: (Subtitle required). (3) Advanced readings and discussion of contemporary issues in critical theory and cultural studies. Taught in Spanish or English. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 708 CRITICAL PERSPECTIVES ON SPANISH LITERATURE AND CULTURE: (Subtitle required). (3)
Advanced readings and discussion of Spanish literature and culture: open topic with preference for cross-disciplinary or trans-historical subjects. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 709 CRITICAL PERSPECTIVES ON LATIN AMERICAN AND U.S. HISPANIC LITERATURE AND CULTURE (Subtitle required). (3)
Advanced readings and discussion of Latin American and U.S. Hispanic literature or culture. May deal with a single author's work, a genre or a cultural phenomenon: open topic with preference for cross-disciplinary or trans-historical subjects. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 710 SEMINAR IN MEDIEVAL SPANISH LITERATURE AND CULTURE: (Subtitle required). (3)
Special and intensive study of selected topics in Spanish literature and culture from the 13th through the 15th century. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 720 SEMINAR IN EARLY MODERN AND BAROQUE SPANISH LITERATURE AND CULTURE: (Subtitle required). (3)
Special and intensive study of selected topics in Spanish literature and culture of the 15th and 16th centuries. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 730 SEMINAR IN 18TH AND 19TH CENTURY SPANISH LITERATURE AND CULTURE: (Subtitle required). (3)
Special and intensive study of selected topics in 18th and 19th century Spanish literature and culture. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 740 SEMINAR 20-21ST CENTURY SPANISH LITERATURE AND CULTURE: (Subtitle required). (3)
Special and intensive study of selected topics in contemporary Spanish literature and culture. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

SPA 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

SPA 750 SEMINAR IN COLONIAL LATIN AMERICAN LITERATURE AND CULTURE: (Subtitle required). (3)
Special and intensive study of selected topics in Colonial Latin American literature and culture. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 760 SEMINAR IN 19TH CENTURY LATIN AMERICAN LITERATURE AND CULTURE: (Subtitle required). (3)
Special and intensive study of selected topics in 19th century Latin American literature and culture. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

SPA 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

SPA 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

SPA 770 INTRODUCTION TO HISPANIC STUDIES. (3)
This course is designed to give new and continuing M.A. and Ph.D. students an overview of and introduction to graduate studies and the profession of Hispanism.

SPA 780 SEMINAR IN 20TH CENTURY LATIN AMERICAN LITERATURE AND CULTURE 1900-1950'S: (Subtitle required). (3)
Special and intensive study of selected topics in Latin American literature and culture of the first half of the 20th century. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 781 SEMINAR IN CONTEMPORARY LATIN AMERICAN LITERATURE AND CULTURE 1960'S TO PRESENT: (Subtitle required). (3)
Special and intensive study of selected topics in contemporary 20th and 21st century Latin American literature and culture. May be repeated to a maximum of 9 credits when taught under different subtitles.

SPA 782 SPECIAL STUDIES IN SPANISH. (1-3)
Selected studies and investigations in the Spanish language and Hispanic literature, permitting the student to work in areas of special interest and providing opportunity for original endeavor. May be repeated to a maximum of six credits. Prereq: Graduate standing.

SPA 785 SEMINAR IN U.S. HISPANIC AND BORDER LITERATURE AND CULTURE: (Subtitle required). (3)
Special and intensive study of related topics in U.S. Hispanic and Border literature and culture. May be taught in Spanish or English. May be repeated to a maximum of 9 credits when taught under different subtitles.

# History

## College of Arts & Sciences

The Department of History offers both the M. A. and the Ph.D. degrees. A reading knowledge of at least one foreign language is required for both degrees. The M.A. degree may be obtained either by Plan A (thesis) or Plan B (non-thesis). The Ph.D. program is built around graduate readings and research seminars that are designed to prepare students for the qualifying exams and to write the doctoral dissertation. Program requirements vary depending on specific concentrations. More detailed information may be found at: https://history.as.uky.edu/

**Admission Procedures & Requirements**
Students applying for either the MA or the Ph.D. program should submit evidence of extensive undergraduate preparation in History (preferably an undergraduate major). Applicants who wish to be considered for financial assistance and fellowships should review the department's web-site for specific deadlines and must apply no later than January 1.

For additional requirements and information on application procedures, consult: https://history.as.uky.edu/applying-program.

**Course Descriptions**

HIS 500 PRECLASSICAL AND CLASSICAL GREECE. (3)
A history of Greece from earliest times to the death of Alexander the Great.

HIS 501 FOURTH-CENTURY GREECE AND THE HELLENISTIC WORLD. (3)
A history of Greece and the Greek world from the death of Alexander to the Roman conquest of Egypt.

HIS 502 A HISTORY OF THE ROMAN REPUBLIC. (3)
A history of Rome from earliest times to the fall of the Republic. Emphasis will be placed upon the territorial expansion of Rome and the effects of this expansion on republican institutions.

HIS 503 A HISTORY OF THE ROMAN EMPIRE. (3)
A study of the foundation of the Roman Empire, the development of Imperial institutions, social and intellectual developments of the GraecoRoman world. The decline of Rome and the barbarian invasions of the fourth century.

HIS 504 GREEK AND ROMAN MEDICINE. (3)
An historical introduction to the development of Greek and Roman medicine, from the pre-Socratic philosophers through Oribasius and early medieval influences. Prereq: A course in ancient history, or classics, or ancient philosophy, or consent of instructor.

HIS 506 HISTORY OF SEXUALITY IN THE U.S. (3)
An overview of the history of beliefs about sexuality, sexual cultures and norms, and sexuality's relationship to power in American society from the colonial period to the present.

HIS 509 ROMAN LAW. (3)
An historical introduction to the development of Roman law, from the Twelve Tables through the Codex Justinianus. (Same as CLA 509.)

HIS 510 MEDIEVAL LAW. (3)
This course examines the development of the various legal systems to which people in western Europe had recourse between the fourth century and the fourteenth century. Topics to be covered include the shift from oral to written law, the problems small communities faced in dealing with transgressors, the competition between various authorities for jurisdiction, the ways in which Judaeo-Christian values and beliefs affected the orientation of medieval law, the use of procedures such as ordeals and inquisitions, the evolution of ideas about natural rights, and how law reflects the massive social and political reorganization of the west that occurred after the Roman Empire.

HIS 511 BARBARIANS. (3)
This course examines the peoples known to historians of Western Europe as the "Barbarians" who took up residence on the continent of Europe and whose polities replaced the central government of imperial Rome in the fifth and subsequent centuries, as well as those of the northern realms of the British Isles and Scandinavia. Topics to be studied include the ethnic and cultural identities of the Barbarians, their role in redefining the social and political institutions of Europe, the reasons for their political and military successes, and their hold on the imaginations of both sympathetic and unsympathetic historians.

HIS 512 CAROLINGIAN EMPIRE. (3)
This course examines the reconstitution of much of the former Roman empire in the western provinces under the hegemony of the Carolingian rulers of the eighth and ninth centuries. Among the topics to be studied are the dynami interactions between powerful ecclesiastical and secular leaders that produced a distinctive vision of a Christian empire, the relations between the Carolingian, Byzantine, and Islamic polities, the means of building royal legislative and judicial power in an environment of fragmented authority, the role of literary and artistic activity in creating a distinctive "Carolingian Civilization", the military activities that consolidated the empire, and the fragility of the imperial enterprise.

HIS 513 MEDIEVAL INSTITUTIONS SINCE THE MID-10TH CENTURY. (3)
A survey of medieval political, social, economic and ecclesiastical institutions from the beginning of the High Middle Ages to the middle of the 15th century.

HIS 514 SPAIN: FROM RECONQUEST TO EMPIRE, 1200-1700. (3)
This course focuses on the expansion of the Christian kingdoms (Portugal, Castile, and Aragon) in the Iberian peninsula and across the Atlantic. Special attention will be paid to the interaction of Judaism, Christianity, and Islam: cultural transformations, including developments in music, literature, and the arts; political developments in Iberia and the emergence of Spain and Portugal; and the spread of Iberia's transAtlantic empires.

HIS 519 THE ERA OF THE RENAISSANCE. (3)
An historical description and analysis of the development of political, economic, social, religious, intellectual and cultural institutions of Europe from Petrarch to Erasmus.

HIS 520 THE ERA OF THE REFORMATION. (3)
An historical description and analysis of the development of the religious, intellectual, cultural, political, economic and social institutions of Europe from Luther to the Treaty of Westphalia.

HIS 521 EUROPEAN SOCIAL HISTORY, 1400-1800. (3)
Survey of European social history in the early modern period, including analysis of demographic patterns, family and social structures, rural and urban economic patterns, and cultural and religious attitudes.

HIS 522 EUROPE AND THE WORLD IN THE AGE OF REVOLUTION (1760-1815). (3)
A study of the political, social, economic and cultural changes that transformed Europe during the age of the French Revolution and Napoleon, with special emphasis on the relations between Europe and the non-European world during this period.

HIS 525 MODERN EUROPE: 1890-1939. (3)
This course examines European history from 1890-1939. It focuses heavily on the Great War and its aftermath through an analysis of the political cultures of the era. Prereq: HIS 105 or consent of instructor.

HIS 526 EUROPE SINCE 1939. (3)
This course examines the major cultural, social, and political developments that have shaped Europe, European history, and Europe's relationships with the world since the outbreak of World War II. Prereq: HIS 105 or consent of instructor.

HIS 529 WOMEN IN MODERN EUROPE. (3)
This course examines the historical, changing lives of women in Europe from the late eighteenth century to the present. It explores the historical contributions of both ordinary and famous women, as well as their participation in, and contributions to, major political, social, and cultural movements. The course will analyze changes and continues through the lens of gender.

HIS 534 RUSSIA IN THE 19TH CENTURY. (3)
This course examines the social, political, and cultural history of 19th Century Russia in depth, focusing on the social conditions of serfdom and its abolition, the causes of social tension in late Imperial Russia, and the long term causes of the Russian Revolution of 1917.

HIS 535 RUSSIA IN THE 20TH CENTURY. (3)
This course examines the social, political and cultural history of 20th century Russia in depth, focusing on the social conditions that caused the Revolution, the formation of the Soviet Union and its decline.

HIS 536 INTELLECTUAL AND CULTURAL HISTORY OF RUSSIA TO 1800. (3)
A study of Russian culture to 1800 emphasizing Slavic paganism, Orthodox Christian culture in Kiev, Novgorod, and Muscovy, and the impact of the West in the Seventeenth and Eighteenth Centuries.

HIS 537 INTELLECTUAL AND CULTURAL HISTORY OF RUSSIA FROM 1800 TO THE PRESENT. (3)
A study of Russian culture from 1800 to the present emphasizing the conservative as well as the revolutionary tradition, the Russian avantgarde, Stalinist culture, and the Dissident Movement.

HIS 540 HISTORY OF MODERN FRANCE TO 1815. (3)
The course of French history to 1815, including the development of French political, administrative, legal, social, economic and cultural achievements and institutions and their contribution to the modern world.

HIS 541 HISTORY OF MODERN FRANCE SINCE 1815. (3)
Continuation of HIS 540.

HIS 542 GERMAN HISTORY, 1789-1918. (3)
This course examines the political, social, and cultural history of Germany during the century when it arose from utter defeat by Napoleon to become the strongest economic and military power in Europe, then concludes with Germany's fate in World War I.

HIS 543 GERMAN HISTORY SINCE 1918. (3)

This course examines the history of Germany from the end of World War I until the present, including the Weimar Republic, the Third Reich, the occupation regimes after World War II, East and West Germany from 1949 to 1990, and the reunified Germany since 1990. The main focus of coverage will be on political and social history, with lesser emphasis on cultural, diplomatic, and military history.

HIS 546 THE BYZANTINE EMPIRE. (3)
A study of Byzantine history from the time of Constantine the Great to the capture of Constantinople by the Turks in 1453. Prereq: HIS 104 or 247.

HIS 549 HISTORY OF THE MIDDLE EAST: 1952 TO THE PRESENT. (3)
A continuation of HIS 548. Emphasis is on the politics of Middle Eastern nationalism, Pan-Arabism and its demise, the Arab-Israeli conflict, the politics of oil and nuclear weapons, the Islamic revolution in Iran, and the development of the Islamic movement since 1967.

HIS 550 STUDIES IN MID-EAST HISTORY AND POLITICS: (Subtitle required). (3)
Selected topics on the history of the Middle East and its politics. The specific topics for a given semester will be listed in the class schedule book and the department's website.

HIS 552 TUDOR-STUART BRITAIN, 1485-1714. (3)
An analysis of political, religious, cultural, and economic changes in Britain during the reign of the Tudor and Stuart kings and queens, a period when Britain became increasingly prominent in world affairs.

HIS 553 EIGHTEENTH CENTURY BRITAIN. (3)
An analysis of English society and politics in an important transition period when the country was transformed by the Industrial Revolution and challenged by the French Revolution.

HIS 554 BRITISH HISTORY 1815-1901. (3)
A detailed study of Britain's political, social, diplomatic and industrial development in the 19th century.

HIS 555 BRITISH HISTORY SINCE 1901. (3)
A detailed study of Britain in the 20th century with special consideration of Britain in World War I and World War II, and her position in the contemporary world.

HIS 556 THE BRITISH EMPIRE, 1322-1879. (3)
This course covers the rise, fall, and rise of the British empire from its extension into Scotland and Ireland till the beginning of the age of "New Imperialism," explaining the means by which Britain came to dominate one-third of the globe, and its impact on the many cultures, economics, and geopolitical entities of the third world. It will further discuss how those cultures transformed Britain itself. Prereq: Prior experience in HIS 105 strongly recommended.

HIS 557 THE BRITISH EMPIRE AND COMMONWEALTH, 1880-2000. (3)
This course will trace the imperial theme, and the gradual decline and decomposition of Britain's empire from Victoria's day to the present; it will examine decolonization and the blending and clash of cultures, the effect of technology and western ideas on the subject peoples, and their impact on western civilization. Prereq: Prior experience in HIS 105 strongly recommended.

HIS 561 CULTURE, IDEAS, AND SOCIETY IN LATIN AMERICA. (3)
This course explores the interplay of culture, ideas, and society in the history of Latin America from Independence (1825) to the present. It takes an interdisciplinary approach and is attentive to issues of class, gender and sexuality, ethnicity and race, power, domination, and resistance. Major themes to be

developed in the course are history of ideas; popular and elite cultures; material and visual culture; work, leisure, and consumption; and the politics of representation. Prereq: HIS 207 or LAS 201 are suggested.

HIS 562 MODERN MEXICO. (3)
Following a brief survey of Mexican political history from Independence to the present, this course will examine topically major historical themes, such as landholding and agrarian problems, church and state, and assessment of the 1910 Revolution.

HIS 563 THE HISTORY OF WOMEN IN LATIN AMERICA. (3)
This course will survey the history of women in Latin America from pre-Columbian period to the present. The emphasis will be mainly on the late nineteenth and twentieth centuries in order to understand the situation of women in Latin America today.

HIS 564 HISTORY OF BRAZIL. (3)
Study of Brazilian history from 1500 to the present, stressing the multiethnic dynamics of colonial society, the political transformations of independence, and the contemporary legacies of race, slavery, abolition, and gender.

HIS 572 AMERICAN LEGAL HISTORY. (3)
A history of law in the United States, emphasizing interrelationship of law and society. Particular attention given to law and economic growth, the criminal justice system, legal reform, the bar, and minorities and the law.

HIS 573 AMERICAN CONSTITUTIONAL HISTORY. (3)
A study of constitutional development in the United States from the colonial period to current times, with emphasis on the Supreme Court.

HIS 574 THE DIPLOMACY AND FOREIGN POLICY OF THE UNITED STATES TO 1919. (3)
A survey designed to acquaint the student with the principles of American foreign policy and its historical evolution. Prereq: HIS 108 or equivalent.

HIS 575 THE DIPLOMACY AND FOREIGN POLICY OF THE UNITED STATES SINCE 1919. (3)
A continuation of HIS 574. Foreign policy after the United States became a world power. Prereq: HIS 109 or equivalent.

HIS 576 FRONTIER AMERICA, 1400-1869. (3)
A study of the ways in which America's people shaped and were transformed by the frontier; how they wrestled with the problems of nationhood, democracy, sacrifice, and innovation; and how the idealism and promise were fulfilled and betrayed, from the first settlers to the driving of the Golden Spike.

HIS 577 FRONTIER AMERICA, 1869-PRESENT. (3)
A survey of the many Westerners, women as well as men, Native Americans, Chinese, and Hispanics as well as whites, sodbusters as well as six-shooters, and of the many Wests, wild and not-so-wild, from the prairie homesteaders to the Sagebrush Rebellion; and how they made, inherited, and were imprisoned by the frontier heritage.

HIS 578 HISTORY OF THE OLD SOUTH. (3)
A study of the colonial beginnings and expansion of southern life, economics, and society. The growth of slavery, staple agriculture, and sectional politics will constitute the major interest. Prereq: HIS 108.

HIS 579 HISTORY OF THE NEW SOUTH. (3)
The evolution of southern life and society, agrarian politics, relationships with other sections, industrial growth, and new leadership.

HIS 580 HISTORY OF APPALACHIA. (3)
A survey of the social, economic, and cultural history of Appalachia from the colonial period to the present with emphasis on the interaction of this social state region with the broader forces of social change at work in modern America. Prereq: HIS 108, 109 or consent of instructor.
HIS 584 HEALTH AND DISEASE IN THE U.S. (3)
Examines the emergence of modern medicine and the allied health professions, from colonial times to the present. Emphasis will be placed on the social, institutional, and scientific contexts of medical thought, education, and practice. It also explores how social and professional thought and action shape the meaning of health and disease.

HIS 587 THE CIVIL RIGHTS MOVEMENT IN THE U.S. SINCE 1930. (3)
This course will focus on the struggle for African American equality in the U.S. during the mid twentieth century. It will examine key civil rights issues, events, strategies, leaders and organizations on both the local and national levels. Using historical documents and documentary film presentations this course will discuss the status of race relations in America over the past fifty years. (Same as AAS 587.)

HIS 593 EAST ASIAN HISTORY SINCE WORLD WAR II. (3)
A study of the revolutionary political, economic and social changes occurring in China, Japan,

HIS 616 PALEOGRAPHY. (3)
This course provides training in the skills needed to read the handwritten materials that constitute evidence for historical investigation of the production and circulation of information outside the medium of print. While the specific scripts to be studied will vary from semester to semester, depending upon whether the course is focused upon Latin paleography, Greek paleography, or vernacular paleographies, students will learn to read and transcribe manuscripts, to expand abbreviations appropriately, to recognize the chronological and geographical extent of particular scripts, to develop strategies for reading difficult scripts, to find the specialized reference works to assist them in studying handwritten materials, and to understand the historical arguments that have been constructed on the basis of analysis of scripts and the "archaeology of the book." The course also provides training in basic codicology and editorial techniques for establishing a text and recording variant readings. Prereq: Some familiarity with the language of the materials. (Same as CLA 616.)

HIS 621 READINGS IN EARLY MODERN EUROPE, 1450-1648. (3)
This course is designed to give graduate students a grounding in the historiography of Europe from 1450 to 1648. Students should expect to familiarize themselves in the recent trends in political, social, cultural, religious, economic, and intellectual history of the period.

HIS 622 READINGS IN EARLY MODERN EUROPE, 1648-1815. (3)
This course is designed to give graduate students a grounding in the history of Europe from the conclusion of the Thirty Years War to the Era of The French Revolution, with a focus on political, cultural, and intellectual history.

HIS 623 READINGS IN 19TH CENTURY EUROPEAN HISTORY. (3)
Intensive survey of the literature in the political, social, and/or cultural history of nineteenth-century Europe. May be repeated to a maximum of six credits when topical coverage is sufficiently different from

one semester to another. Prereq: Graduate status.

HIS 624 READINGS IN EUROPEAN HISTORY OF THE TWENTIETH CENTURY. (3)
A critical survey of problems and literature in the political, social, and cultural history of Twentieth Century Europe. May be repeated to a maximum of six credits when topical coverage is sufficiently different from one semester to another. Prereq: An undergraduate course in European history.

HIS 625 BRITAIN, 1688-1815. (3)
A general graduate-level introduction to the political and social history of Britain from the Glorious Revolution through the French Revolution. Focuses on: Whig justification for revolution, "Rage of Party," Walpolean oligarchy and its "country" critics, agricultural revolution, urbanization, growth of the "middling sort," plebeian culture and the limits of hegemony, growth of national identity and the "fiscal-military" state, social context of the criminal law, Wilkite and American crises. Prereq: Permission of instructor.

HIS 626 BRITAIN, 1792-1914. (3)
This course will provide graduate students with a detailed overview of the history of Britain in the "long" nineteenth century. It will focus on such issues as the impact of the Industrial Revolution, the formation of a recognizably modern class society, the growth of workingclass political consciousness, and the politics of class and gender. Prereq: Permission of instructor.

HIS 627 THE BRITISH EMPIRE, 1763-1914. (3)
This course provides graduate students with a detailed overview of several broad themes pertaining to the history of the British empire, 1763-1914: the first imperial crisis, slavery and the slave trade, race as a category of imperial knowledge/power, women's emancipation and the problem of empire, the post-colonial challenge to the "imperial mindset," and the intensification of imperial awareness within Britain itself, c. 1880-1914. Prereq: Permission of the instructor.

HIS 628 COLLOQUIUM ON MODERN EUROPEAN HISTORY. (3)
This course will provide an overview of the major themes and events that have shaped Modern European History from the late 18th century to the present. We will analyze the various ways in which particular historical topics have been interpreted (and reinterpreted) over time, as well as historian's different methodologies, underlying assumptions, and use of evidence. The major goal of the course, however, is to introduce graduate students to significant works and historical debates in Modern European History.

HIS 637 READINGS IN COLONIAL LATIN AMERICAN HISTORY. (3)
Intensive survey of major themes and debates in colonial Latin American history from 1492 to the early nineteenth century. Includes political, economic, social, and cultural topics.

HIS 638 READINGS IN LATIN AMERICAN HISTORY. (3)
Intensive survey of the major themes and debates in Latin American History from 1850 to the present. Includes political, economic, social and cultural topics. Prereq: Consent of instructor.

HIS 640 READINGS IN AMERICAN HISTORY TO 1877. (3)
Course will examine major scholarly debates in American history to 1877.

HIS 641 READINGS IN AMERICAN HISTORY SINCE 1877. (3)
Course will examine major scholarly debates in American history since 1877.

HIS 650 READINGS IN SPECIAL TOPICS IN HISTORY. (3)
Supervised reading at the graduate level of a selected bibliography of the essential literature of various

special topics. May be repeated to a maximum of nine credits with different topics. Prereq: Consent of instructor.

HIS 651 READINGS IN U.S. FOREIGN RELATIONS SINCE 1900. (3)
This course will involve intensive reading in the history of United States foreign relations in the twentieth century. It will examine various theoretical approaches to the subject. It will analyze the sources and consequences of America's global expansion as well as the historiography of important events such as World War I and II, Korea and Vietnam.

HIS 653 READINGS IN U.S. WOMEN'S HISTORY. (3)
This course will introduce students to the main currents in U.S. women's history in four broad chronological units: Traditional America, 1600-1820; Industrializing America-Part I, 1820-1880; Industrializing America-Part II, 1880-1920; and Modern America, 1920-present. Within this framework, the course will explore such topics as: work, communities and public life; gender, families and sexuality; race and African-American experiences; and religion, reform and political culture. The course will also familiarize students with the ongoing theoretical debates within women's history.

HIS 654 READINGS IN MODERN AFRICAN-AMERICAN HISTORY. (3)
Introduces graduate students to the historical literature on 20th century African-American history and major historiographical issues. (Same as AAS 654.)

HIS 655 READINGS IN ANTEBELLUM SOUTHERN HISTORY. (3)
Introduces graduate students to the historical literature on the antebellum South and the major historiographical issues.

HIS 656 READINGS IN NEW SOUTH HISTORY. (3)
Introduces graduate students to the historical literature on the New South and the major historiographical issues.

HIS 657 RACE RELATIONS IN THE UNITED STATES. (3)
This seminar focuses on the African American experience in the United States from Reconstruction to the present. Using primary documents and secondary readings, this course will examine the construction of race relations and the individuals, organizations, events, and issues significant to the shaping of the black experience. (Same as AAS 657.)

HIS 673 READINGS IN AMERICAN HISTORY: THE GILDED AGE AND THE PROGRESSIVE ERA. (3)
An intensive survey of the major historiographical issues and the secondary literature of the Gilded Age and the Progressive Era.

HIS 695 INDEPENDENT WORK. (1-3)
Under special conditions selected students may investigate problems, with weekly reports to instructor. May be repeated to a maximum of nine credits. Prereq: Consent of instructor.

HIS 700 SPECIAL PROBLEMS IN HISTORY. (3)
Professors will conduct research seminars in topics or problems in which they have special research interests. May be repeated to a maximum of 12 credits. Prereq: Consent of instructor.

HIS 701 RESEARCH SEMINAR IN AMERICAN HISTORY. (3)
Graduate research seminar in American history. May be repeated to a maximum of 12 credits.

HIS 705 COLLOQUIUM IN PRE-MODERN EUROPEAN HISTORY. (3)
Graduate research seminar for students in pre-modern European history. Students will write a research paper of 20-30 pages using primary sources in the original languages. Class time will primarily involve discussion of works in progress, including works by the students and pre-modern European faculty members, as well as discussion of the mechanics of researching and writing history.

HIS 706 SEMINAR IN MEDIEVAL HISTORY. (3)
Directed research on a common problem. May be repeated to a maximum of 12 credits. Prereq: A reading knowledge of Latin or of one European language or consent of instructor.
HIS 710 SEMINAR IN AMERICAN HISTORY, 1607-1815. (3)
May be repeated to a maximum of 12 credits.

HIS 711 SEMINAR IN AMERICAN HISTORY, 1815-1865. (3)
May be repeated to a total of 12 credits.

HIS 722 SEMINAR IN MODERN EUROPEAN HISTORY, 1870 TO THE PRESENT. (3)
May be repeated to a maximum of 12 credits.

HIS 730 SEMINAR IN MODERN BRITISH HISTORY. (3)
May be repeated to a total of 12 credits.

HIS 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

HIS 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

HIS 750 INTRODUCTION TO THE HISTORICAL PROFESSION. (1)
Intend to acquaint students with dissertation research expectations, the responsibilities of a new faculty member, and professional career options.

HIS 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

HIS 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

HIS 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

# Linguistic Theory & Typology

## College of Arts & Sciences

The MA in Linguistic Theory & Typology (MALTT) offers training by a world class faculty in theoretical frameworks for approaching descriptive, historical, and sociolinguistic data with a special focus on how grammatical features are distributed across the world's languages. Emphasis is given to language modeling and analysis through computational and quantitative methods. In addition to providing invaluable intellectual preparation for doctoral studies in linguistics, the MALTT program prepares students for careers in high-tech industries, text-based consultancies in law and medicine, and jobs in government agencies.

**Admission Requirements**
We welcome students with a BA/BS major or minor in Linguistics. Students with degrees in cognate disciplines are also welcome to apply but will have to take an introductory course in linguistics prior to enrollment. We run such a course as a summer online course. Minimum GPA is 3.3. Funded positions are available (TA, RA) on a competitive basis.

**Degree Requirements**
Students take 30 hours of LIN course work and complete a thesis. The course work must include at least 15 hours taken at the 600 or 700 level. Mandatory courses are LIN 601 Research Methods and LIN 701 Research Seminar in Linguistic Theory & Typology. All students must take a syntax course (LIN 512, 622, or 712) and a phonology course (LIN 515, 615, or 715). Students must also take a course in either morphology (LIN 505, 605, 705) or a course in phonetics (LIN 500, 600, or 700). The thesis component consists of a written research project and oral examination. The thesis must be approved by a committee of three faculty.

**Course Descriptions**

LIN 500 PHONETICS. (3)
This course examines the phonetics of natural language, including both the articulation and acoustics of speech sounds and suprasegmental units. Discussion includes extensive reference to languages other than English. Prereq: LIN 221.

LIN 505 LINGUISTIC MORPHOLOGY. (3)
This course examines word structure in natural language. It compares current theoretical approaches to the analysis of inflection, derivation, and compounding, and identifies the dimensions of typological variation in each of these domains. Discussion includes extensive reference to languages other than English. Prereq: LIN 221.

LIN 506 SOCIOLINGUISTICS. (3)
This course is an advanced survey of current areas of research in sociolinguistics. Topics include dialectology, language variation and change, interactional sociolinguistics, language and gender, bilingualism, and language contact. Prereq: LIN 221 or LIN 222 or SOC 101 or ANT 220. (Same as ANT/SOC 506.)

LIN 507 LINGUISTIC ANTHROPOLOGY. (3)
This course is an advanced survey of current areas of research in linguistic anthropology. Topics include language and thought, cultural differences in linguistic interaction, the ethnography of communication, ritual uses of language, language and identity and cultural poetics. Prereq: LIN 221 or LIN 222 or SOC 101

or ANT 220. (Same as ANT 507.)

LIN 508 DISCOURSE ANALYSIS. (3)
This course is an introduction to the methods used in various approaches to discourse and textual analysis. The approaches examined include Speech Act Theory, Conversation Analysis, Ethnographic Discourse Analysis, Discourse Pragmatics, Interactional Sociolinguistics, Variation Analysis, and Critical Discourse Analysis. Special attention is giving to practical experience analyzing both spoken and written discourse. Prereq: LIN 221 or LIN 222 or SOC 101 or ANT 220. (Same as SOC 508.)

LIN 509 FORMAL SEMANTICS. (3)
This course is an introduction to modern, model-theoretic approaches to natural language semantics. We examine a range of issues relating to the notions of meaning and truth in language; to the interface of semantics with syntax; and to the relation between semantics and pragmatics. Students attend a large number of essential lectures; participate in several discussions with their classmates; and submit several written analyses addressing specific problems in the semantics of English. Topics include the relation of denotation to truth and meaning; quantification in natural language; speech acts and illocutionary force; conversational implicature; intensional constructions; indexicality; presuppositions; uses of lambda abstraction in semantic analysis; lexical meaning; and generalized quantifiers. Prereq: LIN 221 or graduate standing.

LIN 510 CORPUS LINGUISTICS. (3)
A linguistic corpus is a collection of language samples chosen to model language use of a specific speech community and to provide primary materials for linguistic investigation. Modern digital corpora harness the quantitative power of computers for data-rich analysis in all areas of linguistic study. This course surveys the key principles of corpus linguistics and the criteria used in assembling linguistic corpora. It discusses the application of corpus-based investigations across linguistic research domains, and engages students in hands-on linguistic research using various types of corpora. Prereq: LIN 221 and LIN 222.

LIN 511 COMPUTATIONAL LINGUISTICS. (3)
Computational linguistics addresses the problem of 'information overload', the result of huge advances in processing speeds and memory size. This course shows the methods and techniques for automatically analyzing and modeling natural language data in order to redress the balance of information acquisition and information analysis, turning information into knowledge. The focus will be word-based, sentence-based and meaning-based computational approaches. Students will have the opportunity to practically apply their theoretical knowledge in a computer environment. Computer languages used will be Python and DATR, as well as some basic UNIX-based scripting languages. No experience with computers is necessary. By the end of the course students will have acquired a host of transferable skills for an increasingly digitally dominated job market.Prereq: LIN 221.

LIN 512 ANALYSIS OF ENGLISH SYNTAX. (3)
Contemporary approaches to the syntactic analysis of Modern English; particular attention is devoted to Chomskyan syntactic theory. Prereq: LIN 221 or graduate standing. (Same as ENG 512.)

LIN 513 TEACHING ENGLISH AS A SECOND LANGUAGE. (3)
The course examines the current theories and methods of teaching English as a second language. The course will include (1) language learning theory as it relates to other disciplines; (2) methods and techniques of contrastive analysis. Prereq: One course in linguistics or consent of instructor. Provides ENG Major Elective credit and ENG minor credit. (Same as EDC/ENG 513.)

LIN 514 TESL MATERIALS AND METHODS. (3)
An extension to ENG/EDC 513, this course will include examination and evaluation of published materials designed for teaching English to speakers of other languages. Students will create individualized teaching materials and gain practical experience in applying the methods and using their own materials. Prereq: ENG/EDC 513 or consent of instructor. Provides ENG Major Elective credit and ENG minor credit. (Same as EDC/ENG 514.)

LIN 515 PHONOLOGICAL ANALYSIS. (3)
This course is an investigation of the systematic properties of speech sounds in natural languages. It compares current theoretical
approaches to the analysis of individual features and sounds as well as larger prosodic units, and identifies the dimensions of typological variation in the phonological domain. Discussion includes extensive reference to languages other than English. Prereq: LIN 221. (Same
as ANT 515.)

LIN 516 GRAMMATICAL TYPOLOGY. (3)
This course examines the typological classification of languages according to their morphological and syntactic characteristics. Course work includes practical training in the writing of grammatical descriptions and in the elicitation, transcription, and analysis of data from a non-Western language. Discussion includes extensive reference to languages other than English. Prereq: LIN 221. (Same as ANT 516.)

LIN 517 SPECIAL TOPICS IN LINGUISTICS (Subtitle required). (3)
The focus will be on intensive study of problems and issues that do not fall under linguistics course headings. These may have an interdisciplinary emphasis, or they may concentrate on some special topics of current research. All topics will be subject to review by the director of the program. May be repeated under different subtitle to a maximum of six credits. Prereq: LIN 221.

LIN 518 ADVANCED HISTORY OF THE ENGLISH LANGUAGE. (3)
This course explores the development of English from its roots in Indo-European, through Old, Middle, and Early Modern English(es), culminating with a review of the English languages of today. It focuses on the phonological, grammatical, and lexical changes of the language, as well as on the social contexts of the rise and spread of English as a contemporary world language. Special emphasis is given to a linguistically informed understanding of how the language has changed in response to political and historical pressures. Fulfills the ENG Early Period requirement. Provides ENG Major Elective Credit and ENG Minor credit. (Same as ENG 518.)

LIN 519 HISTORICAL LINGUISTICS. (3)
This course studies the historical development of language through time and space, examining the internal mechanisms and external influences involved in language change. Change will be examined at all levels: orthographic, phonetic, phonological, morphological, syntactic, semantic, and lexical. The course will also investigate a variety of topics related to the phenomenon of language change: language classification; comparative linguistics; the reconstruction of linguistic systems; the social context of language change. Through study of these issues, students will gain insights into historical language varieties and writing systems; relationships among the world's languages; and the origins of the sounds, words, and structures of the languages we speak today. Prereq: LIN 221 and LIN 222. (Same as ANT 519.)
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IN 520 SANSKRIT I. (3)
An introduction to the Sanskrit language. Includes a historical survey of the language; detailed study of the devanagari writing system and of Sanskrit phonology and grammar; a recitation component; and the reading of selected Sanskrit texts. Prereq: Completion of the fourth semester of a foreign language.

LIN 521 SANSKRIT II. (3)
A continuation of LIN 520. Includes intensive study of the relationship of Sanskrit to other early Indic languages (especially Vedic and Pali); discussion of the Indo-European ancestry of these languages; and the reading of selected texts in these languages. Prereq: LIN 520.

LIN 527 LANGUAGE INVESTIGATIONS (Subtitle required). (3)
This course presents a focused investigation of an individual language or a set of languages (in a language family or other defined grouping, e.g., connected by geopolitical area), examining genetic and typological features of the language(s) from a structural, historical, and/orsociolinguistic perspective. The course may be taken twice for up to six (6) credits under different subtitles. Prereq: LIN 221 and LIN 222, or consent of instructor.

LIN 529 LANGUAGE CONTACT. (3)
This course provides a linguistic investigation of language contact, the interaction of two or more languages in situations of individual or community bilingualism/multilingualism. The full range of linguistic contact phenomena will be illustrated with examples from different languages, both historically and in the present day. We will discuss the outcomes of language contact – language maintenance (borrowing, code-switching, multilingualism), language shift (endangered languages, language death), and the creation of new languages (pidgins, creoles, mixed languages) – in a range of contexts, considering both the social factors in language contact and the effects of contact on the linguistic structure of the languages involved. Prereq: LIN 221 and LIN 222, or consent of instructor.

LIN 530 PRAGMATICS. (3)
Survey of linguistic pragmatics, including Gricean implicature, reference, presupposition, speech acts, information structure, and the representation of discourse. Discussion focuses primarily but not exclusively on the English language. This course may require LIN 540 taken concurrently. Prereq: LIN 221 or permission of the instructor; may require LIN 540 taken concurrently

LIN 540 LABORATORY IN LINGUISTICS (Subtitle required). (1)
A laboratory course offering students the opportunity for hands-on application of the general theories and methods of linguistics at the level of advanced undergraduate/beginning graduate training. The lab environment will generally involve both individual and small group work, developing both independent research skills and an ability to engage in collaborative linguistic investigation. May be repeated for credit under different topics. Prereq: LIN 221 or consent of instructor; may require concurrent enrollment in an accompanying LIN lecture
course.
LIN 550 LINGUISTIC FIELD METHODS. (3)
This course is an introduction to field methods for grammatical description. Working with a native speaker of an unfamiliar language, students will gain experience in eliciting and analyzing data in descriptive linguistics. We will consider general issues related to fieldwork,including choosing a field site and consultants, software for linguistic archiving and analysis, as well as the psychological, ethical, and practical considerations related to fieldwork. The bulk of the course, however, will focus on practical experience in describing the phonetics, phonology, morphology, and syntax of an unfamiliar language. LIN 540 must be taken concurrently. Prereq: LIN 221 or graduate standing in Linguistics; requires LIN 540 taken concurrently.

LIN 600 ADVANCED PHONETICS. (3)
This course presents advanced study of linguistic phonetics, building on the material presented in LIN 500 (Linguistic Phonetics). The course will emphasize current questions in phonetic theory and experimental

methods. Students will develop skills in using experimental and analytical techniques for conducting research that is relevant to current theoretical questions. This course requires concurrent enrollment in LIN 640 Advanced Laboratory in Linguistics: Phonetics. Prereq: LIN 500 (Linguistic Phonetics) or similar course approved by the Director of Graduate Studies. LIN 640 Advanced Laboratory in Linguistics: Phonetics must be taken concurrently.

LIN 601 RESEARCH METHODS IN LINGUISTICS. (3)
Students pursuing an MA degree in Linguistic Theory & Typology (MALTT) must be equipped with a toolbox of suitable methods for gathering, analyzing, and modeling linguistic data. This course introduces a range of research methods which are widely applicable in
scientific investigation but whose linguistic relevance we shall emphasize here. The methods are (1) statistical analysis, (2) computational modeling, (3) field work and (4) experimental techniques. Overarching all these methods is the scientific method of enquiry, a recursive and cumulative process of gathering data and building, testing, and refining hypotheses, and interpreting all results. Some of the questions that students will learn how to answer are: Are my data collection methods sufficiently rigorous? Are the results of my data analysis statistically significant? Does my hypothesis control for variables? Is my hypothesis computationally tractable? Are my methods and their results replicable? The course also introduces students to major primary and secondary resources for linguistic research, including the principal bibliographic and indexing services, leading professional journals, major disciplinary organizations, significant traditional and online collections of linguistic data, etc. These resources will be discussed for each of the disciplinary strengths represented in the MALTT program. Prereq: LIN 211 or equivalent.

LIN 605 ADVANCED MORPHOLOGY. (3)
Advanced morphology builds on the groundwork laid in LIN 505 (Linguistic Morphology). The focus shifts from fundamentals of morphology to theoretical morphology. Special emphasis is given to the inferential-realizational approach and centrality of the paradigm. The course will address issues such as the nature of rules in morphology, morphology's place in the grammar and 'challenging' morphology, examples of which include deponency, syncretism, heteroclisis, periphrasis and defectiveness. Prereq: LIN/ENG 505 or a similar course approved by the Linguistics Program director or DGS.

LIN 606 ADVANCED SOCIOLINGUISTICS. (3)
Building upon the solid foundation in the broad principles of sociolinguistic inquiry developed in LIN/ANT/SOC 506, this course explores current theoretical debates in sociolinguistics by introducing a series of alternative frameworks, which may include paradigms like traditional Labovian sociolinguistics or the exploration of sociolinguistic concepts in social theory, and students will be responsible for assessing and critiquing each framework as presented. This course may require LIN 640 taken concurrently. Prereq: LIN/ANT/SOC 506 (Sociolinguistics) or similar course approved by the Director of Graduate Studies; may require LIN 640 taken concurrently.

LIN 609 ADVANCED SEMANTICS. (3)
This course is an examination of current research in linguistic semantics. The course covers a range of central topics, including the syntax/semantics interface and the nature of semantic compositionality; the semantic analysis of specific linguistic phenomena, such as plural number, generics, valence-changing operations, reflexives and reciprocals, modality, counterfactual conditionals; referential vs cognitive approaches to semantics; and modern approaches to the relation between semantics and pragmatics. Prereq: LIN 509 (Formal Semantics) or similar course approved by Director of Graduate Studies; may require LIN 640 taken concurrently.

LIN 610 ADVANCED COMPUTATIONAL/CORPUS LINGUISTICS. (3)

Building on the theoretical, conceptual, and methodological overview of computational and corpus linguistics presented in LIN 510 (Corpus Linguistics) and LIN 511 (Computational Linguistics), this course engages students in advanced applications of computational and corpus theories, concepts, and methods in the study of human language. Topics explored may include one or more of the following: specialized computational/corpus approaches for specific linguistic subfields; frameworks for simulation, modeling, annotation/encoding of linguistic data; processing and analysis of digital multimodal linguistic resources. This course requires concurrent enrollment in LIN 640 Advanced Laboratory in Linguistics: Computational/Corpus Linguistics. Prereq: LIN 510 (Corpus Linguistics) or LIN 511 (Computational Linguistics) or similar course approved by the Director of Graduate Studies

LIN 611 QUANTITATIVE METHODS IN LINGUISTICS. (3)
An increasingly important method in linguistic research relies on measuring some quantity, and inferring some linguistic reality based on such findings. This course presents scenarios where such an approach makes sense, and outlines the appropriate measures and the safest, most reliable ways in which such measures can be used to draw inferences. This course requires concurrent enrollment in LIN 640 Advanced Laboratory in Linguistics: Quantitative Methods. Prereq: LIN 601 (Research Methods in Linguistics) or similar course approvedby the Director of Graduate Studies. LIN 640 Advanced Laboratory in Linguistics: Quantitative Methods must be taken concurrently.

LIN 612 STRUCTURE AND STYLISTICS OF FRENCH. (3)
A study of the history and structure of French with an emphasis on contemporary features. (Same as ENG/FR 612.)

LIN 615 ADVANCED PHONOLOGY. (3)
This course provides an introduction to current constraint-based theoretical approaches within phonology, emphasizing Optimality Theoretic approaches. Within this framework students will analyze individual features, sounds and prosodic units, all within problem sets conducted in class and at home. This course may require LIN 640 taken concurrently. Prereq: LIN 515 (Phonological Analysis) or similar course approved by Director of Graduate Studies; may require LIN 640 taken concurrently.

LIN 617 ADVANCED TOPICS IN LINGUISTICS. (3)
Advanced investigation into a designated topic in linguistic theory and typology. May be repeated to a maximum of twelve credits under different subtitles. Prereq: A course in a cognate field at the LIN 500 level or equivalent, or by discretion of the DGS.

LIN 619 HISTORICAL SOCIOLINGUISTICS. (3)
This course investigates language variation and change in its socio-historical context, focusing on the effects of such parameters as age, gender, education, social class, and region on the historical development of language through time and space. The effects of socio-historical variables will be examined at all levels of historical language variation and change: orthographic, phonetic, phonological, morphological, syntactic, semantic, and lexical. The notions of “standard language” and “language standardization” will also be addressed from a historical sociolinguistic perspective. Prereq: LIN 221 and LIN 222 or equivalent, or consent of instructor, (LIN 506 and 519 recommended).

LIN 622 ADVANCED SYNTAX. (3)
The course builds on the groundwork laid in LIN 512 Analysis of English Syntax in two main ways: (1) by framing the problems introduced in the first course within a non-Chomskyan framework of assumptions found in constraint-based lexicalist grammars; and (2) by going beyond the confines of English to account for syntactic data from other languages. A fundamental shift from Chomskyan to constraintbased

lexicalist grammar is the rejection of syntactic derivation, or transformations, i.e. the assumption that there are distinct underlying and surface representations in which arena transformations / movement play a significant role. Topics covered include: formal grammar as unification grammar, headedness, binding theory, agreement, and the role of the lexicon in determining syntactic structure. This course may require LIN 640 taken concurrently. Prereq: LIN/ENG 512 (Analysis of English Syntax) or similar course approved by the Director of Graduate Studies; may require LIN 640 taken concurrently.

LIN 629 ADVANCED HISTORICAL LINGUISTICS. (3)
This course takes as its starting point the theoretical and conceptual overview of historical linguistics presented in LIN 519 (and similar theoretical introductions to historical linguistics). Building on that foundation, we engage in advanced investigations in the study of language history. Topics taught in this course may include one or more of the following: specific focus on historical phonology, morphology, and/or syntax; application of specific theoretical frameworks to the study of historical language change; examination of quantitative and computational approaches to historical linguistic research; analysis of correlations between historical linguistic data and data from other fields (archeology, anthropology, genetics, etc.). Prereq: LIN 519 or consent of instructor.

LIN 640 ADVANCED LABORATORY IN LINGUISTICS (Subtitle required). (1)
An advanced laboratory course offering students the opportunity for hands-on application of specialized theories and methods at the advanced level of graduate training in linguistic research. The lab environment will generally involve both individual and small group work, developing both independent research skills and an ability to engage in collaborative linguistic investigation. May be repeated to a maximum of ten credits. Prereq: LIN 601 or permission of the Director of Graduate Studies; may require concurrent enrollment in an accompanying LIN lecture course.

LIN 695 DIRECTED STUDIES IN LINGUISTICS. (1-3)
This course allows students to undertake study of special topics in linguistics under faculty supervision. May be repeated to a maximum of six credits. Prereq: LIN 601 or permission of the instructor; a previous course at or above the 500 level in the relevant subdiscipline of linguistics is recommended. LIN 695 may not be entirely devoted to content that is regularly taught in another LIN course.

LIN 700 ADVANCED SEMINAR IN PHONETICS (Subtitle required). (3)
This course is a seminar allowing advanced graduate students to pursue original research in linguistic phonetics. Each student will investigate a specific question or issue in the field phonetics: s/he will assign readings related to that topic and will lead discussions of those readings with other seminar participants. (I will likewise assign some readings and lead discussions of them.) Each student will conduct original research on the specific topic that s/he has chosen; this research will culminate in both a written paper and an in-class presentation of her/his findings, analyses and conclusions. The research may be documentary, experimental or computational in nature. May be repeated under different subtitles to a maximum of 6 credits. This course may require LIN 740 taken concurrently. Prereq: LIN 600 (Advanced Phonetics) or similar course approved by Director of Graduate Studies; may require LIN 740 taken concurrently.

LIN 701 RESEARCH SEMINAR IN LINGUISTIC THEORY AND TYPOLOGY. (3)
Students are trained in research and professionalization related to the discipline of linguistics. To that end students will create a 20-30 page research report as a culmination of a set of training milestones that include (1) producing an annotated bibliography, (2) writing an abstract, (3) reflecting on good practice in linguistics research, (4) publicly presenting research, and (5) reflecting on professional aspects of linguistics.Prereq: Second-year standing in the MA program in Linguistic Theory & Typology, LIN 601.

LIN 705 ADVANCED SEMINAR IN MORPHOLOGY (Subtitle required). (3)

Seminar in special topics in linguistic morphology; examples of prospective topics include: morphotactics, morphological complexity, morphological interfaces, paradigm-based morphology. May be repeated under different subtitles to a maximum of six credits. This course may require LIN 740 taken concurrently. Prereq: LIN 605 (Advanced Morphology) or similar course approved by the Director of Graduate Studies; may require LIN 740 taken concurrently.

LIN 706 ADVANCED SEMINAR IN SOCIOLINGUISTICS (Subtitle required). (3)
Advanced seminar in special topics in sociolinguistics; examples of prospective topics include: dialectology, world Englishes, sociophonetics, contact phenomena, historical sociolinguistics, and language and identity. May be repeated under different subtitles to a maximum of six credits. This course may require LIN 740 taken concurrently. Prereq: LIN 606 (Advanced Sociolinguistics) or similar course approved by the Director of Graduate Studies; may require LIN 740 taken concurrently.

LIN 709 ADVANCED SEMINAR IN SEMANTICS AND PRAGMATICS (Subtitle required). (3)
Advanced seminar in special topics in the semantics and pragmatics of natural languages; examples of prospective topics include: quantification, generic sentences, temporal semantics, conditionals, conventional implicature, anaphora. May be repeated under different subtitles to a maximum of six credits. This course may require LIN 740 taken concurrently. Prereq: LIN 609 (Advanced Semantics) or similar course approved by the Director of Graduate Studies; may require LIN 740 taken concurrently.

LIN 710 ADVANCED SEMINAR IN COMPUTATIONAL/CORPUS LINGUISTICS (Subtitle required). (3)
Advanced seminar in special topics in computational and corpus approaches to the study of language; examples of prospective topics include: data visualization, computational simulation and modeling, advanced corpus construction and analysis. May be repeated under different subtitles to a maximum of six credits. This course may require LIN 740 taken concurrently. Prereq: LIN 610 (Advanced Computational/ Corpus Linguistics) or similar course approved by the Director of Graduate Studies; may require LIN 740 taken concurrently.

LIN 712 ADVANCED SEMINAR IN SYNTAX (Subtitle required). (3)
Advanced seminar in special topics in syntax: Examples of prospective topics include ellipsis and anaphora, the dative alternation, comparatives, island constraints, etc. May be repeated under different subtitles to a maximum of 6 credits. This course may require LIN 740 taken concurrently. Prereq: LIN 612 (Advanced Syntax) or similar course approved by Director of Graduate Studies; may require LIN 740 taken concurrently.

LIN 715 ADVANCED SEMINAR IN PHONOLOGY (Subtitle required). (3)
Advanced seminar in special topics in phonology; examples of prospective topics include: prosodic categories, historical phonology, syllable structure, mergers and neutralization, coarticulation, etc. May be repeated under different subtitles to a maximum of six credits. This course may require LIN 740 taken concurrently. Prereq: LIN 615 (Advanced Phonology) or similar course approved by the Director of Graduate Studies; may require LIN 740 taken concurrently.

LIN 719 ADVANCED SEMINAR IN HISTORICAL LINGUISTICS (Subtitle required). (3)
Advanced seminar in special topics in historical linguistics; examples of prospective topics include: historical phonology; grammaticalization; analogical change; the evolution of alignment systems; language contact and language change; quantitative and computational approaches; deep reconstruction; language families and distant genetic relationship; universals of language change. May be repeated under different subtitles to a maximum of six credits. This course may require LIN 740 taken concurrently. Prereq: LIN 629 (Advanced Historical Linguistics) or similar course approved by the Director of Graduate Studies; may require LIN 740 taken concurrently.

LIN 740 LABORATORY FOR ADVANCED LINGUISTICS SEMINARS. (1)

A laboratory course tied directly to an advanced seminar in linguistics at the 700 level, offering students the opportunity for guided application of the advanced theories and methods focused on in the seminar. The lab will provide an environment for individualized work with tools specific to each student's research question (within the framework of the seminar), while at the same time encouraging collaborative investigation and shared discovery. May be repeated to a maximum of five credits. Prereq: Concurrent enrollment in the accompanying LIN 700-level advanced seminar course.

LIN 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work towards the degree must be completed.

# Mathematics

## College of Arts & Sciences

The Department of Mathematics grants the M.A., M.S., and Ph.D. degrees. There are no specific course prerequisites for admission; however, two semesters of advanced calculus, and at least one semester each of algebra and topology are suggested. Both the M.A. and M.S. degrees are 30-credit-hour programs, offered under either Plan A or Plan B.

The Master of Arts degree, featuring a core program that emphasizes mathematical structures, is designed for prospective community college teachers and for students contemplating studies at the Ph.D. level. The Master of Science degree, through an emphasis on the applications of mathematics and the acquisition of computational skills, focuses on careers in business, industry, and government.

The doctorate is a research degree granted on the basis of broad mathematical knowledge and exhibited creative ability. Course work leading to the doctorate is available in the areas of algebra, analysis applied mathematics, discrete mathematics, numerical analysis, partial differential equations, and topology. Each student must pass three comprehensive examinations in one of the six areas of algebra, analysis, discrete mathematics, numerical analysis, partial differential equations, and topology.

**Admission Requirements**
The graduate programs in mathematics do not have formal admission requirements other than those of the Graduate School. Admission, however, is competitive. The admissions committee reviews transcripts, letters of recommendation, the candidate's personal statement, and GRE scores seeking evidence of mastery in proof-based mathematics (such as analysis, topology, and modern algebra), the ability to craft mathematical proofs, and general mathematical maturity.

**Degree Requirements**
In order to be admitted to candidacy for the Ph.D. degree, a student must complete studies in a minor field (either inside or outside the department) and successfully complete three comprehensive examinations as described above. Subsequent work becomes highly specialized through seminars, independent study, and finally, work on a dissertation is an original contribution to the candidate's major field. The faculty has research expertise in algebraic topology, coding theory, ring theory, algebraic geometry, number theory, complex variables, rational approximation, operator theory, partial differential equations, mathematical physics, continuum mechanics, numerical analysis, algebraic combinatorics, and optimization.

The ability to communicate mathematics is an increasingly important professional qualification. The department requires all students to complete a teaching or research assignment during each semester of their enrollment in a graduate mathematics program. Students will be assigned to teach courses at the early undergraduate level. With the approval of the Director of Graduate Studies, a student may substitute an equivalent research effort for the teaching activity.

**Course Descriptions**

MA 501, 502 SEMINAR IN SELECTED TOPICS. (3 ea.)
Various topics from the basic graduate courses. Designed as a course for teachers of lower division mathematics and usually offered in connection with a summer institute. May be repeated to a maximum of six credits. Prereq: Teaching experience in the field of mathematics and consent of instructor.

MA 506 METHODS OF THEORETICAL PHYSICS I. (3)
The course and its sequel (MA/PHY 507) are designed to develop, for first-year graduate students, familiarity with the mathematical tools useful in physics. Topics include curvilinear coordinates, infinite series, integrating and solving differential equations of physics, and methods of complex variables. Work with Green's functions, eigenvalues, matrices and the calculus of variations are included as a part of MA/ PHY 506 and 507. Prereq: PHY 404G or equivalent. (Same as PHY 506.)

MA 507 METHODS OF THEORETICAL PHYSICS II. (3)
Continuation of MA/PHY 506. Fourier and Laplace Transforms, the special functions (Bessel, Elliptic, Gamma, etc.) are described. Work with Green's functions, eigenvalues, matrices and the calculus of variations are included as a part of MA/PHY 506 and 507. Prereq: MA/PHY 506. (Same as PHY 507.)

MA 514 COMBINATORIAL STRUCTURES AND TECHNIQUES. (3)
An introduction to fundamental structures and techniques in combinatorics, including such topics as graphs, trees, colorings of graphs, extremal graphs, bipartite matchings, partially ordered sets, extremal set theory, flows in networks, and the principle of inclusion/ exclusion. Prereq: MA 322 and one additional upper division math course or consent of instructor.

MA 515 LINEAR AND COMBINATORIAL OPTIMIZATION. (3)
Mathematical and computational aspects of linear programming and combinatorial optimization. Linear optimization is introduced by presenting solution techniques (primal and dual simplex) and studying geometric properties and duality for linear systems of inequalities. Asics of combinatorial optimization, including trees, paths, flows, matchings, and matroids, and the corresponding algorithms are presented. Prereq: A course in linear algebra or consent of instructor. (Same as STA 515.)

MA 522 MATRIX THEORY AND NUMERICAL LINEAR ALGEBRA I. (3)
Review of basic linear algebra from a constructive and geometric point of view. Factorizations of Gauss, Cholesky and Gram-Schmidt. Determinants. Linear least squares problems. Rounding error analysis. Stable methods for updating matrix factorizations and for linear programming. Introduction to Hermitian eigenvalue problems and the singular value decomposition via the QR algorithm and the Lanczos process. Method of conjugate gradients. Prereq: MA 322. (Same as CS 522.)
MA 527 APPLIED MATHEMATICS IN THE NATURAL SCIENCES I. (3)
Construction, analysis and interpretation of mathematical models applied to problems in the natural sciences. Physical problems whose solutions involve special topics in applied mathematics are formulated, various solution techniques are introduced, and the mathematical results are interpreted. Fourier analysis, dimensional analysis and scaling rules, regular and singular perturbation theory, random processes and diffusion are samples of selected topics studied in the applications. Intended for students in applied mathematics, science and engineering. Prereq: MA 432G or three hours in an equivalent junior/senior level mathematics course, or consent of instructor. This course is open only to graduate students or undergraduates with engineering standing. (Same as ME 527.)

MA 533 PARTIAL DIFFERENTIAL EQUATIONS. (3)
Elementary existence theorems, equations of first order, classification of linear second order equations, the Cauchy and Dirichlet problems, potential theory, the heat and wave equations, Green's and Riemann functions, separation of variables, systems of equations. Prereq: MA 532 and MA 472G or equivalent.

MA 537 NUMERICAL ANALYSIS. (3)
Floating point arithmetic. Direct methods for the solution of systems of linear algebraic equations. Polynomial and piecewise polynomial approximation, orthogonal polynomials. Numerical integration: Newton Cotes formulas and Gaussian quadrature. Basic methods for initial value problems for ordinary

differential equations. The emphasis throughout is on the understanding and use of software packages for the solution of commonly occurring problems in science and engineering. Prereq: CS/MA 321 or equivalent or graduate standing or consent of instructor. Knowledge of a procedural computer language is required. (Same as CS/EGR 537.)

MA 551 TOPOLOGY I. (3)
Topological spaces, products, quotients, subspaces, connectedness, compactness, local compactness, separation axioms, convergence.

MA 561 MODERN ALGEBRA I. (3)
Algebraic structures, quotient structures, substructures, product structures, groups, permutation groups, groups with operators, and the Jordan-Holder theorem. Prereq: Consent of instructor.

MA 565 LINEAR ALGEBRA. (3)
Review of finite dimensional linear algebra, the rank of a matrix, systems of linear equations, determinants, characteristic and minimal polynomials of a matrix, canonical forms for matrices, the simplicity of the ring of linear mappings of a finite dimensional vector space, the decomposition of a vector space relative to a group of linear mappings and selected topics of a more advanced nature. Prereq: MA 322 or consent of instructor.

MA 570 MULTIVARIATE CALCULUS. (3)
A self-contained course in n-dimensional analysis, including the general form of Stokes' theorem. Prereq: MA 432G or equivalent.

MA 575 PRINCIPLES OF ANALYSIS. (3)
Real and complex numbers, sequences and series, continuity, differentiation, integration, and uniform convergence. Prereq: MA 471G or equivalent or consent of instructor.

MA 601 TEACHING COLLEGE MATHEMATICS. (1)
A seminar for teaching assistants on the basics of teaching mathematics at the college level as well as use of appropriate technology. Includes topics such as syllabus construction, lesson planning, grading assignments, web pages, typesetting mathematics with LaTeX. Required of all new graduate teaching assistants in mathematics. Prereq: Must hold teaching assistantship in mathematics or consent of the instructor.

MA 611 INDEPENDENT WORK IN MATHEMATICS. (3-9)
Reading course for graduate students in mathematics. May be repeated to a maximum of nine credits. Prereq: Major in mathematics, a standing of at least 3.0 and consent of instructor.

MA 613 PROBLEMS SEMINAR IN OPERATIONS RESEARCH. (3)
In this course the student is exposed to the art of applying the tools of operations research to "real world" problems. The seminar is generally conducted by a group of faculty members from the various disciplines to which operations research is applicable. Prereq: MA 617 and STA 525 or consent of instructor. (Same as EE/STA 619).

MA 614 ENUMERATIVE COMBINATORICS. (3)
An introduction to the basic notions and techniques in enumerative combinatorics. The material has applications to polytopal theory, hyperplane arrangements, computational commutative algebra, representation theory and symrnetric functions. Topics include generating functions, the principle of inclusion and exclusion, bijections, recurrence relations, partially ordered sets, the Mobius function

and Mobius algebra, the Lagrange inversion formula, the exponential formula and tree enumeration. Prereq: A graduate course in linear algebra or consent of instructor.

MA 622 MATRIX THEORY AND NUMERICAL LINEAR ALGEBRA II. (3)
Numerical solution of matrix eigenvalue problems and applications of eigenvalues. Normal forms of Jordan and Schur. Vector and matrix norms. Perturbation theory and bounds for eigenvalues. Stable matrices and Lyapunov theorems. Nonnegative matrices. Iterative methods for solving large sparse linear systems. (Same as CS 622.)

MA 625 NUMERICAL METHODS FOR DIFFERENTIAL EQUATIONS. (3)
Numerical solution techniques for boundary value problems for ordinary differential equations, and for parabolic and elliptic partial differential equations. Prereq: CS/MA/EGR 537 or consent of instructor.

MA 628 APPLIED MATHEMATICS IN THE NATURAL SCIENCES II. (3)
Continuation of MA/EM 527 with emphasis on special topics and techniques applied to partial differential equations that occur in various physical field theories. Field equations of continuum mechanics of solids and fluids are reviewed. The method of characteristics, elliptic functions and integrals, Legendre polynomials, Mathieu functions, integral equations and transforms, and the methods of potential theory are examples of selected topics studied in introductory applications. Intended for students in applied mathematics,science and engineering. Prereq: MA/EM 527.

MA 630 MATHEMATICAL FOUNDATIONS OF STOCHASTIC PROCESSES AND CONTROL THEORY I. (3)
A modern treatment of stochastic processes from the measure theoretic point of view with applications to control theory; the basic notions of probability theory, independence, conditional expectations, separable stochastic processes, martingales, Markov processes, second order stochastic processes. Prereq: MA 432G and 670.

MA 633 THEORY OF PARTIAL DIFFERENTIAL EQUATIONS. (3)
A continuation of MA 533. Topics may include hypoelliptic operators and interior regularity of solutions; P(D)-convexity and existence theorems; regularity up to the boundary; applications of the maximum principle; semi-group theory for evolution equations; perturbation methods; well-posed and improperly posed problems; equations with analytic coefficients; a symptotic behavior of solutions; nonlinear problems. Prereq: MA 533.

MA 641 DIFFERENTIAL GEOMETRY. (3)
Tensor products, exterior algebra, differentiable maps, manifolds, geodesics, metric properties of curves in Euclidean fundamental forms, surfaces. Prereq: Consent of instructor.

MA 651 TOPOLOGY II. (3)
Embedding and metrization, compact spaces, uniform spaces and function spaces. Prereq: MA 551.

MA 654 ALGEBRAIC TOPOLOGY I. (3)
Homotopy and homology theories, complexes and applications. Prereq: MA 551, 561, 651 or equivalent.

MA 655 ALGEBRAIC TOPOLOGY II. (3)
Singular homology theory and applications, homology of products, singular and Cech cohomology with applications. Prereq: MA 654.

MA 661 MODERN ALGEBRA II. (3)

Rings, fields of quotients, rings of polynomials, formal power series, modules, exact sequences, groups of homomorphisms, natural isomorphisms, algebras and tensor algebras. Prereq: MA 561 or consent of instructor.

MA 665 RINGS AND MODULES. (3)
This graduate course is a continuation of MA 661. Topics include modules over principal ideal domains, localization, primary decomposition, associated prime ideals, classes of rings and modules such as Noetherian rings and Dedekind domains, tensor and exterior products, exact sequences and resolutions, ideals and varieties, Hilbert's Nullstellensatz. Prereq: MA 561 and MA 661 or consent from instructor.

MA 667 GROUP THEORY. (3)
A study of homomorphisms for groups, finite groups, solvable groups, nilpotent groups, free groups, and abelian groups. Prereq: MA 661.

MA 671 FUNCTIONS OF A COMPLEX VARIABLE I. (3)
Differentiation and integration, contour integration, poles and residues. Taylor and Laurent series, and conformal mapping. Prereq: MA 575 or consent of instructor.

MA 672 FUNCTIONS OF A COMPLEX VARIABLE II. (3)
A continuation of MA 671 to include the Riemann Mapping theorem, Dirichlet problem, multiple valued functions, Riemann surfaces and applications. Prereq: MA 671.

MA 676 ANALYSIS I. (3)
Sequences and series of real and complex numbers, sequences of functions. Riemann-Stieltjes integration, Lebesque measure and integration. Prereq: MA 575 or consent of instructor.

MA 677 ANALYSIS II. (3)
Continuation of MA 676. Absolutely continuous functions on the real line, Lebesque spaces, beginning theory of Banach spaces including the Hahn-Banach, closed graph, and open mapping theorems. Prereq: MA 676 or consent of instructor.

MA 681 FUNCTIONAL ANALYSIS I. (3)
General theory of normed linear spaces including the Hahn-Banach separation theorems, principle of uniform boundedness and closed graph theorem. Dual spaces and representation theorems for linear functionals. Abstract measure theory and Riesz representation theorem for C(X). Prereq: MA 677 or consent of instructor.

MA 714 TOPICS IN DISCRETE MATHEMATICS (Subtitle Required). (3)
Review of recent research in discrete mathematics. May be repeated to a maximum of nine credits. Prereq: Consent of the instructor.

MA 721 SELECTED TOPICS IN NUMERICAL ANALYSIS. (3)
Review of current research in numerical analysis. May be repeated to a maximum of nine credits. Prereq: Consent of instructor.

MA 732 SELECTED TOPICS IN DIFFERENTIAL AND INTEGRAL EQUATIONS. (3)
Advanced topics in theory of differential (ordinary of partial) and integral equations such as topological dynamics, almost periodic solutions, stochastic differential equations, integro-differential and differential-difference equations, generalized functions as solutions, non-linear partial differential equations, singular integral equations.

MA 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

MA 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

MA 751, 752 SELECTED TOPICS IN TOPOLOGY. (3 ea.)
Prereq: MA 651.

MA 764, 765 SELECTED TOPICS IN ALGEBRA. (3 ea.)
Reports and discussion on recent advances in group theory, ring theory, and homological algebra. Prereq: MA 661 and consent of instructor.

MA 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

MA 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

MA 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

MA 773 SELECTED TOPICS IN ANALYSIS. (3)
May be repeated to a maximum of six credits. Prereq: Consent of instructor.

MA 777 MATHEMATICAL SEMINAR. (3)
May be repeated once to a total of six credits. Prereq: Consent of instructor.

MA 778 MATHEMATICAL SEMINAR. (3)
May be repeated once to a total of six credits. Prereq: Consent of instructor.

# Philosophy

## College of Arts & Sciences

**Admission Requirements**
It is expected that candidates admitted to the graduate program in philosophy will: (1) provide proof of completion of a B.A., B.S., or M.A.; (2) have given evidence of superior skills on the GRE; (3) have achieved an overall grade-point average of at least 3.2 (4.0 scale) in all undergraduate course work; and (4) have achieved an overall grade-point average of at least 3.5 in all graduate course work.

**Degree Requirements**
The Department of Philosophy offers programs of study leading to the Doctor of Philosophy and the Master of Arts degrees. Ordinarily, applicants for graduate study in philosophy at the University of Kentucky will enter the Ph.D. program. The purpose of the Ph.D. program is to develop the student's ability to do serious, advanced research in philosophy. The program is designed to accommodate the needs of individual students at an advanced level to pursue a traditional degree in philosophy, engage in interdisciplinary research to prepare for professions outside of philosophy itself, or prepare for the profession of teaching philosophy. The Ph.D. program requires the completion of 66 hours of course work, or 36 hours of course work beyond course work done for an M.A. in philosophy at the University of Kentucky or elsewhere. Normally, 18 of the 36 required post-M.A. hours will be taken for writing the dissertation, leaving 18 of the required hours for non-dissertation course work. Students will need to demonstrate reading competence in at least one foreign language, as well as competence in logic. They will also complete a three course requirement in 20th century philosophy. In their first year in the program, all students will complete two proseminars, one in metaphysics and epistemology and one in value theory. A Qualifying Examination in each student's area of specialization precedes the writing of the dissertation. Students entering the Ph.D. program without an M.A. in philosophy from the University of Kentucky are expected to complete their degree work within five years. Every effort will be made to see that all students entering the Ph.D. program without an M.A. in philosophy from the University of Kentucky are offered five years of financial support (teaching assistantships and/or fellowships), with ongoing funding for those years contingent on the availability of funds and the student's continuing satisfactory progress through the program. Ph.D. students who have completed all requirements for the M.A. in philosophy at the University of Kentucky will be eligible to receive the M.A. in philosophy *en passant*.

**Course Descriptions**

PHI 503 TOPICS IN ANCIENT PHILOSOPHY. (3)
A study of representative texts and issues in Ancient Philosophy with special attention to historical continuity and the interrelations of thinkers and problems. Possible Topics: Pre-Socratic Philosophers, Plato, Aristotle, Stoicism, Epicureanism, Scepticism. May be repeated to a maximum of six credits. Prereq: PHI 260 or consent of the instructor.

PHI 504 ISLAMIC AND JEWISH PHILOSOPHY AND THE CLASSICAL TRADITION. (3)
A study of representative texts and issues in Islamic and Jewish philosophy with special attention to the historical continuity with the Greek philosophical tradition and the interrelations of thinkers and problems. Possible topics: the commensurability of philosophy and (revealed) law, the creation or eternity of the world, the nature of prophecy, the human good, the nature of God and divine language. Prereq: PHI 260 or consent of instructor.

PHI 506 TOPICS IN MEDIEVAL PHILOSOPHY.(3)
An investigation of issues in Medieval Philosophy. Topics will be chosen which illustrate continuity both with Ancient Greek Sources and with problems in Modern Philosophy. Possible Topics: Neo-Platonism, Faith and Reason, Freedom and Determinism, Universals, the Existence of God, Renaissance reactions. May be repeated to a maximum of six credits. Prereq: PHI 260 or the consent of the instructor.

PHI 509 TOPICS IN THE HISTORY OF MODERN PHILOSOPHY.
A selective study of representative issues and texts in modern philosophy, with special emphasis upon historical continuity and interrelation of thinkers and problems. Possible topics: British empiricism; Leibniz and Locke; Descartes and his critics; Hobbes and Rousseau; Hume and Kant; philosophy and the rise of modern science. May be repeated to a maximum of six credits. Prereq: PHI 270 or the consent of the instructor.

PHI 513 NINETEENTH CENTURY PHILOSOPHY. (3)
An examination of the major topics and trends in 19th century philosophy. Prereq: PHI 270 or consent of instructor.

PHI 514 AMERICAN PHILOSOPHY. (3)
A study of the development of philosophy in America from colonial to recent times with attention to religious, political, literary and scientific influences on American thought. The focus will be on the pragmatic spirit that was the moving force from 19th century idealism to 20th century naturalism, with emphasis on the works of such thinkers as Royce, Peirce, James and Dewey.

PHI 515 CONTEMPORARY PHILOSOPHY: THE ANALYTIC TURN. (3)
A survey of several 20th century philosophical movements, such as logical positivism and ordinary language philosophy, whose members agree that careful attention to language is one of the keys to the resolution of philosophical problems. The works of representative thinkers such as Moore, Russell, the Vienna Circle, Wittgenstein and Austin will be studied. Prereq: PHI 320 or 350 or the consent of the instructor.

PHI 516 CONTEMPORARY PHILOSOPHY: PHENOMENOLOGICAL DIRECTIONS. (3)
A study of 20th century philosophies represented by the works of thinkers such as Husserl and Heidegger, Gadamer and Ricoeur, Habermas and Apel. Generally based in a reflection on human experience, these philosophies undertake a radical criticism of common conceptions of human nature while variously emphasizing rationality, ontology, language, or social and historical context. Prereq: PHI 270 or consent of instructor.

PHI 517 EXISTENTIALISM. (3)
A systematic study of the fundamental concepts and problems of existentialism. Readings selected from such philosophers as Kierkegaard, Nietzsche, Sartre, Marcel, Heidegger, and Jaspers. Prereq: PHI 270 or the consent of the instructor.

PHI 519 CRITICAL SOCIAL THOUGHT. (3)
This course provides a pluralistic introduction to major 20th-century paradigms of critical social thought. Critical social thought in philosophy comprises those authors and schools that focus philosophical methods and questions on the analysis of social conditions and/or focus sociocultural methods and questions on the study of philosophy. These include feminist philosophy, Marxist-influenced social theory, poststructuralism, critical race theory, and post-analytic philosophy. Prereq: For undergraduates, PHI 270, 335, or 340 or consent of instructor. For graduate students outside the philosophy department, permission of the instructor.

PHI 530 ETHICAL THEORY. (3)
A study of ethical theories by detailed examination of a few selected works. Theories considered may include naturalism, intuitionism, noncognitivism, utilitarianism, universalizability, and natural law. Prereq: PHI 130, 330, or 335 or the consent of the instructor.

PHI 531 ADVANCED TOPICS IN ETHICS (Subtitle required). (3)
A topical study in ethics, emphasizing, but not restricted to, contemporary issues. Topics may include the nature of practical reason, justification of moral theories, moral luck, amorality and immorality, moral language, and weakness of will. May be repeated to a maximum of six credits under different subtitles. Prereq: One of the following: PHI 130, 305, 330, or 530; or graduate standing.

PHI 535 SOCIAL AND POLITICAL PHILOSOPHY. (3)
A critical examination of some philosophical problems concerning the nature and evaluation of social and political organizations. For example, questions concerning the nature, justification, and limits of political power may be explored in connection with a study of important classical positions. Prereq: PHI 130, 330, or 335 or the consent of the instructor.

PHI 537 PHILOSOPHY OF LAW. (3)
Concept of law; relations between law and morals; nature of legal reasoning; analysis of legal concepts; justification of punishment. Pass/ fail basis only for law students. Prereq: PHI 130, 330, or 335 or the consent of the instructor.

PHI 540 FEMINIST PHILOSOPHY.
An introduction to feminist philosophical theory, including feminist treatments of various questions in metaphysics, epistemology, logic, and value theory, such as: the nature (if any) of the self; the role of perspectives in knowledge; the nature of reason and the criteria for justification in argumentation; feminist theories of morality and feminist theories of social justice.

PHI 545 PHILOSOPHY OF RELIGION. (3)
An analysis of the philosophical issues raised by religion, such as the problem of religious knowledge, the nature of religious language, science and religion, concepts of God, death, and evil. Prereq: PHI 100, 260, or 270 or the consent of the instructor.

PHI 592 AESTHETICS. (3)
Problems of method in aesthetics; major types of aesthetic theory. Aesthetic materials of the arts in literature, music, and the space arts. Form and types of form. Meaning in the arts. Interrelations of the arts. Lectures, discussions, reports. (Same as A-H 592.)

PHI 550 PHILOSOPHICAL PROBLEMS IN KNOWLEDGE AND REALITY. (3)
Critical examination of issues regarding the foundations of knowledge, the nature of reality and the relation between the two. Evidence, belief, certainty, perception and justification will be among problems considered. Understandings of truth, existence, causality, freedom, time, space and matter will also be attended to. Prereq: PHI 100, 260, 270, or 350 or the consent of the instructor.

PHI 560 PHILOSOPHY OF SCIENTIFIC METHOD. (3)
An examination of the logical and epistemological foundations of empirical science, including fundamentals of concept formation, criteria of cognitive significance, issues of explanation, interpretation, and prediction, and testing and confirmation of theories and laws. Prereq: PHI 100, 120, or 350 or the consent of the instructor.

PHI 561 PHILOSOPHICAL PROBLEMS IN THE NATURAL SCIENCES (Subtitle required).(3)
A systematic examination of selected conceptual and/or metaphysical problems in the natural sciences. Possible topics include: reductionism, teleology, causality and determinism, the structure of space-time, and the "anthropic principle" in cosmology. Prereq: PHI 100, 120, or 350 or the consent of the instructor.

PHI 562 PHILOSOPHICAL PROBLEMS IN THE SOCIAL AND BEHAVIORAL SCIENCES. (3)
An examination of various methodological issues and broader philosophical questions of special concern in the social sciences. Among the topics to be studied: the structure of theories and the roles of mathematics and experimentation in the social sciences, the possibility of an objective or value free social science, and the conceptions of human nature presupposed by different schools of social science. Prereq: PHI 100, 120, or 350 or the consent of the instructor.

PHI 565 PHILOSOPHY OF LANGUAGE. (3)
An investigation of problems current in the philosophy of language such as meaning and reference, the nature of analysis, linguistic relativity and the relation of linguistics to philosophy. Prereq: PHI 320 or 350 or the consent of the instructor.

PHI 570 PHILOSOPHY OF HISTORY. (3)
An examination of the theories and methods utilized by historians with special attention to the problems of laws and explanations in history, the nature of historical knowledge and narrative, and the roles of causal judgments and historical understanding. Attention will also be given to theoretical interpretations of history as offered by Marx, Hegel, Toynbee and others. Prereq: PHI 100, 260, or 270 or the consent of the instructor.

PHI 575 PHILOSOPHY OF MIND. (3)
An examination of problems current in the philosophy of mind, such as the concept of person, the relation of mind and body, the relation of minds and machines, knowledge of other minds, and the roles of dispositions and volitions in human action. Attention will be given to the philosophical analysis of such psychological categories as consciousness, feeling, emotion, perception, imagination, thinking and will. Prereq: PHI 100 or 350 or the consent of the instructor.

# Physics

## College of Arts & Sciences

The Department of Physics and Astronomy offers courses and research opportunities leading to the M.S. and Ph.D. degrees in the areas of astronomy and astrophysics, atomic and molecular physics, low and intermediate energy nuclear physics, condensed matter physics, and particle physics. More detailed descriptions of each of these options is available at https://pa.as.uky.edu/pa-faculty-research. Opportunities exist for experimental, theoretical, and computational, and observational research. Excellent laboratory facilities and library materials are available. Major facilities located within the Department are the six-million volt Van de Graaff accelerator and the Center for Advanced Materials. Computational resources include the Lipscomb HPC cluster and access to XSEDE, NERSC, TACC, JLab and BNL. The Department is active in research at many national laboratories, including Jefferson Lab (Virginia), Oak Ridge National Lab (Tennessee), Los Alamos National Lab (New Mexico), Argonne National Lab. (Illinois), Brookhaven National Lab (New York), Triangle Universities Nuclear Lab (North Carolina), National High Magnetic Field Facility (Florida), and Lawrence Berkeley Lab (California) as well as international laboratories including Paul Scherrer Institute (Switzerland), TRIUMF (Vancouver), and MAX-lab (Sweden). In astronomy our students conduct research at facilities including the National Radio Astronomy Observatory (West Virginia), Arecibo Observatory (Puerto Rico), Kitt Peak National Observatory (Arizona), McDonald Observatory (Texas), and the Hubble Space Telescope, and participate in collaborations including Sloan Digital Sky Survey-IV (SDSS-IV) and the Large Synoptic Survey Telescope (LSST). Such activities expose our graduate students to state-of-the-art instrumentation and world-class researchers.

**Admission Requirements**
In addition to the admissions requirements of the Graduate School, the Department of Physics & Astronomy requires graduate applicants to have a sound foundation in undergraduate physics. This foundation will normally include advanced courses in classical mechanics, electromagnetism and quantum mechanics. Applicants are encouraged to take the GRE physics subject exam. Applicants wishing to apply for financial aid in the form of a teaching assistantship, research assistantship or fellowship must supply letters of recommendation from three individuals familiar with their academic capabilities. Such applicants must also submit a written statement of their interests and background in physics.

Admissions requirements are the same for the M.S. and the Ph.D. programs except that applicants for the Ph.D. must possess an interest in carrying out original research at the advanced level.

**Degree Requirements**
The M.S. program can include an emphasis on basic or applied physics or physics education, and students are encouraged to take courses in related programs that satisfy the appropriate academic objectives. Before taking the M.S. oral exam, the M.S. student must have completed (with a B average) 16 (plan A with a thesis) or 20 (plan B without a thesis) credit hours in approved graduate courses.

The Ph.D. degree is a research degree granted on the basis of broad knowledge of physics and in-depth research in a specific area leading to a dissertation (and generally publications in appropriate refereed journals). Students may perform this research at the University of Kentucky or appropriate collaborating institutions. Before taking the Ph.D. qualifying exam, the student must pass the Physics GRE at the 50th percentile or higher and satisfactorily pass core courses in graduate classical mechanics, electromagnetism, quantum mechanics, and statistical mechanics, as well as electives in topical areas of modern physics.

## Course Descriptions

PHY 504 ADVANCED MECHANICS. (3)
A continuation and extension of PHY 404G. Includes dynamics of a particle, rigid bodies, Lagrange's equations, constrained motions, and oscillations. Prereq: PHY 404G, MA 214.

PHY 506 METHODS OF THEORETICAL PHYSICS I. (3)
The course and its sequel (MA/PHY 507) are designed to develop, for first-year graduate students, familiarity with the mathematical tools useful in physics. Topics include curvilinear coordinates, infinite series, integrating and solving differential equations of physics, and methods of complex variables. Work with Green's functions, eigenvalues, matrices and the calculus of variations are included as a part of MA/ PHY 506 and 507. Prereq: PHY 404G or equivalent. (Same as MA 506.)

PHY 507 METHODS OF THEORETICAL PHYSICS II.
Continuation of MA/PHY 506. Fourier and Laplace Transforms, the special functions (Bessel, Elliptic, Gamma, etc.) are described. Work with Green's functions, eigenvalues, matrices and the calculus of variations are included as a part of MA/PHY 506 and 507. Prereq: MA/ PHY 506. (Same as MA 507.)

PHY 508 COMPUTATIONAL PHYSICS. (3)
A laboratory and lecture course using computational and numerical methods to investigate different phenomena in selected topics of physics. Lecture 2 hours; laboratory, 2 hours per week. Prereq: PHY 361.

PHY 520 INTRODUCTION TO QUANTUM MECHANICS I. (3)
A lecture and problem course providing an introduction to the concepts and formalism of quantum mechanics. Primary emphasis is on the time-independent Schrodinger equation and its applications to simple systems such as the harmonic oscillator, the square-well potential, and the hydrogen atom without spin. Prereq: PHY 361, MA 214.

PHY 521 INTRODUCTION TO QUANTUM MECHANICS II. (3)
A continuation of PHY 520, introducing the quantum description of systems with spin, and approximation methods. Principles of quantum mechanics will be illustrated by their application to model systems selected from the fields of atomic, solid state, nuclear and particle physics. Prereq: PHY 520.

PHY 522 THERMODYNAMICS AND STATISTICAL PHYSICS. (3)
Temperature, heat, and entropy, and the Laws of Thermodynamics, as applied to simple systems. Introduction to statistical mechanics and the description of thermodynamic quantities in terms of ensemble averages. Prereq: PHY 361 and MA 214.

PHY 524 SOLID STATE PHYSICS. (3)
Introductory solid state physics with emphasis on the properties of electrons in crystals; crystal structure, crystal diffraction, reciprocal lattice, lattice vibrations and phonons, free electron theory, energy bands in solids, semiconductors. Prereq: PHY 520, or consent of instructor. Engineering standing required for EE 524. (Same as EE 524.)

PHY 525 CONDENSED MATTER PHYSICS. (3)
Optical, magnetic, and transport properties of metals, semiconductors, superconductors, and dielectrics; cooperative phenomena and phase transitions. Prereq: PHY 524 or consent of instructor.

PHY 535 ADVANCED PHYSICS LABORATORY. (3)
An advanced laboratory course emphasizing quantum phenomena in atomic, solid state and nuclear systems. Laboratory techniques include optical spectroscopy, gamma-ray and particle detection, optical

pumping, atomic and nuclear collisions, and interferometer. Prereq: PHY 335, PHY 361. This course is a Graduation Composition and Communication Requirement (GCCR) course in certain programs, and hence is not likely to be eligible for automatic transfer credit to UK.

PHY 545 RADIATION HAZARDS AND PROTECTION. (3)
An analysis of common radiation hazards encountered in medicine, research, industry, and the environment. Regulations and procedures for the safe use of ionizing and nonionizing radiations. Lecture, two hours; laboratory, two and one-half hours. Prereq: PHY/RM 472G or consent of instructor. (Same as RM/RAS 545.)

PHY 546 GENERAL MEDICAL RADIOLOGICAL PHYSICS. (3)
The uses and dosimetric aspects of radiation in medicine will be analyzed, including many basic applications in the fields of diagnostic radiology physics, therapy physics, and nuclear medical physics. Prereq or concur: RM/PHY 472G or consent of instructor. (Same as RM/RAS 546.)

PHY 554 FUNDAMENTALS OF ATOMIC PHYSICS. (3)
A continuation of introductory quantum mechanics with application to atomic systems. Topics include angular momentum, perturbation theory, variational principles, interaction of radiation with matter, atomic spectra and the Zeeman and Stark effects. Prereq: PHY 520.

PHY 555 FUNDAMENTAL NUCLEAR PHYSICS. (3)
Topics covered include nuclear systematics, the nucleon-nucleon-interaction, nuclear models, radioactivity, nuclear reactions, fission and fusion. Prereq: PHY 520.

PHY 556 FUNDAMENTAL PARTICLE PHYSICS.
Introduction to elementary particle physics. Topics include: particle interactions and families, the quark model, symmetrics and conservation laws, particle reactions and decays, quark dynamics, and elements of quantumchrodynamics and electroweak interactions. Prereq: PHY 520.

PHY 567 INTRODUCTION TO LASERS AND MASERS. (3)
Basic principles of laser action, atomic transitions; population inversion; two-and three-level systems; optical resonators; pumping methods; applications. Prereq: EE 360, EE 468G, or PHY 417G, or consent of instructor. (Same as EE 567.)

PHY 570 SEMINAR ON TEACHING PHYSICS. (1)
A seminar course for teaching assistants focused on developing the art and science of teaching physics. Journal articles, books and other texts will be studied to serve as sources of discussion about the teaching and learning activities in the Department of Physics and Astronomy. Prereq: Consent of instructor.

PHY 571 SEMINAR ON TEACHING PHYSICS LABORATORIES. (1)
A seminar course for teaching assistants focused on developing the art and science of teaching physics laboratories. Journal articles, books and other texts will be studied to serve as sources of discussion about the teaching and learning activities in the laboratory classes in the Department of Physics and Astronomy. Prereq: Consent of instructor.

PHY 591 ASTROPHYSICS I – STARS. (3)
The physics of stars from star formation to stellar death. Topics include stellar structure and evolution, energy generation and transport, the later stages of stellar evolution and stellar remnants. Prereq: PHY 361, PHY 416G, PHY 417G or consent of instructor. (Same as AST 591.)

PHY 592 ASTROPHYSICS II – GALAXIES AND INTERSTELLAR MATERIAL. (3)
The physics of galaxies and of the interstellar medium. Topics include galaxy formation, evolution and interaction, phases of the interstellar medium, and physical processes in the interstellar medium. Prereq: PHY 361, PHY 416G, PHY 417G or consent of instructor.
(Same as AST 592.)

PHY 600 SELECTED TOPICS IN ADVANCED PHYSICS. (2-3)
An advanced seminar course on topics related to departmental research programs. Topics may include astrophysics, atomic physics, condensed matter physics, nuclear physics and particle physics. May be repeated to a maximum of nine hours. Prereq: Consent of instructor.

PHY 605 GRAVITY. (3)
An introduction to the general theory of relativity, covering tensor analysis, Einstein's equations, experimental tests, black holes, and cosmology. Prereq: PHY 504 and PHY 417G, or permission of instructor.

PHY 611 ELECTROMAGNETIC THEORY I. (3)
A lecture and problem course treating electrostatics, boundary conditions, potential problems, energy in electric and magnetic fields, magnetic materials and Maxwell's equations. Prereq: PHY 416G; MA 214.

PHY 613 ELECTROMAGNETIC THEORY II. (3)
Continuation and extension of PHY 611. Includes theory of electromagnetic waves and applications to optical phenomena and radiation. Special theory of relativity and the covariant treatment of Maxwell's equations will be discussed. Prereq: PHY 611.

PHY 614 QUANTUM MECHANICS I. (3)
A lecture and problem course dealing with the description of quantum systems in the forms of wave mechanics, matrix mechanics and state vectors. Also includes angular momentum and its addition, and approximation methods for bound states. Prereq: PHY 520.

PHY 615 QUANTUM MECHANICS II. (3)
Continuation of PHY 614 covering time dependent perturbation theory, symmetry and invariance principles, and elementary scattering theory including the method of partial waves. Prereq: PHY 614.

PHY 616 QUANTUM FIELD THEORY I.
An introduction to field theory and many-body theory. Topics include path integral quantization, second quantization, relativistic field theory of bosons and fermions, Green's function and perturbation theory, field theories on the lattice, renormalization of scalar fields and applications to critical phenomena. Prereq: PHY 615, PHY 632.

PHY 624 CONDENSED MATTER THEORY. (3)
Electron band theory, lattice dynamics, electron-phonon and electron-electron interactions, superconductivity and superfluidity, Fermi liquid theory. Prereq: PHY 524, 614, 632.

PHY 630 TOPICS IN NUCLEAR AND INTERMEDIATE ENERGY PHYSICS (Subtitle required). (3)
A course in nuclear physics, hadron physics and particle physics. Emphasis is placed on topics related to departmental research activities at Jefferson laboratory and elsewhere. Such topics include study of the structure and interactions of hadrons in terms of quarks and gluons. They also include low energy tests of Standard Model predictions. (PHY 630 may be repeated to a maximum of six hours when taken under different subtitles.) Prereq: PHY 629.

PHY 632 STATISTICAL MECHANICS. (3)
A lecture and problem course dealing with the thermal properties of matter from the standpoint of statistical mechanics. Topics include thermodynamic properties, perfect gases, and Fermi-Dirac statistics. Prereq: PHY 504, 520, 522.

PHY 639 PHYSICAL PROCESSES IN ASTROPHYSICS. (3)
A lecture and problem course covering the physical processes encountered in astrophysics. The topics covered will include microphysical processes in stellar atmospheres and the interstellar medium, high-energy astrophysics, and basic hydrodynamics and shock waves. Prereq: PHY/AST 592 or consent of instructor. (Same as AST 639.)

PHY 716 QUANTUM FIELD THEORY II. (3)
A continuation of PHY 616. Topics include approximation methods in many body theory and applications to condensed matter and nuclear systems, quantum electrodynamics, radiative corrections, Higgs mechanism and applications to particle physics and superconductivity, introduction to non-Abelian gauge fields and the standard model. Prereq: PHY 616.

PHY 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

PHY 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

PHY 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended. A weekly meeting of the staff and advanced students for the discussion of recent developments in physics and of work in progress in the department. Credit is given to those who satisfactorily present papers. May be repeated to a maximum of eight credi

# Political Science

## College of Arts & Sciences

**Admission Requirements**
Candidates for admission to the graduate program in political science must apply using the Graduate College online application system, which is available at https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=ukgrad. Required information includes (1) a copy of transcripts and GRE scores; (2) a one- to three-page Statement of Purpose explaining why the student wishes to pursue a Ph.D. degree; (3) three letters of recommendation from persons familiar with the applicant's academic performance; (4) a sample of writing on a topic relevant to political science; (5) a resume or curriculum vitae, and (6) TOEFL scores if the applicant's first language is not English. Applications will only be considered for the fall semester.

Applicants will be evaluated on the basis of the Department's judgment of the likelihood of their success in the program as compared with other applicants and considering the limited number of applicants accepted to the program. In evaluating candidates, the Department will consider the totality of their records, including grades, test scores, letters of recommendation, writing samples, and other relevant information. The department usually only accepts applicants to the PhD. program. Students who do not have political science undergraduate majors are welcome in this program.

**Degree Requirements**
The Political Science Department offers both the M.A. and Ph.D. degrees. The M.A. degree may be earned under either of two plans: Plan A requires at least 24 hours of course work and a thesis; Plan B requires at least 30 hours of course work and examination in three fields of political science, or in two fields of political science and one outside field. Under either plan, the student must take at least two-thirds of the required semester hours in political science, and at least half of the political science work must be in courses open only to graduate students. A candidate for the Plan B master's degree must pass a foreign language requirement or an analytical skills requirement.

The Ph.D. program is divided into a general phase and a specialized phase. Entering students spend their first year in the general phase, which includes proseminars in methodology and in at least four major fields of political science. Students who have previously taken graduate work may be exempt from some of these proseminars. At the end of the first year of graduate work, the student is evaluated by a departmental committee which determines whether the general phase has been satisfactorily completed.

During the specialized phase of the graduate program, the student's work is based on a program of study prepared with their Advisory Committee. The student takes advanced work in at least two substantive fields in political science. The student completes qualifying exams prior to defending the prospectus for the dissertation. The qualifying examination in political science consists of a written and oral examination in each of the two substantive fields specified in the student's program. The examination is given by the Field or Advisory Committee. The student then writes a dissertation and defends it in a final oral examination.

Candidates for the Ph.D. in political science must demonstrate proficiency in a research skill. The required research skill will consist of additional quantitative skills or proficiency in a foreign language that is directly pertinent to the student's research interests.
Additional details about requirements may be secured from the Department of Political Science.

PS 538 CONFLICT AND COOPERATION IN LATIN AMERICAN RELATIONS. (3)
An examination of (1) national development strategies as determinants of Latin American foreign policies, (2) the origins and political consequences of economic nationalism, (3) historical patterns of U.S. response to reformist and/or revolutionary change, (4) the role of extra-continental contenders for influence in the Americas, and (5) at least one contemporary foreign policy issue in inter-American relations. Prereq: PS 428G or permission of instructor.

PS 545 AMERICAN POLITICAL THOUGHT. (3)
This course explores the American tradition of political thought, its formation, and the ways it is involved in major problems of culture, political economy, ideology, and identity. Alternative ideas of work, power, political obligation, science and technology, and related issues are examined. Relationships of theory and practice, public and private, and government and society are analyzed. Prereq: UN3 status.

PS 557 KENTUCKY GOVERNMENT AND POLITICS.
A study of current political issues and institutions in Kentucky.

PS 566 CONSTITUTIONAL INTERPRETATION. (3)
A study of the political and the philosophical origins of the U.S. Constitution and of the competing and overlapping philosophies about how it should be interpreted in modern times. Prereq: One of the following: PS 461G, PS 465G, or HIS 573.

PS 572 INTRODUCTION TO QUANTITATIVE POLITICAL METHODOLOGY. (3)
Introduction to quantitative research methods used by political scientists. The course introduces students to data sets and statistical software commonly used in political science, and basic analysis techniques used to analyze political data. Prereq: For undergraduates, completion of PS 372.

PS 580 THE BUDGETARY PROCESS. (3)
A study of the development of budgetary techniques in the United States, the uses to which budgets are put, the roles of the budgetary process in budgetary politics and in the functioning of government, and the distribution of government resources through the budget.

PS 620 COMPARATIVE POLITICS: THEORY AND METHOD. (3)
A study of the evolution and development of comparative government and politics within the discipline with particular emphasis upon the formulation, application, and limitations of the theories, taxonomies and conceptual frameworks employed in comparative research.
PS 671 STRATEGIES OF INQUIRY IN POLITICAL SCIENCE. (3)
Analysis of research paradigms for political science, and investigation into the foundations of scientific inquiry. Emphasis on topics such as explanation, concept formation, the construction and function of theory, data, and verification.

PS 672 INTRODUCTION TO TECHNIQUES OF POLITICAL RESEARCH. (3)
Basic techniques of data collection, coding, and processing applicable to political research are introduced. Various statistical techniques of data analysis are discussed and applied to political data. Prereq: PS 671, familiarity with appropriate statistical methods and consent of instructor.

PS 674 PROSEMINAR IN THEORIES OF INTERNATIONAL POLITICS. (3)
A survey of the major theoretical approaches to the study of international systems and processes.

PS 680 PROSEMINAR IN POLITICAL INSTITUTIONS AND PROCESS. (3)

A thorough survey of recent literature on political institutions and the political process, including political parties and the legislative and executive processes, at the national and sub-national levels.

PS 681 AMERICAN POLITICAL BEHAVIOR. (3)
A proseminar providing a survey of major theoretical approaches and empirical research in the field of American political behavior. Intended to explore various individual-level models of behavior and then apply them to specific forms of political behavior.

PS 684 PROSEMINAR IN POLICY STUDIES. (3)
A survey of the various approaches to the study and analysis of public policy impacts. Special emphasis will be given to the normative and ethical implications of alternative conceptualizations of the policy process and the role of the policy analyst.

PS 690 PROSEMINAR IN CONTEMPORARY POLITICAL THEORY. (3)
An examination of contemporary political theories, especially their relationships to theoretical issues in policy analysis. Major problems such as inquiry and change, ideology and power, and knowledge and authority will be studied, particularly in the context of public policy.

PS 711 TOPICAL SEMINAR IN POLITICAL SCIENCE (Subtitle required). (3)
Topic and instructor will vary from semester to semester. Faculty member presents seminar on topic in which he has particular research competence or special expertise. May be repeated under different subtitle to a maximum of nine hours. Prereq: Two semesters of graduate work and consent of instructor.

PS 731 INTERNATIONAL SECURITY/CONFLICT ANALYSIS. (3)
The seminar examines international security affairs, with an emphasis on the sources and nature of conflict, and methods of conflict, the patterns of conflict, and methods of conflict resolution and regulation, both within states and among them. Prereq: Consent of instructor.

PS 732 COMPARATIVE FOREIGN POLICY (Subtitle required).
This seminar will emphasize comparative analysis of foreign policy. It will compare the foreign policies of a number of countries in order to develop propositions and arrive at generalizations regarding foreign policy process and behavior. The comparative focus will vary. May be repeated to a maximum of six credits under different subtitles.

PS 733 INTERNATIONAL POLITICAL ECONOMY. (3)
The course examines the contending theoretical perspectives and substantive functional issues underlying the politics of international economic relations. Special attention is paid to international trade and money, the politics of North-South relations, and comparative foreign economic policies. Prereq: Consent of instructor.

PS 734 GREAT BOOKS OF WORLD POLITICS. (3)
Overview of classic texts on war and statecraft. Prereq: Consent of instructor. (Same as DIS 710.)

PS 735 DEMOCRACY AND INTERNATIONAL AFFAIRS. (3)
Discussion of the impact of the global spread of democracy on foreign policy and war. Prereq: Graduate status and consent of instructor. (Same as DIP 715.)

#PS 736 COMPARATIVE POLITICAL BEHAVIOR. (3)
An examination of major theoretical approaches to the study of public opinion and mass behavior around the world. The course focuses on the study of the origins and consequences of citizens' political attitudes

and behaviors. Students are exposed to experimental and nonexperimental methodologies as well as statistical techniques for the analysis of survey data. Prereq: PS graduate student or consent of instructor.

PS 737 TRANSNATIONAL ORGANIZATIONS AND PROCESSES. (3)
An analysis of approaches to the study of international, transnational and regional political and economic organizations and processes within the context of world politics. An examination of the impact of these activities and processes on contemporary problems of world order. Prereq: Graduate student status.

#PS 738 CIVIL CONFLICT. (3)
This seminar covers a systematic theoretical and empirical study of civil conflict. The readings are focused on the most recent empirical work in this area, though a handful of the more traditional and case-oriented research will arise throughout the course. A major component of this course is the production of a research paper, which will apply and extend the topics into an original piece of research.

#PS 739 COMPARATIVE POLITICAL INSTITUTIONS. (3)
This class provides a survey of comparative political institutions across the globe with an emphasis on the concepts used to understand how institutions structure political outcomes. Students also learn about how and why political institutions vary across the globe and the consequences of institutions for a range of political phenomena. Prereq: PS graduate student or consent of instructor.

#PS 740 HUMAN RIGHTS. (3)
This seminar examines the influence of domestic institutions and the international human rights regime on patterns of government respect for human rights cross-nationally. Prereq: PS graduate student or consent of instructor.

#PS 741 INTERNATIONAL SECURITY. (3)
This political science seminar is intended expose students to a range of scholarly literature on international security. We will discuss conflict emergence, recurrence, and resolution, with attention to the roles of tools such as arms, alliances, trade, mediation, international law, and peacekeeping. Prereq: PS graduate student or consent of instructor.

PS 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

PS 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

PS 750 POLITICAL PARTIES AND ELECTIONS IN AMERICA.
A study of the organization and functions of political parties, nominations and elections, and voting alignments. Prereq: An undergraduate political parties course or consent of instructor.

PS 756 REGIONAL POLITICS (Subtitle required). (3)
This seminar focuses on the domestic politics and international relations of countries within a specific geographic region (Latin America, the Commonwealth of Independent States, Western Europe, Africa, East Asia, etc.). Theoretical foci include political economy, policymaking, regional integration and national security, development, and political culture.

PS 760 SEMINAR IN JUDICIAL PROCESS. (3)
A thorough survey of literature in judicial process, focusing largely on judicial recruitment and decision-making, litigants' strategies, the implementation and impact of judicial policies and relations between the courts and other power centers. May be repeated to a maximum of six credits.

PS 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

PS 775 SEMINAR IN PUBLIC POLICY. (3)
A political analysis of the domestic policy process including the formation, implementation, and impact of policy.

PS 778 RESEARCH PROBLEMS IN TRANSNATIONAL POLITICS. (3)
This seminar focuses on research strategies that can be utilized in dealing with problems in transnational politics. May be repeated to a maximum of six hours with consent of the instructor. Prereq: PS 620 or PS 674.

PS 780 LEGISLATIVE BEHAVIOR. (3)
A study of recent research in the legislative process emphasizing both the substantive and methodological aspects. Prereq: An upper division course in the legislative process or consent of instructor.

PS 795 SPECIAL PROBLEMS IN POLITICAL SCIENCE. (1-3)
Specific programs of readings are developed to meet the needs of individual students. May be repeated to a maximum of six credits for master's students and 12 credits for Ph.D. students. Prereq: Any 600 level course in political science or consent of the Director of Graduate Study.

PS 796 DIRECTED RESEARCH IN POLITICAL SCIENCE. (1-3)
Individual research in a particular field of political science under the supervision of selected faculty. Open to advanced graduate students who are prepared for intensive study and research beyond that offered in regular classes in each field. May be repeated to a maximum of six hours. Prereq: Consent of the instructor and the director of graduate studies.

# Psychology

## College of Arts & Sciences

The department offers the Ph.D. degree in psychology in two programs: clinical psychology and experimental psychology, the latter subdivided into cognitive studies/developmental studies, behavioral neuroscience/psychopharmacology, and social psychology. The major goal of the doctoral programs in psychology is to prepare the student for a career in research in both academic and non-academic settings and in teaching.

The area of specialization in clinical psychology provides academic courses, practica, and internships which permit students to combine their teaching and research activities with a clinical career in the mental health field. Special areas of expertise among clinical faculty include psychological assessment, child clinical psychology, health psychology, neuropsychology, personality, psychopathology and diagnosis, psychotherapy, research methodologies, and substance abuse. Clinical training is facilitated by early placement of students at a variety of sites including medical centers, a federal corrections facility, community mental health centers, state and private psychiatric hospitals, and the department's own psychological clinic. The clinical program is fully accredited by the American Psychological Association.

The concentration in behavioral neuroscience and psychopharmacology is designed to train students broadly, through integrated course work and individualized training, in the general theoretical principles and technical approaches used to investigate the biological and behavioral mechanisms of alcohol and drug abuse. Psychopharmacological approaches to understanding basic principles of learning are also emphasized. Numerous collaborative efforts exist between faculty including those in other departments and these are strongly encouraged. Students receive a concentrated laboratory experience ranging from cell culture models, animal models (birds, mice or rats) or human subjects.

The cognitive studies area provides integrated course work and individualized training designed to prepare students for a career in research and teaching. Emphasis is placed on theoretical analysis and empirical studies involving adult cognition, cognitive development, animal cognition and the application of cognitive theories to everyday cognition. Scholarship in basic theory is the primary focus of training, but students interested in applying their training to nonacademic settings (e.g., business, law) may do so.

The developmental studies area focuses on typical and atypical development in human infancy and childhood, and the major aim of graduate training is to develop strong theoretical and methodological foundations in these fields. The primary emphasis is on research, while students are also encouraged to develop expertise in teaching. Training is tailored to individual students' needs. The developmental area is associated with the Children at Risk research cluster, which involves faculty and students from many programs across campus and provides opportunities for multi-disciplinary research and training.

The area in social psychology is designed to provide intensive experience in research with members of the social psychology faculty, with the aim of developing in the student a strong theoretical and research competence with complex social phenomena. Traditions of both experimental laboratory research and naturalistic study are utilized; emphases include theoretical and applied significance of research. Each student's course of study is individually designed to fit that student's particular needs and interests. Research experience in related behavioral sciences (for example, communication, marketing, behavioral sciences) is encouraged. During the first year of the doctoral program, students in all areas gain experience in the major content areas of psychology and in psychological statistics. Thereafter, the student and the

advisor construct a program of study consistent with the academic interests and professional goals of the student. M.A. and M.S. degrees are awarded under Plan A only, as one component of doctoral training.

**Admission Requirements**

The minimum departmental standards for admission to graduate work in psychology include an undergraduate overall average of B or better, a satisfactory score on the verbal and quantitative portions of the Graduate Record Examination (GRE) and three letters of recommendation. All admissions are on a competitive basis. For additional information concerning the program in psychology and such matters as financial support, contact the Director of Graduate Studies, Department of Psychology or see https://psychology.as.uky.edu/.

**Course Descriptions**

PSY 500 HISTORY AND SYSTEMS OF PSYCHOLOGY. (3)
The course reviews the historical context, influences, and individuals instrumental in the development of psychological research, theories, and systems. Readings and discussions of original sources and contemporary research are emphasized. Prereq: Completion of one of the following: PSY 427, 430, 440, 450, 456, 460, or 552.

PSY 534 CHILD PSYCHOPATHOLOGY. (3)
The course is designed to cover issues in the classification, assessment, and treatment of the major childhood behavior disorders, including attention deficit and conduct disorders, learning disabilities, depression, and child abuse. In addition, issues relating to parent-child relations, divorce, and children's attributions will be covered. Prereq: Completion of one of the following: PSY 427, 430, 440, 450, 456, 460, or 552.

PSY 535 PSYCHOLOGICAL TESTING. (3)
A general orientation to the field of psychological testing. Introduction to the principles and methods of psychological testing, and a survey of the various kinds of psychological tests. Prereq: Completion of one of the following: PSY 427, 430, 440, 450, 456, 460, or 552.

PSY 552 EVOLUTIONARY PSYCHOLOGY. (4)
The course deals with sociobiology, the evolutionary basis of behavior. It examines a range of behavior from responses that are genetically predisposed to the highly flexible conceptual behavior shown by humans, including the origins of belief systems. A required laboratory component consists of applications of techniques used to study flexible animal behavior. Students will learn to train an animal to perform several tasks including a stimulus discrimination. Prereq: Declared major in Psychology, PSY 195, PSY 215, 216, 311, or consent of instructor. This course is a Graduation Composition and Communication Requirement (GCCR) course in certain programs, and hence is not likely to be eligible for automatic transfer credit to UK.

PSY 561 ADVANCED TOPICS IN FOUNDATIONS OF CLINICAL PSYCHOLOGY (Subtitle required). (3)
Selected topics in clinical psychology such as health psychology and introduction to clinical psychology. Course topics will vary from year to year, providing students with a diversity of material in the area of clinical psychology. May be repeated to a maximum of six credits. Prereq: Completion of one of the following: PSY 427, 430, 440, 450, 456, 460, or 552.

PSY 562 ADVANCED TOPICS IN COGNITIVE PSYCHOLOGY (Subtitle required). (3)
This course is designed to provide in-depth study of a specialized topic within cognitive psychology. Topics will vary from year to year and may include: theories of memory; theories of reading; cognition and emotion; connectionist modeling; engineering and environmental psychology. May be repeated to a maximum of six credits. Prereq: Completion of one of the following: PSY 427, 430, 440, 450, 456, 460, or

552.

PSY 563 ADVANCED TOPICS IN DEVELOPMENTAL PSYCHOLOGY (Subtitle required). (3)
This course is designed to provide in-depth study of a specialized topic in developmental psychology. Topics will vary from year to year and may include: cognitive development; development of memory and attention; development of reasoning and problem solving; and media use and children's development. May be repeated to a maximum of six credits. Prereq: Completion of one of the following: PSY 427, 430, 440, 450, 456, 460, or 552.

PSY 564 ADVANCED TOPICS IN LEARNING (Subtitle required). (3)
The course will provide in-depth study of specialized topics in the area of higher learning in animals. Topics will vary from year to year and may include concept learning, memory, imitation, language, and cooperation. The course will also examine these processes from the perspective of sociobiology. May be repeated to a maximum of six credits. Prereq: Completion of one of the following: PSY 427, 430, 440, 450, 456, 460, or 552.

PSY 565 ADVANCED TOPICS IN NEUROSCIENCE (Subtitle required). (3)
Advanced coverage of recent research within the field of behavioral neuroscience. The course will provide in-depth coverage of one topic, such as developmental psychobiology, neurobiology of learning and memory, or the biological basis of reward. May be repeated to a maximum of six credits. Prereq: Completion of one of the following: PSY 427, 430, 440, 450, 456, 460, or 552.

PSY 566 ADVANCED TOPICS IN SOCIAL PSYCHOLOGY (Subtitle required).(3)
Selected topics exploring aspects of social psychology. The content of the course will vary from year to year, focusing on topics such as social cognition, the self, cross-cultural psychology, personal relationships, consumer and organizational psychology, and nonverbal communication. Class format will be determined by the instructor, with some years having a small seminar structure and other years having a more traditional lecture format. May be repeated to a maximum of six credits. Prereq: Completion of one of the following: PSY 427, 430, 440, 450, 456, 460, or 552.

PSY 603 PSYCHOPATHOLOGY. (3)
An examination of the descriptive, theoretical, and research material relevant to the major classes of disturbed behavior. Special attention is devoted to the stylistic features of neurotic and psychotic communication and behavior. Prereq: Enrollment in the graduate program in clinical psychology.

PSY 610 PSYCHOMETRICS. (3)
Analysis and interpretation of human measurements. The course deals with the application of basic inferential procedures to the analysis and interpretation of psychological data. Required of all graduate students in psychology. Prereq: A course in statistics.

PSY 611 PSYCHOLOGICAL RESEARCH. (3)
The course deals with the design of psychological experiments. Emphasis is upon issues concerning choice of appropriate designs for psychological research. Both experimental and correlational research designs are studied. Required of all graduate students in psychology. Prereq: PSY 610 or permission of instructor.
PSY 616 RESEARCH DESIGN IN CLINICAL PSYCHOLOGY. (3)
Concentrates on current methodologies utilized in clinical research and on the application of sophisticated techniques to traditional research problems. Students are expected to master critical skills for the evaluation of research designs and are encouraged to explore creative approaches to research in important clinical areas. Prereq: Enrollment in the graduate program in clinical psychology.

PSY 620 PROSEMINAR IN HISTORY AND SYSTEMS OF PSYCHOLOGY.
A study of the philosophical precursors and scientific traditions of psychology. The schools of 19th and 20th century psychology are surveyed as are the major theoretical positions and content areas of contemporary psychology. Prereq: Graduate standing in Department of Psychology or Department of Educational and Counseling Psychology. (Same as EDP 615.)

PSY 621 PROSEMINAR IN LEARNING. (3)
An intensive treatment of concepts, methodology, and current developments in the field of learning.

PSY 622 PROSEMINAR IN PERSONALITY. (3)
An intensive treatment of theories, methods of investigation and current developments in the area of personality. Prereq: Enrollment in graduate program in Psychology or consent of instructor.

PSY 623 PROSEMINAR IN SENSATION AND PERCEPTION. (3)
An intensive examination of the facts, methods and concepts involved in the study of sensory and perceptual processes. Prereq: Consent of instructor.

PSY 624 PROSEMINAR IN SOCIAL PSYCHOLOGY. (3)
An intensive examination of the methods and data of social psychology with emphasis on social attitudes. Prereq: PSY 344 or 314 or equivalent.

PSY 625 PROSEMINAR IN DEVELOPMENTAL PSYCHOLOGY. (3)
An intensive treatment of theoretical and experimental literature, both classical and contemporary, in developmental psychology. Prereq: Admission to the graduate program in psychology or consent of instructor.

PSY 626 SURVEY OF HEALTH PSYCHOLOGY. (3)
A survey of the field of health psychology. It will explore the ways in which social and psychological research contribute to an understanding of health and illness behavior. Prereq: Graduate or professional standing and consent of instructor. (Same as BSC 626.)

PSY 627 PROSEMINAR IN PHYSIOLOGICAL PSYCHOLOGY. (3)
An intensive examination of theories, methods of investigation, and current developments in the field of physiological psychology. Prereq: Graduate standing or permission of instructor. (Same as PGY 627.)

PSY 628 PROSEMINAR IN COGNITIVE PROCESSES. (3)
An intensive examination of theoretical and empirical evidence concerning mental processes in the adult human, including attention, memory, language, and problem-solving. Prereq: Graduate standing in psychology, or consent of instructor.

PSY 629 INTRODUCTION TO CLINICAL PSYCHOLOGY. (2)
Offered conjointly by the clinical faculty; covers the broad perspectives of clinical psychology, methods, history, ethics, and professional issues. Prereq: Enrollment in the graduate program in psychology.

PSY 630 CLINICAL METHODOLOGY I. (2)
An intensive survey and evaluation of tests of intelligence and objective methods of assessment of normal and abnormal personality. Special emphasis is given to major theoretical issues and relevant quantitative methods. Prereq: Enrollment in the graduate program in Clinical Psychology.

PSY 631 PRACTICUM IN CLINICAL METHODOLOGY I. (2)

Clinical interviewing and practice in writing reports on behavioral observations, content of verbalization, and case history data. Practice in administration, scoring and interpretation of intelligence tests and objective personality tests. Laboratory, four hours. Prereq: Enrollment in graduate program in Clinical Psychology and prior or concurrent enrollment in PSY 630.

PSY 632 CLINICAL METHODOLOGY II. (2)
Theoretical issues, quantitative methods and research findings on the projective methods of assessment of normal and abnormal personality. Prereq: PSY 630, and enrollment in graduate program in psychology.

PSY 633 PRACTICUM IN CLINICAL METHODOLOGY II. (2)
Practice in the administration and scoring of projective techniques and batteries of clinical tests. Laboratory, four hours. Prereq: PSY 630 and 631, and enrollment in graduate program in clinical psychology. Prereq or concur: PSY 632.

PSY 636 SYSTEMS OF PSYCHOTHERAPY. (3)
An intensive examination of the major theoretical and research approaches to therapeutic behavior change. Prereq: PSY 632 and 633, and enrollment in graduate program in clinical psychology.

PSY 637 PRACTICUM IN PSYCHOLOGICAL ASSESSMENT AND INTERVENTION. (1-3)
Supervised experience in the techniques of psychological assessment and intervention with adults, children, families, and groups. Laboratory, two to six hours per week. May be repeated up to sixteen hours. Prereq: PSY 636 and enrollment in graduate program in clinical psychology.

PSY 638 DEVELOPMENTAL NEUROBIOLOGY. (3)
An explanation of the processes which contribute to the development of the nervous system. Neurophysiological, cell biological and molecular approaches to cell differentiation, neuronal pathfinding and synapse formation and stabilization will be explored and discussed. Examples will be drawn from both vertebrate and invertebrate preparations. Prereq: BIO 535 or consent of instructor. (Same as ANA/ BIO/ PGY 638.)

PSY 639 PRACTICUM IN PSYCHOLOGICAL ASSESSMENT AND INTERVENTION SUMMER WORK. (0)
Supervised experience in the techniques of psychological assessment and intervention with adults, children, families, couples and/or groups that occurs during the summer, i.e., outside of the academic year (Fall/Spring semesters). This course does not fulfill one of the program requirements for group supervision but it does meet legal and ethical requirements for supervision during practicum training. May be repeated. Prereq: PSY 636 and enrollment in graduate program in clinical psychology.

PSY 708 INTERNSHIP IN CLINICAL PSYCHOLOGY. (0)
Full time practice in an APA-accredited internship setting, with on-site supervision provided by the internship setting and with academic supervision provided by the Director of Clinical Training at the University of Kentucky. May be repeated twice. Prereq: All course work in doctoral program in clinical psychology, approved dissertation proposal, and consent of Director of Clinical Training.

PSY 710 TOPICAL SEMINAR IN CLINICAL PSYCHOLOGY. (3)
A selected topics course designed to cover content areas which are not being met by the current faculty; may be taught by persons with special qualifications from the community or by existing faculty exploring new areas. The topics, which may be offered as the need arises, may include on a semester basis mental retardation, intensive psychoanalytic theory, psychopharmacology, etc. May be repeated to a maximum of six credits. Prereq: As specified by instructor.

PSY 766 TOPICAL SEMINAR IN BEHAVIORAL NEUROSCIENCE. (3)
A study of selected topics in behavioral neuroscience with emphasis on recent research and theory. May be repeated to a maximum of nine credits. Prereq: Consent of instructor. This course may be elected to fulfill requirements in the psychology and physiology graduate programs. (Same as PGY 767.)

PSY 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

PSY 772 TOPICAL SEMINAR IN LEARNING. (3)
The study of selected topics in the learning area with emphasis on the recent experimental and theoretical literature. May be repeated to a maximum of six credits. Prereq: Consent of instructor.

PSY 776 SEMINAR IN DEPENDENCY BEHAVIOR. (3)
The course is designed to explore theories of dependency behavior by examining the concept of dependency as it can be applied to the study of various phenomena including alcohol use and abuse; dependence on other psychoactive substances; institutional dependency; dependency in work settings; and poverty and welfare. Prereq: Consent of instructor. (Same as ANT/SOC/BSC 776.)

PSY 778 TOPICAL SEMINAR IN DEVELOPMENTAL PSYCHOLOGY.
An advanced seminar in selected topics in human development, including cognition, learning, language, personality, socialization, life span issues, and developmental aspects of psychopathology. Prereq: PSY 625 and enrollment in graduate psychology program, or consent of instructor. May be repeated a maximum of six credits.

PSY 779 TOPICAL SEMINAR IN SOCIAL PSYCHOLOGY. (3)
Each semester some topic in the field of social psychology, such as attitudes and beliefs, structures and function of social groups, social determinants of behavior, leadership, and morale will be studied intensively. May be repeated to a maximum of six credits. (Same as SOC 779.)

PSY 780 PROBLEMS IN PSYCHOLOGY. (1-3)
This number is used for topical seminars taught on an experimental basis or covering special material that may not be presented again. May be repeated to a maximum of 12 hours credit.

PSY 781 RESEARCH PARTICIPATION. (1)
Emphasis on the team approach to research. Designed primarily for first year graduate students. May be repeated to a maximum of four credits. Laboratory, two to four hours. Prereq: Enrollment in the graduate program in psychology.

PSY 790 RESEARCH IN PSYCHOLOGY. (1-12)
A minimum of three hours per credit a week is required on research conducted in consultation with the instructor. May be repeated as necessary with the approval of the Director of Graduate Studies.

# Sociology

## College of Arts & Sciences

The Sociology graduate program offers Master of Arts and Doctor of Philosophy degrees. Plan A or B are both options for the Master's degree. Graduate students pursuing a Ph.D. Choose an area of specialization related to the following faculty areas of expertise: Crime, Law, and Deviance; Global Work and Politics; Rural, Environmental, and Community Sociology; Health and Medical Sociology; and Social Inequalities: Race, Class, and Gender. Additionally, students must demonstrate competence in theory and methods prior to taking the qualifying examination in their specialization area.

To aid in financing graduate education, a number of assistantships are available to qualified students. Outstanding students may compete for fellowships.

Sociologists at the University of Kentucky in the Departments of Sociology, Community and Leadership Development (in the College of Agriculture, Food, & Environment), and Behavioral Science (in the College of Medicine) carry on a substantial variety of research projects, consultative activities, extension education programs, and community services. Specialized experience and training are available to graduate students in rural sociology at the Agricultural Experiment Station and opportunities for applied sociology experience are available in the Cooperative Extension Service.

Assistantships and traineeships in health-related areas are available to graduate students in Behavioral Science in the College of Medicine.

Opportunities for multidisciplinary work exist in conjunction with centers and programs at the University of Kentucky including African American and Africana Studies, Appalachian Center and Appalachian Studies, the Center for Research on Violence Against Women, Sanders-Brown Center on Aging, Prevention Research Center, Center on Drug and Alcohol Abuse, Center for Poverty Research, the Quantitative Initiative for Policy and Social Research, Committee on Social Theory, International Studies, and Gender and Women's Studies. Assistantships and traineeships are also available to qualified sociology graduate students through these centers and programs.

**Admission Requirements**
The percentile rankings of the three components of the Graduate Record Examination (GRE) must average (mean) at least 50 percent. The following additional materials are required to apply for admission to the graduate program in Sociology, and should be sent directly to the Graduate School's ApplyYourself site. Any inquiry on the program requirements and the admission process should be directed to: Director of Graduate Studies, Department of Sociology, 1515 Patterson Office Tower, University of Kentucky, Lexington, KY 40506-0027:

- A statement of goals and reasons for pursuing an advanced degree in sociology. It is helpful if applicants also address the field(s) of interest within sociology they may wish to pursue in their graduate studies.
- A sample of writing, preferably in the form of a term paper, an extensive essay, or a draft of a senior thesis. If the applicant has completed a master's degree, she or he may submit one or two chapters from the master's thesis. Please do not submit a copy of the entire master's thesis.
- Three letters of recommendation.
- Application form for fellowships and assistantships, if the applicant wishes to be considered for a teaching assistantship, research assistantship, traineeship, or fellowship. This application form is available at: https://soc.as.uky.edu/sites/default/files/application.pdf.

SOC 506 SOCIOLINGUISTICS. (3)
This course is an advanced survey of current areas of research in sociolinguistics. Topics include dialectology, language variation and change, interactional sociolinguistics, language and gender, bilingualism, and language contact. Prereq: LIN 221 or LIN 222 or SOC 101 or ANT 220. (Same as ANT/LIN 506.)

SOC 508 DISCOURSE ANALYSIS. (3)
This course is an introduction to the methods used in various approaches to discourse and textual analysis. The approaches examined include Speech Act Theory, Conversation Analysis, Ethnographic Discourse Analysis, Discourse Pragmatics, Interactional Sociolinguistics, Variation Analysis, and Critical Discourse Analysis. Special attention is giving to practical experience analyzing both spoken and written discourse. Prereq: LIN 221 or LIN 222 or SOC 101 or ANT 220. (Same as LIN 508.)

SOC 517 RURAL SOCIOLOGY. (3)
A sociological study of the issues relevant to rural communities. Topics may include transformations in rural communities; the agrifood system; and the natural environment in the U.S. and the world. Prereq: Graduate student status; undergraduates with consent of instructor only. (Same as CLD 517.)

SOC 534 SOCIOLOGY OF APPALACHIA. (3)
A sociological study of selected social issues facing Appalachian communities, with an emphasis on placing regional political economy, society and culture in a global context. Prereq: Sociology, Anthropology or CLD senior major or minor; Appalachian Studies minor; graduate student status; or consent of instructor. (Same as ANT/CLD 534.)

SOC 539 ADVANCED TOPICS IN CRIME, LAW AND DEVIANCE (Subtitle required). (3)
A sociological study of a special topic central to the scientific study of crime, law or deviance. Topics may include deviant subcultures; substance use; social control of crime; sociology of law; and philosophies of punishment. May be repeated to a maximum of six credits under different subtitles. Prereq: Graduate student status; undergraduates with consent of instructor only.

SOC 541 ADVANCED TOPICS IN WORK, ORGANIZATIONS, AND ECONOMY (Subtitle required). (3)
A sociological study of selected topics related to work, organizations, and the economy. Topics may include economic sociology; sociology of occupations and professions; and sociology of organizational administration. Prereq: Graduate student status; undergraduates with consent of instructor only.

SOC 543 ADVANCED TOPICS IN POLITICAL SOCIOLOGY (Subtitle required).
A sociological study of selected topics related to politics and government. Topics may include national and supra national government; citizenship; contestation; political parties, social movements; strategic protests; ideology; identity; and globalization. Prereq: Graduate student status; undergraduates with consent of instructor only.

SOC 550 ADVANCED TOPICS IN SOCIOLOGY (Subtitle required). (3)
A sociological study of topics, theories, or research findings from selected sociological subfield. May be repeated to a maximum of six credits under different subtopics. Prereq: Graduate student status; undergraduates with consent of instructor only.

SOC 565 INDEPENDENT WORK. (1-3)

Independent sociological study of a topic under the supervision of faculty. Students must identify both a project topic and a sociology faculty mentor who has agreed to supervise this project. A learning contract must be filed in the department in order to receive a grade for this course. May be repeated to a maximum of six credits. Prereq: Graduate student status; undergraduates with consent of instructor only.

SOC 603 SEMINAR IN TEACHING SOCIOLOGY. (1-3)
A pedagogical and professional development seminar to prepare skillful, effective sociology instructors. Prereq: Graduate standing in sociology or consent of instructor.

SOC 610 PROSEMINAR IN COMPLEX ORGANIZATION. (3)
A systematic examination of the sociological concepts, literature and current developments in the field of complex organizations. Prereq: Consent of instructor.

SOC 622 TOPICS AND METHODS OF EVALUATION. (3)
An examination of a subset of evaluation methods, topics, and problems. An introductory course in the area with minimal emphasis on quantitative methods. The course is designed to: provide a perspective from which evaluation studies may be viewed; and, to provide experiences for those who will learn from or conduct evaluations. Prereq: Consent of instructor, and a basic course in statistics or research. (Same as ANT/EDP/EPE 620.)

SOC 630 PROSEMINAR IN DEVIANT BEHAVIOR. (3)
A systematic examination of the sociological concepts, literature, and current developments in the field of deviant behavior. Prereq: Graduate standing; SOC 436 or equivalent.

SOC 635 SEMINAR IN SOCIAL INEQUALITIES. (3)
This course provides a graduate-level introduction to sociological theory and research on social inequalities and stratification. It includes both classic and contemporary works on topics such as political economy, the state, domination, democracy, work, poverty, welfare, resistance, class, race, ethnicities, and gender. The course serves as a foundational course for graduate students with interests in social inequalities, and is required for Sociology graduate students seeking a specialization in this area. Prereq: SOC 650 or SOC 651 or consent of instructor. (Same as AAS 635.)

SOC 637 SOCIOCULTURAL DIMENSIONS OF ECONOMIC DEVELOPMENT. (3)
Examination of social, cultural and economic conditions in lesser developed countries. Discussion of the various socioeconomic and cultural theories of change and developments, and of alternative policies for the world of the future. Considers the possible roles for social scientists in policy formulation and application. Prereq: Six graduate credits in social sciences or consent of instructor. (Same as ANT 637.)

SOC 640 SCIENCE, AGRICULTURE, AND DEVELOPMENT. (3)
An in-depth examination of the interrelations between science, agriculture, and development. Both domestic and international issues are explored. Prereq: Graduate standing in the social or agricultural sciences. (Same as ANT/CLD 640.)

SOC 641 GENDER ISSUES IN DEVELOPMENT. (3)
An examination of gender issues in domestic and international development. Prereq: Graduate standing in the social or agricultural sciences or permission of the instructor. (Same as ANT 641.)

SOC 642 THE SOCIOLOGY OF WORK, OCCUPATIONS AND LABOR MARKETS.
This course examines the theories of work and occupations; the industrial structure of the labor force,

the nature of mental and manual labor; the structure of labor markets including underemployment, unemployment, and segmentation; occupational mobility and status attainment; worker resistance and informal groups; worker participation and teamwork; labor and management relations; and state and national legislation regarding work, conflict, safety, and discrimination. Prereq: Graduate standing in sociology or other graduate department.

SOC 645 TOPICS IN POLITICAL SOCIOLOGY. (3)
This course examines how states, capital, and other relevant social groups interact to produce new or stabilize old frameworks for work or other aspects of society. Its topics may include many different areas including: employee representation; health and safety issues; race and gender discrimination; corporate relocation and the international division of labor. No matter what topic chosen for the course, the basic aspects of political sociology including pluralist, elite, neo-corporatist, and citizenship theories will be covered. Prereq: Graduate standing in sociology or other graduate department.

SOC 646 SOCIAL MOVEMENTS AND SOCIAL CHANGE. (3)
This seminar focuses on literature pertaining to collective, extra-institutional efforts to form new or maintain old forms of social order in the United States and other countries. While specific content might vary in response to instructors' interests and department demands, attention will be given to such issues as movement emergence, maintenance, and transformation, labor and resource mobilization, social networks, organization cultures, movement identities and ideologies, social problems construction, strategies and tactics development, as well as the relative success of social movement activities. The seminar can include illustrative material from a variety of social movements and counter-movements (e.g., political, lifestyle, religious, etc.) Prereq: Graduate standing in sociology or other graduate department.

SOC 650 CONCEPTS AND THEORIES IN SOCIOLOGY. (3)
Consideration of central conceptual issues underlying the construction of various sociological theories and their explanatory frameworks. A systematic exploration of the development and application of central conceptual frameworks of the discipline. Prereq: Consent of instructor.

SOC 651 CLASSICAL SOCIOLOGICAL THEORY.(3)
Intensive examination of the ideas and continuing significance of leading nineteenth century sociological theorists. The work of Marx, Weber, Durkheim, and Simmel or Mead is given particular attention. Discussion concerns the contents of their writings, the sociohistorical context in which they were developed, and their applicability to contemporary society. Prereq: Consent of instructor.

SOC 653 FAMILY THEORY. (3)
A survey and critical evaluation of family macro and micro theories. The course will include (a) a historical perspective on the development of family theory; (b) the prevalent macro theories/conceptual frameworks in use in the field; and (c) current trends in the development of micro, or middle-range, family theories. Prereq: FAM 652. (Same as FAM 653.)

SOC 661 SOCIOLOGY OF EDUCATION. (3)
A study of schooling and education using basic analytic paradigms of sociology. Emphasis on schools as formal organizations and education in a changing, technologically oriented and stratified society. Prereq: SOC 101 or equivalent. (Same as EPE 661.)
SOC 665 PROGRAM DEVELOPMENT AND EVALUATION. (3)
Course is designed to help students design, implement, and evaluate educational and social programs using a logic-based framework. (Same as CLD 665.)

SOC 675 THEORETICAL FOUNDATIONS OF COMMUNICATION AND COMMUNITY. (3)

This course is designed to explore the dynamics of community development and leadership communication within both geographic-bounded communities and communities of taste. (Same as CLD 675.)

SOC 680 SOCIAL INVESTIGATION. (2)
This course is a core research design course in the Sociology graduate program. The primary objectives are to: (a) help you understand the process of social science research and (b) build your skills to develop an original research project in sociology or related social science disciplines. The course is organized around "sociology in action", covering such topics as developing effective research questions, selecting appropriate research methods and theoretical framing, writing and revising a proposal, acquiring an IRB approval for your research, and developing and managing your research budget and time. Prereq: Graduate student standing, or consent of instructor.

SOC 681 RESEARCH DESIGN AND ANALYSIS. (3)
Problem definition and delimitation, design appropriate to problem and data, and selection of appropriate analysis techniques; critical examination of representative research studies. Prereq: Elementary statistics.

SOC 682 SPECIAL TOPICS IN ADVANCED SOCIOLOGICAL METHODS. (1-3)
A focused treatment of one or more issues, topics, or problems in sociological methods such as time-series analysis, causal analysis, participant observation, conduct of experiments, sociohistorical methods, scale construction, etc. May be repeated to a maximum of nine credits. Prereq: SOC 681 or equivalent.

SOC 684 FARMING SYSTEMS RESEARCH METHODS.(3)
A critical analysis of the concepts, methods, and practices of farming systems research. Design and carry out an FSR project. Prereq: Graduate standing in the social or agricultural sciences. (Same as ANT 684.)

SOC 685 COMMUNITY DEVELOPMENT THEORY AND PRACTICE. (3)
This course examines the application of our conceptual understanding of community and organizational dynamics to community development that builds upon assets and encourages local involvement. (Same as CLD 685.)

SOC 691 SOCIOLOGY OF FOOD AND AGRICULTURE. (3)
This seminar will analyze the transformation of agriculture and the food system in the historical context of increased globalization. Emphasis is given to key historical transitions, changing social relations surrounding production and consumption of food, and shifts in regulations and policy at the local, national, and/or international levels. Such emphases provide a framework for understanding the historical roots and future prospects for the socioeconomic problems confronting contemporary U.S. and global agriculture and food economies. Prereq: Graduate standing, or consent of instructor. (Same as AEC/CLD 691.)

SOC 730 SPECIAL TOPICS IN DEVIANT BEHAVIOR. (1-3)
A focused treatment of one or more issues, topics, or problems in the field of deviant behavior such as delinquency, sociology of law, criminal justice and corrections, radical criminology, or methodological issues in deviance research. May be repeated to a maximum of nine credits. Prereq: SOC 630 or equivalent or consent of instructor.
SOC 735 TOPICAL SEMINAR IN SOCIAL INEQUALITIES. (3)
Advanced study of topics of current importance in the study of social inequalities and stratification. May be repeated under different subtitles to a maximum of 12 credits. Prereq: SOC 635 or consent of instructor.

SOC 737 CULTURE, ENVIRONMENT AND DEVELOPMENT. (3)
This seminar explores the interrelationships between social processes, development and the environment.

It provides the graduate student with the necessary theoretical and analytical tools to examine the social and cultural processes of environmental degradation and change. Topics include political ecology, health impacts of development, deforestation, resource tenure systems, environmental grassroots movements and large-scale development organizations. Prereq: Consent of instructor. (Same as ANT 736.)

SOC 748 MASTER'S THESIS RESEARCH.(0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

SOC 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

SOC 751 CONTEMPORARY SOCIOLOGICAL THEORY.(3)
A survey of major theoretical perspectives in modern sociology, focusing on twentieth century developments in European and American sociological theory. The principal contributions of selected theorists are considered and their role in the establishment of contemporary sociology is assessed. Prereq: SOC 651 or consent of instructor.

SOC 752 SEMINAR IN FAMILY THEORY CONSTRUCTION. (3)
An advanced seminar focusing on the definition, evaluation and construction of family theory. Inductive and deductive theory construction strategies are surveyed, evaluated and applied. Prereq: FAM 652.

SOC 766 CONCEPTS IN MEDICAL SOCIOLOGY. (3)
A review of sociological concepts and methods which have been applied to the study of health and medicine; the contributions of medical sociology to general sociological theory and to concepts and research on health-related problems of society. Prereq: Consent of instructor. (Same as BSC 766.)

SOC 767 DISSERTATION RESIDENCY CREDIT.(2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

SOC 773 TOPICAL SEMINAR. (3)
Analysis of topics of scientific interest in rural sociology, selected from such fields as the following: criticism of research; sociological factors in land use; migration; rural social ecology of the South; highland societies. May be repeated to a maximum of six credits.

SOC 776 SEMINAR IN DEPENDENCY BEHAVIOR. (3)
The course is designed to explore theories of dependency behavior by examining the concept of dependency as it can be applied to the study of various phenomena including alcohol use and abuse; dependence on other psychoactive substances; institutional dependency; dependency in work settings; and poverty and welfare. Prereq: Consent of instructor. (Same as ANT/PSY/BSC 776.)
SOC 777 SEMINAR IN MENTAL ILLNESS CONCEPTS, RESEARCH AND POLICY. (3)
Advanced study of contemporary concepts of mental health and mental illness, and their historical development; major forms of response to mental illness. Prereq: Consent of instructor. (Same as BSC 777.)

SOC 779 TOPICAL SEMINAR IN SOCIAL PSYCHOLOGY. (3)
Each semester some topic in the field of social psychology such as attitudes and beliefs, structure

and function of social groups, social determinants of behavior, leadership, and morale will be studied intensively. May be repeated to a maximum of six credits. (Same as PSY 779.)

SOC 780 SPECIAL PROBLEMS IN SOCIOLOGY. (1-6)
May be repeated to a maximum of 10 credits.

SOC 781 QUANTITATIVE DATA ANALYSIS II. (3)
This intermediate statistics course emphasizes the fundamentals of multivariate regression. The goal is to develop a foundational toolkit to model a variety of dependent variables. The course will teach students how to make decisions about how to model data, how to estimate equations, and how to solve common problems with multivariate regressions. This is an applied course that will utilize Stata to analyze quantitative social science data. Prereq: SOC 681, PS 572 or consent of the instructor.

SOC 785 COMPARATIVE HEALTH CARE SYSTEMS. (3)
This seminar will focus on concepts, issues, and research pertaining to health care systems in comparative perspective. It will deal with the following questions. (1) What are the core analytical dimensions of a health care system? (2) How do health care systems connect with the other institutional domains of a society, with its value-system, and with its major cultural and historical trends? and (3) Within the health care system, how are the main constituents of modern medicine related to each other? Prereq: Consent of instructor. (Same as BSC 785.)

SOC 790 RESEARCH IN RURAL SOCIOLOGY. (1-3)
Individual graduate research with correlated study of rural social research types and methods. May be repeated for a maximum of six credits.

SOC 792 RESEARCH IN SOCIOLOGY. (1-6)
Individual research and reading in particular fields of sociology, under staff supervision. Open to advanced students who are prepared for intensive study beyond that offered in regular classes in each field. May be repeated to a maximum of 10 hours.

SOC 797 COMMUNITY DEVELOPMENT PRACTICUM. (1-9)
Supervised experiences in the application of sociological concepts and techniques to problems of program development in a community or state agency, organization, or department. Learning contract required. May be repeated to a maximum of 9 credits. Prereq: Approval of the Director of the Community Development Program

# Statistics

## College of Arts & Sciences

The Department of Statistics offers programs of study leading to the degrees of Master of Science (Plan A or B available), Doctor of Philosophy, and Master of Applied Statistics (Online). The M.S. degree is professionally oriented for the student who plans a career in government, business or industry and is preparatory for the Ph.D. The Ph.D. program offers a broad training in both statistical theory and methods while affording options to suit the student's interests. The statistics Ph.D. is well-suited for academic, business, government and industrial positions. In addition to formal course work and research training, the advanced student has opportunities to gain valuable practical experience by participating in consulting activities under faculty supervision. Master of Applied Statistics is an innovative online professional graduate degree which is designed to train professional, practice-oriented statisticians who have both data analytic and computing skills.

Both, the M.S. and the Ph.D. program offer a Mathematical Statistics track, as well as a Biostatistics track. The latter tracks are designed for students who envision a future at the interface of Statistics and the Life Sciences.

Course work is available in areas associated with statistics such as biological modeling, probability, inference, experimental design and analysis, computational statistics, nonparametric methods, Bayesian analysis, mixed modeling, multivariate analysis, survival analysis, clinical trials, and many other selected topics of the student's choice.

The University of Kentucky is represented on the Committee on Statistics of the Southern Regional Education Board.

**Admission Requirements**
Students with an undergraduate major in any of the mathematical, physical, biological, social or applied sciences are encouraged to apply.

The minimum GRE and GPA admissions requirements for the M.S. and Ph.D. programs in Statistics are the same as for the Graduate School. However, the number of admissions is limited and admissions decisions are made on a competitive basis. All M.S. applicants must have successfully completed a three or four semester sequence in calculus and a course in linear algebra and have good communication skills. In addition, all Ph.D. applicants must have mastered the equivalent of MA 471G. All Master of Applied Statistics applicants must have completed two semesters of calculus and a course in statistical methodology. Students wishing to apply for teaching assistantships and/or fellowships must submit three letters of recommendation.. Applicants wishing to be admitted directly to the Ph.D. program must have an M.S. in Statistics and the permission of the Director of Graduate Studies.

Please see the departmental website for up-to-date information and answers to frequently asked questions about the admissions process.

## Master of Science

The Statistics Department offers the degree of Master of Science with (Plan A) or without (Plan B) a thesis, and in two different tracks: a Mathematical Statistics track and a Biostatistics track.

*Shared Core (Required for all students)*

- STA 602 (4) Introduction to Statistical Methods
- STA 603 (4) Introduction to Linear Models and Experimental Design
- STA 605 (3) Computational Inference
- STA 606 (3) Theory of Statistical Inference I
- STA 623 (3) Theory of Probability
- STA 632 (3) Longitudinal Data Analysis

*Mathematical Statistics Track*

Curriculum requirements for the Mathematical Statistics track are the shared core courses above, plus the following courses:

- STA 607 (3) Theory of Statistical Inference II
- STA 624 (3) Applied Stochastic Processes
- STA 643 (3) Advanced Experimental Design

*Biostatistics Track*

Curriculum requirements in the Biostatistics track are the shared core courses above, plus:

- STA 635 (3) Survivability and Life Testing
- STA 653 (3) Clinical Trials
- STA 665 (3) Analysis of Categorical Data
- STA 693 (2) Biostatistical Practicum, 1 unit course in each of the two semesters in the second year

Programs of study for Plan B require a total of at least 35 semester hours. Students will typically fulfill this requirement by taking electives (additional courses besides the shared core and track requirements) in the Fall and Spring of their second year. Programs of study for Plan A (with thesis) require a total of at least 29 semester hours which are satisfied by either of the two course lists above.

The electives can be selected from the menu of courses listed below. Before the end of the second semester, the M.S. candidate must present a proposed plan of study for approval by the Director of Graduate Studies. There are no formal minor requirements.

**Comprehensive Exams**

All master's candidates are required to pass a comprehensive departmental written examination on the content of the courses STA 602, STA 603, STA 605, STA 606, and STA 623. This examination is normally administered in late May/early June. It is truly comprehensive also in the sense that all parts must be taken together: If a student decides not to take a part of the examination, that part is automatically counted as failed. Students taking the comprehensive exam will receive either a pass at the doctoral level, a pass at the master's level, or a failure. The examination may be repeated only once. Successful completion of the comprehensive examination at the doctoral level is required for admission into the PhD program.

**Electives**

The electives may be chosen from any course in the following menu that is NOT used as a track requirement.

- MA 471G (3) Advanced Calculus I
- STA 607 (3) Theory of Statistical Inference II
- STA 612 (3) Sequential Analysis
- STA 616 (3) Design and Analysis of Sample Surveys
- STA 621 (3) Nonparametric Inference
- STA 624 (3) Applied Stochastic Processes
- STA 626 (3) Time Series Analysis

- STA 630 (3) Bayesian Inference
- CPH 631 (3) Design and Analysis of Health Survey
- STA 635 (3) Survivability and Life Testing
- CPH 636 (3) Data Mining in Public Health
- STA 643 (3) Advanced Experimental Design
- STA 644 (3) Advanced Linear and Nonlinear Models
- STA 653 (3) Clinical Trials
- STA 661 (3) Multivariate Analysis I
- STA 662 (3) Resampling and Related Methods
- CPH 664 (3) Design and Analysis of Clinical Trials
- STA 665 (3) Analysis of Categorical Data

Any course on this list NOT required for the chosen track may be used as an elective. Thus, for example, STA 665 would count as an elective for the Mathematical Statistics track, but it is a track requirement for the Biostatistics track. Similarly, STA 624 would be an elective for the Biostatistics track but is a track requirement for the Mathematical Statistics track.

* A student who takes both STA 653 and CPH 664 may only receive credit towards the degree for one of these two courses.

## Doctor of Philosophy

The core curriculum in statistics is designed to provide doctoral candidates with a firm foundation in probability theory, inference, and classical methodology. In addition, the theory and application of computational statistics, biostatistics, and state-of-the-art inferential procedures are an integral part of the core curriculum.
Students in the doctoral program in statistics will choose one of two areas of specialization, 1) mathematical statistics/probability or 2) biostatistics. The requirements for these areas of specialization are:

*Mathematical Statistics/Probability*
- STA 701 – Advanced Statistical Inference I
- STA 703 – Advanced Probability
- STA 705 – Advanced Computational Inference
- STA 707 – Advanced Data Analysis
- STA 702 – Advanced Statistical Inference II

*Biostatistics*
- STA 701 - Advanced Statistical Inference I
- STA 703 - Advanced Probability
- STA 705 - Advanced Computational Inference
- STA 707 - Advanced Data Analysis
- STA 709 - Advanced Survival Analysis

All students must take an additional six elective courses chosen by the student and approved by the DGS. These courses must be chosen from among STA 612, STA 616, STA 621, STA 624, STA 626, STA 630, STA 635, STA 643, STA 644, STA 653, STA 661, STA 662, STA 665, CPH 631, CPH 636, and CPH 664. STA 695 will also be considered on a case by case basis. If a student completes both STA702 and STA709, the student may choose their official track and count the non-required course as an elective. Note that STA715 (reading course) may not be used to satisfy elective requirements. Students must successfully complete a common written exam over STA 701 and STA 703 plus respective prerequisites.

* A student who takes both STA 653 and CPH 664, may only receive credit towards the degree for one of these two courses.

Students must pass a uniform written exam over STA 701 and STA 703 plus respective prerequisites. This exam will normally be offered in January and students will usually sit for the written examination at the beginning of the Spring semester in the third year of the program. The uniform exam can be repeated once. After completion of tract course requirements and successful completion of the written exam, students must also successfully complete an oral qualifying exam which is scheduled through the Graduate School and administered by the student's advisory committee. A significant part of this exam is to be a dissertation proposal.
Areas of current research interest can be found by going to the Department of Statistics faculty web page https://stat.as.uky.edu/.

All students, master's and doctoral, will be required to take part in an internship program. This will usually consist of teaching (three or six semester hours) or an equivalent amount of work in a research assistantship working with researchers across campus.

## Master of Applied Statistics

The Master of Applied Statistics is a thirty hour, online, Plan B, professional graduate degree that can be completed in a summer and two consecutive semesters or on a part-time basis. The program is unique in that it uses data visualization and statistical computing to teach fundamental concepts in statistical inference to students with a career-oriented focus on data analysis

Core Courses (Required for all students)

- STA 645(3) Computational Theory and Data Visualization
- STA 646(4) Foundations of Probability and Inference
- STA 647(2) Statistical Computing with SAS
- STA 648(4) Regression Modeling
- STA 649(4) Design of Experiments

The electives can be selected from the menu of courses listed below.

- STA 650(3) Applied Multivariate Analysis
- STA 651(1) Advanced Programming with R
- STA 652(3) Advanced Statistical Modeling
- STA 654(3) Applied Bayesian Analysis
- STA 656(3) Statistical Quality Control
- STA 659(3) Advanced Statistical Methods (subtitle required)

### Course Descriptions

STA 515 LINEAR AND COMBINATORIAL OPTIMIZATION. (3)
Mathematical and computational aspects of linear programming and combinatorial optimization. Linear optimization is introduced by presenting solution techniques (primal and dual simplex) and studying geometric properties and duality for linear systems of inequalities. Asics of combinatorial optimization, including trees, paths, flows, matchings, and matroids, and the corresponding algorithms are presented. Prereq: A course in linear algebra or consent of instructor. (Same as MA 515.)

STA 524 PROBABILITY. (3)
Sample space, random variables, distribution functions, conditional probability and independence, expectation, combinatorial analysis, generating functions, convergence of random variables, characteristic

functions, laws of large numbers, central limit theorem and its applications. Prereq: MA 213 and MA 322. (Same as OR 524.)

STA 525 INTRODUCTORY STATISTICAL INFERENCE. (3)
Simple random sampling, statistics and their sampling distributions, sampling distributions for normal populations; concepts of loss and risk functions; Bayes and minimax inference procedures; point and interval estimation; hypothesis testing; introduction to nonparametric tests; regression and correlation. Prereq: STA 320 or STA 524 or consent of instructor. (Same as OR 525.)

STA 569 APPLIED STATISTICAL METHODS. (3)
This course is an introduction to research statistics. Topics include exploratory data analysis, random variables (binomial and normal distributions), estimation of proportions and means, correlation, regression, chi-squared tests, and ANOVA. Examples will be drawn from biomedical or professional applications with analysis illustrated in software common to data analysis. Prereq: MA 109 or consent of instructor.

STA 570 BASIC STATISTICAL ANALYSIS. (4)
Primarily in biological, behavioral and social sciences. Introduction to methods of analyzing data from experiments and surveys; the role of statistics in research, statistical concepts and models; probability and distribution functions; estimation; hypothesis testing; regression and correlation; analysis of single and multiple classification models; analysis of categorical data. Lecture, three hours; laboratory, two hours. Prereq: MA 109 or equivalent. For graduate students; undergraduates must have consent of instructor.

STA 580 BIOSTATISTICS I.(2)
STA 580 covers univariate statistical methods commonly encountered in public health studies. This includes descriptive statistics, hypothesis testing, paired and unpaired t tests, ANOVA, contingency tables, log rank test, regression and correlation. Prereq: MA 109 or higher. (Same as CPH 580.)

STA 600 COMMUNICATING IN STATISTICS. (0)
Pedagogical skills for teaching assistants in undergraduate statistics courses and effective communication skills for professional statisticians. Topics include: basic teaching techniques, use of writing assignments to increase understanding of statistical concepts, writing and grading effective exams, and recording and analyzing grades with the aid of software. Videotaped sessions will be conducted and critiqued. May be repeated a maximum of three times. Prereq: STAT major.

STA 602 INTRODUCTION TO STATISTICAL METHODS. (4)
Sampling distributions, statistical models, point estimates and conference intervals, significance testing. Experimental Design (randomized blocks, nested/hierarchical models, Latin Squares), ANOVA (one, two, and multiway factorials, fixed and random effects), multiple comparison procedures, rank-based analyses, linear and nonlinear regression, power and sample size calculations, professional presentation of results. Lecture, three hours; laboratory, two hours per week. Prereq: Graduate Standing in Statistics.

STA 603 INTRODUCTION TO LINEAR MODELS AND EXPERIMENTAL DESIGN.(4)
Multivariate normal distribution, linear models in matrix notation, multiple linear regression (distributional results, categorical predictors, interactions, connection to ANOVA, sums of squares, diagnostics, ridge and nonparametric regression). Generalized linear models (binomial, poisson, and gamma regression), overdispersion, mixed models, diagnostics, professional presentation of results. Prereq: STA 602; coreq: STA 606.

STA 605 COMPUTATIONAL INFERENCE. (3)
Statistical Packages, numerical methods in maximization and integration, bootstrapping, simulation methods, multivariate normal distribution. Prereq: Graduate Standing in Statistics.

STA 606 THEORY OF STATISTICAL INFERENCE I. (3)
Convergence concepts (Central Limit Theorem), Sampling from a Normal Distribution, Order Statistics, Methods for finding point and interval estimates, methods for finding hypothesis tests, sufficiency principle, methods for evaluating point estimators (mean square error, unbiasedness, Cramer-Rao lower bound), Asymptotics of point estimates, interval estimates, and hypothesis testing procedures. Prereq: STA 623

STA 607 THEORY OF STATISTICAL INFERENCE II. (3)
Minimal sufficiency and completeness, Lehmann-Scheffe Theorem and basic decision theory, methods for evaluating interval estimators. Methods for evaluating hypothesis testing procedures, robustness and M-estimation, sequential analysis, censored data, model selection techniques. Prereq: STA 606.

STA 612 SEQUENTIAL ANALYSIS.(3)
Survey and application of sequential sampling. Sufficiency and estimation. Two Stage sampling. The SPRT and its properties, both exact and approximate. Truncated and grouped SPRT's. Decision Theoretic approach. Sequential Estimation. Fixed width confidence intervals. Composite hypotheses and nuisance parameters. Generalized SPRT's. K hypothesis problems. Optimal Stopping. Prereq: STA 606.

STA 621 NONPARAMETRIC INFERENCE. (3)
Estimation and testing when the functional form of the population distribution is unknown; rank and sign tests; tests based on permutations of observations; power of nonparametric tests; optimum nonparametric tests and estimators. Prereq: STA 606.

STA 623 THEORY OF PROBABILITY. (3)
Axioms of Probability, conditional probability, distribution functions, density and moment generating functions, expected values, discrete and continuous distributions, joint, marginal, and conditional distributions, transformations, covariance and correlation, inequalities, properties of sums from a random sample. Prereq: Graduate Standing in Statistics.

STA 624 APPLIED STOCHASTIC PROCESSES. (3)
Definition and classification of stochastic processes, renewal theory and applications, Markov chains, continuous time Markov chains, queueing theory, epidemic processes, Gaussian processes. Prereq: STA 524 or STA 623 or consent of instructor. (Same as OR 624.)

STA 626 TIME SERIES ANALYSIS. (3)
Time series and stochastic processes, auto-correlation functions and spectral properties of stationary processes; linear models for stationary processes, moving average, auto-regressive and mixed autoregressive-moving average processes; linear nonstationary models, minimum mean square error forecasts and their properties; model identification, estimation and diagnostic checking. Prereq: STA 422G or equivalent. (Same as ECO 626.)

STA 630 BAYESIAN INFERENCE. (3)
Likelihood principles, sufficiency, natural conjugate and hierarchical priors, empirical Baysian analysis for estimation and testing. Prereq: STA 606.

STA 632 LONGITUDINAL DATA ANALYSIS. (3)
This course presents statistical techniques for analyzing longitudinal studies and repeated measures experiments that occur frequently in public health, clinical trials, and outcomes research. This course will cover linear mixed models, generalized linear mixed models and an introduction to nonlinear models as they apply to the analysis of correlated data. Prereq: BST 682 and BST 676 or equivalent. (Same as BST 762.)

STA 635 SURVIVABILITY AND LIFE TESTING. (3)
Life Table Analysis. Estimation of survival rates with censored data. Competing Risk Theory. Parameter estimation for commonly encountered reliability distribution with complete censored and truncated data. Maximum likelihood and order statistics techniques. Survivability growth models, comparison of survival distribution, and sample size determination in clinical trials. Extreme value theory. Prereq: STA 606.

STA 643 ADVANCED EXPERIMENTAL DESIGN. (3)
Linear Model interpretation in vector spaces and projections, use of generalized inverses, identifiability and estimability of contrasts, normal equations, Gauss-Markov Theorem, MVUE, distribution theory for quadratic forms, complex designs such as crossover, split-plot and repeated measures, asymptotics for general linear models, familiarity with nonparametric regression models. Prereq: STA 603.

STA 644 ADVANCED LINEAR AND NONLINEAR MODELS. (3)
Review of the general linear model. Regression methodology using Ridge, Bayes, and Stein estimaters. The use of PRESS, Cp, and R2 statistics as selection criteria. Modern computational methods. Nonlinear models and their methodology. Robust Regression. Prereq: STA 603.

STA 645 COMPUTATIONAL THEORY AND DATA VISUALIZATION. (3)
This course aims to teach students to use programming to gain intuition about statistical theory and fundamental concepts and to visualize data appropriately. Specifically, computational methods covered include simulation methods and numerical methods in maximization and integration. Appropriate graphical displays of statistical and simulation results will be emphasized. Statistical concepts covered include sampling distributions, confidence intervals and p-values, the central limit theorem, expectation, and maximum likelihood estimation. Student understanding of course ideas will rely heavily on performing simulation studies and discussing the assimilated class results online. Prereq: Graduate status in Master of Applied Statistics.

STA 646 FOUNDATIONS OF PROBABILITY AND INFERENCE. (4)
This course introduces probability, random variables, independence, and distribution theory. Inference topics include, but are not limited to, estimation, hypothesis tests, likelihood ratio tests, confidence intervals, sufficiency, and efficient estimators. Prereq: Graduate status in Master of Applied Statistics. Coreq: STA 645.

STA 647 STATISTICAL COMPUTING WITH SAS. (2)
This course aims to teach students to use the SAS statistical programming language and to apply this knowledge appropriately in a variety of settings. Student achievement in the course will rely heavily on performing computational tasks, data management, editing data, running basic statistical procedures, and producing reports using SAS. Prereq: Graduate status in Master of Applied Statistics.

STA 648 REGRESSION METHODS. (4)
Statistics (STA) 648 is an applied regression course that emphasizes data analysis and interpretation. Generally, regression is a collection of methods for determining and using models that explain how a response variable (dependent variable) relates to one or more explanatory variables (predictor variables).

This course aims to teach students about different regression models, their corresponding assumptions, and how to interpret the estimated models. Statistical computing will be central to understanding material in this course as the student will be required to perform analyses on real datasets using the learned methods. Prereq: STA 645 and admission to the Master of Applied Statistics program or permission of the instructor.

STA 649 DESIGN OF EXPERIMENTS. (4)
Statistics (STA) 649 is an introduction to the principles of experimental design. Many statistics courses are taught from the perspective of analyzing data that has already been collected. However, problems that occur at the analysis stage (e.g., violations of assumptions, too small of sample, etc.) could have been avoided if the experimenter had consulted a statistician before the experiment was conducted and the data collected. This course will introduce common experimental designs so that when the data are collected, the aforementioned shortcomings are avoided. The course will provide equal treatment to both the conceptualization of the designs and the analysis of the subsequent experiment. Prereq: STA 647, STA 648, and admission to the Master of Applied Statistics program or permission of the instructor.

STA 650 APPLIED MULTIVARIATE STATISTICS. (3)
The main objective of this course is to equip students with the traditional and modern multivariate statistical methods. Students will learn the motivation behind these methods, how to apply them and interpret the results obtained. Focus will be on understanding distributional results rather that the technical derivations. Students will gain competency in writing R scripts for applying the multivariate methods learned. Prereq: Graduate status in Master of Applied Statistics, STA 646, STA 648; corequisite: STA 649.

STA 651 ADVANCED PROGRAMMING WITH R.(1)
Statistics (STA) 651 discusses advanced programming techniques using the R language. Programming topics include how to handle various facets of data structures in R, how to produce simple and advanced graphics in R, and how to synthesize the necessary components of simulation studies. Prereq: STA 645 and admission to the Master of Applied Statistics program or permission of the instructor.

STA 652 ADVANCED STATISTICAL MODELING. (3)
This course aims to teach students to use advanced statistical modeling techniques and to interpret the results in context. Specifically, the statistical methods covered include general linear models and linear mixed models, semiparametric regression, nonlinear models, mixed models in ANOVA, generalized linear models, ridge regression, and repeated measures experiments. Prereq: STA 649 and graduate status in Master of Applied Statistics.

STA 653 CLINICAL TRIALS. (3)
Design and analysis of Phase I-III clinical trials, interim monitoring of trials, sample size, power, crossover trials, bioequivalency, mixed models, and meta analysis. Coreq: STA 603. (Same as BST 713.)

STA 654 APPLIED BAYESIAN INFERENCE. (3)
This course provides an introduction to Bayesian inference and a summary of Bayesian methods for fitting, assessing, and selecting models. Topics include Bayes' Rule and Probability, Binomial Models for Proportions, Poisson Models for Counts, Normal Models for Continuous Data, Linear Regression, Log-linear and Contingency Tables, Hierarchical Models, Hypothesis Testing, Model Comparison, and Selected Applications. Prereq: Graduate status in Master of Applied Statistics, STA 646, STA 648.

STA 655 INTRODUCTION TO STATISTICAL GENETICS. (3)
BST 655 presents an introduction to the statistical methodologies used today to investigate genetic

susceptibility to complex diseases. The course focuses on linkage and association analysis with applications to real-world data. Commonly used (and freely available) software will be presented and used throughout. Because the field is constantly evolving, a focus of the material for this course will be recent statistical human genetics literature. Prereq: STA 580 or equivalent. (Same as BST 655.)

STA 656 STATISTICAL QUALITY CONTROL. (3)
Dimensions of quality, numerical and graphical descriptions of data, discrete and continuous distributions, basic reliability concepts, control charts for variables and attributes, process capability studies, and selected additional topics as time permits such as cusum charts, acceptance sampling. Prereq: STA 645 and admission to the Master of Applied Statistics program or permission of the instructor.

STA 659 ADVANCED STATISTICAL METHODS. (3)
Supervised reading, discussion, and practice of a selected statistical methodological area. Prereq: STA 646, STA 648, and graduate status in Master of Applied Statistics.

STA 661 MULTIVARIATE ANALYSIS I. (3)
Characterization and properties of the multivariate normal distribution, random samples from this distribution; multivariate analysis of variance, related distribution theory; factor analysis. Prereq: STA 603.

STA 662 RESAMPLING AND RELATED METHODS. (3)
Theory and application of the bootstrap, jackknife and other resampling methods. Prereq: STA 605 and STA 606.

STA 665 ANALYSIS OF CATEGORICAL DATA. (3)
Multinomial and product-multinomial models; large-sample theory of estimation and testing, Pearson chi-square and modified chi-square statistics, Pearson-Fisher Theorem, Wald Statistics and generalized least squares technique; applications to problems of symmetry, association and hypotheses of no interaction in multi-dimensional contingency tables. Prereq: STA 603 and STA 606. (Same as BST 763.)

STA 671 REGRESSION AND CORRELATION. (2)
Simple linear regression, elementary matrix algebra and its application to simple linear regression; general linear model, multiple regression, analysis of variance tables, testing of subhypotheses, nonlinear regression, step-wise regression; partial and multiple correlation. Emphasis upon use of computer library routines; other special topics according to the interests of the class. Lecture, three hours per week; laboratory, two hours per week for seven and one half weeks. Offered the first or second half of each semester. Prereq: STA 570 or STA 580.

STA 672 DESIGN AND ANALYSIS OF EXPERIMENTS. (2)
Review of one-way analysis of variance; planned and unplanned individual comparisons, including contrasts and orthogonal polynomials; factorial experiments; completely randomized, randomized block, Latin square, and split-plot designs: relative efficiency, expected mean squares; multiple regression analysis for balanced and unbalanced experiments, analysis of covariance. Lecture, three hours per week; laboratory, two hours per week for seven and a half weeks. Offered the first or second half of each semester. Prereq: STA 671.

STA 673 DISTRIBUTION-FREE STATISTICAL INFERENCE AND ANALYSIS OF CATEGORICAL DATA. (2)
Inference for population quantiles, sign tests, Wilcoxon tests, Kruskal-Wallis and Friedman tests, Kendall and Spearman rank correlation. Goodness-of-fit tests for completely and partially specified distributions, rxc contingency tables, McNemar and Cochran's Q tests for matched proportions; three dimensional tables

and tests of partial and multiple associations. Lecture, three hours per week; laboratory, two hours per week for seven and a half weeks. Offered the first or second half of each semester. Prereq: STA 570 or STA 580.

STA 675 SURVEY SAMPLING. (2)
Simple random sampling and stratified random sampling, ratio and regression estimators, cluster sampling, systemic sampling, and multistage sampling. Specific problems associated with running a survey: non-response, call-backs, questionnaire construction, mail questionnaires, and area sampling. Lecture, three hours per week; laboratory, two hours per week for seven and a half weeks. Offered the first or second half of each semester. Prereq: STA 570 or STA 580.

STA 676 QUANTITATIVE INHERITANCE IN PLANT POPULATIONS. (3)
After a brief review of population genetics theory, the course is divided into two sections which cover methods of estimating genetic variances and selection methods in population improvement. The course will focus on handling and interpretation of actual data sets through data analysis and discussion of current literature. Prereq: STA 570, STA 671, and STA 672. (Same as PLS 676.)

STA 677 APPLIED MULTIVARIATE METHODS. (3)
Survey of multivariate statistical techniques. The multivariate normal distribution; the general linear model; general procedures for parameter estimation and hypothesis testing in the multivariate case; Hotelling's T2, multivariate analysis of variance and covariance; structural models for the covariance matrix; utilization of existing computer programs. Prereq: STA 671 and 672.

STA 679 DESIGN AND ANALYSIS OF EXPERIMENTS II. (3)
A continuation of STA 672. Multiplicative models in two-factor experiments. Partial factorials. Extensions and modifications of split plots and Latin squares. Confounding in factorial experiments. Response surface methods. Estimation of variance components. One restrictional and two restrictional lattice and incomplete block designs. Combining analyses of similar experiments. Prereq: STA 671 and 672 or equivalent.

*STA 681 BIOSTATISTICS II. (3)
Students will learn statistical methods used in public health studies. This includes receiver operator curves, multiple regression, logistic regression, confounding and stratification, the Mantel-Haenzel procedure, and the Cox proportional hazards model. Prereq: STA 570, CPH 603, STA 580/CPH 580, or equivalent. (Same as CPH 630.)

STA 690 SEMINAR IN STATISTICS. (1)
May be repeated to a maximum of three credits.

STA 692 STATISTICAL CONSULTING. (3)
Basic principles of statistical consulting including how to manage a consulting session, how to formulate and solve problems and how to express results both orally and in writing. Students will be expected to analyze data from a current consulting project. Lecture, two hours; laboratory, two hours per week. Coreq: STA 643 or 644 or consent of instructor.

STA 693 BIOSTATISTICAL PRACTICUM. (1-2)
This course will involve students in small consulting projects intended to illustrate practical biostatistical problems. Prereq: STA 603.

STA 695 SPECIAL TOPICS IN STATISTICAL THEORY (Subtitle required). (1-3)

To be selected by staff. May be repeated to a maximum of nine credits. Prereq: STA 601.

STA 700 FOUNDATIONS OF PROBABILITY AND INFERENCE. (3)
Measures on the real line and probability spaces, Lebesque measure, properties of distribution functions and random variables, integrals and expectations. Prereq: MA 471G.

STA 701 ADVANCED STATISTICAL INFERENCE I. (3)
Basic concepts of decision theory, sufficiency and completeness; completeness of multiparametric exponential family; unbiasedness and invariance of decision rules; Bayes, minimax and invariant estimators; testing of hypotheses and optimality properties. Prereq: STA 607 and STA 700.

STA 702 ADVANCED STATISTICAL INFERENCE II. (3)
UMP and UMP unbiased tests for multiparametric exponential families; locally best tests; invariance and permutation tests, UMP invariant tests for linear hypotheses; asymptotic aspects of classical statistics, ML estimation and concepts of efficiency; sequential probability ratio test; confidence set, UMA unbiased and invariance confidence sets. Prereq: STA 701.

STA 703 ADVANCED PROBABILITY. (3)
Probability spaces, extension theorem, random variables; independence, conditional probability, conditional expectation; laws of large numbers, law of the iterated logarithm; convergence in distribution; characteristic functions; central limit theorems; martingales. Prereq: STA 700 and STA 532.

STA 704 ADVANCED PROBABILITY - STOCHASTIC PROCESSES. (3)
Random functions; jump Markov processes; processes with independent increments; stationary stochastic processes; diffusion processes; limit theorems; applications of stochastic processes. Prereq: STA 703.

STA 705 ADVANCED COMPUTATIONAL INFERENCE. (3)
Numerical maximization and integration, resampling methods, EM algorithm, Markov Chain Monte Carlo methods. Prereq: STA 605 and STA 701.

STA 707 ADVANCED DATA ANALYSIS. (3)
Theory and data analysis involving likelihood functions, mixed models, missing responses. Prereq: STA 643.

STA 709 ADVANCED SURVIVAL ANALYSIS. (3)
Lindberg CLT, Kaplan-Meier and related estimators, Cox proportional hazards and related methods, approximations of type I and II error. Prereq: STA 635, 701.

STA 715 READINGS IN STATISTICS AND PROBABILITY (Subtitle required). (1-6)
Supervised reading and discussion of a selected research topic. May be repeated to a maximum of nine credits. Prereq: STA 701 and STA 703 and consent of instructor.

STA 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

STA 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

STA 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

# Teaching World Languages

## College of Arts & Sciences

The College of Arts and Sciences (Department of Modern and Classical Languages, Literatures and Cultures, and the Department of Hispanic Studies) and the College of Education (Curriculum and Instruction) offer a graduate program leading to the MATWL (Master of Arts in Teaching World Languages).

**Admission Requirements**
Applicants for admission must be concurrently approved by the Graduate School and the Teacher Education Program (TEP). They are reviewed by the Director of the MATWL Program in consultation with the MATWL Program Faculty Committee.

Candidates seeking admission to the MATWL program should demonstrate proficiency in the target language with a rating of Advanced Low in an ACTFL Oral Proficiency Interview (Latin excepted). Candidates must also document a course of study that reflects mastery of language structure, a broad range of modern and classical literature, and the history of the relevant culture(s). Candidates in Latin must document a course of study that reflects mastery of language structure, knowledge of the literature, history, mythology, and culture of ancient Rome and Greece, and proficiency in oral reading. Documentation of such a course of study typically consists of an undergraduate degree in a world language that includes a major in the appropriate language and/or other coursework sufficient to fulfill the MATWL admission requirements. Although each language area has its unique requirements, candidates typically have 48 to 66 credit hours in their academic teaching specialties.

An applicant may be provisionally admitted without meeting all of the minimum standards if other factors, including letters of recommendation, the writing samples (English and L2), and the oral interviews (English and L2), indicate an ability to perform satisfactorily in graduate-level work. Presentation of a minimum Graduate Record Examination score (GRE) and a minimum Grade Point Average (GPA) does not, however, automatically guarantee admission to the program, as the final decision depends on an evaluation of all materials submitted and the Program Faculty's assessment of the applicant's potential for successful graduate study.

**Other Specific Requirements**
In addition to assuring that the applicant has met the admission requirements of the Graduate School, the director and the program faculty Committee carefully evaluates the following material:

- an ACTFL rating of Advanced Low or better in language area
- a minimum 2.75 overall undergraduate GPA, a minimum 3.0 GPA in the language-specific field, and a minimum 3.0 GPA in any previous graduate work;
- three letters of recommendation;
- three writing samples with at least one in the target language;
- an interview by the appropriate program faculty;
- a score of at least 150 verbal, 143 quantitative, and 4 in analytic writing in each of the GRE areas, and a rating of 4 in the writing test
- 200 hours of documented experience with children 6 to 13 years of age and/or 14- to 18-year old adolescents as well as community and cross-cultural experience;
- a statement of moral/ethical principles.

Graduate school applications must be returned to the graduate School Office, and the TEP application

to Stayc DuBravac, Director of the MATWL Program, Department of Modern and Classical Languages, Literatures and Cultures, 1055 Patterson Office Tower, University of Kentucky, Lexington KY 40506-0027. For admission in the program, all materials should be received by the MATWL Director no later than February 1.

**Degree Requirements**
Successful completion of the MATWL program includes:
- an ACTFL rating of Intermediate High or better in language area;
- internship/Student Teaching in language content area reflecting exposure to diversity (MATWL degree candidates spend one semester interning in a program at the elementary or middle school level and in a program at the high school level);
- internship/Student Teaching in a second language area if this is a student's goal (MATWL candidates may complete Student Teaching in two languages but have to add appropriate course work to their curriculum contract in this area as decided upon by their advisory committee);
- an additional ACTFL test for the second language area as necessary;
- successful completion of all course work;
- successful evaluation at mid- and end-point by the program faculty;
- successful performance on comprehensive exams;
- passing scores on PRAXIS II tests (both PLT and Language)
- a complete Portfolio.

**The Portfolio**
The Kentucky EPSB Teacher Standards are the organizing principle of the Portfolio. Students begin the Portfolio in their first semester and continue it into their last semester. It documents a student's teaching philosophy and reflection on the practicum and field experiences. Because the portfolio is an integral part of the exit requirement, a student must produce a well-designed portfolio if s/he is to be recommended for certification. Portfolios are evaluated for:
- quality and quantity of experiences documented under each of the Standards;
- quality of thought and reflection as related to the underlying pedagogical issues;
- observance of requisite components;
- the style, structure and appearance of the portfolio as a professional document

For further information concerning the MATWL program, consult the Program Director. Students may also want to consider concurrent degrees in the language specialty or in Teaching English as a Second Language.

## Graduate Courses

*College Of Education*

| | | |
|---|---|---|
| EDC 610 | Classroom Management | (3) |
| EDP 500/600 | Educational Psychology | (3) |
| EDS 600 | Survey Of Special Education | (3) |

*College Of Arts And Sciences (Methods Courses)*

| | | |
|---|---|---|
| MCL 510 | Methods Of Teaching World Lang: Novice Learners | (3) |
| MCL 610 | Methods Of Teaching World Lang: Adv Learners | (3) |
| MCL 601 | Teaching Internship | (12) |

*College Of Arts And Sciences (Sample Language Content Courses)*

Chinese

| | | |
|---|---|---|
| CHI 511 | Literary Chinese | (3) |

| | | |
|---|---|---|
| Classics (Latin) | | |
| CLA 511 | Studies In Roman Philology | (3) |
| CLA 512 | Studies In Roman Philology | (3) |
| CLA 523 | Roman Republican Poetry (Subtitle Required) | (3) |
| CLA 527 | Roman Imperial Poetry (Subtitle Required) | (3) |
| | | |
| French | | |
| FR 510 | Linguistic Structure Of Modern French | (3) |
| FR 606 | Literature Of The Middle Ages (Subtitle Required) | (3) |
| FR 609 | Seventeenth-Century Studies (Subtitle Required) | (3) |
| FR 617 | Eighteenth-Century Studies (Subtitle Required) | (3) |
| FR 630 | French Language, Literature And Culture Outside France (Subtitle Required) | (3) |
| | | |
| German | | |
| GER 507 | Advanced German Composition And Conversation | (3) |
| GER 520 | Special Topics Seminar | (3) |
| GER 616 | Studies In Genre | (3) |
| GER 630 | Studies In The 20th Century | (3) |
| GER 650 | Multidisciplinary German Studies Seminar (Subtitle Required) | (3) |
| GER 721 | Special Topics In German Literary And Cultural History | (3) |
| | | |
| Japanese | | |
| JPN 400g | Topics In Japan Studies | (3) |
| JPN 420g | Pre-Modern Literary And Visual Arts Of Japan | (3) |
| JPN 421g | Contemporary Literary And Visual Arts Of Japan | (3) |
| JPN 451g | Social Movements In Modern Japan | (3) |
| JPN 461g | Japanese Colonialism And Its Legacies | (3) |
| JPN 491g | Japanese Landscapes | (3) |
| JPN 551 | Japanese Multinational Corporations | (3) |
| | | |
| Modern And Classical Languages | | |
| MCL 517 | Second Language Acquisition | (3) |
| MCL 650 | Topics In Intercultural Teaching | (3) |
| MCL 690 | Culture, Cognition, & Second Language | (3) |
| | | |
| Hispanic Studies | | |
| SPA 600 | History Of The Spanish Language | (3) |
| SPA 601 | Studies In Spanish Pedagogy (Subtitle Required) | (1) |
| SPA 602 | Studies In Spanish Linguistics (Subtitle Required) | (3) |
| SPA 608 | Special Topics In Spanish Literature And Culture (Subtitle Required) | (3) |
| SPA 609 | Special Topics In Latin American And U.S. Hispanic Literature And Culture (Subtitle Required) | (3) |
| SPA 690 | Studies In Spanish And/Or Latin American Film (Subtitle Required) | (3) |

# Teaching English as a Second Language

## College of Arts & Sciences

The Department of Modern and Classical Languages, Literatures and Cultures offers a graduate program leading to the M.A. degree in Teaching English as a Second Language – MATESL (36 cr.). The general goal of graduate work in the program is to provide students with a quality teacher education program that will prepare candidates for a satisfying career in language teaching.

**Admission Requirements**
Applicants for admission must first be approved by the Graduate School. They are then reviewed by the Director of the program in the department of Modern and Classical Languages, Literatures and Cultures, who consults with the MATESL Program Faculty Committee before returning recommendations to the Graduate School.

An applicant may be provisionally admitted without meeting all of the minimum standards if other factors, including letters of recommendation, the writing samples, and the oral interviews, indicate an ability to perform satisfactorily in graduate-level work. Presentation of a minimum Graduate Record Examination score (GRE) and a minimum Grade Point Average (GPA) does not, however, automatically guarantee admission to the program, as the final decision depends on an evaluation of all materials submitted and the Program Faculty's assessment of the applicant's potential for successful graduate study.

**Other Specific Requirements**
In addition to assuring that the applicant has met the admission requirements of the Graduate School, the director and the program faculty Committee carefully evaluates the following material:

- a minimum 2.75 overall undergraduate GPA, a minimum 3.0 GPA in the language-specific field, and a minimum 3.0 GPA in any previous graduate work;
- three letters of recommendation;
- personal statement of interest in language teaching
- an interview by the appropriate program faculty;
- demonstrated basic skills

Graduate school applications must be returned to the Graduate School Office.

**Degree Requirements**
All candidates are required to meet the following set of learning outcomes. Candidates must:

**I. Language & Learning**

1. demonstrate professional level knowledge of the English language, including English as a linguistic system and as a tool for social and cognitive functioning;
2. demonstrate knowledge of research in second language acquisition processes;
3. demonstrate knowledge of learning differences among students, including learning disabilities;
4. demonstrate the ability to inform teaching practices through the study of social learning and cognitive research and theories and the use of inquiry into specific teaching contexts.

**II. Culture**

1. demonstrate knowledge of the major research and theories related to the nature and role of culture in instruction and learning;
2. demonstrate knowledge of a specific cultural context for ESL/EFL teaching;
3. demonstrate skill in inquiring into cultural groups, processes, and identities to support language

development.

**III. Planning, Implementing and Managing Instruction**

1. demonstrate the ability to create lesson plans and effectively implement them according to current educational research, concepts and "best practices;"
2. demonstrate an understanding that teaching involves relationship building with learners;
3. demonstrate knowledge of curriculum design, standards-based curricula and materials and strategies and techniques for classroom implementation;
4. demonstrate the ability to use technology as an effective resource in the classroom;
5. demonstrate the ability to differentiate instruction for the diverse learning needs of ESL/EFL students;

**IV. Assessment**

1. demonstrate knowledge of various assessment instruments and issues as they affect ELLs;
2. demonstrate the ability to use standards-based assessment instruments to show language growth and inform instruction;
3. demonstrate the ability to inquire into students' personal histories and linguistic, cultural and educational backgrounds in order to adapt instruction to learner needs.

**V. Professionalism**

1. demonstrate knowledge of the history, research, public policy and current practices in the field of ESL teaching and apply this knowledge to inform teaching and learning;
2. demonstrate the characteristics of a "reflective practioner," through questioning and inquiry into their own teaching practices and using professional development opportunities;
3. demonstrate the ability to build partnerships with colleagues and students' families, serve as a community resource, and advocate for ELLs;
4. demonstrate the ability to adhere to ethical standards for Kentucky educators

For further information concerning the MATESL program, consult the Program Director.

**The Portfolio**

The successful submission of the TESL Professional Portfolio is the culminating requirement of the program. The portfolio has three core functions: 1) reflective tool for professional development; 2) advance an argument that you are a competent language teacher and have met the program TESL Standards; 3) document that you have met the requirements for the TESL MA Program.

## TESL Knowledge Areas & Graduate Courses

| TESL Knowledge Areas | TESL Curriculum |
|---|---|
| Language (12 cr.) | MCL 575: Introduction to Linguistics for Teachers (3cr.) |
| | TSL 560: Literacy Development in the ESL Classroom (3 cr.) |
| | MCL 665: Second Language Curriculum & Assessment (3 cr.) |
| | TSL 675: English Grammar: Analysis & Pedagogy (3 cr.) |
| Learning (9 cr.) | MCL 517/LIN 517: Second Language Acquisition (3cr.)<br>MCL 690: Culture, Cognition and L2 Language Learning (3 cr.)<br>500/600 level course from Education (3 cr.) |

| | |
|---|---|
| Pedagogy (15 cr.) | MCL 510: L2 Teaching Methods: Young & Beg. Level Learners (3cr.)<br>MCL 610: Second Language Teaching Methods: 9-12, Adult & Advanced Students<br>TSL 697: ESL Teaching Internship (9 cr.) |

**Course Descriptions**

TSL 515 ENGLISH LANGUAGE DEVELOPMENT IN THE CONTENT CLASSROOM. (3)
This course is designed to engage class participants in the study of learning and teaching of ESL students in the PreK – 12 content classroom. The course is structured around two foundational knowledge bases for the field of ESL teaching: 1) the role of language and culture in school curriculum and classroom learning; 2) the challenges that content classes – math, science, and humanities – pose for English learners. The goal of the course is to prepare content teachers to effectively teach English learners both language and subject matter.

TSL 560 LITERACY DEVELOPMENT IN THE ESL CLASSROOM. (3)
This course is designed to introduce students to theory, research, and teaching applications of second language literacy development in the ESL classroom. This is a field-based course, and students will study current teaching methods of literacy instruction and apply those ideas with learners in an ESL setting. (Same as EDC 560.)

TSL 597 ESL TEACHING PRACTICUM. (3)
This course provides students with a supervised ESL teaching experience of 45 hours, and an additional 15 hours of course meetings with the supervisor to explore instructional strategies, classroom management issues and reflect upon their own development as teachers. The course is designed as the culmination of the TESL Graduate Certificate, and can be taken in the fall, spring or summer terms. ESL teaching placements must be approved by the course instructor. Prereq: Students must be enrolled in the TESL Graduate Certificate course of study.

TSL 675 ENGLISH GRAMMAR: ANALYSIS AND PEDAGOGY. (3)
This course is designed to deepen students' explicit understanding of English grammar, with particular attention paid to grammatical structures most challenging for English language learners. The course explores the development of learner language, with a primary focus on the development of English grammatical competence. Issues in the teaching of English grammar are studied and applied to ESL teaching techniques and curriculum.

TSL 697 ESL INTERNSHIP. (3-9)
This course provides TESL MA students with a supervised ESL teaching experience of 90 hours, and an additional 15 hours of course meetings with the supervisor to explore instructional strategies, classroom management issues and reflection upon their development as ESL teachers. The course is designed as the culmination of the TESL MA program, and can be taken as a variable credit course (3 – 9 credits) in the fall, spring or summer terms. In order to fulfill the program internship requirements, a total of 9 credits must be completed. Prereq: Student must be in good standing in the TESL MA program.

# COLLEGE OF COMMUNICATION AND INFORMATION

# Communication

## College of Communication & Information

The College of Communications and Information offers programs leading to the Master of Arts (either Plan A or Plan B) and Doctor of Philosophy degrees in Communication. The program offers special opportunities for students to apply communication theory and research across many contexts. Students may develop a program of study emphasizing (or combining) research areas such as health communication, information studies, instructional communication, media and mass communication, risk and crisis communication as well as strategic and organizational communication. The program is designed to serve the needs of students whose goals may include teaching and academic research, professional research, or communication careers in the media or other organizations.

Students pursuing work in health communication are encouraged to develop interdisciplinary programs involving the Department of Behavioral Science, the College of Medicine, as well as the Colleges of Dentistry, Health Sciences, Pharmacy, and Nursing. Communication also participates in interdisciplinary research programs with the Center for Prevention Research, the Sanders-Brown Center for Aging, and a variety of other health-related departments and institutes.

**Admission Requirements**
Students with an undergraduate degree from a fully accredited institution of higher learning and a grade point average of 3.0 on a 4.0 scale are admissible to the graduate program. Only students who have previously completed a master's degree may apply for admission into the doctoral program. Master's degree applicants are expected to have had at least twelve hours of appropriate undergraduate work in communication. Students with degrees in areas not directly related to communication are encouraged to apply, but they may be required to take course work without graduate credit. Should the Admissions Committee feel there is a deficiency in the applicant's studies, it may require enrollment in specific undergraduate courses. Courses taken to remove a deficiency cannot be counted towards the master's degree. In some cases, successful professional experience in a communication field will be considered in admitting students to the program.

Applicants must complete the University of Kentucky's Graduate School online-application and pay the application fee. Per the Graduate School's instruction, all applicants are required to submit official scores on the Graduate Record Examination and official transcripts of all work taken at and beyond the college level. Students whose native language is not English must also submit an official score of at least 550 (or 213 on the computer version or 79 on the internet-based version) of the Test of English as a Foreign Language (TOEFL) or a minimum of 6.5 of the International English Language Testing Service (IELTS). Additionally, all applicants must submit to the College of Communications and Information Studies Graduate Admissions office: (1) transcripts of all work taken at the college level (unofficial or photocopies are acceptable), (2) at least three letters of recommendation focusing on their academic abilities accompanied by the supplied Reference Form and (3) the completed Application Essay indicating why they want to pursue a graduate degree with their reasons for applying to the program. No additional forms are required for financial assistance consideration—all applicants will be considered for funding at the time of review.

The Admissions and Financial Aid Committee will review only completed admission files after January 5 of each year. Applications must have their completed file on record with the Associate Dean for the Graduate Programs in Communication by the deadline in order to be considered for fall admission. New graduate

students are permitted to enroll only during the fall semester.

Exceptions will be made only because of circumstances beyond the control of the applicant. This deadline does not apply to: (1) UK undergraduate students in the College of Communications and Information Studies applying as University Scholars, who may be admitted for summer, fall or spring semesters, and (2) current students in the M.A. Program in Communication or the M.L.S., M.S.L.S or M.S. in ICT.

## Master of Arts

The M.A. program requires that every student become familiar with the important theories and concepts and the principal investigation methods used to expand knowledge of communication. All students are required to complete 30 credit hours to complete the Master of Arts degree. Students will be required to take 12 core credit hours consisting of Communication Theory (CJT 651), and Communication Research Methods (CJT 665), plus Statistics 570 (or its equivalent as determined by the Associate Dean for Graduate Studies). In addition, all students will be required to take either Interpersonal Communication (CJT 631) or Mass Communication (CJT 608 or CJT 645). Students may choose from either the Plan A (Thesis option) or Plan B (non-thesis) options to complete their Masters degree requirements.

Plan A: Students choosing Plan A will take a minimum of 24 credit hours of actual course work, and write a thesis (Note: the six thesis credits must be taken under CJT 768 - Residence Credit for the Master's degree). All students will also complete an oral examination in defense of the thesis.
Plan B: Students choosing Plan B, will take a minimum of 30 hours of course work, followed by a written and oral examination over the student's program.

At least 21 credit hours of the minimum requirements for the master's degree must be from offerings within the College of Communications and Information studies (both Plan A and Plan B). Plan A students may include six hours of CJT 768 in the 21 hours, since the thesis involves work in an area of communication. Also, at least 15 credit hours of the minimum requirements must be in courses at the 600 and 700 levels (both Plan A and Plan B). Plan A students may include six hours of CJT 768 in the 21 hours. No more than three credit yours in Plan A and 6 credit hours in Plan B (of the minimum requirements) may be earned in directed study, directed reading, or internship courses (e.g., CJT 696, CJT 700, CJT 781, and CJT 790).

Students without previous course work in communication may be required to take undergraduate work that does not count toward graduate credit, as determined by the Admissions Committee. Individuals without significant practical experience are strongly encouraged to take CJT 696 - Internship in Communication, which could include opportunities to work with external agencies and funded projects, both within and outside the university.

## Doctor of Philosophy

The Ph.D. program emphasizes communication as a social science. Graduates are prepared for university positions and careers in government, the media and other organizations as researchers, consultants and policy makers. Students must demonstrate general knowledge of communication across various contexts, as well as competence in a core area of specialization. Current core areas include health communication, information studies, instructional communication, media and mass communication, risk and crisis communication as well as strategic and organizational communication.

Students must demonstrate a thorough grasp of communication theory and research methods and must take course work in a cognate area outside of Communication. Proficiency in a foreign language is not required for successful completion of the Ph.D. in Communication. A student's advisory committee may, however, stipulate certain graduate-level courses in another language for the student's program that are consistent with the objectives of the student's program. The required curriculum is as follows:

***Fall Semester: Year 1***

CJT 651 Communication Theory
CJT 664 Qualitative Methods in Communication Research
STA 570 (or other advanced statistics course)

***Spring Semester: Year 1***

CJT 631 Proseminar in Interpersonal Communication OR
CJT 645 Proseminar in Mass Communication
CJT 665 Quantitative Methods in Communication Research

***Fall Semester: Year 2***

CJT 751 Advanced Topics in Communication Theory Construction

All students are also required to complete at least 3 credit hours of CJT 790 (Research Problems in Communication) by the last semester of course work.

The Associate Dean for Graduate Programs, in consultation with the Graduate Review committee, can waive any of the above requirements for a student who has previously taken the same or equivalent course at UK or another university for graduate credit. Each student works with a major professor and an advisory committee to plan course work and complete the dissertation. The committee also administers the qualifying examination and the final oral examination. The qualifying examination consists of a written and oral examination over general communication theory, the core area of specialization, research methods/statistics and the cognate area.

## Course Descriptions

COM 525 ADVANCED ISSUES IN ORGANIZATIONAL COMMUNICATION (Subtitle required). (3)
Examines theory and research relevant to understanding advanced issues in organizational communication. Topics may include strategies of innovation, organizing, networking, decision-making, globalization, technology, power, and diversity. Prereq: COM 326 or COM 351.

COM 535 RISK AND CRISIS COMMUNICATION. (3)
This course examines strategic risk and crisis communication research, theory, and practices. Special emphasis is placed on crisis planning, media relationships, image restoration, ethical responses, and organizational learning. Prereq: COM 326 or COM 351.

COM 553 CRITICAL ANALYSIS OF COMMUNICATION AND PERSUASION IN POPULAR CULTURE. (3)
This course focuses on what and how popular culture entertainment media functions to communicate and persuade. Forms to be examined may include films/movies, television programs, music, cartoons, and/or comics. Ultimately, students will be equipped with tools to make educated decisions as critical consumers of the messages conveyed in popular culture entertainment media. Prereq: COM 326 or COM 351.

COM 571 INTERPERSONAL COMMUNICATION IN HEALTH CONTEXTS. (3)
Examines theory and research relevant to the role of interpersonal communication in managing mental and physical health. Topics related to interaction in health contexts include: communicating identity in health and illness, health and personal relationships, health care provider/ patient communication, medical decision-making, and interpersonal health education and prevention efforts. Prereq: COM 471, and COM 326 or COM 351.

COM 572 HEALTH COMMUNICATION CAMPAIGNS AND COMMUNITIES. (3)
This course focuses on the role of the mass media in contemporary public health campaigns. Most class sessions focus on the application of theory and research to the design of these campaigns. Earlier studies examining the role of the mass media in health campaigns indicated that the mass media played a small and rather insignificant role in changing health behaviors. However, more recent studies indicate that careful targeting combined with formative research often yield successful behavior change. Prereq: COM 326 or COM 351.

COM 581 TEAMWORK AND LEADERSHIP IN ORGANIZATIONS. (3)
Examines theory and research on the nature and development of small group communication. Topics include leadership, interpersonal relations and roles, goals, and decision-making in multiple organizational contexts. Communication major or permission of instructor required for enrollment. Prereq: COM 325 AND completion of the major graduation communication and composition in the communication major requirement (COM 326 or COM 351).

COM 584 TEACHING OF COMMUNICATION. (3)
This course uses communication research and theory to develop effective instructors of communication. Topics include instructor identity, course development, teaching communication contexts (e.g., small group, intercultural, persuasion, speech) in diverse settings (e.g.,
classroom, organizational training), managing learners, and learning assessment. Prereq: COM 326 or COM 351.

COM 591 SPECIAL TOPICS IN COMMUNICATION (Subtitle required). (1-3)
Intensive study of a specialized topic area in communication. May be repeated to a maximum of six credits under different subtitles. Prereq: COM 326 or COM 351.

# Information Communication Technology

College of Communication & Information

## Master of Science

Our Information Communication Technology program strives to educate students to assume roles where the application of information technology (IT) is concerned with the ultimate goal of connecting people, organizations, and communities to enhance their ability to succeed. This master's program focuses on providing students with the knowledge and skills to assume leadership positions charged with effectively applying, using, and managing technology when solving problems specifically related to information and communication. It provides a human and organizational focus on technology – teaching students how to be effective users of technology. In general, the ICT program focuses on the intersection of technology, the people who use that technology, the policies and regulations governing or affecting use of that technology, and the community or environment in which that technology is used, in order to facilitate communicating information in meaningful ways.

**Admission Requirements**

Students are admitted for fall and spring semesters. Application deadlines are July 15 for fall admission and November 15 for spring admission. Students pursuing the degree will apply to the Graduate School for admission to the ICT MS degree program. There is no preferred undergraduate degree program. Admission to the ICT MS degree program requires 1) a bachelor's degree from an accredited institution; 2) a grade point average of 3.0 or higher on any prior undergraduate or graduate work, in both cases on a scale with A = 4.0; and 3) Graduate Record Exam scores, verbal: new exam 150 or higher OR old exam 400 or higher, quantitative: new exam 140 or higher OR old exam 450 or higher, and analytical writing 4.0 or higher. For the quantitative and analytical scores, applicants should meet at least one of the minimum scores. Applicants for whom English is not the native language must achieve a TOEFL score of 550 for the paper-based test (213 for computer-based test or 79 for the internet-based test). Students may take 500-level undergraduate courses, with the advice of faculty or staff, to remedy any deficiencies.

**Degree Requirements**

The ICT master's degree program requires successful completion of 36 hours, including 15 hours of required core classes. With the faculty advisor's prior approval, as many as 6 elective hours may be taken in a cognate area of study. Students pursuing the ICT master's will submit a research proposal in the form of a written paper and visual presentation as their Exit Requirement. Students will identify an ICT-related problem space, research current options, propose a new solution, and provide reasoning and evidence that supports the new solution. The project may be new, or it may be an extension to a project started during a student'sinternship, as long as the student substantially expands what they did during the internship.

**Course Descriptions**

ICT 550 SECURITY INFORMATICS. (3)

This course introduces students to policy concerns relating to security informatics, and highlights theoretical and practical approaches to designing secure information and communication technology (ICT) systems. It addresses key issues such as authentication, risk analysis, access control, database and network security, and information assurance.

ICT 552 CYBERCRIME AND DIGITAL LAW ENFORCEMENT. (3)

The global reach of the Internet, the low marginal cost of online activity, and the relative anonymity of users have contributed to a wide escalation in cybercrimes. Consequently, information and

communications technologies (ICT) are being increasingly employed to instigate threats to global civil society. This course provides an overview of cybercrime and the digital law enforcement practices put in place to respond to them. The course will focus on the types and extent of current cybercrimes, how the justice system responds to these crimes, the various constitutional protections afforded to computer users, the law and policies that govern cybercrime detection and prosecution, and related technologies.

ICT 596 INTERNSHIP IN ITC. (3)
Provides students with supervised work-and-learning experience in a professional environment under the direction of a University faculty member and an employee of a participating firm. One hundred forty four (144) hours of student time are expected during the semester. Enrollment is contingent upon the availability of internships. Students are selected on the basis of personal qualifications, including GPA, courses taken, recommendations, and an interview.

ICT 600 INFORMATION COMMUNICATION TECHNOLOGY IN SOCIETY. (3)
We live in a world of rapid technological innovation. This innovation has allowed significant changes in the ways that we communicate and interact with forms of media. In fact, the technologies related to communication have created a culture surrounding how we see, hear, read and use information, and have significantly impacted politics, economics, policy, etc. This course studies the impacts of information and communication technology (ICT) on individuals and society, and the impact that society has on ICTs. It examines current issues related to the diffusion of new technologies in society as well as the obstacles to widespread use of individual ICTs. Students in this course will analyze the various theories related to the use of emerging communications forms, and consider the factors related to successful ICT deployment. Students will be required to look beyond "good/bad" classification of new communication technology, and conduct in-depth interrogations of ICTs, the issues that surround them and the environments in which ICTs are used.

ICT 601 INFORMATION SEEKING. (3)
This course provides an overview of the theory and practices of human information seeking behavior, including both basic models to understand user behavior, and techniques to effectively select, locate, evaluate, and use information to meet diverse information needs and facilitate human-computer interaction.

ICT 605 INTRODUCTION TO HUMAN COMPUTER INTERACTION. (3)
Human computer interaction (HCI) is an interdisciplinary field in which computer scientists, engineers, psychologists, social scientists, and design professionals play important roles. The goal of HCI is to solve real problems in the design and useof technology, making computerbased systems easier to use and more effective for people and organizations. Ease of use and effectiveness are critical to the success of any systems that interact with people, including software systems, home, office and factory appliances, and web and phone applications. This course provides an overview and introduction to the field of human-computer interaction, with a focus on how it applies to managers, technology executives, and others who will work with HCI professionals. Particular emphasis will be placed on what HCI methods and HCI-trained specialists can bring to design and development teams. The course will introduce students to proven tools and techniques for creating and improving user interfaces, such as Participatory Design, HCI for Development, Contextual Inquiry, and Think-Aloud User Testing. Students at the end of the course will have learned some useful techniques and an understanding of systematic procedures for creating usable and useful designs and systems.

ICT 610 ICT RESEARCH METHODS. (3)
Information and Communication Technologies (ICTs) are pervasive in our increasingly global society and, importantly, have the potential to improve lives and society. This course is designed to provide you

with a sophisticated understanding of the philosophy, theory, design, and analysis of both qualitative and quantitative research in communication. During this course you will be exposed to a variety of methodological designs and statistical procedures to allow you to complete your own research projects during your time as a graduate student here at the University of Kentucky. Using a variety of methods ranging from the foundational (e.g., interviews, surveys) to cutting edge (e.g., big data analysis, geospatial mapping) and readings from a variety of contexts (e.g., education, healthcare, risk and crisis), this course is designed to equip you with the research and methodological tools to understand how ICTs affect individuals, relationships, groups, organizations, social movements, and policies and to use these methodological tools in applied settings.

ICT 626 ELECTRONIC INFORMATION RESOURCES IN THE HEALTH SCIENCES. (3)
Survey of electronic information resources in the health sciences, including databases and Web sources. Discussion of relevant controlled vocabularies and their use in formulating and executing search strategies. The course also includes an evidence based health care component whereby students learn to analyze critically the biomedical literature and determine reference and research relevancy. (Same as LIS 626.)

ICT 627 CONSUMER HEALTH INFORMATION RESOURCES. (3)
History and development of consumer health information resources; role of professional and governmental agencies in provision of consumer health information; policy issues related to provision of consumer health information. Consumer health professional literature, user information needs, user resources, and information services. Identification, selection, utilization, and evaluation of consumer health information for special populations within specialized educational and healthcare settings. Trends and issues in consumer health informatics. (Same as LIS 627.)

ICT 630 INFORMATION RETRIEVAL. (3)
This course reviews important information retrieval (IR) theories and models; explores a brief history of IR research; and examines various IR applications. Students will get familiar with IR foundations such as document indexing or query expansion/optimization strategies, as well as understand overall system architectures for selected IR applications. Students will explore how to analyze and compare IR systems, how to select the best IR systems for particular tasks and how to design a prototype for an efficient IR system. Prereq or concur: LIS 636 or LIS 637 or LIS 638. (Same as LIS 630.)

ICT 636 INTRODUCTION TO COMPUTER INFORMATION SYSTEMS. (3)
A broad introduction to the use of computers as tools for creativity, communications, organizing information, and problem-solving. The basic concepts of computer hardware, software, networking, and the Internet are covered. Students also will be introduced to basic techniques for designing and creating a web site.

ICT 638 ADVANCED WEB DESIGN. (3)
This course serves as a hands-on introduction to advanced web design techniques. Topics include the web development process, creating dynamic content, advanced layout and design, client-side and server-side scripting languages, graphic file types and optimization, web forms, multimedia, and web servers and databases. Prereq: ICT 636, or consent of instructor.

ICT 640 HEALTH INFORMATION RESOURCE SERVICES. (3)
A survey of information agencies and health science libraries, including topics related to: the healthcare community and their information needs, information resources in the health sciences, controlled medical terminologies and classification systems, search and retrieval of information resources, issues in the management of collections and access to health libraries. (Same as CI/LIS 640.)

ICT 650 INTRODUCTION TO LEADERSHIP IN INFORMATION PROFESSIONS. (3)
The primary purpose of this course is to expose students to leadership strategies and challenges in the information professions. Primary attention is placed on: 1) the role of communication in effective leadership; 2) innovation and change in the information professions and the leadership styles available for addressing such changes; 3) ethical frameworks in communication leadership; 4) issues management and organizational planning; and 5) leadership communication strategies for managing conflict and crises. Prereq: Graduate student status in the ICT, LIS, or CJT graduate programs.

ICT 651 TECHNOLOGY SECURITY. (3)
An introduction to information security including vocabulary and terminology, threats to information systems, cryptology, ethics, the legal environment, and risk management. Identification of exposures and vulnerabilities and appropriate countermeasures are addressed. The importance of appropriate planning, policies and controls is also discussed. It is expected that each student will possess some knowledge of programming, operating systems, and networking, although advanced knowledge in those areas is not necessary.

ICT 658 KNOWLEDGE MANAGEMENT. (3)
Organizational knowledge is a valuable strategic asset. Knowledge management refers to the systematic management of an organization's knowledge assets so that they can be leveraged for sustainable advantage. This course examines how knowledge is created, captured, organized, diffused, and implemented in an organization. Topics covered include knowledge management processes and practices, corresponding technologies, collaboration tools, and people and cultural issues. (Same as LIS 658.)
ICT 661 INTRODUCTION TO DATA SCIENCE. (3)
This course will provide a foundation in the area of data science based on data curation and statistical analysis. The primary goal of this course is for students to learn data analysis concepts and techniques that facilitate making decisions from a rich data set. Students will investigate data concepts, metadata creation and interpretation, general linear method, cluster analysis, and basics of information visualization. At the beginning, this course will introduce fundamentals about data and data standards and methods for organizing, curating, and preserving data for reuse. Then, we will focus on the inferential statistics: drawing conclusions and making decisions from data. This course will help students understand how to use data analysis tools, and especially, provide an opportunity to utilize an open source data analysis tool, R, for data manipulation, analysis, and visualization. Finally, in this course we will discuss diverse issues around data including technologies, behaviors, organizations, policies, and society. (Same as LIS 661.)

ICT 662 DATA ANALYSIS AND VISUALIZATION. (3)
This course examines three major categories of topics in relation to data analysis and visualization. First, this course will cover the basic ways that data can be obtained from various sources, such as raw text files, web APIs, and data repositories. It will also cover the techniques of data cleaning and how to organize data for analysis. Second, the course will cover the essential techniques for analyzing quantitative data. It will teach prediction and clustering methods that are useful to solve various real data analysis tasks. In addition, students will learn major theories and recent methods in text analysis. Third, this course teaches how to create visualizations that effectively communicate the meanings behind data and information. The course will cover key practical skills in information visualization, such as plotting, mapping, and network visualization. This course will not be mathematically intensive. Instead, the course will use existing computational tools and programming libraries to solve various problems. You will use the R language and environment intensively for data analysis and visualization. (Same as LIS 662.)

ICT 690 SPECIAL TOPICS IN LIBRARY AND INFORMATION SCIENCE. (3)
Intensive study of one aspect of library and information science under the leadership of an authority in the area. (Same as LIS 690.)

ICT 695 INDEPENDENT STUDY IN INFORMATION COMMUNICATION TECHNOLOGY. (3) Opportunities for directed study in subjects or problems of interest to a student. Observation and research required, and a written report describing the work accomplished. Prereq: Consent of instructor and approval of proposal.

# Library Sciences

## College of Communication & Information

The School of Library and Information Science offers the Master of Science in Library Science (MSLS). This degree can be completed entirely online with no required travel to Lexington, Kentucky.

**Admission Requirements**
Students are admitted for fall, summer, and spring semesters. Students pursuing the degree will apply to the Graduate School for admission to the Library Science MS degree program. There is no preferred undergraduate degree program. Admission to the Library Science MS degree program requires 1) a bachelor's degree from an accredited institution; 2) a grade point average of 3.0 or higher on any prior undergraduate or graduate work, in both cases on a scale with A = 4.0; and 3) Graduate Record Exam scores, verbal: new exam 150 or higher OR old exam 400 or higher, quantitative: new exam 140 or higher OR old exam 450 or higher, and analytical writing 4.0 or higher. For the quantitative and analytical scores, applicants should meet at least one of the minimum scores. Applicants for whom English is not the native language must achieve a TOEFL score of 550 for the paper-based test (213 for computer-based test or 79 for the internet-based test). Students who are admitted will be expected to complete online Microsoft Office trainings, available through the University at no charge, for Word, Access, Excel, and PowerPoint by the end of their second semester. These trainings serve a leveling function and help to ensure that students entering the graduate program possess baseline skills with general office productivity applications.

**Degree Requirements**
To successfully complete the MSLS degree, a student must successfully complete 36 hours of course work and a program portfolio. The 36 hours (12 courses) are made up of 12 hours of required courses, 6 hours of technology electives, 6 hours of foundational courses and 12 hours of student selected electives.

*Required Courses (all 4 courses required)*

| | | |
|---|---|---|
| LIS 600 | Information in Society | (3) |
| LIS 601 | Information Searching | (3) |
| LIS 602 | Knowledge Organization | (3) |
| LIS 603 | Management in Information Organizations | (3) |

*Foundational Courses (select 2)*

| | | |
|---|---|---|
| LIS 621 | Introduction to Information Services | (3) |
| LIS 630 | Information Retrieval | (3) |
| LIS 672 | Practicum | (3) |

*Technology Electives (select 2)*

| | | |
|---|---|---|
| LIS 636 | Foundations of Information Technology | (3) |
| LIS 637 | Information Technology | (3) |
| LIS 638 | Internet Technologies And Information Services | (3) |
| LIS 668 | Information Systems Design | (3) |

*Student can select an alternative technology elective if it is first approved by the adviser.

With the faculty advisor's prior approval, as many as 6 elective hours may be taken in a cognate area of study. Transfer credit is limited to 9 credit hours and includes any of the School's courses taken while in post-baccalaureate status.

Degree requirements allow a student considerable freedom to design her/his program to suit individual needs and interests. The curriculum is sufficiently varied to permit opportunities to build both breadth and depth into the course of study. The student is assisted by a faculty advisor who provides guidance and counsel. Ultimately, however, it is the student's responsibility to see that all School and Graduate School requirements are met prior to taking submitting the program portfolio.

A grade point average of 3.00 (B) must be maintained. Failure to do so results in academic probation, and will result in dismissal, if, in the prescribed time, the grade point average is not raised to 3.00 or higher. A student who earns a third C (or lower) grade is dismissed from the program, even though the student may have earned the required minimum 3.00 grade point average.

**Course Descriptions**

LIS 510 CHILDREN'S LITERATURE AND RELATED MATERIALS. (3)
A survey of children's literature, traditional and modern. Reading and evaluation of books with multimedia materials with emphasis on the needs and interests of children. Covers media for use by and with children from preschool through grade six.

LIS 514 LITERATURE AND RELATED MEDIA FOR YOUNG ADULTS. (3)
A study of literature and related materials for use with young people in grades 6-12. Emphasis is placed on the special characteristics and needs of young people and the evaluation of materials for this age group. (Same as EDC 504.)

LIS 600 INFORMATION IN SOCIETY. (3)
Students investigate the Information Society and its relationships with our world including the impact on information organizations and communities. Students focus on the discipline's ethics, values, and core concepts.

LIS 601 INFORMATION SEARCH. (3)
Within given theoretical contexts, students search and retrieve organized information. Students learn to construct, apply, and critically evaluate advanced information search and retrieval strategies.

LIS 602 KNOWLEDGE ORGANIZATION. (3)
Students describe and classify recorded knowledge and learn fundamental principles and practices that facilitate access and retrieval.

LIS 603 MANAGEMENT IN INFORMATION ORGANIZATIONS. (3)
Students learn and apply the basic elements of management and leadership within the context of information organizations.

LIS 604 LIBRARY AND BOOK HISTORY. (3)
Development of libraries and books from earliest time to the present with special reference to their relationship to contemporary social, economic, cultural and political trends. Emphasis is given to American library and book history.

LIS 605 INFORMATION POLICY AND TECHNOLOGY REGULATION. (3)
This course explores the socio-cultural, economic and political issues confronting communication and information professionals and the transformative impact of these issues on information policy development. The rapidly evolving communication and information infrastructure and the global shift to an information society will provide the context for the course. Within this context, emphasis will be placed on issues of access, which includes, universal service, intellectual freedom, intellectual property

rights, privacy, security, advocacy, equity, and the role of library and information professionals and organizations in policy formulation.

LIS 608 METHODS OF RESEARCH IN LIBRARY AND INFORMATION SCIENCE. (3)
Basic tools, techniques and methods of research. Consideration is given to the role and purpose of research in library and information science and its relationship to research in other disciplines. Includes critical evaluation of current research in library and information science and the development of a research proposal. Prereq: LIS 601, LIS 602 or consent of instructor.

LIS 609 CURRENT PROBLEMS IN LIBRARY AND INFORMATION SCIENCE. (3)
A seminar which examines current philosophical and managerial issues in library and information science. Focus is on the analysis, origins, evaluation and current status of these issues. Prereq: Eighteen hours of graduate study in LIS or consent of instructor.

LIS 610 LIBRARY MATERIALS AND LITERATURE FOR CHILDREN. (3)
A survey and historical study of library materials and literature for children up to grade 6. Students will engage in extensive reading, and in the evaluation of books and some multimedia materials. Basic programming will be explored.

LIS 611 CRITICAL ANALYSIS OF CHILDREN'S LITERATURE. (3)
Advanced study of book evaluation, literary criticism, children's book publishing, awards, and current trends in the field. Individual projects require extensive critical reading. Prereq: LIS 610 or LIS 614 or consent of instructor.

LIS 612 YOUTH LITERATURE FOR A DIVERSE SOCIETY. (3)
A survey and historical study of culturally diverse literature for youth of all ages. Students will engage in extensive reading, evaluation, and discussion of literature and the issues related to developing an understanding of various cultures and special populations within the United States. Prereq: LIS 610: Library Materials and Literature for Children (or comparable).

LIS 613 INFORMATION RESOURCES AND SERVICES FOR CHILDREN. (3)
A study of effective programming for children and young adults. Emphasis is placed on oral presentations. Literature-based activities and community outreach.

LIS 614 LIBRARY MATERIALS AND LITERATURE FOR YOUNG ADULTS. (3)
A study of literature and related materials for use with young people in grades 7-12. Emphasis is placed on the special characteristics and needs of young adults and the evaluation of materials for this age group.

LIS 621 INFORMATION RESOURCES AND SERVICES. (3)
This course provides an introduction to the theory and practice of information services, which are defined broadly as the activities in which information professionals engage to connect people to the information they need, including information needs assessment, direct information provision, information literacy instruction, and intermediation for all stages of the information search process. Emphasis is placed on the roles played by information professionals to help diverse users define and negotiate their information needs, navigate usersystem interfaces, formulate effective search strategies for information retrieval, and evaluate and select information. Attention is also given to the skills necessary to plan for, implement, and evaluate the delivery of information services in a wide variety of organizational contexts. The ethical foundations of information services are also considered. Prereq: LIS 601.

LIS 622 SOCIAL SCIENCE INFORMATION. (3)
Examination of important issues and developments relating to creation, packaging, dissemination and use of social science information by various segments of society. Emphasis on understanding information needs of those who use social science information and information systems, source and services available to satisfy those needs. Prereq: LIS 601 or consent of instructor.

LIS 623 ADVANCED REFERENCE SERVICES. (3)
This course provides advanced study of the theory and practice of information services, which are defined broadly as the activities in which information professionals engage to connect people to the information they need, including information needs assessment, direct information provision, information literacy instruction, and intermediation for all stages of the information search process. Emphasis is placed on the structure of information, information seeking, and information sources within disciplines. Students will be prepared to help advanced users define and negotiate their information needs, navigate user-system interfaces, formulate effective search strategies for information retrieval, and evaluate and select information. Ethical issues in information services are also considered. Prereq: LIS 601, LIS 622.

LIS 624 INFORMATION IN SCIENCE AND TECHNOLOGY. (3)
The content and structure of bibliographic and other information resources in science and technology. A consideration of formal and informal communication in science and technology with emphasis on sources and services in agriculture, astronomy, biology, chemistry, mathematics, natural resources, zoology, and other closely related subjects. Prereq: LIS 601 and LIS 602 or consent of instructor.

LIS 625 INFORMATION LITERACY INSTRUCTION. (3)
This course examines the theory and practice of instruction provided in information organizations to develop clients' abilities to effectively locate, evaluate, select and use information. Attention is given to the nature of information literacy, systematic instructional design, needs assessment, methods of instruction, teaching and learning preferences, and the evaluation of learning and programs. This course is interdisciplinary and draws on theory from Library & Information Science, Instructional Communication, Education and Cognitive Psychology. We will examine and criticize various instructional models, plan for and deliver instruction in both in-person and computeraided venues, learn various methods for assessing teaching and learning, and discuss the managerial and political aspects of instructional delivery in various information agency contexts, with a special emphasis on those in academic settings. Prereq: LIS 601 or consent of instructor.

LIS 626 ELECTRONIC INFORMATION RESOURCES IN THE HEALTH SCIENCES. (3)
Survey of electronic information resources in the health sciences, including databases and Web sources. Discussion of relevant controlled vocabularies and their use in formulating and executing search strategies. The course also includes an evidence based health care component whereby students learn to analyze critically the biomedical literature and determine reference and research relevancy. (Same as ICT 626.)

LIS 627 CONSUMER HEALTH INFORMATION RESOURCES. (3)
History and development of consumer health information resources; role of professional and governmental agencies in provision of consumer health information; policy issues related to provision of consumer health information. Consumer health professional literature, user information needs, user resources, and information services. Identification, selection, utilization, and evaluation of consumer health information for special populations within specialized educational and healthcare settings. Trends and issues in consumer health informatics. (Same as ICT 627.)

LIS 629 INTRODUCTION TO MEDICAL INFORMATICS. (3)
This course is designed to introduce the interdisciplinary field of medical informatics to health information professionals. Medical Informatics is a developing field that essentially seeks to apply information and computing technologies to improve all aspects of healthcare, including patient care, research, and education. During the semester we will explore a number of topics central to understanding the field, including: the nature of biomedical information, the electronic medical record, the role of information and computing technologies to support clinical decision making, healthcare and informatics standards, information retrieval, system analysis and technology assessment, and essential issues of information technology in medical education and medical ethics. By the end of this Web-based course, students are expected to be able to understand broad aspects of the field and can use this as a foundation for further education, training, and work in health information professions. (Same as CI 629.)

LIS 630 INFORMATION RETRIEVAL. (3)
This course reviews important information retrieval (IR) theories and models; explores a brief history of IR research; and examines various IR applications. Students will get familiar with IR foundations such as document indexing or query expansion/optimization strategies, as well as understand overall system architectures for selected IR applications. Students will explore how to analyze and compare IR systems, how to select the best IR systems for particular tasks and how to design a prototype for an efficient IR system. Prereq or concur: LIS 636 or LIS 637 or LIS 638. (Same as ICT 630.)

LIS 634 INFORMATION ARCHITECTURE. (3)
The course introduces the concepts and practices of information architectures (IA) for a Web site within the context of the organization it serves. It aims to acquaint students with principles and process of information architecture for user-centered design of websites. It also provides students the opportunity to develop practical skills related to the design of information organization and navigation systems. The course prepares students for the companion technical course of "content management systems" where they will apply the theories and techniques studied in this course to the implementation of a fully functional website.

LIS 636 FOUNDATIONS OF INFORMATION TECHNOLOGY. (3)
A study of the computing fundamentals necessary for the understanding and use of information technology. Focus is on examining computer systems in concept and practice, which is essential to information professionals. Topics include how computers represent, process, store and retrieve information; how operating systems control these processes, interpret commands, present the user interface, and run applications; how databases are designed and created; how general understanding of programming processes and productivity software skills is important in a variety of professional contexts. Productivity applications include the Office suite, Internet applications and web publishing, and database management systems.

LIS 637 INFORMATION TECHNOLOGY. (3)
Study of computer and communication technology used in modern information storage and retrieval systems. Consideration also given to managing microcomputer services, hardware evaluation and selection, and system security. Prereq: Consent of instructor. (Same as CI 637.)

LIS 638 INTERNET TECHNOLOGIES AND INFORMATION SERVICES. (3)
A course examining the structure, development and evolution of the Internet; network protocols and client/server architecture issues; Web page design, authoring, and evaluation; the use of the Internet as an information storage and retrieval system; recent advances in HTML and scripting languages; and Internet related social issues such as censorship and copyright. Prereq: LIS 636 or consent of instructor. (Same as CI 638.)

LIS 640 HEALTH INFORMATION RESOURCE SERVICES. (3)
A survey of information agencies and health science libraries, including topics related to: the healthcare community and their information needs, information resources in the health sciences, controlled medical terminologies and classification systems, search and retrieval of information resources, issues in the management of collections and access to health libraries. (Same as CI/ICT 640.)

LIS 641 LAW LIBRARIANSHIP. (3)
A study of the materials of legal research and reference work. Emphasis is placed on the methods of effective research and the actual use of legal materials in the solution of practical reference problems. The selection, cataloging, classification, and storage of materials in a law collection are considered. The specialized requirements of law librarianship and law library administration are treated. Prereq: LIS 601 and LIS 602 or consent of instructor.

LIS 642 ORAL HISTORY. (3)
This course is an introduction to oral history as a research methodology and its role in library and archives collections. It is designed for persons intending to conduct oral history interviews to expand library and archival collections. It is also for persons responsible for the archival management of oral history collections. The course examines how oral history projects are initiated, how projects are administered, how interviews are conducted, and how oral history interviews are preserved and made available to researchers. The course will also explore the use of technology in making oral histories available to researchers on the Web. Students will gain practical experience in oral history interviewing and related aspects of oral history, such as transcribing, editing, and publishing oral histories. Taught essentially same as EPE 669.

LIS 643 ARCHIVES AND MANUSCRIPTS MANAGEMENT. (3)
This course is designed to cover the management, care, and servicing of manuscript and archival material. Attention will also be given to criteria for building an archival/manuscript collection in a repository and to the description and interpretation of its holdings in guides and catalogs for the use of researchers. Prereq: LIS 602 or consent of instructor.

LIS 644 ADMINISTRATION OF SCHOOL LIBRARY MEDIA CENTERS. (3)
Examines the philosophy behind current national and state guidelines for library media programs and addresses the roles of library media professionals in program and resource management in the K-12 school setting. Students will work on their individual exit portfolios and plan a practicum experience to meet requirements for performance-based certification by the Kentucky Department of Education.

LIS 645 PUBLIC LIBRARIES. (3)
Examines historical development of the public library and its roles in society. Topics considered include the environment of public libraries; organization and management; information needs of client groups; information resources and services provided to clients; and trends developments in public libraries. Prereq: LIS 601 and LIS 602 or consent of instructor.

LIS 646 ACADEMIC LIBRARIES. (3)
Examines historical development of academic libraries and their roles in higher education. Topics considered include the environment of academic libraries, organization and management needs of client groups, information resources and services provided clients; and issues, trends, and developments in academic libraries. Prereq: LIS 601 and LIS 602 or consent of instructor.

LIS 647 CURRENT TRENDS IN SCHOOL MEDIA CENTERS. (3)
An intensive study of trends in school media centers with emphasis on research, technology, and the role of

the school media specialist in the school curriculum.

LIS 648 TECHNOLOGY IN THE SCHOOL MEDIA CENTER. (3)
Consideration of new and emerging educational technologies that could be integrated into school curriculum. Includes hands-on experiences as well as critical reading and discussion on current issues relating to educational technology and the role of the media specialist in technology integration.

LIS 650 TECHNICAL PROCESSING SYSTEMS. (3)
A survey of manual and computer-based technical processing systems in libraries. Consideration given to circulation, acquisitions, cataloging and serial control systems. Trends and developments in technical processing, files and records management, and technical processing procedures and activities are examined. Prereq: LIS 602 or consent of instructor.

LIS 655 ORGANIZATION OF KNOWLEDGE I. (3)
Theories and practice of bibliographic description and subject analysis. Covers the organization of both print and electronic information, including use of Anglo-American Cataloging Rules, Dewey Decimal Classification, Library of Congress Classification and Library of Congress Subject Headings. Prereq: LIS 602 or consent of instructor.

LIS 656 ORGANIZATION OF KNOWLEDGE II. (3)
In-depth coverage of the theories and practice of bibliographic description and subject analysis. Covers the organization of both print and electronic information and authority control. Emphasis is on problems in practice, special case studies, current issues and future trends of description, subject analysis and online authority control. Prereq: LIS 655, or consent of instructor

LIS 658 KNOWLEDGE MANAGEMENT. (3)
Organizational knowledge is a valuable strategic asset. Knowledge management refers to the systematic management of an organization's knowledge assets so that they can be leveraged for sustainable advantage. This course examines how knowledge is created, captured, organized, diffused, and implemented in an organization. Topics covered include knowledge management processes and practices, corresponding technologies, collaboration tools, and people and cultural issues. (Same as ICT 658.)

LIS 659 COLLECTION DEVELOPMENT. (3)
Intellectual and administrative aspects of building, maintaining and evaluating library collections. Topics include: library cooperation; national standards; the writing and implementation of collection policies; strategies of selection and evaluation; contemporary publishing and the book trade.

LIS 661 INTRODUCTION TO DATA SCIENCE. (3)
This course will provide a foundation in the area of data science based on data curation and statistical analysis. The primary goal of this course is for students to learn data analysis concepts and techniques that facilitate making decisions from a rich data set. Students will investigate data concepts, metadata creation and interpretation, general linear method, cluster analysis, and basics of information visualization. At the beginning, this course will introduce fundamentals about data and data standards and methods for organizing, curating, and preserving data for reuse. Then, we will focus on the inferential statistics: drawing conclusions and making decisions from data. This course will help students understand how to use data analysis tools, and especially, provide an opportunity to utilize an open source data analysis tool, R, for data manipulation, analysis, and visualization. Finally, in this course we will discuss diverse issues around data including technologies, behaviors, organizations, policies, and society. (Same as ICT 661.)

LIS 662 DATA ANALYSIS AND VISUALIZATION. (3)
This course examines three major categories of topics in relation to data analysis and visualization. First, this course will cover the basicways that data can be obtained from various sources, such as raw text files, web APIs, and data repositories. It will also cover the techniques of data cleaning and how to organize data for analysis. Second, the course will cover the essential techniques for analyzing quantitative data. It will teach prediction and clustering methods that are useful to solve various real data analysis tasks. In addition, students will learn major theories and recent methods in text analysis. Third, this course teaches how to create visualizations that effectively communicate the meanings behind data and information. The course will cover key practical skills in information visualization, such as plotting, mapping, and network visualization. This course will not be mathematically intensive. Instead, the course will use existing computational tools and programming libraries to solve various problems. You will use the R language and environment intensively for data analysis and visualization. (Same as ICT 662.)

LIS 665 INTRODUCTION TO DIGITAL LIBRARIES. (3)
This course focuses on the theoretical, technological, human factors and evaluative components of digital library (DL) research and practice. Students will read and discuss literature on DLs, review existing technologies and proof-of-concepts implementation projects, and work as a group to develop a prototype but operational DL. This course is foundational for students wishing to engage seriously in the world of digital librarianship. Prereq: LIS 602, LIS 636.

LIS 668 DATABASE MANAGEMENT. (3)
This course is designed as a first database course for students without any previous experience. The general aim of the course is to understand the basic concepts, principles, and hand-on experiences on database systems. The course will evolve from understanding, visualizing, and analyzing data. Then transition to understanding relational databases by designing and building databases using Access and querying using Structured Query Language (SQL). Prereq: LIS 636 or permission of instructor. (Same as CI 668.)

LIS 672 PRACTICUM. (3)
Practicum in a library or other information-related organization. Student assumes entry level professional duties and responsibilities in an operational setting under the close supervision of an information professional. Requires minimum of 140 hours of experiential learning, and the completion of a multimedia presentation/portfolio under the direction of the course coordinator. Prereq: Completion of 18 hours of graduate work in library and information science and consent of course coordinator.

LIS 676 SCHOOL MEDIA PRACTICUM. (1-12)
Supervised experience at the elementary and secondary levels in school library media centers. Required for students seeking certification as school/media librarians in Kentucky. Experience will be under the joint supervision of college faculty and cooperating media librarians. Prereq: Admission to Teacher Education Program and consent of instructor.

LIS 690 SPECIAL TOPICS IN LIBRARY AND INFORMATION SCIENCE. (3)
Intensive study of one aspect of library and information science under the leadership of an authority in the area. (Same as ICT 690.)

LIS 695 INDEPENDENT STUDY IN LIBRARY AND INFORMATION SCIENCE. (3)
Opportunities for directed study in subjects or problems of interest to a student. Observation and research required, and a written report describing the work accomplished. Prereq: Consent of instructor.

LIS 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

LIS 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours

# COLLEGE OF DENTISTRY

# Dentistry

## College of Dentistry

The goal of the Master of Science degree programs involved in the Orofacial Pain, Orthodontics, and Periodontology specialty training programs is to produce graduates who are clinically adept, well-grounded in research and the biological basis of dentistry and prepared to function at a high level of accomplishment in clinical practice and academic dentistry. The program is interdisciplinary. Faculty members are drawn from the College of Dentistry clinical and graduate faculty, and from departments throughout the University of Kentucky.

Only students of high academic standing will be accepted into these programs, which requires didactic, clinical, and research training. All of these elements are integrated throughout the program. All students receive teaching experience in anticipation of full- or part-time academic involvement after graduation. Students pursuing specialty training in Orthodontics, Periodontology, or Advanced Training in Orofacial Pain are eligible for the Master of Science (M.S.) degree. Successful completion of the M.S. degree is prerequisite to awarding of the program's certificate.

**Admission Requirements**
Applicants to any of the advanced programs must have a D.M.D./D.D.S. degree from an accredited United States or Canadian dental school or equivalent. Admission to the Master of Science Program is based on high academic performance in dental school, professional recommendations and a personal interview.

Depending on the program, applicants must submit official scores to the specific program of interest for one of the following tests: the Graduate Record Exam (GRE), Part I of the National Dental Board, or Part II of the National Dental Board for the Master of Science Programs. Additional exams such as ADAT are now under review and consideration. To determine which of these tests is recommended for your program of interest, please consult each program's web site. Applicants who are not native English speakers must score at least 550 (paper,) 213 (computer) or 79 (internet) on the Test of English as a Foreign Language (TOEFL) or 6.5 on the International English Language Testing System (IELTS). To determine which of these tests is recommended for your specialty track, please consult the web site for that specific program.

**Degree Requirements**
Both Plan A (thesis option) and Plan B (non-thesis option) are currently available to students enrolled in the Master of Science degree program. Requirements for the Master of Science degree are:

1) Satisfactory completion of program requirements;
2) Twenty-four hours graduate credit (Plan A Thesis option) or 30 hours graduate credit (Plan B Non-thesis option), at least 10 hours of which must be from the core curriculum;
3) Submission of an acceptable thesis based on an individual research project (Plan A) or completion of a manuscript based on the results from the individual research project for a peer-reviewed journal (Plan B); and
4) Passage of a comprehensive oral examination and thesis defense (Plan A) or passage of a comprehensive oral examination (Plan B). Foreign language credit is not a requirement.

## Orthodontics

*Core Curriculum*

| | | |
|---|---|---|
| OBI 650 | Oral Biology for Postgraduate Students I | (2) |
| OBI 651 | Oral Biology for Postgraduate Students II | (2) |
| CDS 660 | Research Design, Methodology and Dissemination | (2) |
| CDS 670 | Advances in Oral and Maxillofacial Pathology | (1) |
| CDS 680 | Clinical Medicine for Postgraduate Dental Students | (2) |
| CDS 631 | Diagnosis and Management of Temporomandibular Disorders | (1) |
| | TOTAL | (10) |

*Additional Courses*

| | | |
|---|---|---|
| CDS 611 | Child Growth and Development, Part 1 | (2) |
| CDS 612 | Child Growth and Development, Part II | (2) |
| OSG 651 | Anatomic Relationships in Surgery | (1) |
| ORT 610 | Craniofacial Form | (2) |
| ORT 620 | Oral Pharyngeal Function, Part I | (2) |
| ORT 660 | Orthodontic Diagnosis | (2) |
| ORT 661 | Orthodontic Seminar-Clinic<br>Year 1: 3 credits each semester<br>Year 2: 3 credits each semester<br>Year 3: 3 credits each semester | (18) |
| ORT 662 | Orthodontic Technique | (2) |
| ORT 664 | Biomechanics | (2) |
| ORT 710 | Management of Complex Orofacial Deformities | (1) |
| ORT 770 | Orthodontics Seminar<br>Year 1: 1 credit each semester<br>Year 2: 1 credit each semester<br>Year 3: 1 credit each semester | (6) |
| ORT 790 | Research in Orthodontics<br>Year 1: 3 credits one semester<br>Year 2: 3 credits each semester<br>Year 3: 5 credits each semester | (19) |
| PER 776 | Periodontics Therapy Seminar<br>Year 3: 1 credit each semester | (2) |
| | TOTAL | (71) |

| | | |
|---|---|---|
| ORT 748 | Master's Thesis Research | (0) |
| ORT 768 | Residence Credit for Master's Degree | (1-6) |

## Periodontology

*Core Curriculum*

| | | |
|---|---|---|
| OBI 650 | Oral Biology for Postgraduate Students I | (2) |
| OBI 651 | Oral Biology for Postgraduate Students II | (2) |
| CDS 660 | Research Design, Methodology and Dissemination | (2) |
| CDS 670 | Advances in Oral and Maxillofacial Pathology | (1) |
| CDS 680 | Clinical Medicine for Postgraduate Dental Students | (2) |
| CDS 631 | Diagnosis and Management of Temporomandibular Disorders | (1) |
| | TOTAL | (10) |

*Additional Courses*

| | | |
|---|---|---|
| PER 661 | Modern Concepts in Periodontics (3 semesters) | (6) |
| PER 770 | Treatment Planning Seminar (3 semesters) | (6) |
| PER 772 | Periodontal Biology and Pathology (3 semesters) | (6) |
| PER 774 | Periodontics Surgical Seminar (3 semesters) | (3) |
| PER 776 | Periodontics Therapy Seminar (3 semesters) | (3) |
| PER 790 | Research in Periodontics | (1-3) |
| | TOTAL | (24-26) |

| | | |
|---|---|---|
| PER 748 | Master's Thesis Research | (0) |
| PER 768 | Residence Credit for Master's Degree | (1-6) |

## Orofacial Pain

*Core Curriculum*

| | | |
|---|---|---|
| OBI 650 | Oral Biology for Postgraduate Students I | (2) |
| OBI 651 | Oral Biology for Postgraduate Students II | (2) |
| CDS 660 | Research Design, Methodology and Dissemination | (2) |
| CDS 670 | Advances in Oral and Maxillofacial Pathology | (1) |
| CDS 680 | Clinical Medicine for Postgraduate Dental Students | (2) |
| CDS 631 | Diagnosis and Management of Temporomandibular Disorders | (1) |
| | TOTAL | (10) |

*Additional Courses*

| | | |
|---|---|---|
| OFP 634 | Current Concepts in Temporomandibular Disorders | (3) |
| OFP 636 | Clinical Management of Temporomandibular Disorders | (3) |
| OFP 700 | Orofacial Pain Treatment Planning Seminar | (2) |
| OFP 734 | Current Concepts in Orofacial Pain | (3) |
| OFP 736 | Clinical Management of Orofacial Pain | (3) |
| OFP 790 | Research in Orofacial Pain | (1-6) |
| | TOTAL | (15-20) |

| | | |
|---|---|---|
| OFP 748 | Master's Thesis Research | (0) |
| OFP 768 | Residence Credit for Master's Degree | (1-6) |

# COLLEGE OF DESIGN

# Architecture

## College of Design

### Master of Architecture

The Master of Architecture is a first-professional graduate degree, accredited by the National Architecture Accrediting Board (NAAB). This two-year degree comprises the second part of a sequential "4+2" curriculum, in which a student obtains a four-year (non-professional) Bachelor of Arts in Architecture and concludes with the two-year, first-professional Masters of Architecture degree. Students who receive this degree are eligible to seek professional registration as an architect.

**Admission Requirements**

Applicants for admission to the master of architecture degree program must hold a bachelor of arts in architecture or a bachelor of architecture degree from a NAAB-accredited institution. Admission to the program is contingent on acceptance by the graduate school at the university of kentucky. Applicants are required to submit a portfolio, a personal essay on graduate expectations, transcripts, and gre scores. Students who do not hold a bachelor of arts in architecture or bachelor of architecture degree from the university of kentucky must submit three letters of recommendation as well. Admission to the program is based on a review of the submitted materials.

**Degree Requirements**

To obtain the Master of Architecture degree, students must complete 57 credit hours of graduate work as described in the curriculum below. Every student must complete a Master's Project in his or her area of concentration. Requirements for this degree are governed by and satisfy the accreditation requirements of the National Architecture Accrediting Board.

### Graduate Courses

| | | |
|---|---|---|
| ARC 511 | History And Theory Seminar: Pre-20th Century | (3) |
| ARC 512 | History And Theory Seminar: Modern (Subtitle Required) | (3) |
| ARC 513 | History And Theory Seminar: Contemporary (Subtitle Required) | (3) |
| ARC 514 | History And Theory Seminar: Criticism And Theory (Subtitle Required) | (3) |
| ARC 515 | History And Theory Seminar: Urban Forms (Subtitle Required) | (3) |
| ARC 533 | Structural Design And Analysis II | (3) |
| ARC 534 | Advanced Studies In Structural Systems | (3) |
| ARC 589 | American Landscapes | (3) |
| ARC 599 | Topics In Architecture | (3) |
| ARC 631 | Building Systems Integration | (3) |
| ARC 632 | Special Topics In Environmental Controls | (3) |
| ARC 634 | Architectural Detailing | (3) |
| ARC 641 | Professional Practice | (3) |
| ARC 642 | Professional Internship | (3) |
| ARC 658 | Design Studio VIII | (6) |
| ARC 659 | Design Studio IX | (6) |
| ARC 699 | Topics In Architecture | (3) |

2 ARC 707 Digital Media: History And Theory (3)
ARC 709 Master's Project In Digital Visualization (9)
ARC 719 Master's Project In History/Theory/Criticism (9)
ARC 729 Master's Project In Historic Preservation (9)
ARC 735 Project Delivery (3) ARC 736 Building Codes And Design (3) ARC 738 Construction Specifications (3) ARC 743 Advanced Professional Practice (3) ARC 748 Master's Project Research (3) ARC 750 Design Studio X: Comprehensive Studio (6) ARC 759 Master's Project In Building Design (9) ARC 761 Special Problems In Town Design (3)
ARC 769 Master's Project In Town Design (9)
ARC 799 Topics In Architecture (3)

**Course Descriptions**

ARC 510 GENERATIVE AND CRITICAL STRATEGIES. (3)
This course explores, studies, and tests various visual and analytical tools used by designers to understand their work in order to understand the relationship of form, content, and performance of a design. Students will use these tools to gain an understanding of buildings, spaces, objects, contexts, and landscapes from a wide range of cultures and time periods. Prereq: Admission to the UK School of Architecture Graduate 3+ track.

*ARC 511 HISTORY AND THEORY SEMINAR: PRE-20TH CENTURY (Subtitle required). (3)
One of a series of graduate seminars devoted to investigations and analyses of pre-twentieth century architecture. Subtitle required. May be repeated to a total of 6 credit hours under different subtitles. Prereq: Junior or Senior standing with completion of ARC 314, graduate standing, or consent of instructor or director.

*ARC 512 HISTORY AND THEORY SEMINAR: MODERN (Subtitle required). (3)
One of a series of graduate seminars devoted to investigations and analyses of modern architecture. Subtitle required. May be repeated to a total of 6 credit hours under different subtitles. Prereq: Junior or Senior standing with completion of ARC 314, graduate standing, or consent of instructor or director.

*ARC 513 HISTORY AND THEORY SEMINAR: CONTEMPORARY (Subtitle required). (3)
One of a series of graduate seminars devoted to investigations and analyses of contemporary architecture. Subtitle required. May be repeated to a total of 6 credit hours under different subtitles. Prereq: Junior or Senior standing with completion of ARC 314, graduate standing, or consent of instructor or director.

*ARC 514 HISTORY AND THEORY SEMINAR: THEORY AND CRITICISM (Subtitle required). (3)
One of a series of graduate seminars devoted to investigations and analyses of architectural theory and criticism. Subtitle required. May be repeated to a total of 6 credit hours under different subtitles. Prereq: Junior or Senior standing with completion of ARC 314, graduate standing, or consent of instructor or director.

*ARC 515 HISTORY AND THEORY SEMINAR: URBAN FORMS (Subtitle required). (3)
One of a series of graduate seminars devoted to investigations and analyses of urban forms. Subtitle required. May be repeated to a total of 6 credit hours under different subtitles. Prereq: Junior or Senior standing with completion of ARC 314, graduate standing, or consent of instructor or director.

ARC 533 STRUCTURAL DESIGN AND ANALYSIS II. (3)
An exploration of structural concepts for the materials of steel and wood, including considerations of load and resistance as factors in architectural design. Prereq: ARC 434.

ARC 534 ADVANCED STUDIES IN STRUCTURAL SYSTEMS. (3)
An exploration of structural concepts relating to construction with the materials concrete and masonry, including discussion of stress and load as considerations in architectural design. Prereq: ARC 533.

ARC 550 ACCELERATED DESIGN I. (9)
Accelerated Design I: immersion through design in the comprehensive elements that order architecture with emphasis on integrative strategies. Prereq: Admission to the UK School of Architecture Graduate 3+ track.

ARC 551 ACCELERATED DESIGN II. (9)
Accelerated Design II: an immersion in the art and science of architectural design with emphasis on integrative strategies. Prereq: Admission to the UK School of Architecture Graduate 3+ track.

ARC 584 DESIGN OF TIMBER AND MASONRY STRUCTURES. (3)
Current and historic design methods of buildings and their components using wood, wood products, bricks, and concrete blocks. Prereq: Courses in steel and reinforced concrete design at the senior level, or consent of instructor. (Same as CE 584.)

ARC 599 TOPICS IN ARCHITECTURE. (3)
This course number is to allow for new and experimental classes to be introduced into the architectural curriculum on an ad hoc basis. The course, if adopted on a permanent basis, will be formally proposed for addition to the College curriculum and assigned a new, permanent number. May be repeated to a maximum of six credits under different subtitles. Prereq: TBA.

ARC 631 BUILDING SYSTEMS INTEGRATION. (3)
Graduate level study of the art and science of building design with emphasis given to integrative strategies for developing a comprehensive, multi-systemic, architectural project. Paired with: ARC 750.

ARC 632 SPECIAL TOPICS IN ENVIRONMENTAL CONTROLS. (3)
Advanced studies in human environmental design. Topics for research and development will include sustainability, energy, infrastructure, sanitation and water, lighting, and acoustics. Subtitle required. Prereq: ARC 332 and ARC 333.

ARC 634 ARCHITECTURAL DETAILING. (3)
A study of the art and technique of complete building design through detail development. Prereq: Completion of all technical requirements for BA in Architecture or equivalent and admission to the Master of Architecture program.

ARC 641 PROFESSIONAL PRACTICE. (3)
An exploration of professional and ethical responsibilities of the architect as they pertain to the procedural matters of practice and management. Prereq: Admission to the M.Arch. program.

ARC 642 PROFESSIONAL INTERNSHIP. (3)
A graduate-level summer internship with a professional architectural firm in which the student, along with a faculty advisor, will determine specific experiential and educational goals to be met. Laboratory: hours to be agreed upon with selected firm (apx. 10-15 hrs/wk for duration of internship). Prereq: Admission to the M.Arch. program.

ARC 658 DESIGN STUDIO VIII. (6)
This graduate level studio explores various design topics including building technology, furniture design, digital visualization, historic preservation, and human settlement. Studio: 12 hours per week. Prereq: ARC 457 with a grade of C or better.

ARC 659 DESIGN STUDIO IX. (6)
This graduate level studio explores various design topics including building technology, furniture design, digital visualization, historic preservation, and human settlement. Studio: 12 hours per week. Prereq: ARC 658 with a grade of C or better.

ARC 699 TOPICS IN ARCHITECTURE. (3)
This course number is to allow for new and experimental classes to be introduced into the architectural curriculum on an ad hoc basis. The course, if adopted on a permanent basis, will be formally proposed for addition to the College curriculum and assigned a new, permanent number. May be repeated to a maximum of six credits under different subtitles. Prereq: TBA.

ARC 707 DIGITAL MEDIA: HISTORY AND THEORY. (3)
A graduate level seminar exploring the impact of digital media on visualization and the theoretical implications arising from its use as a means of visual expression. Laboratory: 6 hours per week. Prereq: ARC 406.

ARC 709 MASTER'S PROJECT IN DIGITAL VISUALIZATION. (9)
A final, comprehensive project in the digital visualization concentration, which synthesizes conceptual and experiential knowledge into a cohesive presentation. Studio: 18 hours per week. Prereq: ARC 750 and all requisite courses for the Digital Visualization concentration.

ARC 719 MASTER'S PROJECT IN HISTORY/THEORY/CRITICISM. (9)
A final, comprehensive project in the history, theory, and criticism concentration, which synthesizes conceptual and experiential knowledge into a cohesive presentation. Studio: 18 hours per week. Prereq: ARC 750 and all requisite courses for the History, Theory and Criticism concentration.

ARC 729 MASTER'S PROJECT IN HISTORIC PRESERVATION. (9)
A final, comprehensive project in the historic preservation concentration, which synthesizes conceptual and experiential knowledge into a cohesive presentation. Studio: 18 hours per week. Prereq: ARC 750 and all requisite courses for the Historic Preservation concentration.

ARC 735 PROJECT DELIVERY. (3)
A study in the execution of an architectural design including contract documents, cost estimation, and construction management. Prereq: Completion of all technical requirements for BA in Architecture or equivalent and admission to the Master of Architecture program.

ARC 736 BUILDING CODES AND DESIGN. (3)
An analysis of content and format of current model building codes combined with discussion of the necessity for building codes, problems in interpretation and applications as well as legal aspects involved. Prereq: Completion of all technical requirements for BA in Architecture or equivalent and admission to the Master of Architecture program.

ARC 738 CONSTRUCTION SPECIFICATIONS. (3)
A study in defining the quality of materials used in architectural design. Prereq: Admission to the Master of Architecture program.

ARC 743 ADVANCED PROFESSIONAL PRACTICE. (3)
A continuation of concepts introduced in ARC 641, Professional Practice, with an emphasis in issues relating to the legal, business, and organizational considerations of architectural practice as well as investigations into advocacy and the public and private leadership roles of the architect. Prereq: ARC 641.

ARC 748 MASTER'S PROJECT RESEARCH. (0)
Half-time to full-time work on Master's Project. May be repeated a maximum of six times. Prereq: All course work toward the degree must be completed.

ARC 750 DESIGN STUDIO X. (6)
Utilizing given site and program requirements, graduate students explore design issues comprehensively by producing a developed and detailed building design. Students will engage in structural design, environmental systems, life-safety and post-design assessments as required to meet the most current NAAB standards for a comprehensive studio. Studio: 12 hours per week. Prereq: ARC 659.

ARC 759 MASTER'S PROJECT IN BUILDING DESIGN. (9)
A final, comprehensive project in the building technology and tectonics concentration, which synthesizes conceptual and experiential knowledge into a cohesive presentation. Studio: 18 hours per week. Prereq: ARC 750 and all requisite courses for the Building Design concentration.

ARC 761 SPECIAL PROBLEMS IN TOWN DESIGN. (3)
Students explore various topics related to the theory and practice of existing, emerging and new strategies for city and town development, revitalization, and long-term sustainability. Subtitle required. Prereq: Admission to the Master of Architecture program.

ARC 779 MASTER'S PROJECT IN TOWN DESIGN. (9)
A final, comprehensive project in the town design concentration, which synthesizes conceptual and experiential knowledge into a cohesive presentation. Studio: 18 hours per week. Prereq: ARC 750 and all requisite courses for the Town Design concentration.

ARC 799 TOPICS IN ARCHITECTURE. (3)
This course number is to allow for new and experimental classes to be introduced into the architectural curriculum on an ad hoc basis. The course, if adopted on a permanent basis, will be formally proposed for addition to the College curriculum and assigned a new, permanent number. May be repeated to a maximum of six credits under different subtitles. Prereq: TBA.

# Historic Preservation

## College of Design

Preservation is a field involved with the interpretation and conservation of historic sites, as well as with their renovation and adaptive use. An interdisciplinary approach to the investigation of buildings and landscapes, which addresses the complexity of material culture, has been adopted by the faculty of this program. The College of Design offers a Master of Historic Preservation degree that provides opportunities for students to explore a variety of interests, including Building Revitalization, Community Engagement, and Rural Preservation. Applications are invited not only from those with degrees in design—architects, interior designers, and landscape architects—but also from those who hold degrees in other disciplines and wish to pursue studies in historic preservation. In addition to the two-year Master's degree, the department also offers a graduate certificate in Historic Preservation, which is comprised of two required courses (HP 601 and HP 602) and two additional courses in an area of focus. Admission to the Graduate School is required to enroll in the certificate program.

**Admission Requirements**
Requirements for admission to the Master of Historic Preservation program include 1) a baccalaureate degree from an accredited college or university, 2) demonstration of ability in writing, drawing, drafting, and/or photography, 3) three letters of recommendation and a personal essay, 4) the Graduate Record Examination (GRE), 5) an interview with the faculty in the program, if possible, and 6) a B average GPA at the undergraduate level.

Requirements for the two-year degree include the completion of core courses, advanced electives, and a final project —a total of 48 hours of credit. For additional information on admission and requirements, contact the Director, Graduate Program in Historic Preservation, College of Design, University of Kentucky, Lexington, KY 40506-0041.

## Graduate Courses

| | | |
|---|---|---|
| HP 501 | Selected Topics In Historic Preservation (Subtitle Required) | (3) |
| HP 601 | Introduction To Historic Preservation | (3) |
| HP 602 | Historic Preservation Law | (3) |
| HP 609 | Revitalization | (3) |
| HP 610 | American Architecture I | (3) |
| HP 611 | American Architecture II | (3) |
| HP 612 | Documentation Of Historic Buildings And Sites | (3) |
| HP 613 | Historical Structural Systems And Building Materials | (3) |
| HP 614 | Buildings And Sites II | (3) |
| HP 615 | American Settlement Patterns | (3) |
| HP 616 | Historic Preservation Design | (3) |
| HP 617 | Historic Preservation Planning | (3) |
| HP 675 | Architectural History For Preservation Practice (For Certificate Students Only) | (3) |
| HP 676 | Field Methods In Heritage Conservation | (3) |
| HP 699 | Summer Internship | (1-6) |
| HP 718 | Adaptive Reuse | (3) |
| HP 720 | Case Studies In Preservation | (3) |
| HP 721 | Interpretation Of Historic Buildings And Sites | (3) |
| HP 724 | Advanced Historical Structural Systems And Building Materials Conservation | (3) |

| | | |
|---|---|---|
| HP 748 | Master's Project Res | (0) |
| HP 750 | Architecture Design Studio | (3) |
| HP 772 | Preservation Seminar | (3) |
| HP 785 | Ind Study In Historic Preservation | (3) |
| HP 798 | Research Design | (3) |
| HP 799 | Master's Project | (3,3) |

# Interiors: Planning/Strategy/Design

## College of Design

The graduate program in the School of Interiors leads to a post-professional Master of Arts in Interiors: Planning/Strategy/Design. Students undertake a combination of course work, independent study, and research experience to develop a course of study designed to meet each student's career interests. Courses from within and outside the discipline cultivate interdisciplinary design thinking. Using design-related scholarship/research and creative approaches, students engage in an investigative process leading to an area of design specialization.

Each student works with an advising committee in the selection of a written thesis or a design thesis project option and the appropriate courses at the 500, 600, and 700 levels. Applicants that have an undergraduate degree in interior design or a related professional subject matter normally complete the program in two years. Supplementary course work may be required of applicants without professional undergraduate interior design degrees.

**Degree Requirements**
Students undertake the Master of Arts in Interiors with either a Plan A and Plan B option. The thesis option (Plan A) requires 24 hours of course work, six hours of Master's residence credit, and a written thesis with a research emphasis. Plan B requires completion of 30 credit hours, including six hours of ID 700, in which a student develops a design thesis project that engages in innovative problem-solving focusing on the student's area of specialization. A common core of twelve hours, comprised of ID 650, ID 655, and ID 659, is required of all students. Students complete twelve credits of additional course work in the area of concentration. Students must successfully complete a final examination in the form of a thesis defense, which is required for graduation.

**Admission Requirements**
Potential graduate students must:

1. Apply and be accepted to the Graduate School.
2. Have been granted a baccalaureate degree by an accredited institution with a minimum 3.0 GPA on a 4.0 scale (2.75-3.0 GPA will be considered in relation to other credentials).
3. Have taken the Graduate Record Examination (GRE). For a non-English speaking student, a TOEFL score of 550 or above is required (or a score of 213 on the computer version of TOEFL).
4. After admittance to the Graduate School, apply and be accepted by the School of Interiors

To be reviewed by the school, apply to the graduate program in the School of Interiors through the portal provided by the Graduate School. As part of your application, students will write a personal statement articulating why they wish to study interiors, including career goal aspirations. Additionally, three letters of recommendation regarding academic ability must be included. Students must submit a portfolio to be reviewed and evaluated by a faculty committee. The portfolio may be submitted digitally.

If you would like further information on the program, contact the Director.

**Course Descriptions**

ID 559 SPECIAL TOPIC IN INTERIORS (Subtitle required). (1-3)
Advanced exploration of a specific topic in the profession of interior design. May be offered as a studio and lecture. May be repeated to a maximum of six credits. Prereq: Senior standing or consent of instructor prior to registration.

ID 563 MATERIAL CULTURE: MEDIA CULTURE. (3)
Students consider the history and theories of material and media culture from multidisciplinary perspectives through readings, discussions, analysis, and field visits. Students encounter artifacts and work to critically evaluate them in historical context. They analyze cultural artifacts and images using several material and media culture approaches. Prereq: Junior/senior standing or graduate student.

ID 595 INDEPENDENT STUDY IN INTERIORS. (1-3)
Problems involving independent studio and/or library study conforming to the student's special interest under the direction of an appropriate faculty member. May be repeated to a maximum of six credits. Prereq: Senior standing or consent of instructor and contractual agreement.

ID 641 REGIONAL VARIATIONS IN COLONIAL AMERICAN DESIGN. (3)
An analysis of regional variations in American furnishings, interior finishes, and architecture from colonization to 1783; consideration will be given to historical, economic, social, political, and religious influences on design. Prereq: DMT 142 or consent of instructor.

ID 650 SURVEY OF CURRENT LITERATURE AND METHODOLOGIES. (3)
An intensive survey of literature and methodological inquiry used for problem solving related to the student's desired area of design specialization. Emphasis will be placed on conducting a literature search and review in a specific area of interest. Prereq: Graduate standing.

ID 655 CREATIVE AND THEORETICAL DESIGN PROCESSES. (3)
This course will focus on creativity and the design process with emphasis on investigation of current topics in interior design and the built environment. Theoretical frameworks will be explored to advance understanding of creativity and help students form a knowledge base for developing an in-depth research topic. Prereq: Graduate standing.

ID 659 INTERIORS GRADUATE STUDIO. (3-6)
Advanced graduate-level comprehensive information gathering and analysis for identification of design issues associated with workplace and the human environment. Includes methods of inquiry and design thinking appropriate to a specific typology, design programming, conceptualization, studio experiences, discussions, and development of strategies resulting in a design or research deliverable for an Interiors industry driven problem. Prereq: Graduate standing.

ID 669 ADVANCED COLOR THEORY AND APPLICATION. (3)
Advanced color theory will examine the physical, psychological, historical and technical perspectives. Application of color theory to the built environment. Includes color forecasting, technical processes, color specification, and quality control. Prereq: Graduate standing.

ID 700 RESEARCH APPLICATIONS IN INTERIORS. (1-6)
Independent research for the exploration of a specific problem in interior design. May be repeated to a maximum of six credits. Prereq: Eighteen credit hours of graduate work.

ID 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

ID 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.
ID 772 CURRENT ISSUES IN DESIGN. (3)

Investigation of current topics in interior design. May be repeated to a maximum of six credits.

ID 785 INDEPENDENT STUDY IN INTERIORS. (1-3)
Problems involving independent studio, and/or library study conforming to the student's special interest under the direction of an appropriate faculty member having proficiency in the area selected. May be repeated to a maximum of six credits. Prereq: Nine credit hours of graduate study, consent of instructor, contractual agreement.

# Urban and Environmental Design

## College of Design

The Master of Science in Urban & Environmental Design (MUED) at the UK College of Design is dedicated to helping students think critically about emerging urban and environmental design problems through real-world projects and future-oriented ideas. The one-year program introduces students to the complexity of urban and rural environments — from the varying spectrum of stakeholders to the bounds of existing infrastructures — and promotes an interdisciplinary approach to designing sustainable communities.

The curriculum is studio-based to develop an ethic of collaboration and critical thinking among students, faculty and community members. From these relationships, projects emerge that seek inventive ideas to specific design challenges. Students take a diversified sequence of courses that includes history and theory of urban and environmental design, visualization techniques, policy analysis, and socioeconomic research.

The MUED offers flexible degree options for a variety of student backgrounds and design experience levels. Students with no formal design background are encouraged to apply.

## Application Requirements

- **Portfolio:** The Master of Science in Urban and Environmental Design (MUED) offers flexible degree options for a variety of student backgrounds and design experience levels. Students with no formal design background are encouraged to apply.
    - OPTION 1 is for students with both a prior design degree. This option can be completed in one year (Fall, Spring, and Summer). **A portfolio is required to apply.**
    - OPTION 2 is for students with no formal design background and requires a foundational studio sequence as a prerequisite for admission to the MUED program. **This option can be completed in two years and does not require a portfolio for admission.**
- GRE
- Three letters of recommendation
- Application Deadlines:
    - **Summer:** March 1
    - **Fall:** March 1

# Curriculum

## MUED Curriculum (Prior Design Degree)

### Semester 1 Fall

- UED 601: Urban & Environmental Design Studio I 5 hours
- UED 611: Visualization 2 hours
- Elective 3 hours

### Semester 2 Spring

- UED 602: Urban & Environmental Design Studio II 5 hours
- UED 651: History & Theory 3 hours
- HP 602: Historic Preservation Law 3 hours
- Elective 3 hours

### Semester 3 Summer

- UED 701: Urban & Environmental Design Capstone Project/Thesis 5 hours
- UED 612: Research Design and Methods 1 hour

**Total: 30 hours**

## MUED Curriculum (Non-Design Background)

### Semester 1 Fall

- UED 551: Studio Primer 5 hours
- UED 611: Visualization 2 hours
- UED 501: Introduction to Urban & Environmental Design 3 hours

### Semester 2 Spring

- UED 601: Urban & Environmental Design Studio I 5 hours
- HP 602: Historic Preservation Law 3 hours

### Semester 3 Fall

- UED 602: Urban & Environmental Design Studio II 5 hours
- UED 651: History & Theory 3 hours
- Elective 3 hours

### Semester 4 Spring

- UED 701: Urban & Environmental Design Capstone Project/Thesis 5 hours
- UED 612: Research Design and Methods 1 hour
- Elective 3 hours

**Total: 38 hours**

# Course Descriptions

**HP 602 HISTORIC PRESERVATION LAW. (3)** The goal of this course is to assist non-lawyers in understanding laws, policies, and procedures and how they impact your professional practice as preservationists, planners, archaeologists, and in other conservation related fields. Preservation law encompasses a number of practice areas including, but not limited to land use and zoning, real property, local government, constitutional, administrative, and environmental law as well as the conservation of archaeological resources. Prereq: HP 601 or consent of instructor.

**UED 501 INTRODUCTION TO URBAN AND ENVIRONMENTAL DESIGN. (3)** Introduces the concept of urban and environmental design through a series of case studies that seek to outline the contours of the field. Students will learn key principles and techniques used in urban and environmental design. Prereq: Admission to UED program, or consent of instructor.

**UED 551 SPECIAL TOPICS IN URBAN AND ENVIRONMENTAL DESIGN I. (3)** Examines emergent themes in urban and environmental design and links these themes with historical precedents. Students will develop both visual and verbal arguments in relation to the course topic. Subtitle required. Prereq: Admission to UED program, or consent of instructor.

**UED 601 URBAN AND ENVIRONMENTAL DESIGN STUDIO I. (5)** Investigates the relationship between form and function in urban environments. In this studio, students will develop proposals for phased interventions that respond to both empirical and theoretical problems in urban and environmental design. Close engagement with established community groups will help define the goals of the design studio project. Prereq: Admission to UED program, or consent of instructor.

**UED 602 URBAN AND ENVIRONMENTAL DESIGN STUDIO II. (5)** Examines issues of mobility and access at different scales in urban environments. Working with established community groups, students will develop proposals for phased interventions in response to the specific studio prompt. Particular attention will be devoted to community outreach. Prereq: Successful completion of UED 601, or consent of instructor.

**UED 611 VISUALIZATION AND REPRESENTATION. (2)** Offers technical instruction on prevailing methods of visualization and representation in urban and environmental design. Students will use material from previous or existing courses to create new visual representations. Prereq: Admission to UED program, or consent of instructor.

**UED 612 RESEARCH DESIGN AND METHODS IN URBAN AND ENVIRONMENTAL DESIGN. (1)** Outlines the framework for research in urban and environmental design through a series of case studies that seek to illustrate methodological diversity. Students will develop a research proposal for completing their project or thesis. Prereq: Successful completion of UED 611, or consent of instructor

**UED 651 HISTORY AND THEORY OF URBAN AND ENVIRONMENTAL DESIGN. (3)** Defines the field of urban and environmental design through a survey of notable histories and theories. This course offers diverse perspectives from allied fields such as architecture, landscape architecture, heritage conservation, planning, geography, and others. Prereq: Admission to UED program, or consent of instructor.

**UED 701 URBAN AND ENVIRONMENTAL DESIGN PROJECT. (5)** Identifies an empirical problem in urban and environmental design that derives from independent student research. Working closely with a faculty advisor, specific requirements will be tailored to meet the project demands. Both visual and verbal arguments are expected, but visual content takes priority in the urban and environmental design project. Prereq: Successful completion of UED 602.

# COLLEGE OF EDUCATION

# Applied Behavior Analysis

## College of Education

The Master of Science in Applied Behavior Analysis (MS in ABA) is an on-campus only degree program that will train graduate students to provide behavioral consultation, support, and training to teachers, staff, parents, and individuals with challenging behaviors and/or intensive training needs.

The MS in ABA will provide opportunities for graduate students to work within schools*, homes, and/or other facilities that house individuals with challenging behaviors. In addition, graduate students will be exposed to individuals from diverse ethnic, socioeconomic, cultural, and disability backgrounds.

The program at the University of Kentucky (UK) will focus on children and youth with challenging behaviors from 2 years of age through 21 years of age. In addition, our focus will be on children and youth identified with Emotional and/or Behavioral Disorder (e.g., Oppositional Defiant Disorder, Bipolar Disorder, Intermittent Explosive Disorder), Autism Spectrum Disorder (ASD), Developmental Delay, Intellectual Disability, as well as other academic or mental health issues that affect the child's or youth's behavior.

The Behavior Analyst Certification Board (BACB) has accepted courses within the MS in ABA program as an "approved course sequence." In addition, students in the MS in ABA program will receive required supervision within the practicum setting. The approved course sequence and practicum/supervision requirements will prepare completers of the MS in ABA to sit for the Board Certified Behavior Analyst (BCBA) examination. More information regarding the BCBA examination and requirements can be found at www.bacb.com.

**Admission Requirements**

1. Applicants must hold a Bachelor's Degree in psychology, education, special education, social work, communication disorder, or a closely related field.
2. Applicants must have a minimum of a 3.0 undergraduate grade point average or a minimum of 3.25 graduate grade point average.
3. Applicants must take the Graduate Record Examination (GRE) and submit scores to the Graduate School; the Institution Code for the GRE for UK Graduate School is R1837. There are no specific GRE subtests required.
4. Applicants must secure three (3) letters of recommendations with one related to academic performance (e.g., from professor, advisor) and two related to the applicant's work with children and youth (e.g., from practicum supervisor, research supervisor).
5. Applicants must submit a writing sample of a scholarly paper (e.g., research paper, literature review completed in APA formatting).
6. Applicants must participate in an interview with program faculty.
7. Upon acceptance, applicants must satisfactorily pass a criminal background check (due to the nature of the work performed by behavior analysts).

## Graduate Courses

| | | |
|---|---|---|
| AEDS 601* | Applied Behavior Analysis | (3) |
| EDS 612* | Advanced Practicum: Special Education | (1) |
| EDS 614* | Professional Ethics for Behavior Analysts I | (1) |

| | | |
|---|---|---|
| EDS 633* | Single Subject Research Design | (3) |
| EDS 660 | Overview Of Characteristics And Instructional Strategies For Individuals With ASD | (3) |
| EDS 603* | Behavior Consultation in the Schools | (3) |
| EDS 612 | Advanced Practicum: Special Education | (1) |
| EDS 615* | Professional Ethics for Behavior Analysts II | (1) |
| EDS 630* | Advanced Methods for Teaching Students with Disabilities | (3) |
| EDS 661 | Advanced Instructional Strategies for Students with ASD | (3) |
| EDS 612 | Advanced Practicum: Special Education | (1) |
| EDS 616* | Professional Ethics for Behavior Analysts III | (1) |
| EDS 605 | Practical Applications of Applied Behavior Analysis | (3) |
| EDS 612* | Advanced Practicum: Special Education | (1) |
| EPE 557 | Gathering, Analyzing, And Using Educational Data | (3) |
| EDS 748 | Master's Thesis Research | |

# Counselor Education

## College of Education

The Graduate Program in Counselor Education in the Department of Early Childhood, Special Education, and Counselor Education offers a Master of Arts (M.A.) in Counseling and a doctoral degree in Counselor Education. For application procedures, please go to the Graduate School web site (https://gradschool.uky.edu/ ) and follow the directions for the Apply Yourself application. This electronic application incorporates the program and Graduate School application process.

## Master of Arts in Counseling

The master's program has two specialties: Rehabilitation Counseling and Clinical Mental Health Counseling. The Rehabilitation Counseling specialty is fully accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP) and fulfills national certification requirements in Rehabilitation Counseling. Program graduates are eligible to sit for the Certified Rehabilitation Counselor (CRCC) Examination, state licensure as a professional counselor (LPC), and other national and state certifications. The Clinical Mental Health Counseling (CMHC) specialty covers the required curriculum outlined by CACREP for the specialty. Accreditation for the CMHC specialty is pending approval by CACREP. Graduates in this program specialty typically are pursuing licensure as a professional counselor (LPC).

The program trains students to understand the physical, psychological, social, cultural, global, and economic factors affecting persons with mental or physical disabilities, and to provide counseling for people with disabilities in a wide variety of professional settings. The counselor must demonstrate competencies in ethics, in establishing and conducting counseling relationships, assessment procedures, career counseling, program planning and coordination. They must have an awareness of professional and community resources that can be utilized in the rehabilitation process; have knowledge of persons from culturally diverse backgrounds, and understand how rehabilitation engineering and technology can be utilized to help clients achieve their goals.

The Master's program is offered on campus and via on line web-based instruction. Both formats are equivalent with regard to content and student learning outcomes and can be completed in the same timeframe.

Emphasis is placed on social justice, severe disability and its consequences, independent living, career development and placement, human growth and development, the provision of services in rural communities, technology, business and industry, and consumer issues and rights. Graduates of the program are employed in a wide range of public and private rehabilitation counseling, health, educational, mental health, and human service settings. Students interested in obtaining a terminal

degree in Counselor Education following the completion of their master's degree are encouraged to apply to the doctoral program, described below.

An Endorsement Curriculum and University Scholars Program in conjunction with Kentucky State University facilitate the enrollment of persons from culturally diverse backgrounds. Please contact the Program Coordinator for more information.

## Admission Requirements

The Counseling master's program has the following admission requirements. Students are required to have a minimum undergraduate grade point average of 2.75, submit three letters of reference, complete a statement of professional goals and objectives, complete a program application, and participate in an interview with faculty.

The program faculty consider all of this information in making admissions decisions. Students are admitted from a wide range of backgrounds and academic disciplines. Students are admitted in the fall semester to the Master's program. Admission requirements are the same for the campus and online programs.

## Program Requirements

Course and fieldwork total 60 credit hours for each specialty. At least 75% of the credit hours must be taken at the University of Kentucky. Campus courses are offered primarily in the late afternoon and early evening to accommodate full- and part-time students. Students who attend the program on a full-time basis can complete the program in 16 months.

## Admission to Field Work

Admission to field work will be considered after the student has completed two semesters (full-time) of graduate study or when the student has completed 30 hours of graduate study. The decision to advance to fieldwork includes successful completion of the admission to fieldwork examination, demonstrated skill in academic areas, and a judgment by the faculty that the student possesses the professional, ethical, personal, and social characteristics necessary for providing professional counseling services. In addition, the student must have no "I" (incomplete) or S grades. Any E grades must also be cleared with a regular letter grade prior to beginning fieldwork. Students must also be in good academic standing to begin fieldwork.

## Field Work

The first fieldwork component is a three-credit practicum, which consists of 200 clock hours of supervised experience in Rehabilitation Counseling or Clinical Mental Health in an approved setting, a weekly seminar, and individual supervision. The practicum is generally taken during the eight-week summer session. However, this course is offered every semester to accommodate part-time students. A student must successfully pass the fieldwork examination prior to enrolling in the practicum.

In accordance with national accreditation and certification requirements, students then complete 600 clock hours of supervised internship in a rehabilitation or clinical mental health setting. Every intern

student also participates in a weekly seminar and individual supervision. Internship is three credits per 200 clock hours, and may be taken in the summer, fall, or spring semesters following practicum. The internship is taken in one semester; or, due to extenuating circumstances, it may be divided into two semesters. It is recommended, however, that the internship be completed in one semester.

Students must successfully complete their internship, and demonstrate competence in working with individuals with disabilities in the context of a professional Rehabilitation Counseling or Mental Health Counseling relationship in order to graduate. A final written examination is given at the completion of all course work. Graduation is contingent upon the successful completion of this examination. Students also have the option of using an approved national certification examination as their final program exam.

## Program of Studies and Sequence of Courses: Master's with Rehabilitation Counseling Specialty

### Fall Semester (First Year)

- CED 520: Foundations of Professional Counseling (3)
- CED 650: Counseling Theories (3)
- RC 525: Human Growth, Disability, & Development Across the Lifespan (3)
- CED 515: Medical and Psychosocial Aspects of Disabilities: Physical Disability (3)
- CED 530: Social and Cultural Foundations of Counseling (3)

### Spring Semester (First Year)

- CED 660: Counseling Techniques (3)
- CED 516: Medical and Psychosocial Aspects of Disabilities- Psychiatric Disabilities (3)
- CED 750: Rehabilitation and Mental Health Counseling Research and Program Evaluation (3)
- CED 610: Case Management in Rehabilitation Counseling (3)
- CED 620: Assessment in Rehabilitation and Clinical Mental Health(3)

### Summer Session

- CED 560: Supported Employment, Independent Living, Transition (3)
- CED 640: Private Practice in Rehabilitation Counseling (3)
- CED 710: Clinical Practicum in Counseling (3) *
- CED 630: Career Development Counseling and Job Placement (3)
- CED 550: Ethics for the Counseling Profession (1)
- Approved Electives (2 hours)

### Fall Semester (Second Year)

- CED 730: Clinical Internship in Counseling (9) *
- CED 670: Group and Family Mental Health Counseling (3)
- Electives (3 hours): either CED 540, CED 554, CED 558, or other approved elective

## Program of Studies and Sequence of Courses:  Master's with Clinical Mental Health Counseling Specialty

**Fall Semester (First Year)**

- CED 520: Foundations of Professional Counseling (3)
- CED 650: Counseling Theories (3)
- CED 525: Human Growth, Disability, & Development Across the Lifespan (3)
- CED 540: Addiction and Substance Use Counseling (3)
- CED 530: Social and Cultural Foundations of Counseling (3)

**Spring Semester (First Year)**

- CED 660: Counseling Techniques (3)
- CED 516: Medical and Psychosocial Aspects of Disabilities: Psychiatric Disabilities (3)
- CED 750: Rehabilitation and Mental Health Counseling Research and Program Evaluation (3)
- CED 615: Clinical Practice of Mental Health Counseling (3)
- CED 600: Psychopharmacology (3)

**Summer Session**

- CED 570: Crisis and Trauma Counseling (2)
- CED 680: Mental Health Diagnosis and Treatment Planning for Counselors (3)
- CED 710: Clinical Practicum in Counseling (3) *
- CED 630: Career Development Counseling and Job Placement (3)
- CED 550: Ethics for the Counseling Profession (1)

**Fall Semester (Second Year)**

- CED 730: Clinical Internship in Counseling (9) *
- CED 670: Group and Family Mental Health Counseling (3)
- CED 620: Assessment in Rehabilitation and Clinical Mental Health (3)

**CED 710 and 730 (Practicum and Internship) are offered every semester for part-time students.*

# Doctoral Rehabilitation Counseling Education, Research, and Policy Program

The Counselor Education Doctoral Program offers a Departmental Ph.D. degree with a formal option in Counselor Education, Research, and Policy. The doctoral program is accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP).The doctoral program is campus- based and is not offered on-line. We have carefully designed our doctoral curriculum to meet the needs of students who are preparing for careers in rehabilitation counselor education, research, and administration. Our students complete advanced doctoral seminars in rehabilitation counseling research, psychosocial aspects of chronic illnesses and disability, rehabilitation counseling theory, professional rehabilitation counseling issues, and rehabilitation administration and policy. In these courses, students explore a wide range of psychosocial, societal, and international perspectives on

disability and counseling. In addition to the counseling professional seminars, doctoral students complete coursework in the following areas:

1. A Graduate Core (23 hours), including coursework in college and university teaching, grant writing, clinical practicum experiences and practicum experiences in university teaching, and dissertation residency;
2. A Counselor Education area of emphasis core (15 hours) (counseling professional seminars, described above);
3. A thematic support area from outside the area of emphasis (15 hours), including interdisciplinary coursework consisting of courses from outside the Department, such as: Psychology, Rehabilitation Sciences, Educational and Counseling Psychology, Social Work, Sociology, Communication Disorders, or other areas, designed to develop the student's expertise in a focused area of rehabilitation counseling research, and typically this core directly relates to the student's dissertation topic;
4. A research block (21 hours), including course work in statistical methods, quantitative research methods, qualitative research methods, and mixed method approaches, and research internships.

Each student's program of studies is planned and supervised by an Advisory Committee consisting of 4 individuals, including the student's major professor and two other members from the Department. The remaining member represents the student's outside support area. Upon completion of the prescribed coursework, students are examined to evaluate their preparedness to be advanced to candidacy for the Doctor of Philosophy degree. The basis of this evaluation is completion of a qualifying examination administered by the student's Advisory Committee.

## Admissions Requirements

- Applicants are required to have an undergraduate GPA of at least 2.75;
- A Master's degree in Rehabilitation Counseling or a closely-related field with a GPA of at least 3.5. (Note: Students who are entering with a non-Rehabilitation Counseling Master's degree program may be required to take leveling, or foundational courses as described below.);
- Submission of Graduate Record Examination (GRE) scores (mandatory for all doctoral applicants);
- Minimum of one year (at least two preferred) of post- Master's experience in rehabilitation counseling or a related field (program will alternatively consider extensive prior related experience and exceptional academic performance on an individual basis);
- At least three (3) positive recommendations attesting to the candidate's professional disposition and fitness for the profession, self-awareness and emotional stability, oral and written communication skills, cultural sensitivity and awareness, and potential for scholarship, professional leadership, and advocacy;
- Written statement of the applicant's objectives for completing a doctoral program; and
- A sample of the applicant's academic and/or professional writing. Final admissions decisions are the purview of the Department's faculty.

**Note:** For students applying to the Ph.D. Formal Option with a Master's or graduate degree that is not from a CORE- or CACREP-accredited rehabilitation counseling program, foundational rehabilitation counseling content and core counseling content courses may be required prior to, or concurrent with enrollment. Decisions about the need for foundational coursework are the purview of the Program faculty and will be made on an individual basis, based on review of the applicant's previous graduate coursework, review of applicant's transcripts and course descriptions; previous graduate coursework may in some cases be substituted.

Foundational Coursework includes the following: (a) Foundations or Principles of Rehabilitation Counseling or Counseling, (b) Social and Cultural Diversity, (c) Human Growth and Development, (d) Career Theory and Development, (e) Individual and Group Counseling Theories and Models, (f ) Assessment and Testing, (g) Research and Program Evaluation, (h) Psychosocial and Medical Aspects of Disability.

A typical course sequence is as follows:

## Graduate Core (minimum 23 credits)

1. Coursework from Professional Seminars in Advanced Rehabilitation Counseling may include:
    - CED 740: Administration, Supervision, and Program Evaluation in Rehabilitation Counseling
    - CED 735: Advanced Methods for Teaching and Conducting Research in Counselor Education: From Theory To Practice
    - CED 711: Seminar in Advanced Rehabilitation Practices and Procedures
    - CED 760: Contemporary Practices in Rehabilitation
    - CED 715: Advanced Seminar in Psychosocial Aspects of Chronic Illness and Disability
    - CED 770: Advanced Seminar in Rehabilitation Counseling Theory, Practice, and Education
2. EDS 701 / CED 701 / IEC 701: Seminar for EDSRC Leadership Personnel (1 credit each, 4 semesters) (4)
3. EDS 712 / CED 712 / IEC 712: Seminar in EDSCE Professional Services (3)
4. EDS 720 / CED 720 / IEC 720: Seminar in EDSCE Teacher Preparation (3)
5. EDS 721 / CED 721 / IEC 721: Practicum in EDSCE Personnel Preparation (3-9)
6. EDS 767 / CED 767 / IEC 767: Dissertation Residency Credit (4). EDS 767 is taken for a minimum of two credits per semester for two semesters (excluding summer terms) after successful completion of the qualifying examination.
7. CED 710 Clinical Practicum in Counseling (Doctoral Section).

**Rehabilitation Counseling Area of Emphasis (15 credits)**

**Thematic Support Area (15 credits)**

**Research Tools (21 credits)**

## Required Practicum Experiences

Clinical practicum experiences are required of all doctoral students. As with the didactic portion of the curriculum, practica experiences are planned according to the individual backgrounds and needs of each student. Students are required to complete a 200-hour clinical practicum (40% of which must be direct client contact hours).

## Required Internship Experience

In the course of their program plan, students will complete 600-clock hours of supervised internship, addressing three of the five following areas: Counseling, Supervision, Teaching, Research and Scholarship, Leadership and Advocacy. The internships are designed to ensure doctoral-level experience in counselor education areas including: campus and distance-based teaching, supervision, and clinical counseling. The nature and focus of the internship will be determined in consultation with each student individually.

## Professional Involvement

We encourage and support student's professional development, with an emphasis on participation in the rehabilitation counseling profession at the national level through research, publication, and participation in national conferences and leadership opportunities in our national and regional rehabilitation counseling professional associations. We provide support to our students through research grants and teaching assistantships, and a number of funding opportunities that are available to our doctoral students through our graduate school.

# Course Descriptions

**CED 515 MEDICAL AND PSYCHOSOCIAL ASPECTS OF DISABILITIES: PHYSICAL DISABILITY. (3)** This course is designed to prepare rehabilitation and mental health counselors, social workers and students in related fields with a working knowledge of the medical and psychosocial aspects of physical disability and chronic illness, and to provide students with the knowledge and understanding necessary to function and serve effectively in rehabilitation counseling and related interdisciplinary, allied health, and mental health settings. Topic areas include: human body systems, medical terminology, medical, functional, environmental and psychosocial aspects of physical disabilities and chronic illness, professional ethics, assistive technology, functional capacity, and wellness and illness prevention concepts and strategies. Prereq: College level courses in biology and psychology or consent of instructor. (Same as SW 515.)

**CED 516 MEDICAL AND PSYCHOSOCIAL ASPECTS OF DISABILITIES: PSYCHIATRIC DISABILITIES. (3)** This course is designed to prepare rehabilitation and mental health counselors, social workers, and students in related fields with a working knowledge of the medical and psychosocial aspects of neurodevelopmental and psychiatric disabilities, and to provide students with the knowledge and understanding necessary to function and serve effectively in counseling and related interdisciplinary, allied health, and mental health settings. Topic areas include: medical, functional, and environmental aspects of neurodevelopmental and psychiatric disabilities, professional ethics, assistive technology, diagnostic classification systems, psychopharmacology, functional capacity assessment, and wellness and illness prevention concepts and strategies. Specific disabilities covered during this semester include psychiatric and psychological impairments, neurodevelopmental disabilities, autism, learning disabilities, substance abuse and others. Prereq: College level courses in biology and psychology or consent of instructor. (Same as SW 516.)

**CED 520 FOUNDATIONS OF PROFESSIONAL COUNSELING. (3)** The course provides a comprehensive introduction to rehabilitation and clinical mental health counseling as a human service system in public and private organizations. Students will examine and analyze philosophical, historical, legislative and organizational structures; rehabilitation and related clinical mental health counseling programs; referral and service delivery systems; the rehabilitation counseling process; administration of rehabilitation clinical mental health counseling programs; and professional and ethical issues. Prereq: Twelve hours of social or behavioral science, or graduate standing, or consent of instructor.

**CED 530 SOCIAL AND CULTURAL FOUNDATIONS OF COUNSELING. (3)** This course is designed to assist students to develop an understanding of the implications of cultural and individual diversity including race/ethnicity, gender, disability, age, class, spirituality and religion, geographic region, and sexual orientation. This course will provide an overview of social justice, culturally diverse counseling techniques, and identify how cultural values, beliefs, attitudes, and public policies influence consumers and service providers. Emphasis will be placed on debunking cultural myths and stereotypes through the use of case studies, examples, and discussion to present implications and best practices for rehabilitation and mental health counselors, other human service providers, and educators in addressing the needs of culturally diverse consumers and students through direct service and referral.

In addition, this course offers students an opportunity for self-exploration, growth, and expansion and sharing of diverse viewpoints. Finally, this course is designed to promote ethical and professional behavior when working with diverse populations. Prereq: Consent of instructor.

**CED 540 ADDICTION AND SUBSTANCE USE COUNSELING. (3)** This course is designed to provide students with information about the disease concept and etiology of addiction and co-occurring disorders, theories and models and research of substance-related and addiction disorders, behavioral, psychosocial and physiological effects of alcohol and other drugs, screening, evaluation and assessment, diagnosis, treatment intervention, counseling strategies, and mental health counseling to address issues pertaining to multiculturalism, crises, disaster and trauma, family, prenatal exposure, co-occurring disorders, sexual orientation, and adult children of addicts. In addition, ethical and legal considerations of addiction counseling and principles of self- help programs and identification community resources are discussed. Prereq: Consent of instructor

**CED 550 ETHICS FOR THE COUNSELING PROFESSION. (1)** This is a one-credit hour course designed to provide students with a comprehensive overview of the professional codes of ethics for Rehabilitation Counselors (CRCC) and mental health counselors (American Counseling Association.) A goal of this course is to acquire knowledge about ethical practice in serving persons with disabilities in a changing professional landscape. Emphasis will be on helping to recognize the implications of culture, class, and gender components, as well as identifying appropriate ethical behavior in various rehabilitation and mental health counseling-related practice areas. Prereq: Consent of instructor or admittance to graduate program in Rehabilitation or Mental Health Counseling.

**CED 554 RURAL REHABILITATION. (3)** This course focuses on the various issues related to counseling service provision in rural areas. The course will also present methods and techniques utilized to meet the specific and unique needs of persons with disabilities living in rural areas. Prereq: Consent of instructor or admittance to graduate program in Rehabilitation or Mental Health Counseling.

**CED 558 SPECIAL TOPICS IN REHABILITATION COUNSELING. (1-3)** Study of a selected topic within the field of rehabilitation. Topic to be chosen annually in accordance with student needs and interests. May be repeated to a maximum of six credits.

**CED 560 SUPPORTED EMPLOYMENT, INDEPENDENT LIVING, AND TRANSITION. (3)** This course is designed to provide a basic knowledge and understanding of the origins, development, and underpinnings of supported employment, transition, and independent living for rehabilitation and clinical mental health counselors. The contents of the course provide the student with the following information: philosophies for transition and supported employment programs; the concept of Person Centered Planning; a model for developing a transitional process in the community; vocational training and placement concepts of transition and supported employment; perspectives and roles within supported employment and transition for rehabilitation and clinical mental health counselors; and major elements of independent living rehabilitation. Prereq: Admission to the Rehabilitation Counseling Program or consent of instructor.

**CED 610 CASE MANAGEMENT IN REHABILITATION COUNSELING. (3)** This course emphasizes the basic principles of helping persons with disabilities within the rehabilitation and clinical mental health processes. The course fosters both an appreciation and knowledge of how various theories and research findings translate into appropriate rehabilitation and clinical mental health counseling techniques. The course explores the roles or functions that rehabilitation and clinical mental health counselors play as they work in different clinical rehabilitation and counseling programs and agencies. Prereq: CED 520 or consent of instructor.

**CED 620 ASSESSMENT IN REHABILITATION AND CLINICAL MENTAL HEALTH. (3)** This course includes effective methods and techniques used in determining the academic, intellectual, educational, and aptitude potential of persons with disabilities. Content also includes exploring the ethical practice of assessment and evaluation, test development, reliability, validity, and psychometrics, report writing, use of commercial evaluation systems, and the role of assessment in rehabilitation and clinical mental health counseling programs and agencies. Prereq: A vocational theories course and CED 520 or consent of instructor.

**CED 630 CAREER DEVELOPMENT COUNSELING AND JOB PLACEMENT. (3)** The course examines career theories and development including: the interrelationships among and between work, mental wellbeing, relationships, and other life roles; career, avocational, educational, occupational and labor market information resources; the work environment impact on clients' life experiences; assessing abilities, interests, values, personality and other factors that contribute to career development; career development program planning, organization, implementation, administration, and evaluation; advocating for diverse clients' employment opportunities; client skill development for career, educational, and lifework planning and management; assessment tools and techniques relevant to career planning and decision making; ethical and culturally relevant strategies for addressing career development; the needs of clients and employers as these relate to approaches to be used in job development, analysis, modification, placement and follow-up. The course helps students develop the skills necessary for successful placement of clients into a variety of settings – competitive and supportive employment, independent living, etc. The philosophy of placement including pre-placement analysis, client readiness, career and job development, job re-engineering, and related issues will be presented. Prereq: A vocational theories course, CED 520 and CED 620 or consent of instructor.

**CED 640 PRIVATE PRACTICE IN REHABILITATION COUNSELING. (3)** This course is designed to provide rehabilitation counseling students with a comprehensive knowledge of rehabilitation in business environments. Skills to develop a professional working relationship between the rehabilitation counseling professional, employers, the insurance industry, and other professionals will be taught. A thorough overview of worker compensation, related legislation, and other insurance will be presented. The roles and functions of the rehabilitation professional in business rehabilitation will be discussed. Prereq: Twelve hours of study in rehabilitation counseling or consent of instructor

**CED 650 COUNSELING THEORIES. (3)** This course is designed to provide an overview of theories pertinent to a career as a professional counselor. There will be an emphasis on application of theories to counseling individuals with disabilities. A goal of this course is to acquire knowledge about

counseling theories and to identify ways to integrate theory into practice. Emphasis will be on helping students in developing a personal theoretical orientation and understanding the use of different counseling theories with different clientele, especially with regard to the intersectionality of client identities. Prereq: Admission to the Counseling program or consent of the instructor.

**CED 660 COUNSELING TECHNIQUES. (3)** This course is designed to teach students how to implement counseling techniques. These techniques are applicable to professional careers in rehabilitation counseling and mental health counseling. The techniques presented in this class will be based in the theories presented in CED 650. Students will learn evidence-based practices for working with a variety of individuals and across multiple settings. In addition to learning, practicing, and discussing various counseling techniques, students will engage with additional content necessary for high-quality, ethical counseling practice such as case conceptualization, the use of technology in counseling, counselor characteristics, self-care, and more. Emphasis will be on competence with infusing social justice into counseling practice, and developing a personal counseling style. Prereq: CED 650 or consent of instructor.

**CED 670 GROUP AND FAMILY MENTAL HEALTH COUNSELING. (3)** This course is designed to prepare rehabilitation and clinical mental health counselors and other human service providers to become knowledgeable of counseling theory and skilled in group and family counseling techniques, with a focus on concerns related to disability and rehabilitation and clinical mental health counseling. The course will cover the history of group and family counseling, related counseling theories, elements of leadership in group counseling, family life cycle and models of healthy and unhealthy characteristics of families, culturally diverse perspectives of counseling, and ethical, legal, and professional issues. Students will gain practical experience with group counseling leadership and participation. Prereq: Admissions to the rehabilitation counseling or other human services program, and have counseling theories and techniques course, and consent of instructor.

**CED 701 SEMINAR FOR EDSRC LEADERSHIP PERSONNEL. (1)** Study of issues and topics affecting the preparation of Rehabilitation Counseling, Special Education, and Early Childhood personnel and of research issues involving persons with disabilities and educational and rehabilitation programs. May be repeated to a maximum of six credits. Lecture, two hours per week. Prereq: Admission to Ed.S., EDS, RC, or IEC Ph.D. Programs. (Same as EDS/IEC 701.)

**CED 710 CLINICAL PRACTICUM IN COUNSELING. (3)** The course is designed to provide the student with clinical learning experiences under faculty supervision in a community-based or state rehabilitation mental health agency. The student is expected to demonstrate knowledge and skills in the application of rehabilitation and mental health counseling methods, techniques, and vocational knowledge in working with persons with disabilities. In addition, the student is required to perform all tasks in accordance to ethical and legal standards in clinical rehabilitation mental health counseling. Prereq: Admission to the counseling program, CED 520, CED 530, CED 650, CED 660 and either CED 515 or CED 516, completion of minimum of 20 hours of program courses, consent of instructor, and passing the Admission to Field Work Exam.

**CED 711 SEMINAR IN ADVANCED REHABILITATION PRACTICES AND PROCEDURES. (3)** Advanced study of issues related to rehabilitation counseling, theory, research and practice including problem identification and assessment, program alternatives, services delivery models, theoretical and conceptual frameworks, the translation of theory and research into practice. Prereq: Admission to the doctoral program in Special Education and Counselor Education.

**CED 712 SEMINAR IN EDSCE PROFESSIONAL SERVICES. (3)** Education and Rehabilitation professional services including consultation, technical assistance, continuing education programs, professional organization development, committee and advisory board involvement, professional writing and editing, leadership training, and funding proposal development. Prereq: Admission to Ed.S., EDS, CED, or IEC Ph.D. Programs. (Same as EDS/IEC 712.)

**CED 715 ADVANCED SEMINAR IN PSYCHOSOCIAL ASPECTS OF CHRONIC ILLNESS AND DISABILITY. (3)** This course is a doctoral seminar designed to provide advanced knowledge and understanding of psychosocial aspects of chronic illness and disability (CID), including theoretical, practice, and research approaches to the processes of adaptation to CID, coping, self-management and health decision making, historical and sociological perspectives on disability and cultural and global perspectives, responses, and attitudes about disability, developmental and lifespan issues, and evidence-based practice and interventions in professional rehabilitation counseling practice, policy, and education. Students will engage in advanced analysis and synthesis of relevant theories and their application, and develop knowledge, skill, and experience in the application and teaching of related content in rehabilitation counseling education, research, policy, and practice. Prereq: Admission to the Ph.D. program in Special Education and Counselor Education or permission of instructor.

**CED 720 SEMINAR IN EDSCE TEACHER PREPARATION. (3)** Rehabilitation Counseling and Special Education college/university professor preparation, including syllabus development, organization of class presentations, instructional alternatives, scheduling, student assessment, professor-student interactions, student advising, resource identification and utilization and program evaluation. Prereq: Admission to Ed.S., EDS, CED, or IEC Ph.D. Programs. (Same as EDS/IEC 720.)

**CED 721 PRACTICUM IN EDSCE PERSONNEL PREPARATION. (1-9)** Professional preparation of Rehabilitation Counselors or Special Education Teachers, including practice in delivering lectures, conducting class discussions, leading seminars, directing independent studies, guiding student research projects, demonstrating instructional methods and materials, supervising rehabilitation counselors or special education student teachers, and advising. Laboratory, three-nine hours. May be repeated to a maximum of nine credits. Prereq: Admission to Ed.S., EDS, CED, or IEC Ph.D. Programs. (Same as EDS/IEC 721.)

**CED 730 CLINICAL INTERNSHIP IN COUNSELING. (3,6,9)** This course is designed to provide the student with clinical professional advanced learning experiences under faculty supervision in a community-based or state rehabilitation mental health agency. The student is expected to demonstrate knowledge and skills in the application of rehabilitation counseling and mental health methods, techniques, and vocational knowledge in working with persons with disabilities. In addition the student is required to

perform all tasks in accordance to ethical and legal standards in clinical rehabilitation mental health. Prereq: A minimum of successful completion of one year in the Counseling Program and CED 710 and consent of instructor.

**CED 735 ADVANCED METHODS FOR TEACHING AND CONDUCTING RESEARCH IN COUNSELOR EDUCATION: FROM THEORY TO PRACTICE. (3)** Advanced study of issues related to developing a theoretical framework for conducting and teaching rehabilitation counseling research. The course will incorporate rehabilitation counseling theory into researchable paradigms. The focus will be on understanding issues related to disability, developing a theoretical framework for rehabilitation research, and applying research findings to teaching, practice, policy, and program evaluation. Prereq: Admission to the Ph.D. program in special education and counselor education.

**CED 740 ADMINISTRATION, SUPERVISION AND PROGRAM EVALUATION IN REHABILITATION COUNSELING. (3)** Administrative and supervisory aspects of rehabilitation service delivery. Administration, clinical and technical supervision, staffing, and organizational structure(s) of the rehabilitation service delivery system (state, local, and federal). Research, program evaluation, political and ethical aspects of rehabilitation administration and supervision are overviewed. Prereq: Admission to Ph.D. program in Special Education or Counselor Education, or consent of instructor.

**CED 750 REHABILITATION AND MENTAL HEALTH COUNSELING RESEARCH AND PROGRAM EVALUATION. (3)** The purpose of this course is to introduce students to rehabilitation and mental health counseling research, program evaluation, and research methodology and so that they can become informed, critical, and reflective consumers and producers of quality research. This course provides a comprehensive introduction to research, statistics and research design, hypothesis testing, program evaluation, and research utilization. This is not a statistics course; however, students will be introduced to basic statistical procedures, concepts, and terms. Prereq: A basic research course and CED 520 or consent of instructor.

**CED 760 CONTEMPORARY PRACTICES IN REHABILITATION. (1-3)** Contemporary practices including supported employment, independent living, engineering and technology, family matters, client rights, ethical practices, cultural diversity, aging, and present and future trends in the field of rehabilitation. Analysis of legislation, value systems, political and economic fluctuations and research. Prereq: A minimum of 12 graduate hours in rehabilitation counseling or consent of instructor

**CED 767 DISSERTATION RESIDENCY CREDIT. (2)** Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended. Prereq: Admission to Ed.S., EDS, CED, or IEC Ph.D. Programs. (Same as EDS/IEC 767.)

**CED 770 ADVANCED SEMINAR IN REHABILITATION COUNSELING THEORY, PRACTICE, AND EDUCATION. (3)** This course is a doctoral seminar designed to provide advanced knowledge and understanding of personality and counseling theories and techniques and their application in professional rehabilitation counseling practice and education, rehabilitation counseling process and

outcome research, and the application of counseling theory across diverse populations and settings. Students will engage in advanced analysis and synthesis of counseling theories and their application, and develop knowledge, skill, and experience in the application and teaching of related content in rehabilitation counseling education, research, and practice. Prereq: Admission to the Ph.D. program in Special Education or Counselor Education.

**RC 525 HUMAN GROWTH, DISABILITY, AND DEVELOPMENT ACROSS THE LIFESPAN. (3)** This course provides a comprehensive study of human growth and development in the context of rehabilitation and clinical mental health counseling. Students will review human development theories across the life span and their implications and applications with persons with disabilities. Issues to be addressed include physical, emotional, moral, and cognitive development and the interaction of development and disability; human sexuality and disability; spirituality and religious aspects; transition issues as they relate to family, school, employment, aging, and disability; social and learning needs of individuals across the life span, and ethical and legal issues impacting individuals and families related to adjustment and transition. Prereq: Admission to the Rehabilitation Counseling Program or consent of instructor.

# Curriculum & Instruction

## College of Education

The Department of Curriculum and Instruction offers a wide range of graduate programs leading to the Master of Arts in Education, Master of Science in Education (Plan A or Plan B available), and Doctor of Education degrees. These programs are designed to prepare specialists for a variety of roles in curriculum and instruction including teaching, supervising, and coordinating subject matter areas at the elementary, middle school, senior high, and community college levels. The doctoral programs prepare leaders for public schools, universities, and other educational agencies. Specialization is available in several graduate areas.

## Doctor of Education

In cooperation with the Department of Administration and Supervision, the department offers a program leading to the Doctor of Education (Ed.D.) degree in Instruction and Administration.
Coursework for the Ed.D. in Instruction and Administration, Curriculum and Instruction option, will consist of a minimum of 42 graduate credits beyond the master's degree planned by the major professor and advisory committee based on the student's background, needs and goals. All course work plans will include work in the following:

1. Curriculum and Instruction,
2. Support work in education,
3. Research tool courses (minimum of 9 semester hours required), and
4. Support work outside of education.

**Admission Requirements**
In addition to the admission requirements set by the Graduate School, departmental requirements include a statement of professional goals, an autobiographical sketch, professional writing samples, and four letters of professional reference. Interviews are frequently requested. All materials may be submitted through The Graduate School's online application process.

## Master of Arts in Education (Initial Certification Option - Secondary Education)

This program is designed for students with a completed bachelor's degree in a content field. If it is a University of Kentucky degree, the degree must be in one of the following areas: English, history, mathematics, a science, a social science, or in secondary education. Science and mathematics candidates will also work with faculty in the STEM Education Department. Students having a bachelor's degree listed above from another institution are also eligible. Students not having a degree in one of the above areas may be required to complete additional course work. A departmental requirement is recommendation to a Teacher Education Program. That process involves compliance with admission requirements of the Kentucky Education Professional Standards Board.

Students meet state initial certification requirements while completing degree requirements. Dependent upon the student's background, one may need to complete undergraduate deficiencies to meet degree and certification requirements. Consult the Director of Graduate Studies for specific information regarding degree requirements and the dual application process.

## Master of Science in Education (Instructional Systems Design Option)

The Instructional Systems Design area offers a 36-hour program designed for individuals who wish to develop their knowledge and skills in planning and designing instruction. Persons choosing this area are frequently preparing for instructional systems design responsibilities in business and industry, government, education, and various training organizations.

This program does not require or lead to initial teacher certification. However, previously certified teachers can use the program to advance the rank of their teaching certificates. Both a thesis option (Plan A, requiring 30 hours of course work and 6 hours of thesis credit) and a non-thesis option (Plan B, requiring 36 hours of course work) are offered. All students are required to complete an 18-hour common core including nine semester hours in the Department of Curriculum and Instruction. At least 6 hours must be taken outside the College of Education. An additional 12 credit hours of electives are required for the non-thesis option. The thesis option includes 6 credit hours of electives and 6 credit hours of thesis credit. Specific programs are planned with a faculty advisor subject to the approval of the Director of Graduate Studies.

**Admission Requirements**

For applicants who are not seeking advanced rank teaching certifications, in addition to the admission requirements set by the Graduate School, there is a departmental requirement of three references. For applicants who will pursue advanced teaching certificates, departmental requirements include initial teacher certification and three letters of professional reference. All materials may be submitted through The Graduate School's online application process.

## Master of Arts in Education (Literacy)

Candidates for a Master of Arts in Education with Literacy as an area of concentration must meet the specifications for a Master of Arts in Education, Plan B. The curriculum includes a minimum of 33 credit hours according to the following distribution: a) a minimum of 30 credit hours in specified literacy related courses, b) nine credit hours in other professional educational course work, and c) three credit hours in course work either inside or outside the College of Education.

Completion of the Master of Arts in Education with Literacy as an area of concentration will fulfill the academic requirements for certification as a literacy specialist.

**Admissions Requirements**

In addition to the admission requirements set by the Graduate School, departmental requirements for admission to the Literacy program include initial teacher certification. Applicants without teaching experience or initial teacher certification are considered for this program. However, those without initial teacher certification will not receive a literacy specialist certificate.

## Course Descriptions

EDC 501 TEACHING INTERNSHIP. (1-12)

Supervised practice teaching under competent leadership. Observation, instruction, independent study which parallels field experience, and conferences with supervising instructor included. This course is designed primarily for students in Allied Health Professions, Education, Library and Information Science, Home Economics, and Social Work. May be repeated to a a maximum of 12 hours. Prereq: EDC 500 or permission of instructor.

EDC 504 LITERATURE AND RELATED MEDIA FOR YOUNG ADULTS. (3)
A study of literature and related materials for use with young people in grades 6-12. Emphasis is placed on the special characteristics and needs of young people and the evaluation of materials for this age group. (Same as LIS 514.)

EDC 509 COMPOSITION FOR TEACHERS. (3)
A course covering the basic studies helpful to teachers of English composition at the secondary level. Focuses on the teaching of grammar, punctuation, usage, etc., and on theme planning, correction, and revision. Students are required to do quite a bit of writing. Provides ENG Major Elective credit and ENG minor credit. (Same as ENG 509.)

EDC 513 TEACHING ENGLISH AS A SECOND LANGUAGE. (3)
The course examines the current theories and methods of teaching English as a second language. The course will include (1) language learning theory as it relates to other disciplines; (2) methods and techniques of contrastive analysis. Prereq: One course in linguistics or consent of instructor. Provides ENG Major Elective credit and ENG minor credit. (Same as ENG/LIN 513.)

EDC 514 TESL MATERIALS AND METHODS. (3)
An extension to ENG/EDC 513, this course will include examination and evaluation of published materials designed for teaching English to speakers of other languages. Students will create individualized teaching materials and gain practical experience in applying the methods and using their own materials. Prereq: ENG/EDC 513 or consent of instructor. Provides ENG Major Elective credit and ENG minor credit. (Same as ENG/LIN 514.)

EDC 520 ASSESSMENT AND ACCOUNTABILITY IN MIDDLE LEVEL EDUCATION. (3)
This capstone course is taken during the student teaching experience and is taught via an online modality. The purpose of the course is to investigate and document teaching effectiveness. Candidates design an integrated unit of study, pre and post test student learning,
analyze learning gains drawing on formative and summative measures, and make modifications and accommodations based on the results. Prereq: Admission to Teacher Education.

EDC 522 PSYCHOLOGICAL AND EDUCATIONAL TESTS AND MEASUREMENTS. (3)
Problems of measurement with emphasis on standardized tests. General principles of test construction and evaluation, for standardized assessments and/or teacher-made tests, examinations, criteria for evaluation and marking and other rating systems. (Same as EDP/EPE 522.)

EDC 533 TEACHING LITERACY ACROSS THE DISCIPLINES. (3)
This course provides an in-depth study of theories and teaching methods for integrating literacy (including digital literacy) instruction into content area classrooms at the K-12 levels. Instructional strategies, procedures, and assessments designed to increase vocabulary learning and comprehension of expository texts are emphasized. Prereq: Graduate standing or consent of the instructor.

EDC 537 ADVANCED APPLICATIONS OF TEACHING WRITING. (3)
This course promotes the thoughtful examination of writing instruction at the middle and high school levels Throughout the course, learners are introduced to strategies and skills they can use to enhance their own writing and the writing of their students. Using a process approach, students learn how to communicate ideas effectively in a variety of genres and for a multitude of purposes. Based on the most current research in the field, this course explores such topics as writers workshop, conferencing, assessment of struggling writers, reading/writing connections, writing in the disciplines, revision and editing, the use of digital media to support writers, and the management of writing instruction. This course

is offered in conjunction with an eight-week clinical field experience. Prereq: EDC 347, graduate standing, or permission of instructor.

EDC 541 READING AND UNDERSTANDING EDUCATIONAL RESEARCH. (3)
The purpose of this course is to learn how to critically read, analyze, and reflect upon educational research from quantitative, qualitative, and mixed methods perspectives.

EDC 543 DIGITAL GAME BASED LEARNING AND INSTRUCTION. (3)
Digital game-based video applications as prominent video-based vehicles for distance education and multimedia development through multi-user and virtual platforms. Classroom exercises and projects develop basic video game production skills including the use of graphical and video assets, flash animations storyboarding, equipment, terminology and systems, message design issues and research on DGBL.

EDC 544 USE AND INTEGRATION OF INSTRUCTIONAL MEDIA. (3)
Students use a range of traditional, interactive, and emerging technological interventions in analog and digital formats. Students gain skill in the operation, production, and integration of basic media such as video, graphics, videodisk, and CD-ROM in a variety of instructional settings (training, exploratory learning, on-line databases, etc.). Students demonstrate skills via the composition and production of several media documents using available tools and resources.

EDC 547 TECHNOLOGY IN INSTRUCTION PRACTICE. (3)
Students use instructional computing applications and understand the roles and uses of computers in instruction. Students select and use instructional computing hardware and software appropriate to instructional goals and settings. Students use electronic networks for instructional purposes. Students demonstrate skill using basic productivity software through structured assignments and collaborative projects.

EDC 548 INSTRUCTIONAL TECHNOLOGY LEADERSHIP. (3)
Students develop skill in advanced aspects of the operation and use of the range of instructional technologies from desktop to distributed computing environments. Students use operating systems, learn network administration, do technology planning, and work with basic authoring tools. Skill is demonstrated through a series of projects including development of a technology plan for a specified work setting and authorship of a prototype program.

EDC 549 MIDDLE LEVEL STUDENT TEACHING. (3-15)
This course provides candidates with the opportunity to participate in a full-time, supervised internship in middle grade classrooms. The student teaching experience occurs in a 5-9 school setting. Offered on a pass-fail basis only. Repeated for up to 15 hours. Prereq: Must meet published college requirements for student teaching.

EDC 550 EDUCATION IN A CULTURALLY DIVERSE SOCIETY. (3)
This course assists future educators in developing strategies to create an equitable teaching/learning environment where all students are validated, stimulated, and nurtured. Course participants explore the rationale for their current belief systems and perceptions of other cultures; investigate how and why their personal attitudes, behaviors, and expectations affect the academic and social development of children and youth, and examine contemporary educational issues. (Same as AAS 550.)

EDC 560 LITERACY DEVELOPMENT IN THE ESL CLASSROOM. (3)
This course is designed to introduce students to theory, research, and teaching applications of second

language literacy development in the ESL classroom. This is a field-based course, and students will study current teaching methods of literacy instruction and apply those ideas with learners in an ESL setting. (Same as TSL 560.)

EDC 575, 576 MODERN EDUCATIONAL PROBLEMS. (UNCLASSIFIED). (3 ea.)

EDC 601 THEORIES, PERSPECTIVES, TRENDS AND ISSUES IN MULTICULTURAL EDUCATION. (3)
This course provides students with a critical analysis of multicultural education theories, perspectives, current issues, and trends. Students will develop the competencies needed to write scholarly literature reviews, identify areas in multicultural education needing further research studies, and submit papers for review and presentation at professional meetings. Prereq: Graduate standing, EDP 557 or consent of instructor. (Same as AAS 601.)

EDC 603 TEACHING READING TO LOW-ACHIEVING PRIMARY STUDENTS. (3)
Reading Recovery is dependent on the level of expertise of Reading Recovery teachers. Students will learn to use the Reading Recovery procedures in order to help accelerate the learning of Reading Recovery children. Reading Recovery Teacher Leaders provide clinical supervision and guidance as teachers learn how to problem solve the particular challenges of children who are not making accelerated progress. Additionally, students will study the theoretical underpinnings of Reading Recovery. In order to work effectively within their schools in the future, teachers are placed in the teaching role with visible accountability across a school year.

EDC 605 DISTANCE LEARNING RESEARCH AND DESIGN. (3)
Study of the design and development of distributed learning systems in education and training. Topics include: foundations of distance education, distance learning research, and the design and development of e-learning courses and workshops. Student involvement in the design of an e-learning course or workshop will be emphasized.

EDC 607 INSTRUCTIONAL DESIGN I. (3)
Introduction to the instructional design process from needs assessment and goal definition through evaluation. Each student will design prototype instructional materials based on an instructional design model and/or procedures. The course will also introduce students to the field of instructional design and technology.

EDC 608 INSTRUCTIONAL DESIGN II. (3)
Critical analysis of instructional design models and their theoretical foundations including the impact of various models and perspectives on the practice and the products of instructional design. Prereq: EDC 607 or consent of instructor.

EDC 609 INTERACTIVE MULTIMEDIA AND USER DESIGN. (3)
The goal of this course is to examine the theoretical foundations and best practices involved in multimedia research and interface design. These investigations are anchored in user-centered design and the methodology explored in the course is research to practice in usability testing and iterative program design. Prereq: EDC 544.

EDC 610 DISCIPLINE AND CLASSROOM MANAGEMENT. (3)
The course is designed to examine the causes of and solutions to disruptive and noncompliant behavior and classroom management problems that are within the control of the classroom teacher. The course content is designed around two approaches: (1) identifying prevalent problems and exploring specific solutions to them; (2) presenting selected strategies and applying them to a variety of problems.

In both cases, alternatives are considered in the light of relevant theory, law, research and experience. Prereq: Teacher certification and EDP 203.

EDC 611 AUTHORING APPLICATIONS FOR TECHNOLOGY-BASED INSTRUCTION. (3)
Focuses on individual and collaborative authoring applications for technology based instructional materials. Topics include linear and nonlinear information structures, instructional message design, compositional issues related to audience focus, information density, language control, and organization, and prototype production with industry standard authoring software. Prereq: EDC 547 and EDC 607 or consent of instructor.

EDC 612 INSTRUCTIONAL DESIGN AND TECHNOLOGY FOUNDATIONS. (3)
Provides an in-depth survey of the field of instructional design and technology. Topics covered include the history of instructional design and technology, critical issues, current trends and future prospects for the field, instructional development, research, certification, and professional development. Prereq: EDC 607, EDC 608 or permission of instructor.

EDC 615 ADVANCED INSTRUCTIONAL APPLICATIONS FOR THE EARLY ADOLESCENT LEARNER. (3)
This course for middle school teachers examines the complex nature of the 10 to 14 year old student. Analysis of recent research-based effective instructional strategies to meet the needs, interests, and characteristics of these students will be included. Prereq: Teacher Certification or consent of instructor.

EDC 616 THE MIDDLE SCHOOL. (3)
The purpose of this course is to provide middle school teachers with an in-depth analysis of the characteristics of effective middle school facilities. An examination of current curricular models, issues, trends, and exemplary middle schools will comprise the primary focus of this course. Prereq: EDC 615 or consent of instructor.

EDC 617 EFFECTIVE TEACHING IN CULTURALLY AND LINGUISTICALLY DIVERSE CLASSROOMS. (3)
The purpose of this course is to prepare educators to effectively teach culturally and linguistically diverse students in mainstream classrooms. Prereq: Graduate student status is required.

EDC 618 ADVANCED STUDY IN THE TEACHING OF READING. (3)
An advanced course for classroom teachers which focuses on selection and implementation of reading assessment and instructional procedures. The theoretical bases of the reading process and the knowledge of research in reading will be related to the design of classroom instruction. This course is to become an option in Area 7 of both the Elementary and Secondary Standard Certification programs. Prereq: EDC 330 or 339 or 533 or equivalent.

EDC 619 ASSESSMENT OF READING GROWTH AND DEVELOPMENT. (3)
Clinical techniques for the diagnosis of reading disabilities. A course designed to develop both theoretical understandings and operational skills in clinical diagnosis of reading problems. Classroom application of the techniques is discussed. Prereq: EDC 330, or EDC 533, or EDC 534, or permission of instructor.

EDC 620 DESIGN AND IMPLEMENTATION OF READING INSTRUCTION. (3)
Clinical techniques used in the remediation of reading problems. It is a course designed to develop individualized procedures related to diagnosis. Classroom applications of the instructional procedures are discussed. This course is a combination of lecture and application with a student client. Prereq: EDC 619, or permission of instructor.

EDC 620 DESIGN AND IMPLEMENTATION OF READING INSTRUCTION. (3)
Clinical techniques used in the remediation of reading problems. A course designed to develop individualized procedures related to diagnosis. Classroom application of the instructional procedures is discussed. Lecture, two hours; laboratory, two hours. Prereq: EDC 619, or consent of instructor.

EDC 621 LANGUAGE AND LITERACY DEVELOPMENT. (3)
A study of language and literacy development (oral and written language development, first and second language development, etc.) across the lifespan to provide a foundation for literacy instruction and curriculum development. Prereq: EDC 641 or equivalent course in research foundations.

EDC 622 OBSERVING AND RESPONDING TO YOUNG READERS. (3)
Throughout the preparation year, teacher leaders engage in sensitive observation and responsive teaching of individual grade one children who have been identified as having difficulty learning to read and write. They study the theoretical rationales and practical application of Reading Recovery teaching procedures and connect their practice to wider understandings of literacy development. Across the year, teacher leaders work with a variety of children to gain a range of experiences, always focusing on teaching for accelerated learning. Reading Recovery trainers provide clinical supervision and guidance as teacher leaders learn how to problem solve the particular challenges of children who are not making accelerated progress. In order to work effectively with teachers in the future, teacher leaders are placed in the teaching role with visible accountability across a school year. Prereq: Applied for and been accepted to a Reading Recovery position in a school district.

EDC 623 THEORETICAL FOUNDATIONS: LANGUAGE AND LITERACY LEARNING AND DEVELOPMENT. (3)
Teacher Leaders in training examine the theoretical base underlying the processes of reading and writing. We will explore and extendour own personal models of reading and writing processes and ground this theory, building in close observations of young children reading
and writing. Prereq: Applied for and been accepted to a Reading Recovery position in a school district.

EDC 624 LEADERSHIP PRACTICUM FOR TEACHER LEADERS. (3)
The course prepares teacher leaders for multiple and complex roles. Teacher leaders learn how to deliver initial training courses and ongoing professional support for Reading Recovery teachers. A key aspect of the teacher leader's role is to provide the yearlong course of initial training for Reading Recovery teachers. In order to prepare teacher leaders for this role, attention is given to research, theory and practice relating to adult learners.

EDC 625 LITERACY LEADERSHIP P-12. (3)
The purpose of this course is to prepare literacy professionals to facilitate positive change in school and community settings through program development and evaluation, mentoring, and advocacy. Students will: understand and assume various roles as literacy leaders; learn how to develop, implement, and evaluate effective research-based literacy programs and practices; learn how to design, facilitate, lead, and evaluate effective professional development programs for professional educators; learn how to mentor colleagues and work collaboratively with families, teachers, administrators, policymakers, and community members in individual and group contexts; and learn how to influence local, state, and national policy decisions related to literacy education.

EDC 626 CURRENT ISSUES IN LITERACY EDUCATION. (3)
"Current Issues in Literacy Education" (EDC626) is an advanced course for graduate students, which focuses on contemporary matters in literacy education and learners. An emphasis on social, historical, and

political factors affecting the literacy learning is included.

EDC 627 OBSERVING AND RESPONDING TO YOUNG READERS, ADVANCED. (3)
This course represents advanced study of the Fall Semester course (622). Students will continue to engage in sensitive observation and responsive teaching focusing on the hardest to teach children. Students will refine and deepen their understandings of the theoretical rationales and practical applications of Reading Recovery. The Teacher Leader-in-training will have the opportunity to observe, analyze, discuss, and directly experience the role of Teacher Leader in class and assigned field experiences, while preparing to implement the Reading Recovery program within their region, university or school district.

EDC 628 THEORETICAL FOUNDATIONS: ISSUES IN LITERARY DIFFICULTIES. (3)
The purpose of this course is three fold. First, to acquaint students with the most current thinking about reading and learning processes relative to young, low progress, 'at-risk' students. Second, to acquaint students with the seminal research and theories which have influenced the reading difficulties field. Third, to help students relate recent and seminal theories of learning and, in particular, reading difficulties, to young students who are hard for us to teach. Prereq: Applied for and been accepted to a Reading Recovery position in a school district. EDC 502, EDC 503, EDC 622, EDC 623, EDC 624, EDC 627

EDC 629 LEADERSHIP PRACTICUM FOR TEACHER LEADERS, ADVANCED. (3)
Careful attention to implementation is critical for a successful intervention. Reading Recovery has well-developed, context-sensitive and evolving mechanisms for ensuring quality implementation. Teacher leaders play a critical role in maintaining the quality of each implementation. In order to provide effective leadership, teacher leaders must be knowledgeable about the design principles of the intervention and skillful in problem solving issues that arise. Teacher leaders collect and analyze data to evaluate and strengthen the implementation of Reading Recovery. They create awareness, work collaboratively with stakeholders, and cultivate support for Reading Recovery at the building, district, site, and state levels. Prereq: Applied for and been accepted to a Reading Recovery position in a school district. EDC 502, EDC 503, EDC 622, EDC 623, EDC 624, EDC 627, EDC 628.

EDC 630 FAMILY AND COMMUNITY LITERACY. (3)
Viewed through a lens of lifelong literacy, this course focuses on developing strong partnerships between families, communities, and schools. Course topics will include: (a) family diversity & multiple literacies, (b) learning about, from, and with families & communities, (c) building upon family/community knowledge and resources in instruction, and (d) designing effective partnerships and familyengagement programs. Course assignments will provide hands-on opportunities to engage with these topics in real-world settings. This course is offered via a hybrid distance format, with a combination of on-campus face-to-face class meetings, synchronous online class meetings, and asynchronous work. There are no prerequisites to this course, other than graduate student status.

EDC 632 SOCIAL STUDIES PEDAGOGY IN THE SECONDARY SCHOOL. (0-3)
Through campus and school-based experiences, students will learn how to engage young people in learning social studies and how to make decisions about planning instruction and develop assessment based on a sound knowledge base for applying content, materials, and methods (including educational technology) appropriate for high school students. May be repeated to a maximum of three credits. Lecture, 1-3 hours; laboratory, 3-6 hours per week. Prereq: Admission to the M.A./M.S. in Education (Initial Certification Option-Secondary Education).

EDC 633 BUSINESS PEDAGOGY IN THE SECONDARY SCHOOL. (0-3)
Through campus and school-based experiences, students will learn how to engage young people in learning business and how to make decisions about planning instruction and develop assessment based on a sound knowledge base for applying content, materials, and methods (including educational technology)

appropriate for high school students. May be repeated to a maximum of three credits.

EDC 638 TECHNOLOGY IN SECONDARY EDUCATION. (1-3)
This course emphasizes the use of several key interactive technologies for problem solving – problem solving that occurs on several levels: (1) instructional problem solving (using technology to support various kinds of learning outcomes for students), (2) content problem solving (using games/software/websites to learn to solve problems that reflect the principles and core concepts in your discipline, (3) assessment problem solving (using technologies to support authentic challenging assessments that support evaluation of what students know and are able to do).

EDC 639 TEACHING DIVERSE LEARNERS IN SECONDARY EDUCATION. (1)
This course explores the influence of self-concepts and past experiences on current attitudes, perceptions and behaviors; investigates the effects of cultural traditions, political mandates, educational trends and school curriculums on student achievement; and develops strategies to create equitable teaching/learning environments in secondary education that validate, stimulate, and nurture all students. Prereq: Admission to M.A. in Education (Secondary Education with Initial Certification).

EDC 642 RESEARCH AND THEORY IN LITERACY EDUCATION. (3)
The purpose of this course is to critically examine, analyze, and reflect upon research and theory pertaining to the production and understanding of oral and written language (reading, writing, speaking, listening, viewing, and visually representing). Prereq: EDC 641 or equivalent course in research foundations.

EDC 709 SOCIAL MEDIA AND INTERACTIVE SYSTEMS DESIGN. (3)
The purpose of this course is to examine the growing research and design literature for on-line communities and networked learning groups that support cooperative, collaborative and social instructional activities. Framed by concepts from Activity Theory, Social Networking Theory and Social Learning Models students will read current books, research articles and be introduced to research methods and tools (such as tracking utilities and on-line data collection) for examining on-line communities. Students will design and collect data for an original research project as part of required course work. Prereq: EDC 608, EDC 612, or consent of instructor.

EDC 710 ADVANCED TOPICS IN INSTRUCTIONAL DESIGN. (3)
An identification and analysis of current theories and programs of research in instructional systems design. Students will develop the skills necessary to conduct and write a scholarly literature review and identify potential areas and questions needing further study. Prereq: EDC 608, EDP 610, EDC 612, or consent of instructor.

EDC 712 THE ELEMENTARY SCHOOL. (3)
Recent research and modern trends in teaching the skills and content subjects in the elementary school. Planned for supervisors, superintendents, principals, and teachers for better understanding of a modern elementary school.

EDC 714 THE SECONDARY SCHOOL. (3)
A course designed to acquaint the secondary teacher and the administrator with the nature and function of the secondary school.

EDC 724 GUIDING AND ANALYZING EFFECTIVE TEACHING. (3)
A course designed for educators who are preparing to supervise teachers and who wish to analyze their own practice. Research, policies, and trends are examined and practices analyzed in the context of how to

promote effective teaching. Principles apply to elementary and secondary education.

EDC 726 CURRICULUM INQUIRY MIXED METHODS RESEARCH. (3)
A mixed methodology conceptual framework is used to examine various approaches for designing, implementing, and analyzing practitioner data generated in a variety of instructional settings. Topics include epistemological, methodological, and ethical issues involved in action research, classroom discourse analyses, and mixed methods curriculum inquiry. Prereq: EDP/EPE 558 and EPE 663 or permission of instructor.

EDC 730 PROBLEMS OF THE SCHOOL CURRICULUM. (3)
Problems in the field of the school curriculum and in the preparation of instructional materials. Students enrolling in this course are required to leave on file with the College of Education a complete report of each problem studied. May be repeated once for a maximum of six credits.

EDC 731 SOCIAL STUDIES SEMINAR: HISTORY EDUCATION. (3)
Advanced study of the purposes and practices that characterize K-12 history education in diverse settings, critical analysis of research on the development of children's and adolescents' historical thinking and the introduction of classroom-based techniques for assessing students' historical understanding. Prereq: Graduate standing.

EDC 732 CURRICULUM DESIGN FOR LEARNING AND LEADING. (3)
Critical analysis, design, and implementation of curricula. Survey of theoretical foundations, in-depth applied research experiences, design of curriculum resource materials, and implementation of curriculum designs.

EDC 733 LEADERSHIP AND ANALYSIS OF ADVANCED INSTRUCTIONAL PRACTICE. (3)
Course participants will develop leadership skills in curriculum and instruction through a variety of research-based analytic practices such
as lesson study, observation, mentoring, dialogic and collaborative work in the context of a school learning community. Clinical/field/practicum experiences provide experience identifying a research problem, planning a course of action, and implementing and evaluating the action plan to improve learning results in K-12 classrooms. This course is designed as a hybrid workshop as follows. The class begins with a one-week intensive summer experience. Online and distance learning instruction will be conducted throughout the fall semester as students engage in their course work through clinical/field/practicum experiences. During the semester, two in-class meetings will serve as midpoint and final assessments of student progress toward meeting course objectives. Clinical/field work will be conducted in school classrooms. Practicum, 1 hour; Seminar, 3 hours. Prereq: Graduate-level curriculum course, graduate-level assessment course, and a minimum of two years' K-12 teaching experience.

EDC 740 PRACTICUM IN TEACHING READING AND RELATED LANGUAGE ARTS. (3)
Supervised practicum in analyzing problems in reading and related language arts and providing remedial work. Requires six hours per week in practicum with individual children or groups, plus two hours per week in seminar. May be repeated to a maximum of six credits. Prereq: EDC 619, 620.

EDC 746 SUBJECT AREA INSTRUCTION IN THE SECONDARY SCHOOL. (0-9)
Students will teach in their subject areas in the schools full-time, meet regularly to discuss teaching effectiveness and strategies for improvement and develop their professional portfolios. May be repeated to a maximum of nine credits. Lecture, 3-9 hours; laboratory, 6- 18 hours per week. Prereq: The appropriate methods course in the subject area (SEM 631, EDC 632, EDC 633, SEM 634 or EDC 635). Admission to the M.A./M.S. in Education (Initial Certification Option-Secondary Education). (Same as SEM 746.)

EDC 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

EDC 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

EDC 750 INTERNSHIP IN INSTRUCTIONAL SYSTEMS DESIGN. (3)
Students will apply their knowledge of instructional systems design in a real-life setting. The work setting will be selected based on the professional goals of each student and student work will be supervised and reviewed by the internship coordinator. May be repeated to a maximum of nine credits. Prereq: Consent of program coordinator.

EDC 755 CURRICULUM AND INSTRUCTION RESEARCH COLLOQUIUM. (1)
Students and faculty will discuss current research and related issues in curriculum & instruction. May be repeated to a maximum of two credits. Prereq: Admission to graduate program in Curriculum & Instruction.

EDC 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

EDC 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.
EDC 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

EDC 777 SEMINAR IN CURRICULUM AND INSTRUCTION (Subtitle required). (1-3)
A critical analysis of recently developed materials and techniques in curriculum and instruction for precollege education. Includes analysis of evaluative research related to new materials and techniques. May be repeated to a maximum of nine credits. Prereq: Consent of instructor.

EDC 781 INDEPENDENT STUDY IN CURRICULUM AND INSTRUCTION. (1-3)
An independent study course for graduate students who have completed at least half of the program course requirements in clinical and college teaching, curriculum and instruction, early childhood education, elementary education, reading or secondary education. May be repeated to a maximum of nine credits. Prereq: Consent of the Director of Graduate Studies.

EDC 791 RESEARCH PROBLEMS IN CURRICULUM AND INSTRUCTION. (1-3)
A research problems course for graduate students who have completed at least half of the program course requirements in clinical and college teaching, curriculum and instruction, early childhood education, elementary education, reading or secondary education. May be repeated to a maximum of nine credits. Prereq: Consent of the Director of Graduate Studies.

# Interdisciplinary Early Childhood Education

## College of Education

**Requirements for Program**
The Interdisciplinary Early Childhood (IEC) MEd program prepares educators for leadership roles in schools, programs, and systems that serve children, birth through age five, with and without disabilities and their families. Graduates are awarded the MEd degree in Education with a major in Interdisciplinary Early Childhood. In the Interdisciplinary Early Childhood program, students will build upon their skills as active, critical consumers of research and are expected to consume and produce research that will inform their practice. At this advanced level, students are expected to reflect not only on matters within the classroom context, but also on systems such as schools, families, communities, and policy. Through engaging students in a variety of learning experiences, including field-based experiences, professional literature, and conducting research, the M.Ed. program prepares graduates to build upon their leadership skills so they are prepared to actively engage in their chosen professions as agents of research-based change.

The program is guided by the standards of the Division for Early Childhood of the Council for Exceptional Children and the National Association for the Education of Young Children. The program also embeds Kentucky's Standards for Interdisciplinary Early Childhood Education and the Kentucky Early Childhood Core Content within courses and field experiences.

The IEC program admits twice a year: October 15th is the deadline for completed Department application submissions for Spring or Summer admission; March 15th is the deadline for completed Department application submissions for Summer or Fall. After completed applications are received by the deadline, candidates with complete applications are invited for an interview. Upon admission to the program, students are assigned an advisor and a Curriculum Contract is completed.

For application procedures, please go to the Graduate School web site (http://gradschool.uky.edu) and follow the directions for the Apply Yourself application. This electronic application incorporates the program and Graduate School application process.

**Continuous Assessment**
1. **Assessment at the Point of Entry to the IEC Progra**m. In addition to satisfying the criteria for admission to the University of Kentucky Graduate School, all MEd applicants must complete a departmental application, which includes indicators of written language and professional writing, technology skills, and professional goals, supported by professional letters of recommendation. The program faculty reviews the students' portfolio and interview results to make a determination on entry.
2. **On-going Assessment**. Once students are admitted to the program, they plan with their advisor the remainder of the program. Midpoint review is not necessarily a single point of assessment, and because of the different program options, mid-point evaluations are not restricted to specific timelines or identified courses. All advanced study candidates are evaluated by the conclusion of 15 semester credit hours. Evaluation criteria include the maintenance of at least a 3.0 GPA and the satisfactory performance in coursework and field placements.
3. **Exit Assessment**. MEd students undergo exit review at the conclusion of the final course required on

the program plan for the MEd degree. Because of the distinction between requirements for fulfilling Rank and degree, there may be multiple "exit" reviews for a given student. Thus, students pursuing the Master's may opt to file for Rank change prior to completion of the thesis. In such cases, there will in essence be two "exit" assessments; one for Rank and a subsequent assessment upon thesis completion.

## Graduate Courses

**Core Graduate Coursework**

| | | |
|---|---|---|
| IEC 620 | Assessment in IECE | (3) |
| IEC 621 | Issues in Interdisciplinary Early Childhood Education | (3) |
| IEC 623 | Practicum in IECE | (3) |
| IEC 710 | Advanced Instructional Methods in IECE | (3) |
| IEC 659 | Advanced Child Development | (3) |
| EDS 768 | Residence Credit for Master's Degree | (3) |

**Research Core**

Two courses in a research methodology selected by the student and approved by the thesis advisor; may include courses in a) single subject, b) qualitative, or c) group design.

EDS 601 & EDS 633 (6)
EPE 663 & EPE 763 (6) OR
EDP 557 & EDP 660 (6)

**Electives**

Students choose 9 hours of approved electives in one of the following areas:

1. Administration & Program Development
2. Curriculum Leadership & Technical Assistance
3. Policy & Advocacy
4. Higher Education & Research

## Interdiscplinary Ph.D. in Education Sciences

**Program Overview**

The Interdisciplinary Ph.D. in Education Sciences (major code: EDSC) program is designed for individuals seeking careers in educational research. Graduates of the program are prepared to meet the growing national need for educators who are well trained in methodological issues in education research. This Ph.D. program prepares individuals who will have careers in research universities, educational research labs and corporations, and research groups within education agencies.

All EDSC students will be encouraged to apply for 20-hour per week research assistantships on grant-supported projects in the College of Education and other units at the University of Kentucky. In addition to coursework, students will be expected to attend local, state, or national professional conferences during the first and second years of their programs. All students will be expected to present their research at professional conferences by their third year in the program. EDSC doctoral students are expected to submit manuscripts to professional journals and accomplish refereed publications during their doctoral study. Presentations and publications may be scholarly works with a single author or groups of co-authors.
Curriculum

EDSC is a rigorous doctoral program that requires year-round, full-time study. Students are encouraged to apply for admission for the Fall semester. Students seeking Spring admission should contact the program

DGS to determine if the strand they are interested in allows for Spring admissions. Students will be required to complete a set of core courses in research methods and education policy; in addition, students will then be able to follow a particular "strand" of courses in an area of specialization. All students will be involved in educational research projects throughout their time in the program.

EDSC doctoral students will be required to designate at the time of application the strand that they would like to complete. These include advanced concentrations in the areas of:

a. Curriculum and instruction
b. Educational leadership
c. Educational policy studies: Educational evaluation and policy
d. Educational policy studies: Philosophical and cultural inquiry
e. Health education
f. Interdisciplinary early childhood education
g. Physical education
h. Rehabilitation counseling
i. Special education
j. STEM education

Additional information about the curriculum, including specific course requirements, may be found in the document: Interdisciplinary Ph.D. in Education Sciences Program Plan and Curriculum Sheet. This document is a tool for current and prospective students and faculty advisors.

**Applications**

Qualified applicants will have earned baccalaureate and master's degrees from fully accredited institutions. Applicants must meet admission requirements set by the University of Kentucky Graduate School. Applications to the Interdisciplinary Ph.D. in Education Sciences are made online through the UK Graduate School Apply Yourself application process. Details about the application process can be found at http://gradschool.uky.edu/admissions.

# Educational Policy Studies & Evaluation

## College of Education

The Department of Educational Policy Studies and Evaluation offers programs leading to degrees in the Master of Science (M.S.) in Higher Education, M.S. in Social and Philosophical Studies in Education, M.S. in Research Methods in Education, Doctor of Philosophy (Ph.D.) in Studies in Higher Education, and the Doctor of Education (Ed.D.) in Educational Policy Studies, Measurement, and Evaluation. The department also participates in the College of Education's Interdisciplinary Ph.D. in Education Sciences degree program with the Philosophical and Cultural Inquiry, Educational Evaluation and Policy, and Quantitative and Psychometric Methods strands. Additionally, the department offers graduate certificates in Research Methods in Education and International Education. The department has periodically offered an Ed.D. Cohort program in collaboration with the Kentucky Community and Technical College System.

**Admission to Programs**
Prospective students of the Department of Educational Policy Studies and Evaluation must complete an application to the UK Graduate School and follow general Graduate School application requirements. All master's and doctoral applicants must submit (a) official transcripts for all previous coursework completed at any institution of higher education, (b) official scores on all three sections of the Graduate Record Examination (GRE), (c) a statement of purpose, and (d) letters of reference. Master's applicants must provide two letters of recommendation, whereas doctoral applicants are required to provide four. Moreover, a writing sample is required of all doctoral applicants.

The deadline for application submission to the fall and summer semesters is January 15. The deadline for application submission to the spring semester is October 1 of the preceding year. The periodic Ed.D. Cohort will have its own separate application deadline. Because the Quantitative and Psychometric Methods strand of the Ph.D. in Education Sciences requires that its students begin in the fall semester, applicants must submit their completed applications by the January 15 deadline. The Philosophical and Cultural Inquiry and Educational Evaluation and Policy strands, as well as the M.S. in Research Methods in Education, operate on rolling admission, though students interested in applying for assistantships and/or scholarships must submit their applications in accordance with the January and October deadlines. Graduate certificates also operate on rolling admission.

It should be noted that international students' deadlines may differ from these listings depending on regulations set by the Graduate School. A list of current application deadlines and requirements can be found here. You may view the current Graduate School admission requirements here.

**Admission Requirements**
Admission to the department follows the basic application requirements as specified above. Moreover, those seeking admission must comply with the Graduate School regulations. Incoming international students should check the Graduate School's website or contact an admissions officer in the Graduate School for additional requirements.

## Master of Science in Higher Education

The Master of Science in Higher Education (HIED) is a degree program with options of focus in Higher Education Policy and Student Services. The program serves those contemplating careers in higher education or already working in a college or university, as well as those interested in pursuing the study of higher education at the doctoral level.

**HIED Curriculum**
The program requires 31 hours of coursework to be completed. Courses required of all MSHE students include EPE 601: Proseminar (1 credit hour), EPE 612: Introduction to Higher Education, EPE 653: History of Higher Education, and EPE 676: Organization and Administration of Higher Education. The MSHE program plan also requires one research course, 9 credit hours in the Policy or Student Services emphasis, and 9 additional elective credits.

MSHE students who are in their final semester of coursework are required to take a two-part exam. Students learn about the exam during EPE 601: Proseminar and will receive more information about it during the final semester in which they are enrolled.

## Master of Science in Social & Philosophical Studies in Education

The Master of Science in Social and Philosophical Studies in Education (SPSE) works well as a foundation for doctoral study. When focused with an approved "topical major," the degree may also serve a variety of career and academic purposes. Students following this degree program may engage in the study of the history, sociology, philosophy, and comparative international analyses of education.

**SPSE Curriculum**
The program requires 31 hours of coursework to be completed. The only specific course that SPSE students are required to take is EPE 601: Proseminar (1 credit hour), but program students must take a minimum of 12 hours in their core area of study and at least 18 hours in a concentration of their choosing. Typically, students take at least one research course. Each SPSE student's program plan is highly individualized, as it is created according to their interests and with the guidance of their advisor. A student's program of study may vary from this structure if they receive approval from their major advisor.

SPSE students are required to write and be examined on a scholarly paper in order to graduate from the program. During their final semester, SPSE students will consult their major advisor and form a three-person committee before an examination is held.

## Master of Science in Research Methods in Education

The Master of Science in Research Methods in Education (RMinE) prepares students for careers in settings such as academic institutions, testing organizations, school districts, and state and federal agencies. It is designed to provide a foundation in basic research methods within a problem-of-practice framework while allowing students a focused area of emphasis on Quantitative Methods, Evaluation, or Research Design. RMinE students have the option to complete the entirety of their coursework online.

**RMinE Curriculum**
The program requires 37 hours of coursework, all of which is available online. Courses required of all MSHE students include EPE 601: Proseminar (1 credit hour) and 18 credit hours of core coursework. Each student will complete 18 hours in their chosen concentration. Each concentration has 6 hours of required courses and 12 hours of electives. Specific program plan listings can be found online at https://education.uky.edu/epe/rmine/plan-and-courses/. A student's program of study may vary from this structure if they receive approval from their major advisor.

At the end of the program, RMinE students are expected to be able to implement an evaluation, create and test an assessment, or design and conduct an advanced quantitative research study. RMinE students are required to write and be examined on a scholarly paper in order to graduate from the program. During their final semester, they will consult their major advisor and form a three-person committee before an examination is held.

## Doctor of Education in Educational Policies, Measurement, & Evaluation

The Ed.D. program in Educational Policy Studies, Measurement, and Evaluation (EPME) provides advanced study for those who seek careers in the administration or evaluation of educational programs in schools, colleges, or other institutional settings. Ed.D. candidates may pursue a variety of research interests including but not limited to institutional research and assessment, educational measurement and evaluation, P-12 educational policy issues, post-secondary education, comparative education, and community/continuing education issues.

The Ed.D. differs from the Ph.D. in SHED in focus and audience. Ed.D. students prepare to address live or emerging issues in education as scholarly practitioners. Ed.D. candidates are expected to have a broad knowledge of research methodologies as applied to specific educational contexts.

Admission to this program is offered regularly on UK's Lexington campus with an individualized, on-campus program of study. In addition, the department periodically offers the EPME with a focus on open-access post-secondary institutions via a statewide Ed.D. Cohort model that may continue as needed.

**EPME Curriculum**

The EPME requires completion of 43 credit hours of coursework (42 for members of the Ed.D. Cohort) and a two-part qualifying exam to qualify for doctoral candidacy. Before completing 18 credit hours, students constitute a four-person advisory committee in order to create an approved program of study and provide further guidance throughout their doctoral work. To graduate, EPME students must write a dissertation and defend it before their committee as part of their final exam.

In terms of course requirements, EPME students must take 1 hour of EPE 601: Proseminar, a minimum of 15 hours in a core area of concentration, at least 9 hours of research, and complete the rest of their hours in supporting coursework. Students are encouraged to take multiple courses in contextual studies in education and to take supporting coursework both inside and outside the College of Education. A student's program of study may vary from this structure with approval from their program committee. Ed.D. Cohort students' courses may follow a pattern predetermined by their cohort director.

## Graduate Certificates

The Department of Educational Policy Studies and Evaluation offers graduate certificates in International Education and Research Methods in Education (RMinE). These certificates are designed to provide students with formal recognition of the mastery of a clearly defined academic topic.

**Admission to Certificate Programs**

Certificate applicants are required to apply through the Graduate School's ApplyYourself portal. The general requirements for admission to a certificate curriculum are the same as those in effect for post-baccalaureate status. Students who already are or will be enrolled in a degree program, or those who simply apply for post-baccalaureate (non-degree) status with the Graduate School in order to complete the certificate, are eligible to apply for admission. A student should apply and be admitted to the certificate curriculum prior to completion of coursework for the certificate. For current admission requirements, visit the Graduate School's certificate webpage.

Additional requirements for admission to the Graduate Certificate in International Education are to submit letters of support and complete the certificate application form found online. A letter of support can come from a student's graduate advisor (for current graduate students), DGS (for new graduate students), or research supervisor (for post-doctoral students). Individuals who are non-degree-seeking, have already received their doctorate or other terminal degree, and/or who are enrolling at UK only for the certificate must submit two letters of recommendation. The Graduate Certificate in Research Methods in Education also requires its applicants to complete the Graduate Certificate in RMinE course plan found here.

## Graduate Certificate in International Education

The Graduate Certificate in International Education prepares graduate students for careers in international education, including but not limited to education abroad, international student services, and placement in other international organizations which support the exchange of students in higher education. Through elective courses appropriate to student interests, students will develop a regional area of cultural expertise and participate in at least one professional vocational experience with an emphasis on developing skills in evaluation/assessment, management, and program development.

The certificate curriculum combines 9 hours of core courses and 6 hours of elective coursework for a required total of 15 credit hours. Although the certificate does not require language coursework as part of the curriculum, participants must establish their language proficiency relative to their professional and regional concentration so that they are prepared to be effective and competitive in the field.

A student must have a minimum GPA of 3.0 in their certificate coursework in order to be awarded the Graduate Certificate in International Education. Award of the certificate requires formal admission to the certificate, as well as the approval of the course of study and certificate completion worksheets.

The Director of the Graduate Certificate in International Education is Dr. Beth Goldstein. She can be contacted at bethg@uky.edu and at (859) 257-2705.

## Graduate Certificate in Research Methods in Education

The Graduate Certificate in RMinE provides students with the ability to specialize in education research methods that can be applied to a host of disciplines, including social sciences, physical sciences, K-12 instruction/administration, and business. The certificate combines 12 hours of core courses and 3 hours of elective coursework for a required total of 15 credit hours.

A student must have a minimum GPA of 3.0 in their certificate coursework in order to be awarded the Graduate Certificate in RMinE. Award of the certificate requires formal admission to the certificate, as well as the approval of the course of study and certificate completion worksheets.

The Director of the Graduate Certificate in RMinE is Dr. Kelly Bradley. She can be contacted at kelly.bradley@uky.edu and at (859) 257-4923.

**Addtional Information**

For further information, contact the Director of Graduate Studies in the Department of Educational Policy Studies and Evaluation. You may also contact the department's administrative assistant in 145 Taylor Education Building at (859) 257-2626.

## Graduate Courses

| | | |
|---|---|---|
| EPE 520 | Program Evaluation | (3) |
| EPE 522 | Psychological And Educational Tests And Measurements | (3) |
| EPE 525 | Special Topics Seminar In Educational Policy Studies And Evaluation (Subtitle Required) | (3) |
| EPE 554 | Culture, Education And Teaching Abroad (Same As EDC 554) | (3) |
| EPE 555 | Comparative Education | (3) |
| EPE 557 | Gathering, Analyzing, And Using Educational Data (Same As EDP 557) | (3) |
| EPE 558 | Gathering, Analyzing, And Using Educational Data II (Same As EDP 558) | (3) |
| EPE 571 | Writing Seminar In Educational Research | (3) |
| EPE 600 | Social Foundations Topics For Secondary Education | (1) |
| EPE 601 | Proseminar | (1) |

| | | |
|---|---|---|
| EPE 602 | Social Policy Issues And Education | (1-3) |
| EPE 603 | Politics Of Educational Leadership (Same As EDL 704) | (3) |
| EPE 612 | Introduction To Higher Education | (3) |
| EPE 619 | Survey Research Methods In Education (Subtitle Required) | (3) |
| EPE 620 | Topics And Methods Of Evaluation (Same As EDP 620/ANT 620/SOC 622) | (3) |
| EPE 621 | Advanced Topics And Methods Of Evaluation (Same As EDP/ANT 621) | (3) |
| EPE 622 | College And University Faculty | (3) |
| EPE 628 | Ethics And Educational Decision Making | (3) |
| EPE 632 | Student Services | (3) |
| EPE 640 | Philosophy Of Education | (3) |
| EPE 650 | History Of Western Education | (3) |
| EPE 651 | History Of Education In The United States | (3) |
| EPE 652 | History Of Educational Thought | (3) |
| EPE 653 | History Of Higher Education | (3) |
| EPE 655 | Comparative Higher Education | (3) |
| EPE 660 | Research Design And Analysis In Education | (3) |
| EPE 661 | Sociology Of Education (Same As SOC 661) | (3) |
| EPE 663 | Field Studies In Educational Institutions | (3) |
| EPE 665 | Education And Culture | (3) |
| EPE 667 | Education And Gender | (3) |
| EPE 669 | Oral History | (3) |
| EPE 670 | Policy Issues In Higher Education | (3) |
| EPE 672 | College Teaching And Learning | (3) |
| EPE 674 | Theories Of Student Development | (3) |
| EPE 675 | Sociology Of Higher Education | (3) |
| EPE 676 | Organization And Administration Of Higher Education | (3) |
| EPE 678 | Economics Of Higher Education | (3) |
| EPE 679 | Introduction To Measurement Theory And Techniques (Same As EDP 679) | (3) |
| EPE 680 | Politics Of Higher Education | (3) |
| EPE 681 | History Of University Governance And Its Legal Context | (3) |
| EPE 682 | Higher Education And The Law | (3) |
| EPE 683 | Affirmative Action And Federal Regulation Of Higher Ed | (3) |
| EPE 684 | Higher Education And Athletics: A Historical Analysis | (3) |
| EPE 685 | The Research University | (3) |
| EPE 686 | Philanthropy And Higher Education | (3) |
| EPE 690 | The Community College | (3) |
| EPE 703 | Preparing Research Proposals | (3) |
| EPE 707 | Multivariate Analysis In Educational Research (Same As EDP 707) | (3) |
| EPE 711 | Advanced Quantitative Methods (Same As EDP 711) | (3-12) |
| EPE 712 | Advanced Psychometric Methods (Same As EDP 712) | (3) |
| EPE 763 | Advanced Field Studies | (3) |
| EPE 767 | Dissertation Residency Credit | (2) |
| EPE 773 | Seminar In Educational Policy Studies And Evaluation | (1-3) |
| EPE 778 | Seminar In History Of Education In Kentucky | (3) |
| EPE 785 | Independent Studies In Educational Policy Studies And Evaluation | (1-3) |
| EPE 790 | Internship In Educational Policy Studies And Evaluation | (1-6) |
| EPE 797 | Historical Research On Education | (3) |
| EPE 798 | Seminar In Higher Education | (3) |

# Educational Leadership Studies

## College of Education

The Department of Educational Leadership Studies offers programs leading to the Master of Education (M.Ed) degree, the Specialist in Education (Ed.S) degree, and the Doctor of Education (Ed.D) degree in Educational Leadership Studies. These programs are designed to prepare candidates for leadership positions in P-12 schools and other educational agencies or for the professorship in educational administration. The department has participated in a Cooperative Doctoral Program with four regional comprehensive universities and may continue as needed.

**Admission to Programs**
The Department of Educational Leadership Studies delivers its programs through cohorts that begin in the fall semester. Prospective students must complete two applications—one to the department, one to the UK Graduate School. Instructions and application forms are posted on the department's website. All applicants must submit to the department (a) official transcripts for all previous coursework completed at any institution of higher education and (b) official scores on all three sections of the Graduate Record Examination (GRE). All programs require students to have access to and use information technology. Deadline for application submission to any program is April 1.

## Master of Education

The Master of Education (MEd) in Educational Leadership Studies is a degree program with an option for certification as a school principal in Kentucky. The certification program requires 33 hours of coursework and leads to a letter of eligibility for the Instructional Leader, School Principalship, All Grades professional certificate. Students may achieve Rank II (initial master's degree) or Rank I (30 credit hours beyond initial master's degree) designations through this MEd program. Courses in the MEd program may require students to complete field-based assignments in schools or with the support of a practicing administrator.

**Admission Requirements**
Admission to the M.Ed. program follows the basic requirements of the Department of Educational Leadership Studies and the UK Graduate School as specified above. Those seeking admission to the M.Ed. tied to principal certification must meet the following additional requirements established by the Educational Professional Standards Board:

1. A cumulative 2.75 GPA on a 4.0 scale for all collegiate work;
2. Eligibility for a Kentucky classroom teaching certificate;
3. Successful completion of the Kentucky Teacher Internship Program (KTIP) or two years documented teaching experience outside Kentucky;
4. Successful completion of three years full-time teaching; and
5. Passing score on the national examination required for Kentucky teacher certification.

Program exit requirements for the M.Ed. include:

1. A cumulative 3.0 GPA on a 4.0 scale for coursework completed in the program;
2. Successful completion of the Level I and II portfolio reviews; and
3. Successful defense of the Level II portfolio or other capstone project during a formal oral examination.

Graduates of the M.Ed. program tied to principal certification must meet the following additional requirements before a letter of eligibility can be sent to the Educational Professional Standards Board:

1. Master's degree in education from an accredited institution;

2. Three years full-time teaching experience;
3. Successful completion of all program requirements; and
4. Passing scores on national and state tests as specified by the Kentucky Education Professional Standards Board.

## Specialist in Education

The Specialist in Education (Ed.S.) degree in Educational Leadership Studies offers a practice-oriented, academic program intended to serve two interrelated and complementary purposes:

1. To provide professional educators with an opportunity to develop specialized expertise in the area of educational leadership with a focus on school administration and instructional supervision; and
2. To provide those professional educators who desire it, a bridge from their master's-level academic work to doctoral-level study in a specialized area of educational administration and supervision.

**Ed.S. Curriculum**

The Ed.S. program is divided into two segments. The first consists of 33 credit hours of formal coursework that can be structured to meet the subject-matter requirements for Kentucky certification as a school principal, as an instructional supervisor, or as a district superintendent or to meet the professional development needs of the student. Many courses in the Ed.S. program require candidates to complete field-based assignments in schools, district offices, or other education-oriented settings.

The second segment of the EdS program requires the design, implementation, and submission of a formal written report of a field-based inquiry project. The research component of the Ed.S. program requires candidates to enroll in EDL 785 Independent Work in School Administration for at least 3 credit hours or for a maximum of 6 credit hours. EdS candidates must successfully defend their field-based inquiry project during a formal oral examination.

**Admission Requirements**

Admission to the EdS program requires a master's degree from an accredited institution of higher education and follows the basic requirements of the Department of Educational Leadership Studies and the UK Graduate School as specified above. Applicants who plan to apply EdS courses toward administrator certification (e.g., school principal, instructional supervisor) must meet all additional requirements imposed by the Kentucky Educational Professional Standards Board. Contact the Director of Graduate Studies in the Department of Education Leadership Studies for information about entry and exit requirements for the specific advanced certification sought.

## Doctor of Education

The Department of Educational Leadership Studies offers the Doctor of Education (EdD) with emphasis on preparing scholar-practitioners to assume leadership in diverse educational settings. Each student develops a program of study with three essential elements: (1) the core curriculum; (2) a program major emphasis; and (3) a research sequence. Program content and experiences integrate leadership theory and its application, learning organizations, educational improvement and innovation, educational technology, comparison of educational leadership practiced locally and internationally, economics of education, law and policy, research methods for educational leader, and leadership development of self and others.

**EdD Curriculum**

The EdD program consists of a minimum of 42 credit hours of graduate-level coursework and a minimum of 4 credit hours (two semesters) of EDL 767 Dissertation Residency Credit as required by the UK Graduate School. Students must remain enrolled in EDL 767 from the semester they sit for their Qualifying Examination through semester they defend their dissertation. Internships for graduate students can be arranged with public school systems and other educational agencies.

A limited number of graduate assistantships are available for EdD students. These involve up to 20 hours per week of service to the department or some other unit of the University, designed in such a way that the work contributes to the educational or leadership development of the student. A modest stipend is paid for this service. The University also provides some financial aid in the form of loans and fellowships.

**Admission Requirements**

Admission to the EdD program requires a master's degree from an accredited institution of higher education and follows the basic requirements of the Department of Educational Leadership Studies and the UK Graduate School as specified above. Applicants who plan to use courses for administrator certification (e.g., school principal, instructional supervisor, district administrator) as their major program emphasis must meet all additional requirements imposed by the Kentucky Educational Professional Standards Board. Applicants should contact the Director of Graduate Studies in the Department of Education Leadership Studies for information about entry and exit requirements for the specific advanced certification sought.

# Course Descriptions

EDL 601 INTRODUCTION TO SCHOOL LEADERSHIP AND ADMINISTRATION. (3)
Study of school leadership and administrative responsibilities, with emphases on understanding schools as complex organizations and facilitating leadership to create a work climate supportive of excellence in teaching and learning.

EDL 610 SCHOOL LEADERSHIP PRACTICUM I. (1)
Study and observation of the role and responsibilities of the school principal in practice. Practicum students are required to spend time at school site locations. Prereq: Twelve hours of program course work completed, or consent of instructor.

EDL 611 SCHOOL LEADERSHIP PRACTICUM II. (1)
Study and observation of the role and responsibilities of the school principal in practice. Practicum students are required to spend time at school site locations. Prereq: Twelve hours of program course work completed and EDL 610 completed, or consent of instructor.

EDL 612 SCHOOL LEADERSHIP PRACTICUM III. (1)
Study and observation of the role and responsibilities of the school principal in practice. Practicum students are required to spend time at school site locations. Prereq: Twelve hours of program course work completed and EDL 610, EDL 611 completed, or consent of instructor.

EDL 625 SCHOOL SAFETY AND DISCIPLINE LEADERSHIP. (3)
Study of processes and programs effective in promoting school wide safety and discipline. Emphasis on school connections to community security and resources. Prereq: Admission to Department Program or Consent of instructor.

EDL 627 SCHOOL FINANCE AND SUPPORT SERVICES. (3)
Study of concepts in school finance and school business management. Attention is given to national, state, and local issues. Emphasis is also given to school support services including transportation, facility planning and maintenance, food service, and risk management. Prereq: Program status or consent of instructor.

EDL 628 SCHOOL LAW AND ETHICS. (3)
Study of legal and ethical issues as related to practical problems of school administration. Constitutional provisions and court decisions are examined as they impact education. Prereq: Program status or consent of instructor.

EDL 631 LEADERSHIP FOR SCHOOL PROGRAM COLLABORATION. (3)
This course prepared school leaders to administer integrated instructional support programs in schools and districts. Attention is also given to leadership requirements needed to facilitate collaboration among school and community-based programs that provide and support student learning. Prereq: Program status or consent of instructor.

EDL 634 SECURING AND DEVELOPING SCHOOL STAFF. (3)
Study of human resources development practices in school systems, with emphases on central office and school unit responsibilities for attracting, selecting, developing, evaluating and retaining competent faculty and staff.

EDL 638 INSTRUCTIONAL COACHING AND MENTORING. (3)
This course explores multiple strategies for instructional coaching and mentoring and their relationship to educational leadership, school improvement, and student learning.

EDL 646 LEADERSHIP FOR SCHOOL-FAMILY COMMUNITY ENGAGEMENT. (3)
EDL 646 explores issues in administering integrated support programs in schools and districts serving specific student or community populations while increasing school and community collaboration. Prereq: Program status or consent of instructor.

EDL 661 SCHOOL TECHNOLOGY LEADERSHIP. (3)
This course provides an introduction to the study of school technology leadership with an emphasis on educational administrators developing a shared vision, planning, and promulgating policies and utilizing resources for the comprehensive integration of technology at the school, district, and state levels. Prereq: Admission to the program or consent of instructor.

EDL 662 LEADING FOR NEXT GENERATION LEARNING. (3)
This course focuses on the role of educational administrators in creating and sustaining a culture of learning that ensures all students have access to an academically rigorous, relevant, and engaging education through the use of appropriate digital technologies.

EDL 663 LEADERSHIP FOR SCHOOL PROGRAM IMPROVEMENT. (3)
This course addresses the role of the educational administrator in providing professional development that supports communities of practice and the adoption of contemporary technologies and digital resources to enhance student academic learning. The course introduces students to principles of adult learning that characterize effective professional development and planning as it relates to technology adoption at the school, district and state-levels of education.

EDL 664 ASSESSMENT LEADERSHIP. (3)
This course focuses on educational administrators' use of technology to support data-driven decision making to support continuous improvement and change at the school, district, and state levels of education. Prereq: Admission to the program or consent of instructor.

EDL 665 SCHOOL TECHNOLOGY LEADERSHIP FOR DIGITAL CITIZENSHIP. (3)
This course examines school administrators' social, ethical, and legal issues and responsibilities all students, including those with disabilities and special needs, for digital citizenship. Facilitating understanding of evolving virtual school environments and modeling digital citizenship at the school, district, and state levels are also addressed. Prereq: Admission to the program or consent of instructor.

EDL 669 LEADERSHIP FOR CREATIVE PROBLEM SOLVING. (3)
Study of diverse strategies and protocols used to identify authentic problems of practice in educational settings, diagnose potential options, determine innovation solutions, and assess impact by using diverse data sources.

EDL 676 THE SCHOOL SUPERINTENDENCY. (3)
Role of the school district superintendent is studied including: historical and current job responsibilities of the position; knowledge, skills and dispositions necessary to serve successfully in the position; future challenges of the position. Prereq: Admission to the program and consent of instructor.

EDL 677 SCHOOL SYSTEM ADMINISTRATION. (3)
Study of overall school district management and operations including administration of auxiliary services, federal programs, financial management, and human resources. Prereq: Admission to program or consent of instructor.

EDL 678 STRATEGIC MANAGEMENT IN EDUCATION. (3)
Study of strategic management procedure applications in school administration utilized at both the school district and individual school site levels. Prereq: Admission to program or consent of instructor.

EDL 679 SCHOOL SUPERINTENDENT PRACTICUM I. (1)
Study and observation of the role and responsibilities of the school superintendent in practice. Students are required to spend time in field settings. Prereq: Admission to school superintendency certificate program or consent of instructor.

EDL 680 SCHOOL SUPERINTENDENT PRACTICUM II. (1)
Study and observation of the role and responsibilities of the school superintendent in practice. Students are required to spend time in field settings. Prereq: Admission to school superintendency certificate program and completion of EDL 679 or consent of instructor.

EDL 681 SCHOOL SUPERINTENDENT PRACTICUM III. (1)
Study and observation of the role and responsibilities of the school superintendent in practice. Students are required to spend time in field settings. Prereq: Admission to school superintendency certificate program and completion of EDL 679 plus EDL 680, or consent of instructor.

EDL 682 LEADING DISTRICT CHANGE AND INNOVATION. (3)
This course focuses on understanding the role of the school district superintendent in leading system-wide change and innovation, educational reform in national, state and local contexts and change models and processes. Students will collaborate with a superintendent mentor in completing field-based, work-embedded assignments. Prereq: Admission to the Superintendent Certification Program or consent of the instructor.

EDL 694 LEADERSHIP IN CAREER AND TECHNICAL EDUCATION. (3)
A course designed for superintendents, high school principals, and other leaders. Its purpose is to prepare administrators and supervisors for leadership in career and technical education. (Same as CLD 694.)

EDL 700 KNOWLEDGE BASE FOR LEADERS. (3)
This course reviews the quest for a knowledge based in educational administration. It begins with a survey of the history of education and organizational thought in the United States, examining scientific management, human relations, bureaucracy, and the theory movement. The course also reviews more recent attempts to capture the knowledge base including the University Council of Educational Administration's article bank, PRIMIS, and the Standards for School Leaders from the Interstate School of Leadership Licensure Consortium. The course emphasizes epistemologies used to generate a knowledge base in educational administration tracing the evolution of thought and vocabulary within the profession. Prereq: Permission of instructor.

EDL 701 LEADERSHIP IN EDUCATIONAL ORGANIZATIONS. (3)
A study of leadership with particular emphasis on understanding the nature, defining characteristics, responsibilities, contextual determinants, and importance of leadership within educational organizations. Prereq: Admission to Department program or consent of instructor.

EDL 702 LEADERSHIP FOR ORGANIZATIONAL LEARNING. (3)
This course examines theories associated with organizational learning and change processes that can be used by leaders of 21st century educational systems. Theories are then used to examine prevailing practices within organizations and to inform the development of action plans appropriate for improved organizational performance. Prereq: Admission to Department program or consent of instructor.

EDL 703 LEADING ORGANIZATIONAL CHANGE. (3)
This course focuses on understanding the field of organizational change as well as emphasizing the nature, characteristics, responsibilities, and contextual determinants that influence a leader's role in changing educational organizations. Prereq: Admission to Department program or consent of instructor.

EDL 704 POLITICS OF EDUCATIONAL LEADERSHIP. (3)
This course provides a study of the political contexts in which educational leaders must operate. The course explores the roles of policy actors, institutions, ideologies, and competing interests, both internal and external to education institutions. The course places emphasis on the ways that race, class, and income factor into political decision making in education. Prereq: Graduate standing. (Same as EPE 603.)

EDL 705 INTERNATIONAL PERSPECTIVES ON EDUCATIONAL REFORM. (3)
The course focuses on international education reform, the function of schools in national social, economic and political development, as well as emerging perspectives on educational leadership and professional preparation. Prereq: Admission to a doctoral degree program at the University of Kentucky, completion of EPE 555, its equivalent, or consent of the instructor.

EDL 706 CONTEMPORARY SCHOOL LEADERSHIP. (3)
EDL 706 examines leadership and administrative responsibilities in contemporary P12 schools with emphasis on a principal's role in creating a learning-centered culture focused on student achievement and school excellence. Hybrid delivery that features face-to-face and online sessions. Prereq: Admission to EdD program or permission of instructor.

EDL 707 LEADERSHIP IN LEARNING-CENTERED SCHOOLS. (3)
EDL 707 examines theories associated with learning-centered leadership in P12 educational organizations with emphasis on the roles and responsibilities of principal in supervising and monitoring a school's instructional program, learning assessment, and evaluation and accountability processes to assure academic achievement by all students. Prereq: Admission to Ed.D. program or permission of instructor.

EDL 708 ORGANIZATIONAL LEARNING IN P12 SCHOOLS. (3)
EDL 708 examines theories associated with organizational learning and change processes that can be used by principals to create learningcentered schools. Students conduct disciplined inquiry within P12 schools to identify current practices and then develop action plans to improve school performance.

EDL 709 EVIDENCE-BASED DECISION MAKING. (3)
EDL 709 provides an overview of assumptions and procedures for systematic inquiry in educational settings and practice using diverse strategies to analyze data in order to make informed decisions about improving student learning and school performance. Hybrid delivery that features face-to-face and online sessions. Prereq: Current EdS degree-seeing student in principal preparation program or approval of course instructor.

EDL 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

EDL 751 FOUNDATIONS OF INQUIRY. (3)
Introductory study of assumptions and procedures of systematic inquiry used to investigate administrative, leadership and supervisory phenomena in education. Issues regarding quantitative, qualitative and mixed methods models of inquiry are included.

EDL 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

EDL 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

EDL 770 TOPICAL SEMINAR IN EDUCATIONAL LEADERSHIP. (1-3)
Advanced graduate students enroll in this topical seminar to enhance their portfolios for educational leadership through concentrated study of innovations in the specialized functions of leadership. These specializations include, but are not limited to, the study of curriculum and instructional leadership, educational law, personnel administration, school and community relations, education for diverse populations, budgeting and financing of schools. May be repeated to a maximum of nine credits. Prereq: Admission to program or consent of instructor.

EDL 771 SEMINAR IN LEADERSHIP. (1-3)
A variable topic seminar on selected problems in educational leadership. Activities are designed to improve skill in planning, data-informed decision making, organizing, communicating, evaluating, negotiating, and problem solving will be provided as appropriate. Educational innovations and processes of implementing change may be analyzed. May be repeated to a maximum of nine credits. Prereq: Admission to program or consent of instructor.

EDL 785 INDEPENDENT WORK IN EDUCATIONAL LEADERSHIP. (3)
Includes research on a practical problem in educational leadership. Open only to students with at least one semester of graduate work in education. May be repeated to a maximum of nine credits. Prereq: Consent of instructor.

EDL 792 RESEARCH IN EDUCATIONAL LEADERSHIP. (3)
Critical examination of representative research studies in leadership and related fields. Emphasis upon the students' defining and delimiting an appropriate problem in educational leadership, generating a design appropriate to the problem and selecting appropriate techniques of analysis. Prereq: Admission to program.

# Educational, School, & Counseling Psychology

## College of Education

The Department of Educational, School, and Counseling Psychology offers programs leading to the following degrees: Master of Science in Education (Plans A and B available), the Specialist in Education (Ed.S.), and the Doctor of Philosophy (Ph.D.). Applications to the Master of Arts in Education and the Doctor of Education (Ed.D.) degrees are no longer accepted. Students must apply for admission to both the Graduate School and to the Department. Doctoral applications must be completed by December 1 for summer/fall admission. All other degree applications have a deadline of January 15.

Within the degree programs offered, three specializations are possible: counseling psychology, educational psychology, and school psychology. Specializations are designed to provide students with both a background in behavioral and humanistic components of human learning and behavior, and the competencies to practice the skills designated for these programs. Admission to candidacy in any of these programs includes not only demonstrated skills in the academic area, but a judgment by the faculty of the program that the candidate demonstrates the personal and social characteristics, as well as the professional commitment and ethical standards requisite, for providing the services and demonstrating the skills associated with the program and the advanced degree.

For further information on specific program guidelines first garner information through the departmental website, http://education.uky.edu/EDP/ , and if clarification is needed, contact the Director of Graduate Studies in the Department of Educational, School, and Counseling Psychology.

## Master of Science in Education

The Master of Science in Education degree is offered by the Department for individuals who will not meet state licensure (Licensed Psychological Associate [LPA] or Licensed Professional Counselor [LPC]) requirements in counseling or school psychology immediately upon completion. Individuals who are interested in specializing in educational psychology, human development, measurement, or research in education may obtain this degree. The educational psychology program, planned in consultation with an advisor, is flexible and tailored to individual needs. It consists of 36 hours of course work (including a 3-hour paper) or 30 hours of course work plus a 6-hour thesis. The work completed for this degree with an emphasis in either counseling or school psychology is applicable toward licensure in either counseling or school psychology, respectively, but does not fulfill state certification requirements. In these areas no realistic thesis option is available. The counseling program prerequisites include psychological testing and abnormal psychology.

**Admission Requirements**

Applicants to the M.S. Ed. Degree program leading to certification in school psychology must possess an undergraduate degree in psychology, education, or a closely allied field (e.g., rehabilitation counseling or pediatric nursing). Applicants to the M.S. Ed. Degree program leading to counseling psychology licensure may apply with any undergraduate degree, but an undergraduate degree in psychology, education, or a closely allied field will facilitate movement through the program. Students are selected for these programs based on their undergraduate grade point average, Graduate Record Examination scores, letters of recommendation, a personal statement describing their selection of a career in school or counseling

psychology, a writing sample, and, in the case of school psychology, a personal interview. These data provide information regarding student diversity, interests, and prior academic accomplishments in relation to program goals. The program faculty uses the Graduate School minimum requirements for undergraduate grade point average for admissions eligibility.

## Specialist in Education

The Educational Specialist degree is offered in the areas of educational psychology, counseling psychology, and school psychology. Programs follow the general guidelines of the College of Education as specified earlier (see Advanced Degrees). The program includes the Master of Science in Education degree program plus a full-time one-semester internship and additional course work. This program leads to permission to sit for the State Board of Psychology Certification Examination in Counseling Psychology as a Licensed Psychological Associate (LPA) or the Certification Examination for the Licensed Professional Counselor (LPC). The requirements for the State Board of Education certification in School Psychology include the work for the Master of Science in Education degree plus the additional Educational Specialist degree requirements.

**Admission Requirements**

Applicants to the Ed. S. degree program leading to certification in school psychology must possess a master's degree in psychology, education or a closely allied field (e.g., rehabilitation counseling or pediatric nursing). Applicants to the Ed. S. degree program leading to licensure in counseling psychology must possess a master's degree in counseling psychology. Students who did not complete the M.S. Ed. programs in school psychology or counseling psychology will likely need to complete additional requirements to replace required course work from the M.S. Ed. programs. Students are selected for the Ed.S. program based on their undergraduate and prior graduate grade point average, Graduate Record Examination scores, letters of recommendation, a personal statement describing their selection of a career in school psychology, a writing sample, and a personal interview. These data provide information regarding student diversity, interests, and prior academic accomplishments in relation to program goals. The program faculty uses the Graduate School minimum requirements for undergraduate and graduate grade point average for admissions eligibility.

## Doctor of Philosophy

The Ph.D. program is offered in the specialty areas of counseling psychology, educational psychology, and school psychology under one departmental program. The Doctor of Philosophy programs in Counseling Psychology and in School Psychology are accredited by the American Psychological Association through its Office of Program Consultation and Accreditation (750 First Street, NE, Washington, DC 20002-4242, phone: 202.336.5500). A full-time, supervised one-year internship is required for both areas. Various concentrations are possible within the Ph.D. program. Representative of these are: (a) learning, cognition, and curriculum design; (b) human development and social processes; (c) counseling psychology; (d) measurement, evaluation and research design; and (e) school psychology.

**Admissions Requirements**

Applicants to the Ph.D. Degree program in school psychology must possess an undergraduate degree in psychology, education or a closely allied field (e.g., rehabilitation counseling or pediatric nursing). Applicants to the Ph.D. Degree program leading to counseling psychology licensure may apply with any undergraduate degree, but an undergraduate degree in psychology, education, or a closely allied field will facilitate movement through the program. Students with prior graduate work at the masters or specialist degree will also be considered for admission to advanced graduate status and, in the case of counseling psychology, are preferred. Students are selected for this program based on their undergraduate and prior graduate grade point average, Graduate Record Examination scores, letters of recommendation, personal statements describing their selection of a career in their chosen areas, writing samples, and personal

interviews. These data provide information regarding student diversity, interests, and prior academic accomplishments in relation to program goals. The program faculty uses the Graduate School minimum requirements for undergraduate grade point average for admissions eligibility.

## Course Descriptions

EDP 513 SOCIAL ASPECTS OF BEHAVIOR. (3)
This course is designed to meet the needs of undergraduate and graduate students in the College of Education for a course in theory and principles of social psychology. The course will cover the basic concepts and theories in social psychology. The theories of attitude formation, group dynamics, and biases will be surveyed, with an application to the professional fields of psychology. In addition to the theories and principles of social psychology, research paradigms, social change, social influence, system consultation, and community issues as they relate to social psychological considerations will be addressed. Undergraduate-level prereq: One course in psychology or consent of instructor. Graduate-level prereq: None.

EDP 518 CONTEMPORARY TOPICS IN UNIVERSITY RESIDENTIAL LIVING. (3)
An exploration of topic areas such as conflict mediation, crisis management, communication skills, student development theories, and wellness designed to provide new Resident Life Advisors with the skills and knowledge essential for being successful. Prereq: PSY 100, PSY 215, or EDP 202 and must be a Residence Life Advisor.

EDP 520 PROGRAM EVALUATION. (3)
This course is an application-focused course that provides an overview of program evaluation. This course will cover the types of evaluation, the theory associated with evaluation, and the tools most commonly applied to the evaluation process. Students will develop
an appreciation for the flexibility needed in order to perform evaluation tasks in practical situations related to their area of expertise. (Same as EPE 520/KHP 520.)

EDP 522 PSYCHOLOGICAL AND EDUCATIONAL TESTS AND MEASUREMENTS. (3)
Problems of measurement with emphasis on standardized tests. General principles of test construction and evaluation, for standardized assessments and/or teacher-made tests, examinations, criteria for evaluation and marking and other rating systems. (Same as EDC/EPE522.)
EDP 545 PSYCHOLOGY OF THE BLACK EXPERIENCE. (3)
EDP 545, Psychology of the Black Experience, is an elective course in the Department of Educational, School, and Counseling Psychology and is cross-listed with the Africana Studies program and Psychology department. It is designed to offer enrolled undergraduate and graduate students opportunities to survey, explore, and critique classic and contemporary theories and research articulating the psychologies that inform both social and academic experiences and observed behaviors of Black people. While there are multiple objectives for this upper-level undergraduate and graduate-level seminar course, one central objective for the course is to expose all students to literature and research pertaining to the Black experience in the United States in an effort to develop and refine ideas and mindsets that will foster and reflect innovate ways of thinking about how to enhance the life experiences of Black persons. That is, in the course, the primary objective is to have the course material and critical discourse influence your thinking about and actions towards or on behalf of Black persons. Prereq: PSY 100 or AAS 200 or consent of the instructor. (Same as AAS 545.)

EDP 548 EDUCATIONAL PSYCHOLOGY. (3)
An introduction to the application of principles of psychology to classroom learning and teaching problems.

EDP 557 GATHERING, ANALYZING, AND USING EDUCATIONAL DATA. (3)
This course is rooted in the conceptual understanding of statistics and covers applications of statistical and graphical methods for educational and evaluation data. Basic descriptive statistics, correlation, normal distributions and hypothesis testing will be covered. An emphasis is placed on exploratory data analysis and interpretation of results within the broad contexts of education and evaluation. Statistical literacy exercises will be used for comprehension and application of materials. In addition, applications of statistical software will be demonstrated. Prereq: MA 109 or equivalent; undergraduate (with permission) or graduate status in the College of Education; or consent of the instructor. (Same as EPE 557.)

EDP 558 GATHERING, ANALYZING, AND USING EDUCATIONAL DATA II. (3)
The course covers applications of statistical and graphical methods for educational and evaluation data. Topics to be covered include descriptive statistics, correlation, normal distributions, hypothesis testing, regression, ANOVA, and power. General goals include: developing an understanding of statistical concepts, improving reasoning and critical thinking skills, and to prepare for more advanced quantitative courses. Students will gain valuable statistical computing skills via stats Software. Prereq: EDP/EPE 557 or equivalent. (Same as EPE 558.)

EDP 570 INTRODUCTION TO PSYCHOLOGICAL SERVICES IN SCHOOLS. (3)
A review of the historical development and models of organization and administration in the field of school psychology and the relationship between school psychology and other educational and psychological specialties. Prereq: Admission to School Psychology Program or consent of instructor.

EDP 600 LIFE SPAN OF HUMAN DEVELOPMENT AND BEHAVIOR. (3)
This course is designed to meet the needs of graduate students in the College of Education for a course in theory and principles of developmental theories of individuals across the lifespan. Lifespan developmental psychology is a study of how and why people change over time as well as how and why they remain the same from conception through the aging process. The course is described through three perspectives: physical, cognitive, and psychosocial. Emphasis will be on the major transitions from infancy through young adulthood in the physical, cognitive, social, moral and emotional domains. The impact of ethnic, gender, and cultural factors on development will also be examined.

EDP 603 HUMAN COGNITIVE DEVELOPMENT. (3)
Theory and research concerning the development of attitudes, motives, self-concept and other cognitive processes are presented and the educational implications explored. Prereq: EDP 548 or EDP 610 or EDP 600.

EDP 604 LIFESPAN GENDER DEVELOPMENT. (3)
An in-depth examination of theory, research, and personal attitudes concerning gender development over the lifespan. Interaction of gender with effective personal functioning in family, educational, and work-related settings. Prereq: EDP 600 and 601 or equivalent.

EDP 605 INTRODUCTION TO COUNSELING: TECHNIQUES I. (3)
A survey of counseling psychology, philosophy, procedures and practices. Consideration of the roles of the counselor in relation to counseling services in the community and educational settings. In-depth training in initial counseling skills, interviewing (listening) and relationship building skills. Prereq: Acceptance to the graduate program in counseling psychology with the following major codes: RECO, ECGO, CPEC, ECPY, ECPC, CNPS, ESPP, ESPY, ECPP, or consent of instructor via permit.

EDP 606 COUNSELING PSYCHOLOGY PROFESSIONAL IDENTITY, ISSUES, AND RESEARCH

METHODS. (3)
Foundational doctoral seminar in counseling psychology. Addresses professional identity, historical perspectives, training issues, and current issues in counseling psychology. Provides an introduction to counseling psychology research methodology related to evidencebased practice. Prereq: Enrollment in the doctoral program in counseling psychology.

EDP 610 THEORIES OF LEARNING IN EDUCATION. (3)
Consideration of the theoretical origins of learning within the context of education. Topics include major theories of learning, physiological bases for learning, relationships between learning theory and instruction, and major applications of learning theories in educational settings.

EDP 614 MOTIVATION AND LEARNING. (3)
This course will provide a review of current educational and psychological theories of motivation. After examining various theories (e.g., attributions, goals, self efficacy, expectancy X value), the course will examine applications of these theories to contemporary issues such as violence, substance abuse, dropping out of school, health maintenance, etc.

EDP 615 PROSEMINAR IN HISTORY AND SYSTEMS OF PSYCHOLOGY. (3)
A study of the philosophical precursors and scientific traditions of psychology. The schools of 19th and 20th century psychology are surveyed as are the major theoretical positions and content areas of contemporary psychology. Prereq: Graduate standing in department of Psychology or department of Educational and Counseling Psychology. (Same as PSY 620.)

EDP 616 MULTICULTURAL PSYCHOLOGY. (3)
This course is designed to increase one's sensitivity to and respect for individual differences. Models, frameworks, techniques and experiential exercises are presented to increase one's skill level in working with persons from racially and ethnically diverse backgrounds. Prereq: EDP 600 or equivalent or consent of instructor. (Same as AAS 616.)

EDP 620 TOPICS AND METHODS OF EVALUATION. (3)
An examination of a subset of evaluation methods, topics, and problems. An introductory course in the area with minimal emphasis on
quantitative methods. The course is designed to: provide a perspective from which evaluation studies may be viewed; and, to provide experiences for those who will learn from or conduct evaluations. Prereq: Consent of instructor, and a basic course in statistics or research. (Same as ANT/EPE 620/SOC 622.)

EDP 621 ADVANCED TOPICS AND METHODS OF EVALUATION. (3)
An advanced course in evaluation methods and techniques with an emphasis on quantitative methodology. State of the art ideas and methods of conducting evaluation studies and analyzing data from those studies are presented. The course is designed primarily for those who are conducting or will conduct evaluation studies. Prereq: A basic course in statistics or its equivalent; EDP/EPE/ANT 620; and consent of instructor. (Same as ANT/EPE 621.)

EDP 622 SUPERVISION IN SCHOOL PSYCHOLOGY (Subtitle required). (1)
The objectives of this seminar include 1.) Students will be able to demonstrate knowledge of supervision models and practice, 2.) Students will be able to identify and articulate a personal supervision model, 3.) Students will be able to apply their personal supervision model, and 4.) Students will be able to identify areas of growth and areas in need of improvement with respect to their professional supervision skills. Students will work with second year school psychology students as "Supervisors in Training" to build their knowledge and skill-based competencies in supervision. Prereq: Enrollment in PHD program in School

Psychology.

EDP 630 PRINCIPLES OF PSYCHOLOGICAL ASSESSMENT. (3)
An overview of the principles and methods of psychological assessment including observational methods, interviewing, behavioral analysis, and standardized psychological testing as a means of arriving at a comprehensive individual analysis and of creating a treatment plan for both children and adults. Students develop skills in selection and evaluation of psychological tests (personality, interests, and aptitudes), integration of multi-modal assessment methods, and report writing. Prereq: Acceptance to the graduate programs in Educational and Counseling Psychology with the following major codes: CPEC, ECPY, ECPC, CNPS, ECPP, ECPE, EEPS, ESPY, ECPS, ESPP or consent of the instructor via permit.

EDP 640 INDIVIDUAL ASSESSMENT OF COGNITIVE FUNCTIONING. (3)
This course provides theoretical material and advanced laboratory practice in the measurement of intelligence by individual techniques. Lecture, two hours; laboratory, two hours. May be repeated to a maximum of six credits. Prereq: PSY 535 (with a grade of "B" or better) or equivalent, enrollment in a professional program in Educational, School, and Counseling Psychology or consent of instructor.

EDP 642 INDIVIDUAL ASSESSMENT OF PERSONALITY FUNCTIONING. (3)
An in-depth study of the nature and measurement of human emotion, temperament and personality. Laboratory and field experience in the administration, scoring, and interpretation of tests related to personality functioning and underlying dynamics of personality. May be repeated to a maximum of six credits. Prereq: Successful completion of PSY 535 (or equivalent) with a grade of "B" or better and enrollment in a professional program in Educational, School, and Counseling Psychology.

EDP 649 GROUP COUNSELING. (3)
An overview of the theoretical bases and practical procedures used in the organization, and effective use of group counseling in the facilitation of psychological and educational goals. Prereq: EDP 605, EDP 652 and EDP 661 (all with grades of "B" or better), or consent of instructor.

EDP 650 DIAGNOSIS AND PSYCHOPATHOLOGY IN COUNSELING PSYCHOLOGY. (3)
An integrative seminar in diagnosis and application of theories, techniques and assessment tools in Counseling Psychology. Special consideration of classification of psychological states and characteristics including DSM-IV temperament, analysis, and other research methods of integrating assessment and treatment alternatives. Prereq: PSY 535 or equivalent, EDP 652, and EDP 661 (all with a "B" or better) and admission to a program in Educational, School, and Counseling Psychology or consent of the instructor.

EDP 652 THEORIES OF COUNSELING. (3)
A survey of theories and methods in facilitating personality growth, character maturation, problem solving, decision making, crisis resolutions, and behavior change, through individual and group counseling. Prereq: Acceptance to a graduate program in EDP with the following major codes: EGCO, CPEC, ECPY, ECPC, ESPP, ECPS, ECPE, EEPS, CNPS, EDPS, or consent of instructor via permit.

EDP 656 RESEARCH METHODS. (3)
An introduction to research methods applicable to education, the scientific method, research designs, measurement techniques, statistical analysis, and writing the research report. Prereq: EDP/EPE 557, EDP/EPE 558, or equivalent, but preferred EDP/EPE 558.

EDP 657 MAJOR THEORIES IN LEARNING IN SECONDARY EDUCATION. (1)
This course will provide an overview of some of the major theories of human learning as they relate to

formal education and schooling. We will attempt to examine such theories of human learning while paying close attention to the roles that philosophy, history, the humanities, the natural sciences, and psychology have played in their development. Also, throughout the course, we shall attempt to explore current topics in the formal educational experiences of elementary, secondary and postsecondary students in order to link such theories to known educational practice. Finally, in the interest of advancing the current learning theories, we will offer critical evaluations of the presented learning theories and use these in the development of our own ideas, conceptualizations and theoretical developments regarding human learning. Prereq: Admission to the M.A. in Education (Secondary Education with initial certification option).

EDP 658 PROBLEMS IN EDUCATIONAL PSYCHOLOGY. (1-3)
Special topics in psychological theories and research applicable to educational practices. May be repeated to a maximum of six credits.

EDP 660 RESEARCH DESIGN AND ANALYSIS IN EDUCATION. (3)
This is a statistics-oriented course that focuses on various aspects of regression analysis (general and generalized linear models). Topics to be covered include, but are not limited to, simple correlation and regression, multiple regression (with and without interaction/moderation terms, with/without nonlinear terms, contrast variable coding for categorical predictors, nested model comparison for hierarchical regression, etc.), regression diagnostics (outlying and influential cases identification and assessment, collinearity evaluation, residual analysis, etc.), logistic regression (with a comparison of the logit model with other commonly used classification models like probit model, decision tree model, etc.), among other things. The course will familiarize students with cleaning data for regression analysis, building regression models, conducting statistical inference of regression models, selecting the optimal regression model(s) for the data in hand, and interpreting regression analysis results using the right language. Students will gain requisite foundation knowledge necessary to learn more complex statistical tests and procedures, and become more critical of statistical presentations in academic journals and the mass media. Students will also become proficient in using at least one major statistics computer program (SPSS, Minitab, SAS, Stata, or R). Prereq: EPE/EDP 558 or consent of instructor. (Same as EPE 660.)

EDP 661 TECHNIQUES OF COUNSELING II. (3)
Practice in interviewing, simulated problems, observational techniques, role of the counselor. Study of films, tapes and transcripts of leading practitioners of several schools of counseling. Supervised practice with selected clients. Lecture, two hours; laboratory, two hours. Prereq: EDP 652, PSY 535 (both with a grade of "B" or better), and consent of instructor.

EDP 662 DOCTORAL PRE-PRACTICUM SEMINAR. (1)
Preparation for UK Counseling Center Doctoral Level practicum will include starting to develop an integrative understanding of theory, assessment, ethics, and practice as it relates to effective work with university students. The course introduces the application of traditional individual and group psychotherapy and the provision of effective outreach and consultation on a university campus. Lecture, one hour, fifteen minutes. Prereq: Approval for doctoral-level practicum at UK Counseling & Testing Center.

EDP 664 PRE-MASTERS PRACTICUM IN COUNSELING PSYCHOLOGY. (3-6)
Supervised experience in application of diagnostic and interviewing techniques in a counseling service. May be repeated to a maximum of 12 credits. Lecture, three hours; laboratory, eight hours per three credit hours. Prereq: All required counseling coursework. EDP 605, PSY 535 or equivalent, EDP 652, EDP 688, and EDP 661 (minimum competency courses with grades of "B" or better), application for practicum the semester prior to practicum placement and permission of CPAC.

EDP 665 POST-MASTERS PRACTICUM IN COUNSELING PSYCHOLOGY. (1-6)
Supervised experience in application of diagnostic and interviewing techniques in a counseling service. Prereq: PSY 535 or equivalent, EDP 605, EDP 652, EDP 661, EDP 649, and EDP 688 or equivalent (all with grades of "B" or better). Application for practicum the semester prior to practicum placement and permission of CPAC.

EDP 666 PSYCHOLOGY OF CAREER COUNSELING. (3)
A survey of theories and methods used in Career Counseling. Contemporary approaches to career counseling are studied within developmental and decision-making frameworks. Prereq: EDP 652 and PSY 535 or equivalent (both with a grade of "B" or better).

EDP 669 DIAGNOSTIC CLASSIFICATION IN SCHOOL PSYCHOLOGY. (3)
Review of theory and research related to individual differences in physical, intellectual, social, and emotional development of preschool and school-aged children and adolescents. Compares psychological and educational approaches to diagnostic classification of such differences. Prereq: PSY 533 or consent of instructor.

EDP 670 PSYCHOEDUCATIONAL STRATEGIES OF INTERVENTION. (3)
A general review of and development of basic competence in the major intervention strategies applicable to the amelioration of children's common learning and adjustment difficulties in the school setting. Prereq: EDP 640, EDP 669 and Admission to School Psychology Program.

EDP 671 SEMINAR IN PSYCHOEDUCATIONAL CONSULTATION IN SCHOOLS. (3)
A study of the rationale and techniques used in consultation with teachers, parents, administrators and other school personnel for the purpose of both preventing and alleviating the learning and adjustment difficulties of individual or groups of school-aged children. Prereq: Admission to School Psychology Program, advanced standing in a professional educational program or permission of the instructor.

EDP 674 SCHOOL-BASED PRACTICUM IN SCHOOL PSYCHOLOGY. (1-6)
Supervised experience in the application of psychoeducational, diagnostic assessment, intervention, and consultation services in a school setting. Requires minimum three hours of on-site activities per credit hour. Students will have a primary supervisor at their school site. Students will attend class meetings in a didactic format. Students will have a university supervisor who will serve as a secondary supervisor and communicate and coordinate on-going communication with the school-based supervisor. May be repeated to a maximum of 18 credits. Prereq: Admission to the School Psychology Program and consent of instructor.

EDP 675 PRACTICUM IN SCHOOL PSYCHOLOGY. (1-6)
Supervised experience in the application of psychoeducational, diagnostic assessment, intervention, and consultation services in a clinic, school, or community setting. Requires three hours of on-site activities per credit hour and weekly supervision meetings. May be repeated to a maximum of 18 credits. Prereq: Admission to the School Psychology Program and consent of instructor.

EDP 679 INTRODUCTION TO MEASUREMENT THEORY AND TECHNIQUES. (3)
This is a measurement-oriented course that focuses on introducing measurement theory and techniques used in education and evaluation. Topics to be covered include, but are not limited to, measurement models, bivariate measures of association, norms, standardized score scales, scaling, reliability, validity, item analysis, factor analysis, confirmatory factor analysis, test construction for affective and cognitive

instruments, Item Response Theory, and Rasch. The course aims to familiarize students with measurement terminology, possess a detailed strategy for constructing an instrument suitable for research purposes, become familiar with statistical procedures and software for implementing measurement techniques, gain requisite foundation of knowledge necessary to learn more complex measurement models, and become more critical of measurement presentations in academic journals and the mass media. Prereq: EDP/EPE 660, EPE 621, or equivalent. (Same as EPE 679.)

EDP 680 PARENT AND CHILD COUNSELING. (3)
Theories, methods, and techniques of counseling psychology as applied to planned interventions with parents and their children. Contemporary approaches to family and child dysfunctioning are studied within a framework of human development; applied practice utilizing simulated problems. Prereq: EDP 652 and EDP 661 (both with a grade of "B" or better) or consent of instructor.

EDP 683 TOPICS IN COUNSELING PSYCHOLOGY. (1-3)
Counseling for special problems with special methods. Topics may vary from semester to semester. Seminar, one-three hours per week. May be repeated to a maximum of 12 credits. Prereq or coreq: EDP 652 and consent of instructor.

EDP 685 ISSUES AND TECHNIQUES IN THE COUNSELING OF WOMEN. (3)
The course is designed to improve students' knowledge of the special counseling needs of women and to facilitate students' development of highly skilled techniques for counseling with women. Skill and knowledge areas include such topics as rape, spouse abuse, mastectomy, career, assertiveness, single parenting, and sex discrimination. Prereq: EDP 652 and EDP 661 (both with a grade of "B" or better) or corequisite EDP 604 or consent of instructor.

EDP 686 THEORY AND METHODS IN MARRIAGE AND FAMILY THERAPY. (3)
A survey of theories and methods used in marriage and family therapy. Designed to provide students with a knowledge of the theoretical bases for marriage and family therapy, including an introduction to procedures used to assess, diagnose and treat marriage and family dysfunctions. Prereq: Consent of instructor and EDP 661 (with a grade of "B" or better).
EDP 688 ETHICAL AND LEGAL ISSUES IN PSYCHOLOGY. (3)
This course is designed to educate students about ethical and legal issues related to the practice of psychology. An emphasis is placed on learning the current APA ethical code of conduct, mental health laws, and ethical decision-making models. Prereq: EDP 605 and 661, or consent of the instructor.

EDP 703 SEMINAR IN CLINICAL SUPERVISION AND CONSULTATION. (1-3)
An advanced seminar covering theories, issues, methods and techniques used in supervision of counseling and psychotherapy and in consultation with groups and organizations. Seminar topics will vary depending on the interests of the professor and students. May be repeated to a maximum of six credits. Prereq: EDP 652, EDP 661, and EDP 665 or equivalent.

EDP 704 SOCIAL JUSTICE CONSULTATION AND EVALUATION. (3)
This course focuses on theoretically grounded social justice consultation and evaluation in counseling psychology. The purpose of this course is to help students develop beginning competencies in social justice consultation, advocacy, and program evaluation as counseling psychologists. Doctoral students in counseling psychology will practice beginning skills in interprofessional collaboration and community partnership. Prereq: Students can enroll once they have completed the first year of the counseling psychology doctoral program.

EDP 707 MULTIVARIATE ANALYSIS IN EDUCATIONAL RESEARCH. (3)

Multivariate statistics will prepare student to understand multivariate statistical methods and draw the link between statistics previously learned. Students will be able to conduct, interpret, and critique procedures such as factorial ANOVA, multiple regression, MANOVA, ANCOVA, MANCOVA, PCA, EFA, discriminant function analysis, logistic regression, canonical correlation, hierarchal linear regression, and multivariate analysis of change. Become familiar with statistical software for implementing multivariate procedures. Develop an understanding of the concepts, terms, and symbols used in multivariate statistics (e.g., Matrix Algebra, effect sizes). Gain an appreciation of the role of multivariate procedures in the research process. Gain requisite knowledge necessary to learn more complex statistical procedures. Prereq: EDP/EPE 660 or equivalent. (Same as EPE 707.)

EDP 708 INTERNSHIP IN EDUCATIONAL, SCHOOL, AND COUNSELING PSYCHOLOGY. (0-9)
Full-time practice in an operational setting such as a school or government agency, with on-site supervision provided by the host agency and with academic supervision provided by a University faculty member. Practicum: full-time field experience. May be repeated to a maximum of 12 credits. Prereq: Completion of a minimum of one year of graduate study in the department and consent of instructor.

EDP 711 ADVANCED QUANTITATIVE METHODS (Subtitle required). (3-12)
This course will provide students with an overview of the theory and applications of advanced quantitative methods. A quantitative research method focuses on advanced quantitative methodologies used in methodologically-oriented studies in educational research, evaluation, and statistics. The goal of this course is to prepare students to analyze data using advanced quantitative methods. It covers topics in the areas of multilevel modeling, data mining, missing data, categorical data analysis, meta-analysis, and longitudinal data analysis. Other specific analysis techniques may also be explored. Given the advanced nature of the course, we will not shy away from using the mathematical tools needed to develop the conceptual understanding. But the emphasis of the course will be on the conceptual understanding and application of the tools rather than on the math or the mechanics behind the tools. This course can be repeated for up to 12 credit hours. Prereq: Intermediate Statistics. (Same as EPE 711).

EDP 712 ADVANCED PSYCHOMETRIC METHODS (Subtitle required). (3-12)
This course will provide students with an overview of the theory and applications of advanced psychometric methods. A psychometric method focuses on advanced psychometric methodologies used in methodologically-oriented studies in educational measurement and evaluation techniques. The goal of this course is to prepare students to analyze data using advanced psychometric methods. It covers topics in the areas of Rasch Modeling, Item Response Theory, Structural Equation Modeling, Advanced Survey Techniques, and Latent Variable Modeling (as well as additional techniques). Given the advanced nature of the course, we will not shy away from using the mathematical tools needed to develop the conceptual understanding. But the emphasis of the course will be on the conceptual understanding and application of the tools rather than on the math or the mechanics behind the tools. This course can be repeated for up to 12 credit hours. Prereq: Intermediate Statistics. (Same as EPE 712.)

EDP 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

EDP 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

EDP 765 DOCTORAL RESEARCH SEMINAR. (1)
This seminar provides structure for working with faculty advisors and peer colleagues to cultivate the research skills needed to create new knowledge related to research questions that are important to the field of counseling psychology and to the mission of social justice. Prereq: Enrollment in the counseling psychology graduate program and permission of the instructor.

EDP 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

EDP 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

EDP 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

EDP 770 LEGAL ETHICAL PSYCHOLOGY. (3)
The goal of this course is to provide students with knowledge of ethics and law that pertain to the theory, research, and practice of school psychology. This course will provide experiential and problem-based learning in the area of professional standards and ethics for the field of school psychology. Professional standards and ethics will be drawn from the codes of the American Psychological Association, the National Association of School Psychologists, and the Association of State and Provincial Psychology Boards. Students will translate ethical principles and standards into guidelines for decision making and practice. Prereq: Admission to School Psychology graduate program or permission of instructor.

EDP 776 SEMINAR IN SCHOOL PSYCHOLOGY (Subtitle required). (3)
Topical consideration of philosophical, technical, professional and theoretical positions in school psychology theory and practice. May be repeated to a maximum of nine credits under different subtitles. Prereq: Graduate standing in School Psychology or consent of instructor.

EDP 777 SEMINAR IN COUNSELING PSYCHOLOGY. (1-3)
Topical consideration of philosophical, technical and theoretical positions in counseling theory and practice. May be repeated to a maximum of six credits. Prereq: Consent of instructor.

EDP 778 SEMINAR IN EDUCATIONAL PSYCHOLOGY (Subtitle required). (3)
Intensive study of selected topics in human learning and development. Particular emphasis on research topics. Students will design sample studies in their areas of interest. May be repeated to a maximum of nine credits under different subtitles. Prereq: Doctoral standing in the College of Education or consent of instructor.

EDP 782 INDEPENDENT STUDY IN EDUCATIONAL PSYCHOLOGY. (1-3)
Independent study course for advanced graduate students who desire to investigate special problems and conduct research in educational psychology. May be repeated to a maximum of 12 credits. Prereq: One year of graduate work in educational psychology and consent of instructor.

# Education Sciences

## College of Education

The Interdisciplinary Ph.D. in Education Sciences (major code: EDSC) program is designed for individuals seeking careers in educational research. Graduates of the program are prepared to meet the growing national need for educators who are well trained in methodological issues in education research. This Ph.D. program prepares individuals who will have careers in research universities, educational research labs and corporations, and research groups within education agencies.

All EDSC students will be encouraged to apply for 20-hour per week research assistantships on grant-supported projects in the College of Education and other units at the University of Kentucky. In addition to coursework, students will be expected to attend local, state, or national professional conferences during the first and second years of their programs. All students will be expected to present their research at professional conferences by their third year in the program. EDSC doctoral students are expected to submit manuscripts to professional journals and accomplish refereed publications during their doctoral study. Presentations and publications may be scholarly works with a single author or groups of co-authors.

**Curriculum**
EDSC is a rigorous doctoral program that requires year-round, full-time study. Students are encouraged to apply for admission for the Fall semester. Students seeking Spring admission should contact the program DGS to determine if the strand they are interested in allows for Spring admissions. Students will be required to complete a set of core courses in research methods and education policy; in addition, students will then be able to follow a particular "strand" of courses in an area of specialization. All students will be involved in educational research projects throughout their time in the program.

EDSC doctoral students will be required to designate at the time of application the strand that they would like to complete. These include advanced concentrations in the areas of:

- Curriculum and instruction
- Educational leadership
- Educational policy studies: Educational evaluation and policy
- Educational policy studies: Philosophical and cultural inquiry
- Health education
- Interdisciplinary early childhood education
- Physical education
- Rehabilitation counseling
- Special education
- STEM education

**Application**
Qualified applicants will have earned baccalaureate and master's degrees from fully accredited institutions. Applicants must meet admission requirements set by the University of Kentucky Graduate School. Applications to the Interdisciplinary Ph.D. in Education Sciences are made online through the UK Graduate School Apply Yourself application process.

# Electical Engineering

## College of Engineering

The Department of Electrical and Computer Engineering offers advanced studies leading to either a Master of Science in Electrical Engineering or a Doctor of Philosophy in Electrical Engineering.

**Admission Requirements**
A minimum grade point average of 3.0/4.0 on all undergraduate work is required for admission to the graduate program. A minimum GRE general test scores of 301 (combination of Verbal and Quantitative sections) and analytical writing of at least 2.5 for the M.S. degree. The corresponding minimum GRE scores for Ph.D degree are 310 (V+Q) and 3.0 (Writing). Meeting the minimum requirements does not guarantee admission will be granted. Acceptance is based upon a competitive evaluation and on a space-availability basis. An undergraduate degree in electrical engineering is preferred. Those applicants without a B.S.E.E. degree from an ABET accredited EE program should develop competence and demonstrate ability in the fundamentals of electrical engineering. Such students, before being admitted to full graduate standing within the department, must take (or have taken an equivalent of) a set of prescribed electrical engineering remedial courses. A minimum grade of C must be made in these courses.

**Degree Requirements**
For the M.S.E.E. degree, both the thesis and non-thesis options are available. The thesis option requires 24 hours of acceptable graduate level work plus the satisfying of the usual requirements for the thesis. The non-thesis option, Plan B, requires 30 hours of acceptable graduate work plus an additional three hours of EE 784 (Research Project in Electrical Engineering). All students in their first semester of regular graduate work must select an academic advisor who will assist the student in formulating a graduate plan of study leading to their particular degree. This plan, which must receive the approval of the Director of Graduate Studies, must contain specific courses and a proposed thesis area or specialized project topic.

For the PhD degree, students who only have a B.S. degree must complete 42 hours of course work. Students who have a M.S. degree from an accredited institution must complete 18 hours of course work. Students who have a M.S. degree from a non accredited institution must complete 24 hours of course work.

In order to assure a minimum breadth and level of understanding at the graduate level, all EE graduate students must take three of six specified courses from the major areas of electrical engineering. These courses are: EE 611 Deterministic Systems, EE 621 Electromagnetic Systems, EE 640 Stochastic Systems, EE641 Advanced Power Systems, EE 661 Solid State Electronics, EE 685 Digital Computer Structure. PhD students must also take a course in technical writing such as WRD 204.

The Department of Electrical and Computer Engineering has active research programs in the following areas: power electronics, power systems, electromechanics, computer engineering, control systems, electromagnetics, electro-optics, micro and nano-electronics, signal processing, communication systems, and controls. Departmental laboratories are well-equipped for students' research. In addition, the Power and Energy Institute of Kentucky provides additional research opportunities.

**Course Descriptions**

EE 503 POWER ELECTRONICS. (3)
Study of solid-state power electronic devices and their applications. Examination of control philosophies, steady-state models, and numerical simulation of characterizing differential equations. Current topics of

interest from the literature. Prereq: EE 415G and EE 461 or consent of instructor.

EE 511 INTRODUCTION TO COMMUNICATION SYSTEMS. (3)
An introduction to the basic signal processing operations in communications systems. Topics include frequency and time domain signal and system representation, random signals, modulation, sampling, pulse modulation, information theory. Prereq: EE 421G, MA 320, and engineering standing.

EE 512 DIGITAL COMMUNICATION SYSTEMS. (3)
A treatment of the basic signaling concepts involved in the communication of digital information. Topics include transmission requirements and distortion of digital signals; discrete amplitude, frequency, and phase modulation; error control coding. Prereq: EE 421G, EE 422G, engineering standing or consent of instructor.

EE 513 AUDIO SIGNALS AND SYSTEMS. (3)
An introduction to digital signal processing and classification methods for audio signals. Topics include signal analysis and system design using correlation functions, power spectra, difference equations, and transfer functions; implementations of filters, classifiers, and audio effects; characteristics and modeling of common audio signals such as speech, music, and noise. Prereq: EE 422G, engineering standing.

EE 517 ADVANCED ELECTROMECHANICS. (3)
Dynamics of electromechanical systems and rotating electrical machines. Applications of electro-magnetic theory to electrical machines. Certain special topics of current interest. Prereq: EE 415G, EE 421G, and engineering standing.

EE 518 ELECTRIC DRIVES. (3)
Introduction to common power electronic converters used in electric motor drives. Steady-state analysis methods for electric machines fed by power conditioning converters. Performance prediction of electric machines by electromagnetic field theory and by coupled oil models. Prereq: EE 415G, EE 421G, and engineering standing.

EE 521 INTRODUCTION TO WIRELESS COMMUNICATIONS. (3)
Study of analog RF electronics for wireless communications through a combination of course and laboratory work. Topics covered in the course include: modulation/demodulation, filters, RF transformers, mixers, transistor switches and amplifiers, class A, B, AB, C, D, E, and F amplifiers, quartz crystals, transmission lines, impedance inverters, acoustics, oscillators, audio circuitry, noise and inter-modulation, and antennas. Prereq: Engineering standing.

EE 522 ANTENNA DESIGN. (3)
Principles of radiation, potential solution to Maxwell's equations for current in empty space, electrically small antennas, antenna arrays, wire antenna principles, introduction to numerical methods, aperture antennas, frequency scaling antennas, receiving properties of antennas, antenna measurement techniques. Prereq: EE 468G and engineering standing.

EE 523 MICROWAVE CIRCUIT DESIGN. (3)
Physical and mathematical descriptions of wave propagation in guided structures; microstrip lines; microwave integrated circuits; passive components; two-terminal devices; four-terminal devices; S-parameter concept; equivalent circuit concept; solid state microwave amplifiers and oscillators. Prereq: EE 468G and engineering standing.

EE 524 SOLID STATE PHYSICS. (3)

Introductory solid state physics with emphasis on the properties of electrons in crystals; crystal structure, crystal diffraction, reciprocal lattice, lattice vibrations and phonons, free electron theory, energy bands in solids, semiconductors. Prereq: PHY 520, or consent of instructor. Engineering standing required for EE 524. (Same as PHY 524.)

EE 525 NUMERICAL METHODS AND ELECTROMAGNETICS. (3)
This course covers the basics of numerical methods and programming with applications in electromagnetics. Examples range from statics to radiation/scattering problems involving numerical solutions to integro-differential and finite difference equations. Prereq: EE 468G and engineering standing, or consent of instructor.

EE 526 LEAN OPERATIONS MANAGEMENT. (3)
This course will cover topics in basic lean system operations as well as the management system to support the attainment of highest customer satisfaction with respect to Safety, Quality, Cost, Productivity, Delivery and Human Resource Development. Working in teams, students apply fundamental lean tools and concepts to develop a lean operations environment capable of driving continuous improvement in a simulated factory. As the operational environment evolves, key management principles and tools are explored using the teachings of Taiichi Ohno and others considered to be the pillars of the Toyota Production System. All students must have a webcam and microphone or headset to participate in on-line team and class meetings. Prereq: Enrollment restricted to junior-level or above students. Prior enrollment in the Lean Student certificate course or MFS 503 is required or with the consent of the instructor. (Same as ME 526/MFS 526.)

EE 527 ELECTROMAGNETIC COMPATIBILITY. (3)
Design of electronic systems to minimize 1) emission of electromagnetic signals that cause interference in other electronic systems, 2) the susceptibility of that system to electromagnetic signal from other electronic systems, and 3) the susceptibility of that system to its own, internally generated signals. A set of brief laboratory experiments demonstrate the design principles and provide familiarity with modern test equipment. Prereq: EE 468G and engineering standing.

EE 528 AUTOMOTIVE BODY WELDING. (3)
The objective of this course is to introduce students to automotive Body Production Engineering (BPE). The course will introduce students to the joining methods to produce subassemblies and the main body assembly. The course will cover joining methods, joining theory, quality assessment, and design of experiment to prove welding joints. Prereq: Engineering Standing and enrollment in the Production Engineering Certificate.

EE 531 ALTERNATIVE AND RENEWABLE ENERGY SYSTEMS. (3)
Study of non-traditional, electric generating systems, and the use of renewable energy sources. Energy sources include solar, wind, hydro, and biomass/biogas. Generating technologies include both inverter based equipment and rotating machinery. Prereq: EE 415G, EngineeringnStanding or consent of instructor.

EE 532 SMART GRID: AUTOMATION AND CONTROL OF POWER SYSTEMS. (3)
This course covers introduction to smart grid, key technologies in transmission and distribution systems that enable smart grid, power market structure, and real time pricing. Prereq: Engineering standing, or consent of instructor.

EE 533 ADVANCED POWER SYSTEM PROTECTION. (3)
This course teaches philosophies for protecting power systems, covers micro-processor based relays, and provides projects on relay setting and relay testing. Prereq: Engineering standing, or consent of instructor.

EE 535 POWER SYSTEMS: GENERATION, OPERATION AND CONTROL. (3)
This course covers essential aspects of the energy management system of power systems. Will cover topics: power system economics, state estimation, power system stability, power quality, and fault location. Prereq: EE 537 or concurrent, and Engineering Standing.

EE 536 POWER SYSTEM FAULT ANALYSIS AND PROTECTION. (3)
This course teaches computer based methods for performing fault analysis of power systems, and principles for protecting power systems.
*EE 537 ELECTRIC POWER SYSTEMS I. (3)
A study of power flow, elements of power factor correction, the one-line diagram, the per-unit system, transformer modeling, generator modeling, transmission line modeling, transmission line performance calculations from equivalent circuits, and general methods for network calculations. Prereq: Engineering standing, or consent of instructor.

EE 538 ELECTRIC POWER SYSTEMS II. (3)
Introduction to modern power system practices, basic transient and steady-state stability analysis with emphasis on digital techniques. Prereq: Engineering standing and consent of instructor.
EE 539 POWER DISTRIBUTION SYSTEMS. (3)
Study of electric utility distribution power systems. Topics include configurations, equipment, customer class data, load flow, phase balancing, capacitor placement, system protection, power quality, and distributed generation. Prereq: EE 537, engineering standing or consent of instructor.

EE 543 SOLAR CELL DEVICES AND SYSTEMS FOR ELECTRICAL ENERGY GENERATION. (3)
Physics of photovoltaic (PV) devices, emerging technologies, design of PV cells and systems, electronic components for signal conditioning, integration, installation, performance evaluation and economic issues related to PV systems. Prereq: EE 211 or EE 305 and Engineering Standing, or consent of instructor. (Same as BAE 543/EGR 543.)

EE 546 ELECTRIC POWER SYSTEM FUNDAMENTALS. (3)
Introduction to power transmission basics, power system components, power flow, fault analysis and protection, control, stability, and economic operation of the power grid. This course will also introduce modern trends such as distributed generation, communications, and cybersecurity. Prereq: Graduate or engineering standing and EE 221, EE 305, or equivalent. (Same as EGR 546.)

EE 555 INTRODUCTION TO MICRO-/NANO-ELECTROMECHANICAL SYSTEMS. (3)
This course provides an overview of micromachined structures with an emphasis on operational theory and fabrication technology. Prereq: Engineering standing or consent of instructor. (Same as ME/MSE 555.)
College of Engineering

EE 560 SEMICONDUCTOR DEVICE DESIGN. (3)
Theory, development and discussion of equivalent circuit models of transistor devices, negative resistance, semiconductor devices and praetersonic devices based on electronic processes in solid state elements. High and low frequency, as well as the Ebers-Moll and charge control switching models and their application in computerized electronic circuit analysis will be developed. Prereq: EE 461G or equivalent,
and engineering standing.

EE 562 ANALOG ELECTRONIC CIRCUITS. (3)
Feedback amplifiers, tuned and untuned amplifiers, oscillators, AM and FM transmitters. Prereq: EE 360, EE 461G and engineering standing.

EE 566 ENGINEERING OPTICS. (3)
Fundamentals of geometrical and physical optics; applications as related to problems in engineering design and research, details of some optical measurement techniques; introduction to lasers; techniques for determining optical properties. Prereq: Engineering standing. (Same as ME 560.)

EE 567 INTRODUCTION TO LASERS AND MASERS. (3)
Basic principles of laser action; atomic transitions; population inversion; two and three level systems; optical resonators; pumping methods;
applications. Prereq: EE 360, EE 468G, or PHY 417G, or consent of instructor. (Same as PHY 567.)

EE 568 FIBER OPTICS. (3)
The course presents theory and practice related to (a) fiber optic cable and their fabrication, (b) fiber optic transmitters and detectors, (c) fiber optic communication systems and (d) fiber optic remote sensors. Prereq: EE 468G. (Same as MSE 568.)

EE 569 ELECTRONIC PACKAGING SYSTEMS AND MANUFACTURING PROCESSES. (3)
Study of packaging systems which interconnect, support, power, cool, protect, and maintain electronic components. The course will address systems at the chip, board, and product levels. Topics include design, properties, materials, manufacture, and performance of various packaging systems. Laboratory will provide familiarity with design software and production equipment and processes. Prereq: EE 211 or EE 305, EE 360 or MSE 402G, or consent of instructor. (Same as MSE 569.)

EE 570 FUNDAMENTALS OF NANOELECTRONIC DEVICES AND MATERIALS. (3)
Energy bonds in crystals; heterostructures; quantum wells and low dimensional systems; the two-dimensional electron gas and MODFET; transmission in nanostructures; current topics in nanoscale devices. Prereq: EE 360 and engineering standing, or consent of instructor. (Same as ME/MSE 570.)

EE 571 FEEDBACK CONTROL DESIGN. (3)
System representation via transfer function and state variables, root locus analysis; Bode plots; compensation by root-locus and frequency response methods; state variable feedback; sensitivity analysis; tracking via output feedback; digital control systems. Prereq: EE 421G, EE 422G, engineering standing, and consent of instructor.

EE 572 DIGITAL CONTROL OF DYNAMIC SYSTEMS. (3)
Zero and first order hold, theory of analog to digital and digital to analog conversion. Z-transform analysis, discrete state variable analysis, discrete estimation techniques, error analysis of discrete systems. Prereq: EE 422G, engineering standing.

EE 575 INDUSTRIAL CONTROL. (3)
Control technologies for industrial and process control systems, including sensors, actuators, PLCs, and hydraulic and pneumatic control elements. Prereq: Engineering standing or graduate standing.

EE 579 NEURAL ENGINEERING: MERGING ENGINEERING WITH NEUROSCIENCE. (3)
A multidisciplinary approach combining engineering principles for systems analysis and control, knowledge of biological control mechanisms, and computational properties of biological neural networks in the development of engineering neural networks for control applications. Topics include: equivalent circuit models for biological neurons and networks, non-linear differential equation representations, biological control strategies for rhythmic movements, design and development of controller for robot function, proposal development and presentation. Prereq: EE 422G and Engineering Standing or consent

of instructor. (Same as BME 579.)

EE 580 EMBEDDED SYSTEM DESIGN. (3)
Embedded System Design covers the design and implementation of hardware and software for embedded computer systems. Topics include architectural support for embedded systems, power management, analog and digital I/O, real-time processing design constraints and the design of embedded systems using a real-time operating systems. Prereq: EE/CPE 287, EE/CPE 380, and engineering standing or consent of instructor. (Same as CPE 580.)

EE 582 HARDWARE DESCRIPTION LANGUAGES AND PROGRAMMABLE LOGIC. (3)
A study of hardware description languages including netlists, VHDL and Verilog; their use in digital design methodologies including modeling techniques, design verification, simulation, synthesis, and implementation in programmable and fabricated logic media. Programmable logic topics include CPLD and FPGA architectures, programming technologies and techniques. Prereq: EE/CS 380 and engineering standing.

EE 584 INTRODUCTION OF VLSI DESIGN AND TESTING. (3)
Introduction to the design and layout of Very Large Scale Integrated (VLSI) Circuits for complex digital systems; fundamentals of the VLSI fabrication process; and introduction to VLSI testing and structured design for testability techniques. Prereq: Engineering standing or consent of instructor. (Same as CPE 584.)

EE 585 FAULT TOLERANT COMPUTING. (3)
Students in this course study the theory and practice of fault-tolerant and dependable computing systems. The course will introduce sources of faults, error and failures in computer controlled systems and approaches to design masking and recovery techniques at the hardware, software, and systems level. Prereq: EE/CPE 380 and engineering standing or consent of the instructor. (Same as CPE 585.)

EE 586 COMMUNICATION AND SWITCHING NETWORKS. (3)
Fundamentals of modern communication networking and telecommunications, data transmission, multiplexing, circuit switching networks, network topology routing and control, computer communication, packet switching networks, congestion control, frame relay, ATM switching networks, traffic and congestion control. Prereq: EE/CPE 282 and engineering standing. (Same as CPE 586.)

EE 587 ADVANCED EMBEDDED SYSTEMS. (3)
An advanced course in the design of embedded systems using state-of-the art microcontroller hardware and software development tools. Topics include architecture support for real-time operating systems, language support for embedded and real-time processing, embedded and wireless networking. Prereq: EE/CPE 580 and engineering standing or consent of instructor. (Same as CPE/CS 587.)

EE 588 REAL-TIME COMPUTER SYSTEMS. (3)
This course covers features typically found in real-time and embedded systems. Topics include real-time operating systems, scheduling synchronization, and architectural features of single and multiple processor real-time and embedded systems. Prereq: EE/CPE 580 and engineering standing or consent of instructor. (Same as CPE 588.)

EE 589 ADVANCED VLSI. (3)
An advanced class in topics related to Very Large Scale Integration. Example topics are advanced simulation, yield impact, memory design, statistical analysis and date reduction. Prereq: EE 584, engineering standing.

EE 595 INDEPENDENT PROBLEMS. (1-3)
For electrical engineers. A problem, approved by the chairperson of the department, provides an objective for study and research. May be repeated to a maximum of six credits. Prereq: 2.5 standing and engineering standing.

EE 598 SPEC. TOPICS MULTI-INST (Subtitle required). (3)
This course covers advanced topics on various aspects of electrical engineering, and is a template for courses to be shared among multiinstitutions via distance learning technologies.

EE 599 TOPICS IN ELECTRICAL ENGINEERING (Subtitle required). (3)
A detailed investigation of a topic of current significance in electrical engineering such as biomedical instrumentation, digital filter design, active networks, advanced electrical devices, digital communications, display of electronics. May be repeated, but only three credits can be earned under the same title. Only nine credit hours may count toward degree requirements. A particular topic may be offered at most twice under the EE 599 number. Prereq: Equivalent of two 400-level courses in electrical engineering, consent of instructor and engineering standing.

EE 601 ELECTROMAGNETIC ENERGY CONVERSION I. (3)
Generalized electric machine theory; parameter determination. Energy conversion in continuous media including magnetohydrodynamics. Prereq: Consent of instructor.

EE 603 POWER ELECTRONICS. (3)
Study of solid-state power electronic devices and their applications. Examination of control philosophies, steady-state models, and numerical simulation of characterizing differential equations. Current topics of interest from the literature. This course may not be used to satisfy degree requirements if credit is earned in EE 503. Prereq: EE 517 and EE 571 or consent of instructor.

EE 604 SWITCH MODE CONVERTERS. (3)
Study of analysis techniques for switching mode converters and associated control practices. Boost, buck, buck-boost, flyback, and Cuk topologies in both continuous and discontinuous conduction modes are presented. Numerical solution, state-space averaging, and linearization techniques are applied to predict performance and formulate transfer characteristics. Prereq: EE 517 or consent of instructor.

EE 605 MODELING, SIMULATION AND CONTROL FOR MANUFACTURING. (3)
The purpose of this course is to examine methods and systems from the perspectives of modeling, simulation, and control of manufacturing facilities. The emphasis will be primarily on techniques that can be used to model and evaluate performance of systems. Students are encouraged to think critically about available technologies, identify relative strengths and weaknesses, and analyze the technologies toward developing improved solutions to factory control and information management problems. Prereq: Graduate Standing. (Same as ME/MFS605.)

EE 606 GLOBAL ISSUES IN MANUFACTURING. (3)
The need to increase quality, productivity, efficiency and sustainability in manufacturing operations spanning the product, process and systems (manufacturing systems as well as supply chain) domains is essential for companies to be successful. The increased globalization of markets and manufacturing operations, declining natural resources and negative consequences of some manufacturing practices as well as increased legislation in many regions has led to many new challenges that companies must overcome to be successful in competitive markets. This seminar course will introduce students to a variety of global issues in manufacturing through presentations by leading national and international experts in these domains. The seminars will cover a broad range of manufacturing related topics relevant to many

disciplines including manufacturing, mechanical and electrical engineering. The course can also help graduate students identify topical issues that need further investigation and could become potential research topics. (Same as ME/MFS 606.)

EE 611 DETERMINISTIC SYSTEMS. (3)
Concepts of linear systems, singularity functions, convolution and superposition integrals, state-variable method for linear systems, relation between transfer function and state-variable equations, fundamental matrix, state-transition matrix, unit-impulse response matrix, and transmission matrix. Prereq: EE 421G.

EE 613 OPTIMAL CONTROL THEORY. (3)
State-space modeling of control systems; variational techniques; system optimization by maximum principle, dynamic programming; Hamilton-Jacobi equations design of linear optimal systems; computational methods for solving boundary value problems. Prereq: EE 611.

EE 614 ADAPTIVE CONTROL. (3)
Real-time parameter estimation; deterministic self-tuning regulators; stochastic and predictive self-tuning regulators; model-reference systems; auto-tuning; gain scheduling; practical issues; design and simulation projects. Prereq: EE 611.

EE 619 PROBLEMS SEMINAR IN OPERATIONS RESEARCH. (3)
In this course, the student is exposed to the art of applying the tools of operations research to real world problems. The seminar is generally conducted by a group of faculty members from the various disciplines to which operations research is applicable. Prereq: MA 617 and STA 525 or consent of instructor.

EE 621 ELECTROMAGNETIC FIELDS. (3)
Development of electromagnetic field theory from the basic postulates of Maxwell's equations in differential and integral forms, solution to static, quasistatic, and wave-propagation problems. Radiation from dipole antenna elements. Prereq: EE 468G.

EE 622 ADVANCED ELECTRODYNAMICS. (3)
Solution methods for applied electrodynamics problems; uniqueness, equivalence, duality, reciprocity; linear space methods; wave solutions in separable coordinate systems; classical problems in cartesian, cylindrical, and spherical coordinates. Prereq: EE 468G.

EE 624 COMPUTATIONAL ELECTROMAGNETICS: THE FINITE-DIFFERENCE TIME-DOMAIN. (3)
A course on the application of the finite-difference time-domain (FDTD) technique for the full-wave simulation of time-dependent electromagnetic waves in complex media. Representative topics in the course include: The Yee-algorithm, numerical dispersion and stability, physical source models, absorbing boundaries and perfectly matched layered media, near-field to far-field transformations, modeling of microwave circuits and antennas, parameter extraction, lumped load models, non-uniform and non-orthogonal grid methods, and current topics in FDTD. Prereq: EE 621 or consent of instructor.

EE 625 COMPUTATIONAL ELECTROMAGNETICS. (3)
This advanced course in computational electromagnetics primarily covers moment method and finite element method solutions to scattering problems. Representative topics of the course include surface and volume equivalence principles, scattering by material cylinders, scattering by periodic structures and absorbing boundary condition models. Prereq: EE 525, EE 621, or consent of instructor.

EE 630 DIGITAL SIGNAL PROCESSING. (3)
An introductory treatment of the basic concepts of signal processing via time and frequency domain

(Z-transform) methods and a survey of procedures for designing, implementing and using digital signal processors. Prereq: EE 512 or consent of instructor.

EE 635 IMAGE PROCESSING. (3)
The course outlines applications of image processing and addresses basic operations involved. Topics covered include image perception, transforms, compression, enhancement, restoration, segmentation, and matching. Prereq: Graduate standing and consent of instructor. (Same as CS 635.)

EE 639 ADVANCED TOPICS IN SIGNAL PROCESSING AND COMMUNICATIONS. (3)
Advanced topics in signal processing and communications research and design topics of current interests, such as optical processing, pattern recognition, satellite systems, and digital communication networks. A review and extension of current literature and selected papers and reports. May be repeated to a maximum of nine credits. Prereq: Advanced graduate standing.

EE 640 STOCHASTIC SYSTEMS. (3)
Random variables, stochastic processes, stationary processes, correlation and power spectrum, mean-square estimation, filter design, decision theory, Markoff processes, simulation. Prereq: EE 421G.

EE 641 ADVANCED POWER SYSTEMS. (3)
This course covers advanced topics on electric power systems including power system analysis, operation, monitoring, protection, optimization and control. Prereq: Graduate student, AND EE 415 or equivalent or consent of instructor.

EE 645 ADVANCED CONTROL SYSTEM ANALYSIS. (3)
Conceptual development and study of complex systems; their synthesis and design; analysis and optimization of system parameters. Inputoutput relationships; formulation of mathematical models, parameters and constraints on physical systems. Prereq: ME 440 or instructor consent. (Same as ME 645.)

EE 661 SOLID-STATE ELECTRONICS. (3)
A study of semiconductor fundamentals including crystal structure, basic quantum mechanics, energy-band theory, carrier distributions, carrier transport, and recombination-generation. Analysis of semiconductor devices including PN junction diodes, bipolar-junction transistors, metal-semiconductor diodes, and metal-oxide semiconductor field effect transistors. Prereq: EE 360 and EE 461G or consent of instructor.

EE 663 OPTOELECTRONIC DEVICES. (3)
Theory and applications of photodetectors, solar cells, semiconductor lasers, light emitting diodes and display devices, nanocrystalline structures and organic semiconductors applications in optoelectronic devices. Prereq: EE 360 or MSE 402G, consent of instructor and/ or graduate standing. (Same as MSE 663.)

EE 664 MULTIDISCIPLINARY SENSORS LABORATORY. (3)
A multidisciplinary laboratory course with laboratory experiences in areas related to sensors and sensing architectures, typically including chemistry, chemical and materials engineering, and electrical engineering. Lecture, 1 hour; laboratory, 2 hours. Prereq: One year of college chemistry, calculus and physics. GS 660 or by consent of instructor. (Same as CHE/CME/MSE 664.)

EE 672 NONLINEAR SYSTEMS AND CONTROL. (3)
This course presents methods for analyzing and controlling nonlinear dynamic systems. The major topics are: 1) fundamental properties of nonlinear ordinary differential equations such as existence and uniqueness; 2) Lyapunov stability theory; and 3) nonlinear feedback control techniques such as

backstepping, feedback linearization, and Lyapunov-based design. (Same as ME 672.)

EE 684 INTRODUCTION TO COMPUTER AIDED DESIGN OF VLSI CIRCUITS. (3)
Computer aided design of Very Large Scale Integration (VLSI) circuits. Topics include: VLSI technologies, CMOS circuit characteristics, computer aids in the design of VLSI circuits, use of various CAD tools for layout, circuit design, logic design, and functional design, and the use of VLSI circuits in the system design. A design project is required. Prereq: EE 581 and EE 461G or consent of instructor.

EE 685 DIGITAL COMPUTER STRUCTURE. (3)
Study of fundamental concepts in digital computer system structure and design. Topics include: computer system modeling based on instruction set processor (ISP) and processor-memory-switch (PMS) models, design and algorithms for ALU, processor, control unit and memory system. Special topics include floating-point arithmetic, cache design, pipeline design technologies, and parallel computer architectures. Prereq: EE 380 and EE 581 or consent of instructor.

EE 686 ADVANCED COMPUTER ARCHITECTURE DESIGN. (3)
A study of current diverse advanced architectures such as microprogrammed, parallel, array and vector, networked, and distributed architectures; applications and example systems employing these architectures; matching applications to architectures; consideration of architectures of the future. Prereq: EE 685.

EE 698 SPEC. TOPICS MULTI-INST (Subtitle required). (3)
This course covers advanced topics on various aspects of electrical engineering, and is a template for courses to be shared among multiinstitutions via distance learning technologies.

EE 699 TOPICS IN ELECTRICAL ENGINEERING (Subtitle required). (3)
A detailed study of a topic of current interest in electrical engineering. May be repeated to a maximum of six credits, but only three credits may be earned under the same subtitle. A particular topic may be offered at most twice under the EE 699 number. Prereq: Consent of instructor.

EE 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

EE 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

EE 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

EE 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

EE 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

EE 780 ADVANCED PRACTICE IN ELECTRICAL AND COMPUTER ENGINEERING. (1-3)
Apply advanced training in electrical/computer engineering to solve complex practical problems through analysis, design, implementation, experiments, and/or developments subject to approval of the course instructor. This course may be repeated for a maximum of six credit hours in combination with EE 783. Prereq: 18 hours of graduate courses.

EE 783 SPECIAL PROBLEMS IN ELECTRICAL ENGINEERING. (1-3)
Open to graduate students only. Individual work on an assignment approved by the chairperson of the department. May be repeated to
a maximum of nine credits.

EE 784 RESEARCH PROJECT IN ELECTRICAL ENGINEERING. (3)
Individual study related to a special research project supervised by the student's advisor. A final written report on the project is required. This course is open only to and required by students pursuing the MSEE degree with a non-thesis option (Plan B). The course cannot satisfy part of the required 30 hours of course work for Plan B. Prereq: Approval of student's MSEE advisor.

EE 790 RESEARCH IN ELECTRICAL ENGINEERING. (1-9)
Research in any field of electrical and/or computer engineering subject to approval of the Director of Graduate Studies. This course can be taken prior to the qualifying examination, but will not count for pre-qualifying examination residency credit. This course may be repeated to a maximum of 18 credit hours. Prereq: Consent of DGS.

# Kinesiology and Health Promotion

## College of Education

The Department of Kinesiology and Health Promotion offers graduate work leading to the Master of Science, Doctor of Education, and Doctor of Philosophy degrees. The Master of Science degree offers concentrations in biomechanics, exercise physiology, health promotion, physical education, coaching, and sport leadership. There is also a Master of Science degree option in Sport and Exercise Psychology. The Ed.D. degree has concentrations in health promotion and in physical education. The Ph.D. degree in Exercise Science offers specializations in biomechanics or exercise physiology. The department also offers a Ph.D. in Interdisciplinary Sciences with both Physical Education and Health Education concentrations. Program information can be found on the departmental website: https://education.uky.edu/khp/grad/

All application materials for the Department of Kinesiology and Health Promotion graduate programs must be submitted through the online application, which is accessible from the Graduate School web page: https://gradschool.uky.edu/

Additional admission and degree requirements for each program and/or specialization can be found below.

## Master of Science in Kinesiology and Health Promotion

The master's program is designed to provide a high-quality graduate program for students who desire advanced study to enhance their professional knowledge and skills as well as for students who complete the master's degree as an intermediate step toward doctoral work. Students can select from a variety of specializations (biomechanics, exercise physiology, health promotion, physical education, coaching, and sport leadership) to meet their interest areas and career goals as described below.

The objective of the program is to prepare the student to:

- permit an in-depth study of a specialized content area within the field;
- effectively locate, analyze, and use significant elements of the professional literature and research materials;
- acquire a knowledge of sound research procedures; and
- engage in clinical, applied, and/or experiential learning opportunities to enhance students' professional development

The course work and program experiences are designed to enable graduate students in the Department of Kinesiology and Health Promotion to demonstrate:

1. Educational, professional and technological standards.
2. Literacy skills for life-long professional learning.

3. Current, factual, and functional content knowledge.
4. Functional skills and dispositions of professionals.
5. Skills for research and reflection for learning and leading.
6. Skills to plan, implement, and evaluate basic and applied research.
7. Skills to analyze and interpret research data.

To accomplish these outcomes, students are introduced to a combination of departmental course offerings, supporting electives, and a required core of statistics and research methods. Students work with their advisor to tailor course work and additional opportunities to their interests areas and career goals. Master's candidates with the approval of the department may select either a thesis (Plan A) or a non-thesis option (Plan B).

## Admission Requirements

Applicants must meet the Graduate School requirements set forth in the first part of this Bulletin as well as those set forth for each specialty area. Additional information can be found on the departmental website and is briefly summarized below: https://education.uky.edu/khp/grad/

Specific prerequisites for graduate study at the master's level are determined by a committee of the departmental graduate faculty based upon area of emphasis.

## Application Deadlines

- **Priority deadline for upcoming academic year:** February 1
- **Fall:** July 15 (international students: April 15)
- **Spring:** December 1 (international students: August 22)

## Specializations

### BIOMECHANICS SPECIALIZATION

The specialization in human biomechanics is a multidisciplinary program working together with Kinesiology, Health Sciences, and Engineering. The program helps address critical problems related but not limited to sport, exercise, health, aging, space science and ergonomics.

#### Admission Requirements

- A bachelor's degree from an accredited college or university with adequate preparation in health, physical education, or related fields.
- GRE Requirements: Minimum GRE scores - combined verbal and quantitative score of 286 (minimum verbal score of 146 and quantitative score of 140); 2.75 analytical.
- GPA requirement: 2.75 or higher
- A total of three letters of recommendation are required. A minimum of 2 out of 3 of these letters must be submitted by someone with a terminal degree (i.e. Ph.D., M.D., Ed.D., etc.) and must be from a person with direct knowledge of the applicant's academic capabilities (e.g., instructor, research supervisor, advisor, etc.).

- A bachelor's degree from an accredited college or university with adequate preparation in health, physical education, exercise science, or related fields.

### Degree Requirements

Research Methods and Statistics (6-7 hours) are required for all Kinesiology and Health Promotion majors while the remainder of the courses are specific to the biomechanics specialization. A minimum of 30 total hours is required. See program website for pre-requisites and possible electives.

*Plan A*

- Research Methods (6-7 hours)
    - KHP 644 - Research Techniques Applied to Kinesiology and Health Promotion (3 credits)
    - STA 570 or STA/CPH 580 or EPE/EDP 558 - Basic Statistical Analysis or equivalent (3 or 4 credits)
- Area of concentration (12 hours)
- Disciplinary Support/Supporting Electives (6 hours)
- Thesis (6 hours)

*Plan B*

- Research Methods (6-7 hours)
    - KHP 644 - Research Techniques Applied to Kinesiology and Health Promotion (3 credits)
    - STA 570 or STA/CPH 580 or EPE/EDP 558 - Basic Statistical Analysis or equivalent (3 or 4 credits)
- Area of concentration (15 hours)
- Disciplinary Support/Supporting Electives (6 hours)
- Independent research/study (3 hours)

## EXERCISE PHYSIOLOGY SPECIALIZATION

The specialization in Exercise Physiology offers a robust science-based curriculum to prepare students for a variety of careers in research, clinical, and practitioner-based settings. The curriculum offers numerous clinical, applied, and experiential learning opportunities to enhance students' professional development. Students may pursue research or internship-based tracks to effectively prepare for their professional endeavors.

### Admission Requirements

- Students must contact a program faculty member prior to applying to the program. It is important to identify a faculty member for which the student has similar research/scholarly interests.
- Personal Statement (must indicate a primary and secondary program faculty member)
- GRE Requirements: Minimum GRE scores of 146 verbal; 146 quantitative; 2.75 analytical.
- GPA requirement: 3.2 or higher

## Degree Requirements

Research Methods and Statistics (6-7 hours) are required for all Kinesiology and Health Promotion majors while the remainder of the courses are specific to the exercise physiology specialization. A minimum of 30 total hours is required. See program website for pre-requisites and possible electives.

*Plan A*

- Research Tools (6-7 hours)
    - KHP 644 - Research Techniques Applied to Kinesiology and Health Promotion (3 credits)
    - STA 570 or EPE/EDP 557 - Basic Statistical Analysis or equivalent (3 or 4 credits)
- Area of concentration (12 hours)
- Disciplinary Support/Supporting Electives (6 hours)
- Thesis (6 hours)

*Plan B*

- Research Methods (6-7 hours)
    - KHP 644 - Research Techniques Applied to Kinesiology and Health Promotion (3 credits)
    - STA 570 or EPE/EDP 557 - Basic Statistical Analysis or equivalent (3 or 4 credits)
- Area of concentration (15 hours)
- Disciplinary Support/Supporting Electives (6 hours)
- Independent research/study (3 hours)

# HEALTH PROMOTION SPECIALIZATION

The specialization in Health Promotion is for students passionate about health and wellness who want to make a positive impact on other people's lives. With a flexible distance learning degree option, students will gain advanced professional skills, build professional relationships with top alumni, and engage with internationally-recognized faculty in health promotion. The curriculum offers numerous applied and experiential learning opportunities to enhance students' professional development. Students may pursue research or internship-based tracks to effectively prepare for their professional endeavors. Students will also be prepared to sit for the Certified Health Education Specialist (CHES) examination, a professional credential widely respected in the health promotion field.

## Admission Requirements

- A bachelor's degree from an accredited college or university with adequate preparation in health, physical education, or related fields.
- GRE Requirements: Minimum GRE scores - combined verbal and quantitative score of 286 (minimum verbal score of 146 and quantitative score of 140); 2.75 analytical.
- GPA requirement: 2.75 or higher
- Resume/CV

- A professional goal statement describing the applicant's professional background, motivations for seeking a graduate education in this specialty area, why the current program is an ideal fit, and career/research aspirations.
- Three letters of recommendation: At least two must be from a person with direct knowledge of applicant's academic capabilities (e.g., instructor, research supervisor, advisor, etc.).

### Degree Requirements

Research Methods and Statistics (6-7 hours) are required for all Kinesiology and Health Promotion majors while the remainder of the courses are specific to the health promotion specialization. A minimum of 33 total hours is required. See program website for pre-requisites and possible electives.

*Plan A*

- Research Tools (6-7 hours)
    - KHP 644 - Research Techniques Applied to Kinesiology and Health Promotion (3 credits)
    - STA 569, 570, or EPE/EDP 558 or PSY 610 - Basic Statistical Analysis or equivalent (3 or 4 credits)
- Area of concentration (9 hours)
    - KHP 674 Foundations of Health Promotion (3)
    - KHP 673 Health Promotion and Behavior Change (3)
    - KHP 677 Planning Health Promotion Programs (3)
- Disciplinary Support/Supporting Electives (12 hours)
- Thesis (6 hours)

*Plan B*

- Research Tools (6-7 hours)
    - KHP 644 - Research Techniques Applied to Kinesiology and Health Promotion (3 credits)
    - STA 569, 570 or EPE/EDP 558 or PSY 610 - Basic Statistical Analysis or equivalent (3 or 4 credits)
- Area of concentration (9 hours)
    - KHP 674 Foundations of Health Promotion (3)
    - KHP 673 Health Promotion & Behavior Change (3)
    - KHP 677 Planning Health Promotion Programs (3)
- Disciplinary Support/Supporting Electives (15 hours)
- Internship (3 hours)
    - KHP 577 Practicum in Kinesiology and Health Promotion (3)

## SPORT LEADERSHIP SPECIALIZATION

The Sport Leadership specialization focuses on preparing leaders in all sport, recreation, and fitness related fields. The goal is to help students develop the knowledge and skills to be more effective practitioners and researchers in the field of leadership.

## Admission Requirements

- A bachelor's degree from an accredited college or university with adequate preparation in health, physical education, or related fields.
- GRE Requirements: Minimum GRE scores - combined verbal and quantitative score of 286 (minimum verbal score of 146 and quantitative score of 140); 2.75 analytical.
- GPA requirement: 2.75 or higher
- Three letters of recommendation

## Degree Requirements

Research Methods and Statistics (6-7 hours) are required for all Kinesiology and Health Promotion majors while the remainder of the courses are specific to the sport leadership specialization. A minimum of 30 total hours is required. See program website for pre-requisites and possible electives.

### *Plan A*

- Research Tools (6-7 hours)
    - KHP 644 - Research Techniques Applied to Kinesiology and Health Promotion (3 credits)
    - STA 570 or EPE/EDP 557, 558 - Basic Statistical Analysis or equivalent (3 or 4 credits)
- Area of concentration (12 hours)
    - KHP 676 Current Issues and Problems in Sport Management (3 hours)
    - KHP 683 Leadership, Theory, and Practice in Sport and Fitness Organizations (3 hours)
    - KHP 684 Diversity in Sport and Fitness Organizations (3 hours)
    - KHP 685 Supervision of Sport and Fitness Personnel (3 hours)
- Disciplinary Support/Supporting Electives (6 hours)
- Thesis (6 hours)

### *Plan B*

- Research Methods (6-7 hours)
    - KHP 644 - Research Techniques Applied to Kinesiology and Health Promotion (3 credits)
    - STA 570 or EPE/EDP 557, 558 - Basic Statistical Analysis or equivalent (3 or 4 credits)
- Area of concentration (15 hours)
    - KHP 676 Current Issues in Sport (3 hours)
    - KHP 683 Leadership, Theory, and Practice in Sport & Fitness Organizations (3 hours)
    - KHP 684 Diversity in Sport & Fitness Organizations (3 hours)
    - KHP 685 Supervision of Sport & Fitness Personnel (3 hours)
    - KHP 688 Event Management in Sport (3 hours)
- Disciplinary Support/Supporting Electives (6 hours)
- Internship (3 hours)
    - KHP 687 Practicum in Sport Management (3 hours)

# TEACHING SPECIALIZATION

The teaching specialization focuses on connecting theory of effective teaching processes and the practice of effective teaching in physical education. In addition to learning about appropriate teaching methods, you learn very valuable experiences in the field. Please note: This degree does not lead to teacher certification.

## Admission Requirements

- A bachelor's degree from an accredited college or university with adequate preparation in health, physical education, or related fields.
- GRE Requirements: Minimum GRE scores - combined verbal and quantitative score of 286 (minimum verbal score of 146 and quantitative score of 140); 2.75 analytical.
- GPA requirement: 2.75 or higher
- Three letters of recommendation

## Degree Requirements

Research Methods and Statistics (6-7 hours) are required for all Kinesiology and Health Promotion majors while the remainder of the courses are specific to the teaching specialization. A minimum of 30 total hours is required. See program website for pre-requisites and possible electives.

### *Plan A*

- Research Tools (6-7 hours)
    - KHP 644 - Research Techniques Applied to Kinesiology and Health Promotion (3 credits)
    - STA 570 or EPE/EDP 557, 558- Basic Statistical Analysis or equivalent (3 or 4 credits)
- Area of concentration (6 hours)
    - KHP 601 Teaching Effectiveness and Leadership in Kinesiology and Health Education (3 hours)
    - KHP 602 Promoting Physical Activity for Youth (3 hours)
- Disciplinary Support/Supporting Electives (12 hours)
- Thesis (6 hours)

### *Plan B*

- Research Tools (6-7 hours)
    - KHP 644 - Research Techniques Applied to Kinesiology and Health Promotion (3 credits)
    - STA 570 or EPE/EDP 557, 558 - Basic Statistical Analysis or equivalent (3 or 4 credits)
- Area of concentration (6 hours)
    - KHP 601 Teaching Effectiveness and Leadership in Kinesiology and Health Education (3 hours)
    - KHP 602 Promoting Physical Activity for Youth (3 hours)
- Disciplinary Support/Supporting Electives (18 hours)

# COACHING SPECIALIZATION

The master's degree with a specialization in coaching is directed primarily at preparing graduate students to be coaches at the elementary school, middle school, high school, and collegiate levels. The aim is to help teaching and coaching master's students develop the knowledge and skills to be more effective practitioners and researchers in the field of coaching.

## Admission Requirements

- A bachelor's degree from an accredited college or university with adequate preparation in health, physical education, or related fields.
- GRE Requirements: Minimum GRE scores - combined verbal and quantitative score of 286 (minimum verbal score of 146 and quantitative score of 140); 2.75 analytical.
- GPA requirement: 2.75 or higher
- Three letters of recommendation

## Degree Requirements

Research Methods and Statistics (6-7 hours) are required for all Kinesiology and Health Promotion majors while the remainder of the courses are specific to the coaching specialization. A minimum of 30 total hours is required. See program website for pre-requisites and possible electives.

### *Plan A*

- Research Tools (6-7 hours)
    - KHP 644 - Research Techniques Applied to Kinesiology and Health Promotion (3 credits)
    - STA 570 or EPE/EDP 557, 558- Basic Statistical Analysis or equivalent (3 or 4 credits)
- Area of concentration (9 hours)
    - KHP 601 Teaching Effectiveness and Leadership in Kinesiology and Health Education (3 hours)
    - KHP 676 Current Issues and Problems in Sport Management (3 hours)
    - KHP 684 Diversity in Sport and Fitness Organizations (3 hours)
- Disciplinary Support/Supporting Electives (9 hours)
- Thesis (6 hours)

### *Plan B*

- Research Tools (6-7 hours)
    - KHP 644 - Research Techniques Applied to Kinesiology and Health Promotion (3 credits)
    - STA 570 or EPE/EDP 557, 558- Basic Statistical Analysis or equivalent (3 or 4 credits)
- Area of concentration (9 hours)
    - KHP 601 Teaching Effectiveness and Leadership in Kinesiology and Health Education (3 hours)
    - KHP 676 Current Issues and Problems in Sport Management (3 hours)
    - KHP 684 Diversity in Sport and Fitness Organizations (3 hours)
- Disciplinary Support/Supporting Electives (15 hours)

# Master of Science in Sport and Exercise Psychology

The field of sport and exercise psychology is an interdisciplinary science that explores the relationship between various psychological factors and participation in sport and/or physical activity. The two-year program in the Department of Kinesiology and Health Promotion offers students the choice to pursue a graduate education in the field of sport and exercise psychology by either following an applied or research track. Each option integrates theory-based research and the application of key concepts associated with performance enhancement and life skill development. In this context, successful completion of this program will result in a strong understanding of the various psychosocial factors that influence sport participation and performance.

Upon admission to the program, students will be assigned a faculty advisor who will assist in course selection and planning. The exact program of study specified in an individual program plan will depend on previous coursework and/or individual goals.

## Admission Requirements

- Applicants must meet the following criteria for admission:
- An undergraduate degree in a field closely related to sport and exercise psychology (e.g., psychology, exercise science, health sciences, sport management, etc.).
- A minimum cumulative undergraduate GPA of 2.75 (on 4.0 scale)
- Minimum GRE scores of 146 verbal; 146 quantitative; 2.75 analytical

## Application Requirements

- Official undergraduate transcript
- An updated CV or professional resume
- Three letters of recommendation. At least two from a person with direct knowledge of applicant's academic capabilities (e.g., instructor, research supervisor, advisor, etc.).
- A professional goal statement describing the applicants professional background, motivations for seeking a graduate education in SEP, why the current program and desired track are an ideal fit, and career/research aspirations.

## Degree Requirements

### Disciplinary Core

Required Courses:

- KHP 547 – Psychology of Sport and Physical Activity (3)
- KHP 580 – Group Dynamics in Sport and Physical Activity (3)
- KHP 684 – Diversity in Sport and Fitness Organizations (3)

Suggested Electives (Choose 3):

- EDP 614 – Motivation and Learning (3)
- KHP 605 – Psychological Aspects of Sport Injury and Rehabilitation (3)

- KHP 673 – Health Promotion and Behavior Change (3)
- KHP 674 – Foundations of Health Promotion (3)
- KHP 676 – Current Issues and Problems in Sport Management (3)
- KHP 683 – Leadership, Theory, and Practice in Sport and Fitness Organizations(3)
- KHP 720 – Sports Medicine (3)

**TOTAL:** 18 credit hours

## Professional Practice Core

Required Courses:

- EDP 605 – Counseling Techniques I (3)
- EDP 688 – Ethical and Legal Issues in Psychology (3)
- KHP 689 – Internship in Sport and Exercise Psychology (150 hours per 3.0 credit hours) (6)

Suggested Electives (Choose 1):

- EDP 600 – Life Span of Human Development and Behavior (3)
- EDP 642 – Individual Assessment of Personality Functioning (3)
- EDP 649 – Group Counseling (3)
- EDP 650 – Diagnosis and Psychopathology in Counseling Psychology (3)
- EDP 777 – Seminar in Counseling Psychology (3)
- SW 530 – Responding to Military and Veteran Populations (3)

**TOTAL:** 15 credit hours

## Statistics/Research Design Disciplinary Core

Required Courses:

- EDP 557 – Gathering, Analyzing, and Using Educational Data I (3) **OR** EDP 558 – Gathering, Analyzing, and Using Educational Data II (3)
- KHP 644 – Research Techniques Applied to Kinesiology and Health Promotion (3)

**TOTAL:** 6 credit hours

## Sport Psychology Disciplinary Core

Required Courses:

- KHP 547 – Psychology of Sport and Physical Activity (3)
- KHP 580 – Group Dynamics in Sport and Physical Activity (3)
- KHP 684 – Diversity in Sport and Fitness Organizations (3)

Suggested Electives (Choose 2):

- EDP 614 – Motivation and Learning (3)
- KHP 605 – Psychological Aspects of Sport Injury and Rehabilitation (3)

- KHP 673 – Health Promotion and Behavior Change (3)
- KHP 674 – Foundations of Health Promotion (3)
- KHP 676 – Current Issues and Problems in Sport Management (3)
- KHP 683 – Leadership, Theory, and Practice in Sport and Fitness Organizations (3)
- KHP/AT 720 - Sports Medicine (3)

**TOTAL:** 15 credit hours

## Sport Psychology Professional Practice Core

Required Course:

- EDP 605 – Counseling Techniques I (3)

Suggested Electives (Choose 2):

- EDP 600 – Life Span of Human Development and Behavior (3)
- EDP 642 – Individual Assessment of Personality Functioning (3)
- EDP 649 – Group Counseling (3)
- EDP 650 – Diagnosis and Psychopathology in Counseling Psychology (3)
- EDP 688 – Ethical and Legal Issues in Psychology (3)
- EDP 777 – Seminar in Counseling Psychology (3)
- SW 530 – Responding to Military and Veteran Populations (3)

**TOTAL:** 9 credit hours

## Statistics/Research Design Disciplinary Core

Required Courses

- EPE 558 – Gathering, Analyzing, and Using Educational Data II (3)
- KHP 644 – Research Techniques Applied to Kinesiology and Health Promotion (3)
- KHP 748 – Master's Thesis Research (6)

Suggested Electives (Choose 1)

- KHP 695 – Independent Study in Kinesiology and Health Promotion (3)
- EDP 660 – Research Design and Analysis in Education (3)
- SW 772 – Introduction to Qualitative Research (3)

**TOTAL:** 15 credit hours

**PROGRAM TOTAL:** 39 credit hours (minimum)

# Doctor of Philosophy in Exercise Science

The Ph.D. program offers areas of concentration in Biomechanics or Exercise Physiology. The goal of the program is to provide education to qualified students so that they will have a broad understanding of exercise science, as well as an in-depth knowledge of one specific area or discipline. Graduates of this program will be able to conduct exercise science and/or biomechanics research, teach at the university level, direct discipline specific educational programs, and collaborate with other professionals on various issues related to exercise science/biomechanics. For more information on each concentration area, please visit the departmental website: https://education.uky.edu/khp/grad/

Objectives of the program are to:

- provide a multidisciplinary doctoral program in exercise science with coordinated and expanded course offerings to meet the varied needs and interests of students wishing to pursue a research and/or academic career in the exercise science areas of exercise physiology, biomechanics, and motor control.
- develop scientific expertise and knowledge of resources which will enable students to conduct independent research in their given area of expertise.
- foster cooperative interdisciplinary research.
- provide opportunities for critical interdisciplinary evaluation of current research trends.
- participate in guided research projects of sufficiently complex scope and design to prepare students for conducting their own research.
- prepare leaders to educate others in the area of exercise science.

## Application Requirements

- CV
- Personal Statement: Submit a statement of your professional aspirations and explain how you believe graduate study at the University of Kentucky will enhance your ability to achieve those professional goals. In your statement, provide information about your background, research skills and experiences, personal and professional achievements, and educational, work or life experiences that influenced you and your life goals.
- Writing Sample: Students who have not written a Master's level thesis will be required to submit an example of their research writing. A literature review or project from a completed class are acceptable examples for submission for application. Special circumstances will be considered at the discretion of the applicant's designated potential advisor.
- A Master's degree or graduate level professional (e.g. M.D.) degree from a fully accredited institution of higher learning.
- The Graduate School of the University of Kentucky requires an overall grade point of 3.0 on all prior graduate work and a 2.75 from undergraduate work.
- For the Graduate School, the minimum acceptable TOEFL score is 550 (paper-based) 213 (computer-based), or 79 (internet-based). The minimum IELTS score is 6.5; Submitted scores must be no more than two years old.

- GRE: A combined Verbal and Quantitative GRE score of 297 (minimum verbal score of 153 and Quantitative score of 144) on the revised GRE test.
- Four letters of recommendation are required. A minimum of 3 out of 4 of these letters must be submitted by someone with a terminal degree (i.e. Ph.D., M.D., Ed.D., etc.) and must be from a person with direct knowledge of the applicant's academic capabilities (e.g., instructor, research supervisor, advisor, etc.).

## Degree Requirements

A minimum of 36+ credit hours are required prior to sitting for the qualifying exam, followed by the completion of a dissertation. Determination of a student's particular course plan is made in consultation with the student and his or her approved advisory committee. The dissertation is guided and ultimately approved by the student's dissertation committee.

Each program requires the Exercise Science Core (20 hours), and provides the student with a broad understanding of the various disciplines involved in this field. Each student is also required to take a minimum of 7 hours in research/statistic coursework and 3 hours of computer programming or demonstrate proficiency in programming. Beyond this minimum of 30 hours, the structure and content of the doctoral program are set by an advisor and committee in consultant with each student. The number of formal courses within each area of specialization may vary. It is expected that the depth of knowledge in each area of study comes from independent study and research experiences, in addition to the dissertation, which are under the direction of the faculty. Each student will demonstrate their depth of knowledge by their qualifying exams.

# Doctor of Philosophy in Education Sciences in Health Education

Customize a health education doctorate (Ph.D.) to follow your passion for a career in higher education. This program will prepare students for research-focused faculty positions or careers that involve conducting research on behalf of community health agencies and organizations, corporations, or health-related governmental agencies.

Students will explore both individual and population health, focusing on evidence-based strategies, application of health behavior theory, and research inquiry across a variety of health topics and target populations.

In the health education Ph.D. program at the University of Kentucky, students will:

- develop an understanding of the full spectrum of health education, as well as an in-depth knowledge of one specific area or discipline, such as college health promotion, youth health promotion, substance use prevention, community-based research/interventions, health inequities, and health policy;
- participate in guided research projects designed to prepare you for conducting your own research;
- conduct independent research aligned with your career goals as you develop scientific expertise
- gain teaching experience at the university level, preparing master's students for careers in health education;
- write and publish research in high-quality journals;
- collaborate with faculty on research and service projects;
- have opportunities for multidisciplinary work within health education, health promotion, communication, social sciences, and/or other public health disciplines and topics.

Prospective students are strongly encouraged to identify a faculty member with whom they wish to work prior to applying to the program, as the Ph.D. program in Education Sciences in Health Education utilizes a mentor-based admission process.

## Admission Requirements

- A master's degree or 30 semester hours of approved graduate course work with a 3.0 GPA.
- GRE: A combined Verbal and Quantitative GRE score of 297 (minimum verbal score of 153 and Quantitative score of 144) on the revised GRE taken on August 1, 2011 or after.
- CV
- Personal Statement: Statement of your professional aspirations and explain how you believe graduate study at the University of Kentucky will enhance your ability to achieve those professional goals. In your statement, provide information about your background, research skills and experiences, personal and professional achievements, and educational, work or life experiences that influenced you and your life goals.
- Writing Sample: Students who have not written a master's level thesis will be required to submit an example of their research writing. A literature review or project from a completed

class are acceptable examples. Special circumstances will be considered at the discretion of the applicant's designated potential advisor.

- Four letters of recommendation: At least two must be from a person with direct knowledge of your academic capabilities (e.g., instructor, research supervisor, advisor, etc.).

## Degree Requirements

The Health Education concentration requires a minimum of 42 hours of coursework (beyond those earned for a Masters degree) and 4 hours of dissertation credit hours, for a total of 46 hours. The student's committee may recommend additional hours of coursework, depending on the student's background, experience, and career goals. Additional information, including possible pre-requisites and electives, can be found on the departmental website: https://education.uky.edu/khp/grad/

The general structure of the coursework needed to complete the Ph.D. in Education Sciences with advanced concentration in Health Education course requirements is as follows:

- Pre-requisite courses (based on review of transcripts)
- Health Promotion Core Courses (9 hours)
- Research Methods/Stats Courses (12 hours minimum)
- Cognate Area (9 hours minimum)
- Independent Study/Research (6 hours minimum)
- Electives (6 hours minimum)
- Dissertation Hours (4 hours minimum)

# Doctor of Philosophy in Education Sciences in Physical Education

Students will gain an understanding of the full spectrum of physical education, along with in-depth knowledge of one specific area or disciplines such as comprehensive school physical activity programs, behavior management in activity settings, and motivating individuals to be active. Students will develop extensive subject-matter expertise and discover potential research topics in courses covering physical education, physical activity promotion, epidemiology, sociology, behavioral science, and public health. This Ph.D. program can be completed on campus or in our fully online option.

In the physical education doctorate program (Ph.D.) at the University of Kentucky, students will:

- participate in guided research projects designed to prepare you for conducting your own research;
- conduct independent research as you develop scientific expertise;
- gain teaching experience at the university level, preparing bachelor's and master's students for careers in physical education and health teaching;
- write and publish research in high-quality journals;
- collaborate with faculty on research and service projects; and
- network with physical education teacher educators from across the country and around the world.

## Admission Requirements

- A master's degree or 30 semester hours of approved graduate course work with a 3.0 GPA.
- GRE: A combined Verbal and Quantitative GRE score of 297 (minimum verbal score of 153 and Quantitative score of 144) on the revised GRE test taken on August 1, 2011 or after.
- CV
- Personal Statement: Statement of your professional aspirations and explain how you believe graduate study at the University of Kentucky will enhance your ability to achieve those professional goals. In your statement, provide information about your background, research skills and experiences, personal and professional achievements, and educational, work or life experiences that influenced you and your life goals.
- Writing Sample: Students who have not written a Master's level thesis will be required to submit an example of their research writing. A literature review or project from a completed class are acceptable examples. Special circumstances will be considered at the discretion of the applicant's designated potential advisor.
- Four letters of recommendation: At least two must be from a person with direct knowledge of your academic capabilities (e.g., instructor, research supervisor, advisor, etc.).

## Degree Requirements

Course work will be planned by the advisory committee to complement and extend previous graduate work. Additional information, including possible pre-requisites and electives, can be found on the departmental website: https://education.uky.edu/khp/grad/

**Required Research Methods and Statistics Core (12 hours)**

Includes a minimum of 3 hours of qualitative and 3 hours of quantitative analysis. A total of nine hours must be chosen from either quantitative or qualitative courses. Three additional hours of advanced study are to be selected by the advisory committee to meet the specific research and statistical training needs of the student.

**Advanced Strand (18 hours)**

- KHP 601 – Teaching Effectiveness and Leadership in Kinesiology and Health Education
- KHP 602 – Promoting Physical Activity for Youth*

**Two additional courses in KHP or related area (6+ hours)**

**Other related courses including research courses (6+ hours)**

- KHP 695 – Independent Study in Kinesiology and Health Promotion
- KHP 782 – Independent Research in Kinesiology and Health Promotion

**Dissertation and Independent Studies (18+ hours)**

- KHP 767 – Dissertation Residency Credit (2 hrs/semester after passing qualifying exams)*

# Doctor of Education Sciences in Kinesiology and Health Promotion

The Ed.D. program in Kinesiology and Health Promotion is a high-quality graduate program which aims to respond to the needs of individuals looking to advance their careers. The Ed.D. specialty areas serve professionals from various fields through interdisciplinary and practical experiences, particularly those who desire advanced study to enhance professional knowledge and skills in educational, leadership, industrial, or other appropriate settings.

Our program allows students to explore specific career options and engage in experiential learning within a small classroom environment which fosters personal and individual attention. Our goal is to enable all graduate students to become successful in their academic and professional career.

The Department of Kinesiology and Health Promotion offers two different specializations (Health Promotion and Physical Education) to further interest in a specific area and/or career. Learn more about each specialization below.

## Admission Requirements

- A master's degree or 30 semester hours of approved graduate course work with a 3.0 GPA.
- GRE: A combined Verbal and Quantitative GRE score of 297 (minimum verbal score of 153 and Quantitative score of 144) on the revised GRE test taken on August 1, 2011 or after.
- CV
- Personal Statement: Statement of your professional aspirations and explain how you believe graduate study at the University of Kentucky will enhance your ability to achieve those professional goals. In your statement, provide information about your background, research skills and experiences, personal and professional achievements, and educational, work or life experiences that influenced you and your life goals.
- Writing Sample: Students who have not written a Master's level thesis will be required to submit an example of their research writing. A literature review or project from a completed class are acceptable examples for submission for application. Special circumstances will be considered at the discretion of the applicant's designated potential advisor.
- Four letters of recommendation: At least two must be from a person with direct knowledge of applicant's academic capabilities (e.g., instructor, research supervisor, advisor, etc.).

## Specializations

### HEALTH PROMOTION SPECIALIZATION

The Ed.D. degree with a specialization in Health Promotion prepares students for a career in teaching/mentoring, consulting, policy development, or other leadership roles focused on individual and population health, evidence-based programming, and application of health behavior theory across diverse populations. With the skills and interdisciplinary knowledge students develop through coursework, independent research, community-engaged work, opportunities for teaching and/or

professional service, as well as relationships with faculty mentors, they are prepared to lead in a variety of settings including universities, health promotion agencies at every level, healthcare systems and service organizations, and private industry. The Ed.D. program utilizes a mentor-based admission process. Therefore, students are strongly encouraged to identify a faculty member with whom they wish to work prior to applying to the program.

### Degree Requirements

Our Ed.D. degree with specialization in Health Promotion requires students to complete a minimum of 42 hours of course work. The doctoral degree requires students to complete a core of 9-12 hours of health promotion courses, 9 hours of research/statistics/design courses plus supporting electives for a total of at least 42 hours. Students, with the approval of their advisory committee, select elective course work that will enhance their health promotion knowledge and skills as well as their research skills.

Additional information, including possible pre-requisites and electives, can be found on the departmental website: https://education.uky.edu/khp/grad/

## PHYSICAL EDUCATION SPECIALIZATION

The Physical Education Ed.D. program has a required core of classes and sample of electives with an emphasis in specific areas such as physical education, physical activity promotion, epidemiology, sociology, behavioral science, and public health. The goal is to prepare students to teach courses on physical education methods, physical education curriculum, and physical activity promotion at the undergraduate and graduate level, remain up-to-date on the latest research, network with physical education teacher educators (PETE) from across the country and around the world, and exhibit professional work ethic and behaviors as a PETE student/faculty member.

### Degree Requirements

The Ed.D. program has a required core of classes and sample of electives. The student may have an emphasis in specific areas of education. Additional information, including possible pre-requisites and electives, can be found on the departmental website: https://education.uky.edu/khp/grad/

# Course Descriptions

**EDP 557 GATHERING, ANALYZING, AND USING EDUCATIONAL DATA. (3)** This course is rooted in the conceptual understanding of statistics and covers applications of statistical and graphical methods for educational and evaluation data. Basic descriptive statistics, correlation, normal distributions and hypothesis testing will be covered. An emphasis is placed on exploratory data analysis and interpretation of results within the broad contexts of education and evaluation. Statistical literacy exercises will be used for comprehension and application of materials. In addition, applications of statistical software will be demonstrated. Prereq: MA 109 or equivalent; undergraduate (with permission) or graduate status in the College of Education; or consent of the instructor. (Same as EPE 557.)

**EDP 558 GATHERING, ANALYZING, AND USING EDUCATIONAL DATA II. (3)** The course covers applications of statistical and graphical methods for educational and evaluation data. Topics to be covered include descriptive statistics, correlation, normal distributions, hypothesis testing, regression, ANOVA, and power. General goals include: developing an understanding of statistical concepts, improving reasoning and critical thinking skills, and to prepare for more advanced quantitative courses. Students will gain valuable statistical computing skills via stats Software. Prereq: EDP/EPE 557 or equivalent. (Same as EPE 558.)

**EDP 600 LIFE SPAN OF HUMAN DEVELOPMENT AND BEHAVIOR. (3)** This course is designed to meet the needs of graduate students in the College of Education for a course in theory and principles of developmental theories of individuals across the lifespan. Lifespan developmental psychology is a study of how and why people change over time as well as how and why they remain the same from conception through the aging process. The course is described through three perspectives: physical, cognitive, and psychosocial. Emphasis will be on the major transitions from infancy through young adulthood in the physical, cognitive, social, moral and emotional domains. The impact of ethnic, gender, and cultural factors on development will also be examined.

**EDP 605 INTRODUCTION TO COUNSELING: TECHNIQUES I. (3)** A survey of counseling psychology, philosophy, procedures and practices. Consideration of the roles of the counselor in relation to counseling services in the community and educational settings. In-depth training in initial counseling skills, interviewing (listening) and relationship building skills. Prereq: Acceptance to the graduate program in counseling psychology with the following major codes: RECO, ECGO, CPEC, ECPY, ECPC, CNPS, ESPP, ESPY, ECPP, or consent of instructor via permit.

**EDP 614 MOTIVATION AND LEARNING. (3)** This course will provide a review of current educational and psychological theories of motivation. After examining various theories (e.g., attributions, goals, self efficacy, expectancy X value), the course will examine applications of these theories to contemporary issues such as violence, substance abuse, dropping out of school, health maintenance, etc.

**EDP 642 INDIVIDUAL ASSESSMENT OF PERSONALITY FUNCTIONING. (3)** An in-depth study of the nature and measurement of human emotion, temperament and personality. Laboratory and field experience in the administration, scoring, and interpretation of tests related to personality functioning

and underlying dynamics of personality. May be repeated to a maximum of six credits. Prereq: Successful completion of PSY 535 (or equivalent) with a grade of "B" or better and enrollment in a professional program in Educational, School, and Counseling Psychology.

**EDP 649 GROUP COUNSELING. (3)** An overview of the theoretical bases and practical procedures used in the organization, and effective use of group counseling in the facilitation of psychological and educational goals. Prereq: EDP 605, EDP 652 and EDP 661 (all with grades of "B" or better), or consent of instructor.

**EDP 650 DIAGNOSIS AND PSYCHOPATHOLOGY IN COUNSELING PSYCHOLOGY. (3)** An integrative seminar in diagnosis and application of theories, techniques and assessment tools in Counseling Psychology. Special consideration of classification of psychological states and characteristics including DSM-IV temperament, analysis, and other research methods of integrating assessment and treatment alternatives. Prereq: PSY 535 or equivalent, EDP 652, and EDP 661 (all with a "B" or better) and admission to a program in Educational, School, and Counseling Psychology or consent of the instructor.

**EDP 660 RESEARCH DESIGN AND ANALYSIS IN EDUCATION. (3)** This is a statistics-oriented course that focuses on various aspects of regression analysis (general and generalized linear models). Topics to be covered include, but are not limited to, simple correlation and regression, multiple regression (with and without interaction/moderation terms, with/without nonlinear terms, contrast variable coding for categorical predictors, nested model comparison for hierarchical regression, etc.), regression diagnostics (outlying and influential cases identification and assessment, collinearity evaluation, residual analysis, etc.), logistic regression (with a comparison of the logit model with other commonly used classification models like probit model, decision tree model, etc.), among other things. The course will familiarize students with cleaning data for regression analysis, building regression models, conducting statistical inference of regression models, selecting the optimal regression model(s) for the data in hand, and interpreting regression analysis results using the right language. Students will gain requisite foundation knowledge necessary to learn more complex statistical tests and procedures, and become more critical of statistical presentations in academic journals and the mass media. Students will also become proficient in using at least one major statistics computer program (SPSS, Minitab, SAS, Stata, or R). Prereq: EPE/EDP 558 or consent of instructor. (Same as EPE 660.)

**EDP 688 ETHICAL AND LEGAL ISSUES IN PSYCHOLOGY. (3)** This course is designed to educate students about ethical and legal issues related to the practice of psychology. An emphasis is placed on learning the current APA ethical code of conduct, mental health laws, and ethical decision-making models. Prereq: EDP 605 and 661, or consent of the instructor

**EDP 777 SEMINAR IN COUNSELING PSYCHOLOGY. (1-3)** Topical consideration of philosophical, technical and theoretical positions in counseling theory and practice. May be repeated to a maximum of six credits. Prereq: Consent of instructor.

**EPE 557 GATHERING, ANALYZING, AND USING EDUCATIONAL DATA. (3)** This course is rooted in the conceptual understanding of statistics and covers applications of statistical and graphical methods for educational and evaluation data. Basic descriptive statistics, correlation, normal distributions and

hypothesis testing will be covered. An emphasis is placed on exploratory data analysis and interpretation of results within the broad contexts of education and evaluation. Statistical literacy exercises will be used for comprehension and application of materials. In addition, applications of statistical software will be demonstrated. Prereq: MA 109 or equivalent; undergraduate (with permission) or graduate status in the College of Education; or consent of the instructor. (Same as EDP 557.)

**EPE 558 GATHERING, ANALYZING, AND USING EDUCATIONAL DATA II. (3)** The course covers applications of statistical and graphical methods for educational and evaluation data. Topics to be covered include descriptive statistics, correlation, normal distributions, hypothesis testing, regression, ANOVA, and power. General goals include: developing an understanding of statistical concepts, improving reasoning and critical thinking skills, and to prepare for more advanced quantitative courses. Students will gain valuable statistical computing skills via stats Software. Prereq: EDP/EPE 557 or equivalent. (Same as EDP 558.)

**KHP 547 PSYCHOLOGY OF SPORT AND PHYSICAL ACTIVITY. (3)** An analysis of research findings in the psychology of teaching and coaching with emphasis placed on those factors which influence the acquisition of motor skills as well as on the psychological benefits of exercise and sport. Prereq: Undergraduate psychology course and basic statistics or consent of instructor.

**KHP 577 PRACTICUM IN KINESIOLOGY AND HEALTH PROMOTION. (3 OR 6)** KHP 577 is a three- or six-hour course which focuses on gaining practical experience in the professions of Kinesiology, Health Education and Health Promotion. It provides an opportunity for Kinesiology, Health Promotion minors and majors to apply the theories, knowledge and experiences gained from their coursework to real life situations. Depending on their discipline, students may gain experience in a variety of settings, including but not limited to physical therapy, personal training/fitness facilities, cardiac rehab, health department, student health, non-profit organizations, worksite wellness. Prereq: Exercise Science Majors must obtain Major Status, HEPR, KHPR majors and minors only, or permission by instructor.

**KHP 580 GROUP DYNAMICS IN SPORT AND PHYSICAL ACTIVITY. (3)** This course provides a comprehensive analysis of sport and physical activity from both a social psychological and group dynamics perspective. Sport and physical activity are highly social environments that can have wide and far reaching influence upon those who participate in them. Thus, students enrolled in this course will gain an advanced understanding of the major theories of group development, management, and maintenance, as well as the factors that determine how behavior and performance are affected by interactions with others in the context of sport and physical activity. Finally, students will learn and practically apply techniques related to team building, cohesion, and group work. Prereq: Upper division PHED, KINE majors or HPER, KHPR majors or consent of instructor.

**KHP 601 TEACHING EFFECTIVENESS AND LEADERSHIP IN KINESIOLOGY AND HEALTH EDUCATION. (3)** This course will examine the current research relevant to teacher effectiveness. The development and implementation of practical methods for improving teacher effectiveness in Kinesiology constitute the

primary emphasis of the course. The Kentucky Teacher Standards will be emphasized and used to guide this course.

**KHP 602 PROMOTING PHYSICAL ACTIVITY FOR YOUTH. (3)** The purpose of this course is to provide educators and other professionals with the knowledge and skills necessary to promote physical activity for youth. Current research and philosophies will be presented in a manner that provides a sound philosophical and factual basis for promoting physical activity for youth primarily through schools. Topics such as motivation, health benefits of regular physical activity, physical activity guidelines, and assessment of physical activity will be covered. Students will also be exposed to strategies for increasing physical activity both during the school day and outside of school.

**KHP 605 PSYCHOLOGICAL ASPECTS OF SPORT INJURY AND REHABILITATION. (3)** This course is designed to explore the theory and research related to the psychology aspects of injury and injury rehabilitation. The focus is on theory and application of various psychological concepts. Case studies, research articles, and discussion will be used to explore assessment and intervention approaches relevant for sport medicine and sport psychology professionals. This is a senior level undergraduate course with some non-textbook readings that require students to analyze and summarize journal articles. This course is designed to meet the Psychosocial Strategies and Referral competency, as outlined by the NATA and CAATE.

**KHP 644 RESEARCH TECHNIQUES APPLIED TO KINESIOLOGY AND HEALTH PROMOTION. (3)** This course is intended to provide graduate students with an introduction to the diverse ways of reading, designing, conducting and communicating research in the various areas that comprise kinesiology and health promotion. Specific topics are detailed in the provisional program below. The course will follow a hybrid format in which interactive lectures and online content will be interspersed throughout the semester. This course should be preceded or accompanied by basic statistics. Prereq: This course should be preceded or accompanied by basic statistics.

**KHP 673 HEALTH PROMOTION AND BEHAVIOR CHANGE. (3)** This course focuses on health promotion and behavior change strategies: individual, interpersonal, organizational, community, and public policy will be considered as potential factors that can inhibit or promote behavior change.

**KHP 674 FOUNDATIONS OF HEALTH PROMOTION. (3**) This course is designed to provide students with the foundations of health promotion and education including history, philosophy, and ethics in the field. Prereq: Health-related background and/or course work. Consent of the instructor.

**KHP 676 CURRENT ISSUES AND PROBLEMS IN SPORT MANAGEMENT. (3)** An in-depth analysis of pertinent issues and problems affecting the management of sport and fitness programs. Prereq: Admission to the program or consent from the instructor.

**KHP 677 PLANNING HEALTH PROMOTION PROGRAMS. (3)** This course addresses principles of planning, designing, implementing, and evaluating health promotion and education programs. Prereq: KHP 673 or instructor's permission.

**KHP 683 LEADERSHIP, THEORY, AND PRACTICE IN SPORT AND FITNESS ORGANIZATIONS. (3)** This course is designed to provide students with an overview of the leadership/management concepts, skills, and practices utilized in an ever-changing sport and fitness industry. Prereq: Admission to the department or consent from the instructor.

**KHP 684 DIVERSITY IN SPORT AND FITNESS ORGANIZATIONS. (3)** This course offers an examination of the increasingly prominent diversity-related issues in sport organizations. With references to policy, theoretical frameworks, and a growing body of social science literature, students will explore such issues as, but are not limited to, race/ethnicity, gender, religion, sexual orientation, and disability and the various challenges that have emerged in sport organizations. These information exchanges will ultimately lead us to consider the role of key sport leaders and their strategies (or lack thereof) to promote and effectively maximize the benefits of a diverse workforce. Prereq: Admission to the program or consent of the instructor

**KHP 685 SUPERVISION OF SPORT AND FITNESS PERSONNEL. (3)** A study of the three major functions of the supervisor: planning, directing and controlling and their application to the area of organized sport. Prereq: Admission to the program or consent of the instructor.

**KHP 687 PRACTICUM IN SPORT MANAGEMENT. (3)** Practicum in Sport Management, is designed to provide practical experiences in several areas: 1) office routine; 2) office management; 3) record keeping; 4) budget procedures; and 5) involvement in the general program operations. Prereq: Consent from the instructor.

**KHP 689 INTERNSHIP IN SPORT AND EXERCISE PSYCHOLOGY. (3)** This course is designed for graduate students involved in applied consulting activities in assigned sport or exercise settings. Students in this course agree to follow the ethics code of the Association for Applied Sport Psychology in their practice and will consult with an instructor in a timely way with any ethical-legal issues of concern. Students are also required to engage in 1-hour of supervision (individual or group) for every 10 hours of applied work.

**KHP 695 INDEPENDENT STUDY IN KINESIOLOGY AND HEALTH PROMOTION. (1-6)** A specific topic in kinesiology and health promotion related to the student's interests and program needs is selected for intensive study. Work to be supervised by a graduate faculty member proficient in the area under investigation. May be repeated to a maximum of 18 credits. Prereq: Consent of instructor.

**KHP 720 SPORTS MEDICINE. (3)** A study of the basic areas covered in sports medicine with readings and discussions of current international trends in the research and practice in this field. Prereq: Twelve semester hours; credit in the field of biological sciences; consent of instructor. (Same as AT 720.)

**KHP 748 MASTER'S THESIS RESEARCH. (0)** Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

**KHP 749 DISSERTATION RESEARCH. (0)** Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

**KHP 767 DISSERTATION RESIDENCY CREDIT. (2)** Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

**PSY 610 PSYCHOMETRICS. (3)** Analysis and interpretation of human measurements. The course deals with the application of basic inferential procedures to the analysis and interpretation of psychological data. Required of all graduate students in psychology. Prereq: A course in statistics.

**STA 569 APPLIED STATISTICAL METHODS. (3)** This course is an introduction to research statistics. Topics include exploratory data analysis, random variables (binomial and normal distributions), estimation of proportions and means, correlation, regression, chi-squared tests, and ANOVA. Examples will be drawn from biomedical or professional applications with analysis illustrated in software common to data analysis. Prereq: MA 109 or consent of instructor.

**STA 570 BASIC STATISTICAL ANALYSIS. (3)** Introduction to methods of analyzing data from experiments and surveys; the role of statistics in research, statistical concepts and models; probability and distribution functions; estimation; hypothesis testing; regression and correlation; analysis of single and multiple classification models; analysis of categorical data. Prereq: MA 109 or equivalent.

**STA 580 BIOSTATISTICS I. (2)** STA 580 covers univariate statistical methods commonly encountered in public health studies. This includes descriptive statistics, hypothesis testing, paired and unpaired t tests, ANOVA, contingency tables, log rank test, regression and correlation. Prereq: MA 109 or higher. (Same as CPH 580.)

**SW 530 RESPONDING TO MILITARY AND VETERAN POPULATIONS. (3)** This course provides an overview of social work practice with military members, veterans, and military families. Students will learn to appreciate the unique experiences and stresses of military members and their families, and resultant implications for helping professionals serving this population. Topics to be covered include: (a) Warfare's historical role in shaping public policy, (b) the military as a distinct subculture of American society, (c) common psychosocial problems and stresses experienced by military members, veterans, and military families, (d) a survey of evidenced-based treatments for common psychopathologies and psychosocial problems experienced by this population, (e) an overview of systems of care serving this population, including the roles of social workers within these systems, and special ethical considerations for social workers serving military and veteran populations. Prereq: Open to graduate and upper division undergraduate students.

**SW 772 INTRODUCTION TO QUALITATIVE RESEARCH. (3)** The purpose of this course is to introduce you to the fundamental concepts, language, design, and implementation of qualitative research. The history, characteristics, philosophy, and evaluation of qualitative research will also be a focus, as will the "habits of mind and heart" (Rossman & Rallis, 2003, p. xii) that guide qualitative researchers. The unique contributions that qualitative research can make to the knowledge base in your field of study (with an emphasis on social work) will be underscored. Also addressed in the course are the ways the predominant kinds or approaches to qualitative inquiry shape the design of a study. This course will

involve a variety of small and large group discussions and activities, lectures, hands-on activities, and an individual small-scale qualitative research project.

# Orientation and Mobility

## College of Education

## Master of Arts

The Department of Early Childhood, Special Education, & Counselor Education offers a Master of Arts Program in Orientation and Mobility (O&M). The program uses a hybrid course delivery model, including both face-to-face and on-line courses. Face-to-face courses occur on weekends and in the summer at either the Kentucky School for the Blind (KSB) in Louisville or at the University of Kentucky in Lexington.

The O&M program prepares individuals to provide instruction related to knowledge and skills for independent travel for children and adults with visual impairments, including those with additional disabilities. These professionals teach topics including: the use of canes and dog guides, independent travel skills, sensory and motor development, and advanced travel in complex environments.

The University of Kentucky has the distinction of offering the only O&M program in Kentucky.

### Application Requirements

Applicants must have completed a bachelor's degree in any field with a minimum of 2.75 overall or 3.0 GPA in the last 30 credit hours to apply.

Applications must include the following:

- Resume/CV
- Personal Statement
    - 1-2 page statement on why you want to be an O&M specialist
- Official transcripts from all previous universities or colleges
- Three (3) references
- No GRE scores are required for admission

### Application Information

Go to the Orientation and Mobility – Graduate page at: https://www.uky.edu/academics/masters/orientation-and-mobility-graduate and follow the "Apply Now" link. In the "Plan of Study" the Admission Category should read "Masters degree", then "Orientation and Mobility" for the Program. Applications are accepted in the spring on even years for a fall semester start of that year.

## Degree Requirements

Program completion requires passing grades in all prerequisite and required coursework totaling a minimum of 30 credit hours with an overall GPA of 3.0. Candidates must complete a successful practicum and internship, as well as satisfactory demonstration of all program standards.

### Practicum and Internship Requirements

After coursework is finished, candidates must complete an O&M internship in educational and rehabilitative settings totaling 350 hours as needed for national certification to become a Certified Orientation and Mobility Specialist (COMS). The Kentucky Education Professional Standards Board provides a provisional and professional certificate for O&M specialists (16 KAR 2:210) working in the schools and requires that professionals complete 150-hours of their internship or other O&M instruction with children with visual impairments.

### Required Program Coursework

- RC 525 Human Growth and Development (3)
- BVI 620 Foundations of Orientation and Mobility (3)
- BVI 621 Introduction to Skills and Techniques in Orientation and Mobility (2)
- BVI 622 Advanced Skills and Techniques in Orientation and Mobility (2)
- BVI 623 Orientation and Mobility with Children (3)
- BVI 624 Technology in Orientation and Mobility (1)
- BVI 626 Methods in Orientation and Mobility (3)
- BVI 627 Orientation and Mobility for Individuals with Complex Needs (3)
- BVI 628 Assessment in Orientation and Mobility (3)
- BVI 629 Practicum in Orientation and Mobility (1)
- BVI 720 Internship in Orientation and Mobility (6)

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**Total 30 Credits**

### Prerequisite Coursework

- BVI 580 Introduction to Visual Impairment (3)
- BVI 582 Anatomy and Physiology of the Eye (3)
- BVI 583 Braille Codes I (3)

For candidates who have not already completed the prerequisite courses in visual impairments at the University of Kentucky or another institution, these three courses can be taken concurrently with the required O&M coursework. All prerequisite coursework transferred in from other institutions must have a grade of no less than a B or equivalent and must be approved by the program's Director of Graduate Studies (DGS).

# Course Descriptions

**RC 525 HUMAN GROWTH, DISABILITY, AND DEVELOPMENT ACROSS THE LIFESPAN. (3)** This course provides a comprehensive study of human growth and development in the context of rehabilitation and clinical mental health counseling. Students will review human development theories across the life span and their implications and applications with persons with disabilities. Issues to be addressed include physical, emotional, moral, and cognitive development and the interaction of development and disability; human sexuality and disability; spirituality and religious aspects; transition issues as they relate to family, school, employment, aging, and disability; social and learning needs of individuals across the life span, and ethical and legal issues impacting individuals and families related to adjustment and transition. Prereq: Admission to the Rehabilitation Counseling Program or consent of instructor.

**BVI 580 INTRODUCTION TO VISUAL IMPAIRMENTS. (3)** This course will provide an introduction to the educational programs and services for students with blindness and visual impairments. Content of this course will focus on the historical foundation of the field, the developmental and psychosocial aspects of individuals with visual impairments, an overview of legislation, influential agencies, and service delivery methods. The impact of vision loss on early childhood development will also be covered. Prereq: Admission to the Teacher Preparation Program in Visual Impairments, Orientation and Mobility program, or instructor permission required.

**BVI 582 ANATOMY AND PHYSIOLOGY OF THE EYE. (3)** This course will cover the anatomy and physiology of the eye, including visual development. Causes of ocular and neurological visual impairment will be addressed, treatments, and their impact on learning. Course topics will include optics, low vision devices and services, environmental adaptations, and interpreting eye reports. Learners will have the opportunity to directly observe a low vision evaluation and will learn the components of a functional vision assessment. Prereq: Admission to the Teacher Preparation Program in Visual Impairments, Orientation and Mobility program, or instructor permission required.

**BVI 583 BRAILLE CODES I. (3)** This course is designed to teach the literary braille code. Students will become proficient in transcribing both uncontracted and contracted braille utilizing a Perkins Brailler, slate and stylus, and six-key entry computer software with proper formatting. Students will also learn appropriate techniques for reading braille both tactually and visually. In addition, the history of the braille code will be covered as well as current resources. Prereq: Admission to the Teacher Preparation Program in Visual Impairments, Orientation and Mobility program, or instructor permission.

**BVI 620 FOUNDATIONS OF ORIENTATION AND MOBILITY. (3)** A fundamental course in the history and development of Orientation & Mobility programs, educational and rehabilitation models, and mobility systems. Philosophies, practices, standards, and ethics of O&M will be also discussed. Prereq: Admission to the Orientation and Mobility Program or instructor permission is required.

**BVI 621 – INTRODUCTION TO SKILLS AND TECHNIQUES IN ORIENTATION AND MOBILITY. (2)** This course is an Introduction to skills and techniques used by individuals with visual impairments and instructional strategies to facilitate independent travel including the use of the long cane and adaptive

mobility devices. Emphasis will be placed on the methods of independent travel. Students will have practical experience in traveling under blindfold and vision loss simulators in indoor, residential, and small business environments. Prereq: Admission to the Orientation and Mobility Program or instructor permission is required.

**BVI 622 ADVANCED SKILLS AND TECHNIQUES IN ORIENTATION AND MOBILITY. (2)** The course will focus on advanced skills and techniques used by individuals with visual impairments for independent travel in business and complex environments. Students will have practical experience in the use of the long cane and travel under blindfold and vision loss simulators. Students will gain experience in planning lessons and teaching skills to each other under instructor supervision. Prereq: Admission to the Orientation and Mobility program and instructor permission.

**BVI 623 ORIENTATION AND MOBILITY FOR CHILDREN. (3)** The course will address the impact and effects of a visual impairment on the overall development of children with visual impairments. Course topics will include information on locomotion, concept development, O&M skill acquisition and performance for children with visual impairments. Instructional methods, strategies, and materials for teaching Orientation & Mobility concepts and skills will also be covered. Prereq: Admission to the Orientation and Mobility program and instructor permission.

**BVI 624 TECHNOLOGY IN ORIENTATION AND MOBILITY. (1)** The course will be an introduction to the use of electronic travel aids and electronic orientation aids as a secondary mobility system for individuals with visual impairments. The advantages and disadvantages of using electronic travel devices will be identified along with instructional strategies to incorporate the use into lessons. There will be hands-on experience with using electronic devices with an emphasis on the use of cellphone applications. Prereq: Admission to the Orientation and Mobility Program or instructor permission is required.

**BVI 626 METHODS IN ORIENTATION AND MOBILITY. (3)** The course will address a variety of topics, strategies, and approaches related to Orientation and Mobility instruction for individuals with visual impairments. Content will focus on adult rehabilitation, low vision, and low vision devices, mobility systems, echolocation, and Flash Sonar. The course content will also include instructional approaches used to assessing environments, teach complex travel environments and intersections, adapt for adverse weather conditions, and use various transportation systems. Prereq: Admission to the Orientation and Mobility program and instructor permission.

**BVI 627 ORIENTATION AND MOBILITY FOR INDIVIDUALS WITH COMPLEX NEEDS. (3)** The course will discuss the impact and effects of health conditions and other disabilities among individuals with visual impairments on concept development, learning, and skill acquisition on O&M. Course content will discuss the roles of professionals in addressing complex needs of individuals with visual impairments and deaf-blindness. It will focus on instructional methods and strategies to address complex needs in an educational and rehabilitation setting. Prereq: Admission to the Orientation and Mobility program and instructor permission.

**BVI 628 ASSESSMENT IN ORIENTATION AND MOBILITY. (3)** The course will address strategies and methods for evaluating an individual with a visual impairment and assessing an individual's progress in Orientation and Mobility. Learners also will analyze assessment results to develop and implement appropriate O&M goals and objectives. Other content will include the strategies to select and analyze environments for safety, instruction, and assessment. Prereq: Admission to the Orientation and Mobility program and instructor permission.

**BVI 629 PRACTICUM IN ORIENTATION AND MOBILITY. (1)** The practicum in Orientation and Mobility will consist of supervised, field-based experience in various settings ranging from preschool, school-based, adult rehabilitation, and geriatric settings. Site approval is required by the program coordinator. Prereq: Instructor permission.

**BVI 720 INTERNSHIP IN ORIENTATION AND MOBILITY. (1-6)** Supervised professional experience for candidates in Orientation & Mobility will be offered in an educational or rehabilitation setting serving individuals with visual impairments. A minimum of 350 hours is required. This may be completed either on a fulltime or part-time basis. Prereq: Completion of Orientation & Mobility coursework and instructor permission is required.

# Special Education

## College of Education

Students may enroll for either degree and/or certification graduate programs in the Department of Early Childhood, Special Education, and Rehabilitation Counseling. Information about programs in Rehabilitation Counseling and Early Childhood Special Education can be found elsewhere in this document under those headings. Students seeking initial or additional certification at the graduate level in Moderate/Severe Disabilities are eligible for a Temporary Provisional Teacher Certification through the alternate certificate program. Certification in Learning and Behavior Disorders at the graduate level is also available to those who already hold a teaching certificate in another area.

An advanced program of study (i.e., not initial certification programs) leading to the Special Education Teacher Leader master's degree for a Rank II are available with tracks of focus in the following areas:

1. Learning and Behavior Disorders
2. Moderate/Severe Disabilities
3. Assistive Technology

The degree programs that are offered lead to the Master of Science in Special Education, Specialist in Education, and Doctor of Philosophy degrees. Within the framework of College and University requirements, all advanced graduate degree programs are individually planned. This flexibility makes it possible to structure an appropriate program for each student, based upon previous background and career aspirations. Following are brief descriptions of the various graduate degree programs.

Minimum hours for the Master of Science in Education Degree are distributed as follows:

| | |
|---|---|
| Department of Special Education and Support Areas in the College | (30) |
| TOTAL | (30) |

It should be noted that these are minimum requirements. Program deficiencies may result in programs of study that exceed the minimum. Program faculty or the Director of Graduate Studies should be contacted to obtain the specific number of courses required for each program of study.
At least half of the required semester hours must be earned in courses at the 600-700 level (excluding practica, independent study, and thesis hours). All students also are required to take the following courses: Applied Behavioral Analysis, Behavioral Consultation in the Schools, Methods for Teaching Students with Disabilities, Single Subject Research Design, an advanced curriculum course, Leadership in Special Education, 9 hours in their respective program areas, and 2 – 5 hours in designated leadership coursework. In addition, a thesis is required of all Master of Science in Education students in the Department of Special Education.

Students entering without a teaching certificate and who plan to receive an M.S. degree and teach in a Special Education certificate area must meet certificate program deficiencies, including certification requirements, as outlined by their advisor, in addition to completing the degree requirements listed above. Depending on their program of studies, students may obtain Rank II or Rank I certification concurrently with their master's degrees.

General requirements for the Specialist in Education (Ed.S.) degree have been described in a previous

section of this Bulletin. Ed.S. programs are individually planned for in-depth study in an area of special education and require a research project and written product for completion.

The Doctor of Philosophy (Ph.D.) program is designed to prepare leadership personnel for the field of special education. Primary emphasis is placed upon training persons for positions in higher education personnel preparation, technology applications in special education programs, distance education, and research in special education. Within the context of personnel preparation in special education, various program areas of emphasis can be planned.

**Admission Requirements**
Department standards for admission to graduate work in special education are similar to those of the Graduate School. However, there are some additional requirements. All potential graduate students within the department must complete an application to the Graduate School and the program. This combined application can be found on the Graduate School website and is an electronic application called Apply Yourself.

This application requires each student to submit (a) transcripts from each previously attended institution of higher education to the department, (b) letters of recommendation, (c) the Graduate Record Examination, and (d) an outline of professional goals and objectives. In addition to the above, students applying for admission to the department's doctoral program must (a) submit a sample of professional writing, (b) submit an autobiographical statement, and (c) interview with the departmental faculty.

These interviews generally occur on campus but can be arranged through phone or electronic means if necessary. It should be noted that applicants who are pursuing a degree with a teaching certificate must be admitted to the College of Education's Teacher Education Program. Requirements for admission to this program vary by discipline. Potential students should contact the department's Director of Graduate Studies for additional information.

Financial assistance maybe available, on a competitive basis, to graduate students in special education. Students may apply for graduate assistantships at all levels of graduate study. Scholarships and assistantships are awarded from funds that may be granted to the Department by the Office of Special Education and Rehabilitation Services, U.S. Department of Education as well as other funding sources.

## Course Descriptions

EDS 513 LEGAL ISSUES IN SPECIAL EDUCATION. (3)
A review of pertinent legislation concerning human and constitutional rights related to persons with disabilities. Teachers' specific responsibilities and liabilities are described and related to current requirements for development of appropriate educational programs. Emphasis is given to how, through active parent participation, teachers can facilitate each student's developmental progress. Prereq: EDS 375 or consent of instructor.

EDS 514 INSTRUCTIONAL TECHNOLOGY IN SPECIAL EDUCATION. (3)
An overview of ways technology can be used to facilitate the education of students with disabilities. Topics include personal computer operation, personal productivity tools, instructional software evaluation and integration into the curriculum, multimedia applications, telecommunications, and emerging technologies. Lecture, three hours; laboratory, two hours per week. Prereq: EDS 375 or EDP 203.

EDS 516 PRINCIPLES OF BEHAVIOR MANAGEMENT AND INSTRUCTION. (3)
Basic principles of applied behavior analysis and modification which employ social learning theory

and operant conditioning models are taught. Emphasis is placed on designing individualized learning environments, selecting and implementing behavior management strategies, writing behavior objectives, and performing task analyses. Prereq: EDS 375 or permission of the instructor.

EDS 517 ASSISTIVE TECHNOLOGY IN SPECIAL EDUCATION. (3)
This course is designed to enable students to critically discuss issues relating to the educational, psychosocial, medical, and therapeutic aspects of teaching students with specific cognitive, physical, and sensory disabilities and health impairments. Students will learn to use assistive technology. This will include selecting appropriate adaptive devices/strategies, programming for their use in an educational setting, and identifying professionals who support these selections. The conceptual underpinning of the course is based on the Human Function Model which identifies assistive technologies to assist with the areas of existence; communication; body support, alignment and positioning; travel and mobility; education and transition; environmental adaptation; and sports, recreation, and leisure. Prereq: EDP 203 or EDS 375 or equivalent; or permission of the instructor. Coreq: EDS 301.

EDS 518 BEHAVIOR MANAGEMENT IN APPLIED SETTINGS. (3)
Principles of behavior analysis will be used to determine behavioral functions and intervention development for students exhibiting challenging behaviors within the schools. The course will focus on the key tenants of functional behavioral assessments and behavior intervention planning, with special attention to the provisions of indirect services to students. Field experiences are required as part of this course. Coreq: EDS 401 or permission of instructor.

EDS 522 CHILDREN AND FAMILIES. (3)
The purpose of this course is to provide students with information related to working with young children with and without disabilities and their families. This course will focus both on presenting new information and providing opportunities for students to practice skills necessary for working with families. (Same as IEC 522.)

EDS 526 INTRODUCTION TO SPECIAL EDUCATION ASSESSMENT AND PROGRAM PLANNING. (3)
This course provides an introduction to the procedures used in determining special education eligibility and subsequent program planning for students with disabilities. Emphasis is placed on understanding various assessment processes, instruments, norm-referenced and curriculum-based scores, and individualized educational program planning. Prereq: EDS 375, EDS 513, and EDS 516.

*EDS 528 READING AND LANGUAGE ARTS ASSESSMENT AND METHODS FOR STUDENTS WITH MILD TO MODERATE DISABILITIES. (3)
EDS 528 focuses on designing, implementing, and evaluating individualized reading and language arts programs based on the educational characteristics of children with learning and behavior disorders in elementary and secondary school. This course also addresses the procedures needed for assessing the educationally relevant strengths and weakness in reading and language arts using informal and formal evaluation measures. Prereq: Admission to Teacher Education Program, EDS 570, EDS 516, and/or permission of the instructor. Coreq: EDS 401.

*EDS 529 MATHEMATICS ASSESSMENT AND METHODS FOR STUDENTS WITH MILD TO MODERATE DISABILITIES. (3)
EDS 529 focuses on designing, implementing, and evaluating individualized mathematics programs based on the educational characteristics of children with learning and behavior disorders in elementary and secondary school. This course also addresses the procedures needed for assessing the educationally relevant strengths and weakness in mathematics using informal and formal evaluation measures. Prereq:

Admission to Teacher Education Program, EDS 528, EDS 570, EDS 516, and/or permission of the instructor. Coreq: Students must also be concurrently enrolled in EDS 402.

EDS 530 MODERATE AND SEVERE DISABILITIES.
Special education issues with individuals exhibiting moderate to severe intellectual and developmental disabilities. A critical examination of contemporary research with regard to the educational, behavioral, developmental issues of individuals exhibiting moderate to severe intellectual and developmental disabilities. Issues and research describing the full educational inclusion and community integration of persons with moderate to severe intellectual and developmental disabilities will be addressed. Lecture, three hours. Prereq: Junior or graduate student status. Coreq: Should occur concurrently with EDS 301; or permission of instructor.

EDS 546 TRANSDISCIPLINARY SERVICES FOR STUDENTS WITH DISABILITIES: TRANSITION. (3)
This course is designed as an examination of the critical issues of transition from school to work and post-secondary education for students with disabilities. As such, this course is appropriate for both graduate students in special education and those in rehabilitation counseling. Given the increasing numbers of students with disabilities, including intellectual disabilities, who are attending post-secondary education programs, this course will provide equal emphases to work and post-secondary education, as well as to other critical life domains (community living, recreations, social networks, financial and legal issues involved in transition). Finally, this course will address the broad spectrum of youths and young adults with disabilities – including students with the most significant disabilities, as well as students with more mild disabilities. Prereq: EDS 375 or permission of instructor.

EDS 547 COLLABORATION AND INCLUSION IN SCHOOL AND COMMUNITY SETTINGS. (3)
This course will focus on inclusion of students with moderate to severe disabilities in all aspects of school and community life, with special consideration given to the individual student planning variables that must be addressed in meeting the needs of each school-age student and for preparing students to function as fully and independently in their communities as possible. The course is designed to meet the needs of those pursuing certification in Moderate and Severe Disabilities and pursuing degrees in Elementary and Secondary Education, Vocational Rehabilitation, School Psychology, Social Work, Physical Therapy, Communication Disorders, and related disciplines. Prereq: Consent of instructor. (Same as RC 547.)

EDS 548 CURRICULUM DESIGN FOR STUDENTS WITH MODERATE AND SEVERE DISABILITIES. (3)
This course is designed to expand student's knowledge and skills in administering, interpreting, and utilizing a variety of assessment instruments and procedures (standardized and informal) for the purpose of program planning specifically for students with moderate and severe disabilities. Students will learn about transdisciplinary assessment processes and how to facilitate collaboration between the various related service providers when assessing students. Students will use assessment results to plan individualized instruction for students using a transdisciplinary model. Prereq: Admission to Teacher Education Program, EDS 516, EDS 530, or permission of the instructor; coreq: students enrolled in this course must also be concurrently enrolled in EDS 402.

EDS 549 METHODS FOR STUDENTS WITH MODERATE AND SEVERE DISABILITIES. (3)
This course is designed to introduce students to instructional strategies typically used with students classified with moderate and severe disabilities. Throughout the semester, course participants will be presented with information on how to organize and present instruction to students with moderate to severe disabilities across environments. The implementation of these skills is assessed through written products and classroom performance in school settings. Class meetings are two and one half-hours per

week. Prereq: Admission to Teacher Education Program, EDS 516. Coreq: Occurs concurrently with EDS 401; or, permission of instructor.

EDS 550 STUDENT TEACHING: SPECIAL EDUCATION. (12)
Supervised student teaching in a classroom for students with disabilities utilizing contemporary curricula, assessments, methods, and materials designed for use with children exhibiting moderate severe developmental or intellectual disabilities and learning and behavior disorders. Student teachers are required to demonstrate attainment of the Kentucky Teacher Standards. Student teachers will be evaluated on these competencies by the university supervisor and the supervising classroom teacher throughout the student teaching placement. EDS 550 is offered on a letter grade basis only. Prereq: Published University, College and Departmental requirements (see appropriate section of the most recent UK Bulletin) for admission to student teaching; admission to the Teacher Education Program or permission of instructor. Successful completion of all EDS Core Moderate/Severe Disabilities (MSD) and Learning and Behavior Disorders (LBD) Certification Area course work. EDS 550 is the final certification requirement in the special education teacher undergraduate program. Prior to entering this course, the special education major will have successfully completed all MSD and LBD Area and EDS CORE practica in a variety of learning environments serving the needs of children exhibiting moderate to severe intellectual or developmental disabilities and learning and behavior disorders.

EDS 558 ISSUES IN SPECIAL EDUCATION. (1-9)
In-depth study of a current and topical problem or issue in the education of exceptional children and youth. May be repeated to a maximum of nine credits. A title is assigned each time the course is offered.

EDS 570 CHARACTERISTICS OF LEARNING AND BEHAVIORAL DISABILITIES. (3)
The learning and behavioral problems of exceptional children and youth are considered in the context of normal child development. A survey of the major categories of learning and behavioral disabilities including identification, description and etiology, with material drawn from clinical, theoretical, and research sources. Approaches to remediation cover both community resources and the roles of various professional personnel. Prereq: EDS 375 or equivalent. Coreq: This course will be taken concurrently with EDS 301; or, permission of instructor.

EDS 580 INTRODUCTION TO VISUAL IMPAIRMENTS. (3)
This course will provide an introduction to the educational programs and services for students with blindness and visual impairments. Content of this course will focus on the historical foundation of the field, the developmental and psychosocial aspects of individuals with visual impairments, an overview of legislation, influential agencies, and service delivery methods. The impact of vision loss on early childhood development will also be covered. This course requires one weekend at the Kentucky School for the Blind in Louisville. Prereq: Admission to the Teacher Preparation Program in Visual Impairments or instructor permission required.

EDS 581 METHODS FOR TEACHING STUDENTS WITH VISUAL IMPAIRMENTS. (3)
This course is designed to examine how to teach and modify the core curriculum for students who are blind or visually impaired. Topics will include: adaptation of general education classroom materials, IEP development and implementation, lesson planning, and braille literacy. Prospective teachers will develop organization skills and strategies necessary to be efficient in delivery of services as a teacher of the visually impaired. This course requires one weekend at the Kentucky School for the Blind in Louisville as well as attendance at the Kentucky AER Conference. Prereq: Admission to the Teacher Preparation Program in Visual Impairments and successful completion of EDS 580 or instructor permission.
EDS 582 ANATOMY AND PHYSIOLOGY OF THE EYE. (3)
This course will cover the anatomy and physiology of the eye, including visual development. Causes of

ocular and neurological visual impairment will be addressed, treatments, and their impact on learning. Course topics will include optics, low vision devices and services, environmental adaptations, and interpreting eye reports. Learners will have the opportunity to directly observe a low vision evaluation and will learn the components of a functional vision assessment. This course requires one weekend at the Kentucky School for the Blind in Louisville. Prereq: Admission to the Teacher Preparation Program in Visual Impairments or instructor permission required.

EDS 583 BRAILLE CODES I. (3)
This course is designed to teach the literary braille code. Students will become proficient in transcribing both uncontracted and contracted braille utilizing a Perkins Brailler, slate and stylus, and six-key entry computer software with proper formatting. Students will also learn appropriate techniques for reading braille both tactually and visually. In addition, the history of the braille code will be covered as well as current resources. This course requires one weekend at the Kentucky School for the Blind in Louisville. Prereq: Admission to the Teacher Preparation Program in Visual Impairments or instructor permission.

EDS 584 BRAILLE CODES II. (3)
This course studies braille codes with a special emphasis on the Nemeth Code (Braille Mathematics). Other codes covered are music, foreign language (French, German, and Spanish), and computer braille. Braille formats will also be taught, including how to correctly transcribe and format materials for braille users, including preparing worksheets and tests for students. Competency in using the Cranmer Abacus will also be mastered. This course requires one weekend at the Kentucky School for the Blind in Louisville. Prereq: Admission to the Teacher Preparation Program in Visual Impairments or instructor permission.

EDS 585 ASSISTIVE TECHNOLOGY FOR STUDENTS WITH VISUAL IMPAIRMENTS.
This course introduces a wide variety of technologies for people who are blind or visually impaired. Students will learn about Universal Design for Learning (UDL) as it relates to technology, as well as proprietary software and hardware. Technologies covered include, but are not limited to: Screen readers, screen magnification, electronic note takers, refreshable braille displays, braille translation programs, magnification hardware, scanning and OCR programs, and accessible digital book options. A wide variety of computers, tablets, and smart phone options will be explored. Instructional strategies for teaching technology skills will be emphasized. In-state students are required to attend class at the Kentucky School for the Blind in Louisville and will need to choose the section of the course related to the off-site campus. Out-of-state students will take the course online and should register for the distance learning section. Prereq: Admission to the Teacher Preparation Program in Visual Impairments or instructor permission.

EDS 586 EXPANDED CORE CURRICULUM FOR BLIND AND VISUALLY IMPAIRED. (3)
The Expanded Core Curriculum (ECC) is the body of knowledge and skills that are needed by students with visual impairments due to their unique needs. This course will explore all nine areas of the ECC including: compensatory or functional academic skills, orientation and mobility, social interaction skills, independent living skills, recreation and leisure skills, career education, use of assistive technology, sensory efficiency skills and self-determination. Participants will have the opportunity to observe and work with students in a summer program and teach skills from the ECC. In-state students are required to attend class at the Kentucky School for the Blind in Louisville as well as complete practicum hours at various locations throughout the state. In-state students will need to choose the section of the course related to the off-site campus. Out-of-state students will take the course online and should register for the distance learning section. Prereq: Admission to the Teacher Preparation Program in Visual Impairments or instructor permission.

EDS 587 VISUAL IMPAIRMENTS AND MULTIPLE DISABILITIES. (3)
This course is designed to provide students with knowledge and skills necessary to design and implement

programs for persons who have visual impairments and additional disabilities. Topics include assistive technology, augmentative and alternative communication, literacy instruction, sensory processing, adaptive behavior, and self-help skills. An emphasis will be placed on adaptations that enhance functioning for persons with developmental delays, autism, medical conditions, deaf-blindness, communication disorders, and those with common syndromes and eye disorders related to multiple disabilities. This course requires a weekend at the Kentucky School for the Blind in Louisville. Prereq: Admission to the Teacher Preparation Program in Visual Impairments or instructor permission.

EDS 588 ASSESSMENT OF STUDENTS WITH VISUAL IMPAIRMENTS. (3)
This course covers various types of assessments used to evaluate students who are blind or visually impaired. Participants will discuss testing and assessment including the development of standardized tests and their applicability for individuals with visual impairments, as well as alternate assessments. Students will practice assessing and planning educational programs for students with visual impairments by completing a Functional Vision/Learning Media Assessment, as well as assessments in assistive technology and the Expanded Core Curriculum. This course is designed to be taken in conjunction with student teaching/internship in visual impairments. This course requires a weekend at the Kentucky School for the Blind in Louisville. Prereq: Admission to the Teacher Preparation Program in Visual Impairments or instructor permission.

EDS 589 FIELD EXPERIENCES: MILD DISABILITIES. (3)
Supervised pre-student teaching experiences with children having learning and behavioral disabilities, including practica experience with public school students in at least two different special education sites. Approximately two hours lecture-discussion and two three-hour observations and/or practica per week. Prereq: EDS 513, 516, admission to the Teacher Education Program; or consent of instructor. Prereq. or concur: EDS 528. Must takes EDS 529 concurrently. Must not take concurrently with the Middle School methods block (EDS 330, EDS 343, and two methods classes).

EDS 590 STUDENT TEACHING/FIELD EXPERIENCE IN VISUAL IMPAIRMENTS. (3-12)
This is a supervised student teaching/field experience working with children, preschool through graduation age, who are blind or visually impaired. Candidates will apply best practices for working with children who are blind or have low vision, including those with additional disabilities. Successful completion of this course will demonstrate the candidate's ability to apply methods of teaching that include assessment, program planning and implementation, appropriate environmental and academic modifications, and instruction in the Expanded Core Curriculum. Candidates will also have to demonstrate appropriate classroom and/or caseload management strategies based on their placement. Prereq: Successful completion of EDS 580, 581, 582, 583, 584, 585, 586, and 587 or instructor permission.

EDS 600 SURVEY OF SPECIAL EDUCATION.
A survey of current status of the field of special education. Emphasis is on analysis of the major research literature pertaining to exceptional children and their education. Prereq: Graduate standing.

EDS 601 APPLIED BEHAVIORAL ANALYSIS. (3)
The focus of this course is on the technology of applied behavior analysis, including the functional analysis of children's behavior and the development, implementation, evaluation of behavior management programs with children and youth. Prereq: Completion of EDS 516 or equivalent, with a grade of "B" or better.

EDS 602 ADMINISTRATION AND PROGRAMS IN SPECIAL EDUCATION. (3)
The organization, management and supervision of programs for exceptional children at the local, state and national levels. Roles and functions of the special education administrator are considered. Experiences

drawn from special residential, private and public day schools are studied. Prereq: Certification in special education; six hours of course work in educational administration and supervision.

EDS 603 BEHAVIORAL CONSULTATION IN THE SCHOOLS. (3)
Principles and techniques of behavioral consulting with classroom teachers and other school personnel, with particular focus on supporting handicapped children in mainstream education programs. The consultant's role in providing indirect service to children, through inservice teacher training and consultation, is emphasized. Lecture, two hours; laboratory, two hours. Prereq: EDS 601, or equivalent; EDP 671 (may be taken concurrently); or permission of instructor.

EDS 604 SPECIAL EDUCATION FOR SECONDARY EDUCATION. (1)
This course is designed for secondary teachers who encounter students who require special education services. As such, it is intended to provide an in-depth examination of issues in the education of individuals with disabilities. The course is organized in a seminar format with the intent of creating a dialogue among the participants and the instructors. Emphasis will be placed on the development of concepts and the acquisition of a body of knowledge, which relate to issues, processes and procedures to facilitate the inclusion of all student and collaboration across disciplines. The course takes a broad view of inclusion in all aspects of school and community life. Special consideration is given to the individual student planning variables that must be addressed in meeting the needs of each school-age student with a disability in a variety of integrated school and community settings. Prereq: Admission to the M.A. in Education – Secondary with Initial Certification.

EDS 605 PRACTICAL APPLICATIONS OF APPLIED BEHAVIOR ANALYSIS. (3)
In this course students will expand their understanding of Applied Behavior Analysis (ABA) by learning how to design and evaluate behaviorally based programs that address academic (e.g., learning to learn), adaptive (e.g., self-care), communication (e.g., naturalistic strategies; verbal behavior), social (e.g., initiations), and other related skills (e.g., imitation; self-management) in persons with or at-risk for disabilities and provide training and feedback when working with families and professionals. In addition, students will receive training on writing and modifying behavior intervention plans, with an emphasis on conducting functional analyses. Prereq: EDS 601 (or equivalent); EDS 630 recommended.

EDS 610 ADVANCED EDUCATIONAL ASSESSMENT FOR STUDENTS WITH MILD DISABILITIES. (3)
This course examines factors that contribute to the reliable and valid measurement and diagnosis of students with mild disabilities. Emphasis is placed on evaluating standardized, norm-referenced instruments according to their technical characteristics and merits, developing curriculum-based measures for classroom use, and critiquing emerging systems of determining eligibility for special education Prereq: EDS 528 or consent of instructor.

EDS 611 CONTEMPORARY TRENDS AND ISSUES IN THE EDUCATION OF STUDENTS WITH MILD DISABILITIES. (3)
This course examines trends and issues in the education of students with mild disabilities (e.g., learning disabilities, mild cognitive disability, ADHD, and emotional/behavioral disabilities). The professional literature is examined to identify emerging methods of effective instruction as well as points of controversy in identification, placement, and service. Prereq: EDS 529 and EDS 610 or consent of instructor.

EDS 612 ADVANCED PRACTICUM: SPECIAL EDUCATION. (1-6)
Intensive clinical experience with exceptional children in day and residential schools, hospitals and private agencies. Students engage in prescriptive teaching with persons with disabilities in individualized, small group and special class settings. Laboratory, 6-12 hours per week. Prereq: Graduate Standing; major in

Special Education, Applied Behavior Analysis, or permission of the instructor.

EDS 613 LEGAL AND PARENTAL ISSUES SCHOOL ADMINISTRATION.
This course is designed as a required course for certification in the school administration program or elective in graduate or post baccalaureate degree. Essential course questions will emphasize the delivery of a free and appropriate public education for children with disabilities within a practical application format that is accessible and useful to educational professionals. In addition, the course will consider the implications of federal requirements in state and local policy. Particular attention will be given to leadership within an educational reform environment as well as the legal and programmatic implications for children with disabilities and their families. Finally, the course will model appropriate ways in which educational professionals working with families can maximize educational results for children with and without disabilities. Prereq: Be admitted to an Administrator preparation program, or received permission of instructor. (Same as RC 613.)

EDS 614 PROFESSIONAL ETHICS IN BEHAVIOR ANALYSIS I. (1)
This 1-credit hour course is part of a three-course sequence designed to address ethical, behavioral, and professional conduct for behavior analysts. This course will address content related to the BACB Disciplinary and Ethical Standards and Disciplinary Procedures, as well as the Guidelines for Responsible Conduct for Behavior Analysts. This course prepares students to apply for the Board Certified Behavior Analyst exam. (Must be taken as Co-Requisite to EDS 612: Practicum in Special Education). Prereq: Entrance into the Board Certified Behavior Analyst program, Master's in Applied Behavior Analysis program or permission of instructor.

EDS 615 PROFESSIONAL ETHICS IN BEHAVIOR ANALYSIS II. (1)
This 1-credit hour course is part of a three-course sequence designed to address ethical, behavioral, and professional conduct for behavior analysts. This course will address content related to the BACB Disciplinary and Ethical Standards and Disciplinary Procedures, as well as the Guidelines for Responsible Conduct for Behavior Analysts. This course prepares students to apply for the Board Certified Behavior Analyst exam. (Must be taken as Co-Requisite to EDS 612: Practicum in Special Education). Prereq: Entrance into the Board Certified Behavior Analyst program, Master's in Applied Behavior Analysis program or permission of instructor.

EDS 616 PROFESSIONAL ETHICS IN BEHAVIOR ANALYSIS III. (1)
This 1-credit hour course is part of a three-course sequence designed to address ethical, behavioral, and professional conduct for behavior analysts. This course will address content related to the BACB Disciplinary and Ethical Standards and Disciplinary Procedures, as well as the Guidelines for Responsible Conduct for Behavior Analysts. This course prepares students to apply for the Board Certified Behavior Analyst exam. (Must be taken as Co-Requisite to EDS 612: Practicum in Special Education). Prereq: Entrance into the Board Certified Behavior Analyst program, Master's in Applied Behavior Analysis program or permission of instructor.

EDS 630 ADVANCED METHODS FOR TEACHING STUDENTS WITH DISABILITIES. (3)
An intensive study of the principles and procedures used in programming learning activities for students with disabilities, including those with autism spectrum disorders. Topical areas include the acquisition of stimulus control and programming for the generalization and maintenance skills. Lecture, three hours. Prereq: EDS 601 and consent of instructor.

EDS 631 ADVANCED PROGRAMMING FOR STUDENTS WITH MODERATE AND SEVERE DISABILITIES. (3)

Intensive review of instructional programs designed for use with students with moderate and severe disabilities, including autism spectrum disorders. Emphasis is on leadership in assessment and developing individual education programs for students. Lecture, three hours. Prereq: Consent of instructor.

EDS 632 ADVANCED PRACTICUM: MODERATE AND SEVERE DISABILITIES. (1-12)
Intensive educational experience with students with moderate and severe disabilities in educational, residential and hospital settings. Site and practicum responsibilities will be based on students' competencies and area of interest. May be repeated to a maximum of 21 credits. While enrolled in this course, students will be required to apply for the Teacher Education Program. Prereq: Admission to the Master's program in Special Education or permission of the instructor.

EDS 633 SINGLE SUBJECT RESEARCH DESIGN. (3)
Principles and methods in designing single subject research, including those involving students with disabilities. Students will be required to design a research proposal. Prereq: EDS 601 or 630 or consent of instructor.

EDS 634 LEADERSHIP IN SPECIAL EDUCATION.
Students will select from a variety of options that demonstrate leadership in the field of education. Between the course instructor and each student's master's committee, students will complete a variety of activities and experiences that will assist them in completing the capstone requirement. Prereq: EDS 601, 630, 633.

EDS 640 ADVANCED ASSISTIVE TECHNOLOGY. (3)
An advanced study of assistive technology devices and services for individuals with learning, cognitive, physical, and sensory disabilities. The course includes lecture, hands-on experiences, and discussions of current trends and issues in assistive technology consideration and implementation for teachers, families, and administrators. Prereq: EDS 600 or equivalent or permission of instructor.

EDS 641 ASSISTIVE TECHNOLOGY ASSESSMENT. (3)
A study in the evaluation of students with learning, cognitive, physical, and sensory disabilities for assistive technology devices and services. Students implement data-based assistive technology decisions for students with disabilities, locate assistive technologies through a variety of sources, and develop assistive technology implementation plans for individuals with disabilities. Prereq: EDS 640, or permission of instructor.

EDS 645 HYPERMEDIA DEVELOPMENT FOR SPECIAL EDUCATION. (3)
Students will study ways that hypermedia/multimedia can be developed for use in special education programs. Students will examine how theories of human learning and principles of universal design provide a foundation for designing instructional programs that meet the unique needs of all students. Topics will include theories of human learning, principles of universal design, hypermedia/multimedia concepts, interface design guidelines, computer graphics programs, digital scanning of images, accessible text, sound effects, use of digital movies, and multimedia authoring tools. Prereq: EDS 514 and EDS 600, or permission of instructor.

EDS 647 SEMINAR IN SPECIAL EDUCATION TECHNOLOGY (Variable topic). (1-3)
A topical seminar on technology applications in special education. Seminars will address different topics of timely interest, current issues, and various approaches to providing assistive technology and instructional technology services for people with disabilities. Prereq: EDS 514 and EDS 600, or permission of instructor.

EDS 648 COORDINATING ASSISTIVE TECHNOLOGY PROGRAMS. (3)
Students will study procedures for planning and implementing assistive technology programs in schools.

Topics will include use of planning models, philosophy and mission development, generating program goals and objectives, procedures for preparing strategic plans, establishing policies and procedures, identifying resource requirements, managing program implementation, evaluation of program effectiveness, and preparation of proposals for funding. Prereq: EDS 640 and EDS 641 or permission of instructor.

EDS 649 ADVANCED PRACTICUM: SPECIAL EDUCATION TECHNOLOGY. (1-9)
Students will engage in supervised practicum activities associated with the delivery of technology services to individuals with disabilities. Practicum settings may include schools, rehabilitation agencies, clinics, hospitals, technology resource centers, administrative offices, and other facilities involved in the development or delivery of technology services. May be repeated to a maximum of nine credits. Prereq: EDS 514 and EDS 600, or permission of instructor.

EDS 650 INITIAL CERTIFICATION ADVANCED PRACTICUM IN MODERATE AND SEVERE DISABILITIES. (6)
Supervised practicum experience in a classroom for students with moderate/severe disabilities utilizing contemporary curricula, assessments, methods, and materials designed for use with children exhibiting moderate-severe developmental or intellectual disabilities. This course is designed as an advanced practicum for students in the MSD program who are pursuing an initial certification at the graduate level. Practicum students will be evaluated on these competencies by the university supervisor throughout the semester. EDS 650 is offered on a letter grade basis only. Prereq: Published University, College and Departmental requirements (see appropriate section of the most recent UK Bulletin) admission to the Teacher Education Program or permission of instructor. Successful completion of all EDS Core and Moderate/Severe Disabilities (MSD) Certification Area course work. EDS 650 is the final certification requirement for students obtaining initial certification at the graduate level. Prior to entering this course, the MSD major will have successfully completed all MSD Area and EDS CORE practica serving the needs of children exhibiting moderate to severe intellectual or developmental disabilities. Students in this course will complete their assignments while working full time in a classroom for students with MSD.

EDS 651 DISTANCE EDUCATION: DELIVERY.
This course has been designed for those faculty or future faculty who plan to teach via distance education technology. This course will review current literature on how to deliver distance education content with attention to developing materials, setting delivery timelines, facilitating interactions, and using appropriate teaching strategies. Prereq: Master's degree.

EDS 652 DISTANCE EDUCATION: MANAGEMENT AND SUPPORT. (3)
This course has been designed for those faculty or future faculty who plan to manage or direct programs delivered through distance education technology. The course will focus on current issues and challenges in distance education administration, including such topics as provision of quality support services; policy issues at the local, state, national, and international level; model administrative structures; instruction and technology funding; and virtual institutions. Prereq: Master's degree. (Same as CI 652.)

EDS 660 OVERVIEW OF CHARACTERISTICS AND INSTRUCTIONAL STRATEGIES FOR INDIVIDUALS WITH ASD. (3)
This course introduces students to the characteristics, classification systems, etiology and research, screening and assessment strategies/ issues, approaches, and research-based interventions related to individuals with autism spectrum disorders. Practical classroom strategies, such as visual strategies and environmental arrangements will also be reviewed. The primary goal of the course is to provide students with a foundational knowledge of the strengths and needs characteristic of individuals with ASD, as well as to provide students with a comprehensive array of research-based instructional approaches for individuals

with ASD, and to provide the criteria for determining which approach to use. Prereq: EDS 601.

EDS 661 ADVANCED INSTRUCTIONAL STRATEGIES FOR STUDENTS WITH ASD. (3)
This course builds on topics previously learned in EDS 660. Teachers will learn to critically analyze current trends, issues, and therapies used with individuals with ASDs. Practical classroom strategies detailing what to teach based on assessment results, how to use databased decisions to guide instruction, and an overview of alignment to state standards based on alternate assessments will also be reviewed. The primary goal of the course is to provide teachers with a comprehensive array of practical research-based instructional approaches for individuals with ASDs, criteria for determining which approaches to use, and planning for access to the general education curriculum for all students across the spectrum. Completion of this course sequence (in combination with EDS 660, EDS 662, and EDP 671) will prepare teachers for applications in the ASD Institute (EDS 663). Prereq: EDS 601 and EDS 660.

EDS 662 COMMUNICATION, AAC, AND TECHNOLOGY FOR INDIVIDUALS WITH AUTISM SPECTRUM DISORDERS. (3)
This course prepares persons who will be serving individuals with ASD. The focus of the course is on developing communication in this population, exploring augmentative and alternative communication devices, and using technology to teach individuals with ASD. The course will provide information on (a) typical language development, (b) characteristics of persons with autism and their unique communication needs, (c) assessment of communication needs, (d) development of communication goals, (e) development and delivery of effective strategies for teaching communication, and (f) use of technology to teach individuals with ASD. The objectives of this course are designed to provide students with a comprehensive knowledge of the communication characteristics of persons with autism, the state-of-the-art techniques in providing communication services for this population, and research-based strategies utilizing technology in teaching individuals with ASD. This course will be taught jointly by the Department of Special Education & Rehabilitation Counseling and the Department of Communication Sciences and Disorders. Prereq: EDS 601, EDS 661, EDS 662. (Same as CSD 649.)

EDS 663 SERVING INDIVIDUALS WITH ASD INSTITUTE. (3)
Students will connect content knowledge with skills from courses taken in the Autism Certificate courses (EDS 660, EDS 661, EDS 662, and EDP 671). Students will demonstrate skills in areas such as implementing research-based strategies and/or behavior supports, collaborating for planning and delivery of instruction, working with diverse families and service providers, and evaluating appropriate technologies based on student needs. Students will demonstrate proficiency via role-play, case studies, video examples, and/or direct observation of individuals with ASD. Students will have an opportunity to learn from one another and experts in the field in a face-to-face format. Prereq: EDS 601 and EDS 660, EDS 661, EDS 662, EDP 671.

EDS 701 SEMINAR FOR EDSRC LEADERSHIP PERSONNEL. (1)
Study of issues and topics affecting the preparation of Rehabilitation Counseling, Special Education, and Early Childhood personnel and of research issues involving persons with disabilities and educational and rehabilitation programs. May be repeated to a maximum of six credits. Lecture, two hours per week. Prereq: Admission to Ed.S., EDS, RC, or IEC Ph.D. Programs. (Same as IEC/RC 701.)

EDS 710 SEMINAR IN MILD DISABILITIES.
Advanced study of issues related to mild disabilities in children, including etiology, assessment, intervention, theories, and contemporary research findings. Prereq: Admission to Ed.S. or Ed.D. program in Special Education or consent of instructor.

EDS 711 SEMINAR IN MODERATE AND SEVERE DISABILITIES. (3)
Advanced study of issues related to moderate and severe disabilities, including problems of identification

and assessment, program alternatives, curricula, theories, and contemporary research findings. Prereq: Admission to Ed.S. or Ed.D. program in Special Education or consent of instructor.

EDS 712 SEMINAR IN EDSRC PROFESSIONAL SERVICES. (3)
Education and Rehabilitation professional services including consultation, technical assistance, continuing education programs, professional organization development, committee and advisory board involvement, professional writing and editing, leadership training, and funding proposal development. Prereq: Admission to Ed.S., EDS, RC, or IEC Ph.D. Programs. (Same as IEC/RC 712.)

EDS 713 DESIGNING CLASSROOM-BASED INTERVENTION RESEARCH IN SPECIAL EDUCATION. (3)
The purpose of this course is to acquaint students with methods for designing and conducting experimental and quasi-experimental intervention studies in school-based settings. Students will have the opportunity to conceptualize a study based on their interests and propose procedures for implementing it. Although knowledge of basic statistics would increase understanding, the substance of the course focuses primarily on designing studies that test for the presence of a distinct cause-and-effect relationship between variables.

EDS 720 SEMINAR IN EDSRC TEACHER PREPARATION. (3)
Rehabilitation Counseling and Special Education college/university professor preparation, including syllabus development, organization of class presentations, instructional alternatives, scheduling, student assessment, professor-student interactions, student advising, resource identification and utilization and program evaluation. Prereq: Admission to Ed.S., EDS, RC, or IEC Ph.D. Programs. (Same as IEC/RC 720.)

EDS 721 PRACTICUM IN EDSRC PERSONNEL PREPARATION. (1-9)
Professional preparation of Rehabilitation Counselors or Special Education Teachers, including practice in delivering lectures, conducting class discussions, leading seminars, directing independent studies, guiding student research projects, demonstrating instructional methods and materials, supervising rehabilitation counselors or special education student teachers, and advising. Laboratory, three-nine hours. May be repeated to a maximum of nine credits. Prereq: Admission to Ed.S., EDS, RC, or IEC Ph.D. Programs. (Same as IEC/RC 721.)

EDS 730 SEMINAR IN SPECIAL EDUCATION ADMINISTRATION. (3)
Administration of special education programs at the local and state levels. Emphasis is on program planning, staffing, fiscal management and program evaluation. Prereq: EDS 602 and admission to the Ed.S. or Ed.D. program in special education or consent of instructor.

EDS 731 ADVANCED PRACTICUM: SPECIAL EDUCATION ADMINISTRATION. (1-9)
Supervised practicum experiences related to the administration of special education programs at the local and state levels, and project management, including staff management and development, program planning, evaluation, fiscal management, organization, reporting, communications, and coordination. Laboratory, three-nine hours. May be repeated to a maximum of nine credits. Prereq: Admission to the Ed.S. or Ed.D. program in special education administration or in certification program for special education administrators.

EDS 748 MASTER'S THESIS RESEARCH.(0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

EDS 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

EDS 767 DISSERTATION RESIDENCY CREDIT.(2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended. Prereq: Admission to Ed.S., EDS, RC, or IEC Ph.D. Programs. (Same as IEC/RC 767.)

# STEM Education

## College of Education

The mission of the Department of Science, Technology, Engineering, and Mathematics (STEM) Education is to engage in innovative scholarship, teaching, and service that contributes to improving the quality of P20 science, technology, engineering, and mathematics education in the Commonwealth, the nation, and the world. Faculty members in the department are committed to improving the lives of Kentuckians through scientific literacy, mathematical literacy, and technological literacy from preschool through graduate school and beyond. Faculty members have expertise in a diverse spectrum of specialties relating to research, teaching, and service in STEM Education, and have developed curricula that are widely disseminated locally and nationally. They conduct research on STEM Education issues, conceptual understanding in STEM education, curriculum implementation and teacher professional development. In addition, faculty members have developed a variety of novel courses in STEM Education to foster problem solving, critical thinking, and innovation in STEM Education. The department offers both master and doctoral programs in STEM Education with the flexibility of focusing on a specific discipline (i.e., mathematics education, science education), or a broader focus on STEM Education.

## Master of Science

The Department of STEM Education offers programs leading to a Masters of Science in STEM Education and offers a strand option in the Education Sciences PhD program (see Education Sciences for more info). The MS in STEM Education program is a 30-hour program designed to prepare candidates for advanced roles in K-12 educational settings in the STEM content areas or for a terminal degree route in a STEM Education field. Full-time students in the STEM Education graduate programs are not required to serve in a funded assistantship, but those interested are eligible for the positions available. Part-time enrollment in the program is allowed and the program can be completed in evening hours.

**Admission Requirements**

Admission to the MS in STEM Education program requires completion of a bachelor's degree from an accredited institution of higher education. While this degree does not have to be specific to a STEM Education field, the applicant does need to have strong content knowledge and an interest in the STEM field as evidenced by the rest of the application materials. The applicant must have adequate GRE scores, GPA of at least 2.75 at the undergraduate level and 3.0 at the graduate level, transcripts from previous institutions, a statement of career goals, and three letters of recommendation. The TOEFL is required for students in which English is not their first language. Once the application has been reviewed, applicants will be required to participate in an impromptu writing sample and interview with STEM Education faculty before a final admission decision is determined.

## Doctor of Philosophy

The Department of STEM Education offers a PhD program through the Education Sciences Interdisciplinary PhD. For more information, see the information on Education Sciences in the Graduate Bulletin or contact the Director of Graduate Studies or Department chair for the Department of STEM Education.

## Graduate Courses

The department offers a variety of coursework in order to design a degree program that best meets the needs of the students in the program. Each student in the MS in STEM Education program is required to complete 12 hours of a specialization in a STEM content area (non-STEM Education courses). With the

addition of 6 hours of electives, candidates in the program can acquire 18 hours of graduate coursework in a content area to meet the minimum guidelines needed to teach college-level courses in that content area. The remaining 12 hours of the program are dedicated to STEM Education coursework with the following courses as options:

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| SEM 504 | Designing Project-Enhanced Environments In STEM Education | (3) |
| SEM 603 | Curriculum And Instruction In STEM Education (Required) | (3) |
| SEM 604 | History Of STEM Education | (3) |
| SEM 610 | Effective Use Of Technology For Modeling-Based Inquiry In STEM Education | (3) |
| SEM 620 | Equity In STEM Education | (3) |
| SEM 670 | Advanced Elementary Mathematics Methods | (3) |
| SEM 674 | Advanced Studies In Teaching Elementary School Science | (3) |
| SEM 575 | Mathematics Clinic | (3) |
| SEM 701 | History Of Mathematics Education | (3) |
| SEM 706 | Research In STEM Education | (3) |
| SEM 708 | Engineering In STEM Education | (3) |
| SEM 770 | Special Topics In STEM Education | (3) |

**Course Descriptions**

SEM 504 DESIGNING PROJECT-BASED ENVIRONMENTS IN STEM EDUCATION. (3)
SEM 504 will give students the opportunity to explore STEM contents, technologies, instructional strategies, and assessments necessary in designing and developing a research-based, interdisciplinary, project-enhanced environment. In SEM 504 students will experience, evaluate, and design interdisciplinary, project-enhanced environments within STEM classrooms. Although this course is designed as a distance course, there are some required face to face meetings.

#SEM 521 FOUNDATIONS IN STEM TEACHING. (1-5)
This course is intended to help future mathematics/science teachers build a theoretical background and gain the practical skills needed to begin to develop themselves as effective teachers in secondary classrooms. Students will be introduced to, and gain hands-on experience with a variety of instructional materials appropriate for teaching mathematics/science at the secondary level. Students are encouraged to be creative and reflective in developing, implementing, and evaluating practices associated with teaching concepts and skills. A strong emphasis is placed upon helping students to formulate an understanding of how to integrate the mathematical and scientific practices with the core ideas of the disciplines to develop deep conceptual understanding. The experiences in this course are designed to prepare teachers who will work among diverse populations and constantly be in tune with best practices and their implementation as a way to improve education in Kentucky and beyond. The course will focus on developing a number of general pedagogical skills; the integration of math and science candidates into this single class will enrich the conversations around such topics. SEM 521 will be taught as a hybrid course, with weekly face-to-face meetings paired with online modules that can be completed asynchronously. The course will have an accompanying university research / industry externship / informal STEM education experience associated with it for variable hours and variable credits. Prereq: Admission to the TEP and either the B.S. in STEM Education or the M.A.T. in Secondary STEM Education (Initial Certification – Secondary Ed) program.

SEM 575 SEE BLUE MATHEMATICS CLINIC. (3)
This course focuses on clinical techniques for working with K-12 students who are struggling and/or have disabilities in learning mathematics. It is a course designed to develop both theoretical understandings and operational skills in working with students who struggle in mathematics. Classroom applications of the techniques are discussed. This course is a combination of lecture and application with a student client.

SEM 603 CURRICULUM AND INSTRUCTION IN STEM EDUCATION. (3)
This course introduces the fundamental issues related to curriculum and instruction in STEM programs. Major topics addressed will include (but will not be limited to), defining STEM education, its curricula, purposes, and past and present social and political influences affecting the development and focus of STEM education. Additional discussion will address the stakeholders of STEM education that participate in the development, testing, implementation, and assessment of STEM curricula. A major focus of the course will be on the review of selected STEM curricular programs that reflect research-based "best practices" in STEM education.

SEM 604 HISTORY OF STEM EDUCATION. (3)
The History of STEM Education course will begin with researching the background and development of each individual component of STEM (i.e., Science, Technology, Engineering, and Mathematics) Education. This will follow with a historical comparison of these components highlighting their similarities as well as their differences. The course will conclude with a study of the entity, STEM Education, from the early 19th century America to the present focusing on reports and documents that have connected the Science, Technology, Engineering, and Mathematics disciplines and shaped current research and reform efforts.

SEM 610 TEACHER LEADERSHIP IN STEM EDUCATION. (3)
This course introduces fundamental issues related to classroom research, especially through the lens of action research, and what it means to be a teacher leader in the areas of STEM. Practical application will be the primary focus simultaneously with learning and learning to lead. Collaboration and group work is a hallmark of action research; students in this course will demonstrate their abilities to design, diagnose, plan, implement, observe, and reflect in cooperation with classmates. The various roles and skills necessary to be an effective researcher will be discussed, as well as important issues related to empowerment, contextualization, ethical considerations, and validity. In addition, students will examine action research through the lens of innovation and their role as a future teacher leader.

SEM 613 EFFECTIVE USE OF TECHNOLOGY FOR MODELING-BASED INQUIRY IN STEM EDUCATION. (3)
This course is designed to teach effective uses of educational technologies towards engagement in modeling-based inquiry in STEM Education. Students will learn the key components of facilitating modeling-based inquiry through their own building of accurate conceptual models of explanations of key STEM theories and underlying concepts. Utilizing technologies implemented in authentic STEM practice, students will learn how to facilitate pupils' use of technologies to allow them to make controlled observations, analyze data, recognize patterns, propose and revise their models of explanation, and communicate their models to their peers. Prereq: EDC 317 and/or EDC 607 or its equivalent or permission of instructor.

SEM 620 EQUITY IN STEM EDUCATION. (3)
This course is a seminar designed to study equity issues in the teaching and learning of STEM disciplines in P-20 education. A primary focus will be on enhancing teachers' ability to use research and reflection for learning and leading. Throughout the course the relationship between theory and practice will be emphasized in an attempt to understand some of the complexities and challenges in addressing issues of equity in mathematics learning and teaching. Prereq: Graduate standing.

SEM 631 MATHEMATICS PEDAGOGY IN THE SECONDARY SCHOOL. (0-3)
Through campus and school-based experiences, students will learn how to engage young people in learning mathematics and how to make decisions about planning instruction and develop assessment based on a sound knowledge base for applying content, materials, and methods (including educational technology) appropriate for high school students. May be repeated to a maximum of three credits.

Lecture, 1-3 hours; laboratory, 3-6 hours per week. Prereq: Admission to the M.A./M.S. in Education (Initial Certification Option-Secondary Education).

SEM 634 SCIENCE PEDAGOGY IN THE SECONDARY SCHOOL. (0-3)
Through campus and school-based experiences, students will learn how to engage young people in learning science and how to make decisions about planning instruction and develop assessment based on a sound knowledge base for applying content, materials, and methods (including educational technology) appropriate for high school students. May be repeated to a maximum of three credits. Lecture, 1-3 hours; laboratory, 3-6 hours per week. Prereq: Admission to the M.A./M.S. in Education (Initial Certification Option-Secondary Education).

SEM 670 ADVANCED STUDY IN THE TEACHING OF ELEMENTARY SCHOOL MATHEMATICS. (3)
New developments in modern elementary mathematics for teachers in the elementary schools will be reviewed. Special emphasis will be given to a study of new teaching methods, application of published research, techniques and trends in mathematics in the elementary school. Prereq: Graduate standing.

SEM 674 ADVANCED STUDIES IN TEACHING ELEMENTARY SCHOOL SCIENCE. (3)
An advanced course for classroom teachers that focuses on implementation of instructional strategies and assessments for teaching elementary science. A review of contemporary research in teaching and learning science will be closely related to classroom instruction. Specific focus will be given to technology integration, assessment, and addressing the needs of diverse student populations. Prereq: Graduate standing.

SEM 701 HISTORY OF MATHEMATICS EDUCATION. (3)
A study of mathematics education from early 19th century America to the present focusing on forces that connected mathematics, psychology, psychometrics, sociology, and technology. Prereq: EPE 651 or permission of the instructor.

SEM 702 THEORETICAL FOUNDATIONS OF MATHEMATICS EDUCATION. (3)
A survey of constructivism, cognitive science, and sociological and anthropological perspectives as fundamental theories for mathematical learning, and an overview of research context where these theories guide inquiries. Prereq: EDP 610 (Theories of Learning) or consent of instructor. Many concepts and theories in SEM 702 are related to learning theories. Past students felt better prepared for SEM 702 after taking EDP 610.

SEM 703 ADVANCED RESEARCH IN MATHEMATICS EDUCATION. (3)
An advanced seminar focusing on current critical research issues in mathematics education, the way research impacts education policies and practices, various methodological pursuits of researchers, and theory building.

SEM 706 RESEARCH IN STEM EDUCATION. (3)
Students will have the opportunity to learn about the research paradigms guiding STEM education research throughout history with critical analysis of those most utilized across the modern STEM education research communities. Students will acquire knowledge and skills that allow them to develop a research proposal with explicit discussion of their research assumptions and that targets meaningful and timely research questions in STEM education. Prereq: EDL 651, or EDP/EPE 557 and EPE 570, or EDP/EPE 660 or permission of instructor.

SEM 708 ENGINEERING IN STEM EDUCATION. (3)
SEM 708 will introduce students to the field of engineering and give them the opportunity to explore engineering concepts, engineering design, different fields of engineering, engineering curricular materials for K-12 students, research on including engineering in K-12 education, and assessments necessary in designing and developing research-based, interdisciplinary, engineering-design curricula for K12 students and teachers. In SEM 708 students will experience, evaluate, and design interdisciplinary, engineering design-based curricula to be used within STEM classrooms. Prereq: EDC 707 or permission of instructor.

SEM 746 SUBJECT AREA INSTRUCTION IN THE SECONDARY SCHOOL. (0-9)
Students will teach in their subject areas in the schools full-time, meet regularly to discuss teaching effectiveness and strategies for improvement and develop their professional portfolios. May be repeated to a maximum of nine credits. Lecture, 3-9 hours; laboratory, 618 hours per week. Prereq: The appropriate methods course in the subject area (SEM 631, EDC 632, EDC 633, SEM 634 or EDC 635). Admission to the M.A./M.S. in Education (Initial Certification Option-Secondary Education). (Same as EDC 746.)

SEM 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

SEM 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

SEM 770 SPECIAL TOPICS IN STEM EDUCATION (Subtitle required). (1-4)
This course is a seminar of topical offerings with variable topics in the study of philosophy, principles, trends and research associate with STEM Education. This seminar is designed to cover topical issues around current research and strategies in STEM Education as they relate to P-20 implementation. STEM Education is transdisciplinary and constantly changing. This course will address content specific and transdisciplinary issues within the context of new directives and initiatives. May be repeated to a maximum of twelve credits. Prereq: SEM 603 and/or SEM 706 or permission of instructor.

SEM 781 INDEPENDENT STUDY IN STEM EDUCATION. (1-3)
An independent study course for graduate students. May be repeated to a maximum of nine credits. Prereq: Consent of the Director of Graduate Studies and Program Advisor.

# Teacher Preparation Program in Visual Impairments

## College of Education

The Department of Early Childhood, Special Education, & Counselor Education offers a Master of Science degree in the Teacher Preparation Program in Visual Impairments. The program uses a hybrid course delivery model including both face-to-face and online courses. Face-to-face courses occur on weekends and in the summer at either the Kentucky School for the Blind (KSB) in Louisville or at the University of Kentucky in Lexington.

A Teacher of the Visually Impaired (TVI) educates children in a variety of learning and instructional topics including: assessing and evaluating educational strengths and needs including functional vision and learning media assessments; determining appropriate services and instructional goals; and providing training in the use of adapted materials and devices. A TVI also provides direct instruction in the expanded core curriculum which includes compensatory academic skills, career exploration, sensory efficiency skills, social skills, assistive technology, recreation and leisure activities, self-determination skills, and independent living skills.

The University of Kentucky has the distinction of offering the only program to train teachers of the visually impaired in Kentucky.

## Application Requirements

Applicants must have completed a bachelor's degree in any field with a minimum of 2.75 overall or 3.0 GPA in the last 30 credit hours to apply.

Applications must include the following:

- Resume/CV
- Personal Statement
    - 1-2 page statement on why you want to be a TVI
- Official transcripts from all previous universities or colleges
- Three (3) references

### Application Information

Go to the Teacher Preparation Program in Visual Impairments – Graduate page at: https://www.uky.edu/academics/masters/teacher-preparation-program-visual-impairments-graduate and follow the "Apply Now" link. In "Plan of Study" the Admission Category should read "Masters degree", then "Teacher Preparation Program in Visual Impairment" for the Program. Applications are

accepted on a revolving basis; however, candidates must start the BVI course sequence in the fall semester.

# Degree Requirements

Program completion requires passing grades in all BVI coursework totaling 33 credit hours with an overall GPA of 3.0, successful completion of field experience(s), and satisfactory demonstration of all program standards.

## Practicum and Field Experience Requirements

Practicum is embedded in the BVI courses throughout the program. Each semester, a minimum of 15 hours working with children who are blind and visually impaired is required. Summer practicum consists of an intensive week at an approved program.

Each candidate is required to complete a field experience of no less than 40 days at the end of the program. Each candidate must have a caseload that meets the minimum requirements of:

- Preschool or elementary academic student
- Middle or high school academic student
    - At least one of the academic students must have low vision
- Braille instruction
- Student with complex needs

## Required Program Coursework

- BVI 580 Introduction to Visual Impairment (3)
- BVI 582 Anatomy & Physiology of the Eye (3)
- BVI 583 Braille Codes I (3)
- BVI 611 Methods for Teaching Students with Visual Impairments (3)
- BVI 614 Braille Codes II (3)
- BVI 615 Assistive Technology for Students with Visual Impairments (3)
- BVI 616 Expanded Core Curriculum for Blind and Visually Impaired (3)
- BVI 617 Visual Impairments and Multiple Disabilities (3)
- BVI 618 Assessment of Children with Visual Impairments (3)
- BVI 710 Student Teaching/Field Experience in Visual Impairments (6)

**Total 33 Credits**

## Teacher Certification

This degree does not necessarily lead to teacher certification. Candidates should contact the program's Director of Graduate Studies (DGS) about additional teacher certification requirements. Information is also available on the program website at: https://education.uky.edu/edsrc-programs/teacher-prep-visual-impairments/

# Course Descriptions

**BVI 580 INTRODUCTION TO VISUAL IMPAIRMENTS. (3)** This course will provide an introduction to the educational programs and services for students with blindness and visual impairments. Content of this course will focus on the historical foundation of the field, the developmental and psychosocial aspects of individuals with visual impairments, an overview of legislation, influential agencies, and service delivery methods. The impact of vision loss on early childhood development will also be covered. Prereq: Admission to the Teacher Preparation Program in Visual Impairments, Orientation and Mobility program, or instructor permission required

**BVI 582 ANATOMY AND PHYSIOLOGY OF THE EYE. (3)** This course will cover the anatomy and physiology of the eye, including visual development. Causes of ocular and neurological visual impairment will be addressed, treatments, and their impact on learning. Course topics will include optics, low vision devices and services, environmental adaptations, and interpreting eye reports. Learners will have the opportunity to directly observe a low vision evaluation and will learn the components of a functional vision assessment. Prereq: Admission to the Teacher Preparation Program in Visual Impairments, Orientation and Mobility program, or instructor permission required.

**BVI 583 BRAILLE CODES I. (3)** This course is designed to teach the literary braille code. Students will become proficient in transcribing both uncontracted and contracted braille utilizing a Perkins Brailler, slate and stylus, and six-key entry computer software with proper formatting. Students will also learn appropriate techniques for reading braille both tactually and visually. In addition, the history of the braille code will be covered as well as current resources. Prereq: Admission to the Teacher Preparation Program in Visual Impairments, Orientation and Mobility program, or instructor permission.

**BVI 611 TEACHING METHODS FOR STUDENTS WITH VISUAL IMPAIRMENTS. (3)** This course is designed to examine how to teach and modify the core curriculum for students who are blind or visually impaired. Topics will include: adaptation of general education classroom materials, IEP development and implementation, lesson planning, and braille literacy. Prospective teachers will develop organization skills and strategies necessary to be efficient in delivery of services as a teacher of the visually impaired. Prereq: Successful completion of BVI 580, Admission to the Teacher Preparation Program in Visual Impairments, or instructor permission.

**BVI 614 BRAILLE CODES II. (3)** This course studies advanced braille codes with a special emphasis on braille mathematics utilizing Unified English Braille (UEB) and the Nemeth Code. Other codes covered are music and foreign language (French, German, and Spanish). Braille formats will also be taught, including how to correctly transcribe and format materials for braille users, including preparing worksheets and tests for students. Competency in using the Cranmer Abacus will also be mastered. Prereq: Successful completion of BVI 583 (Braille Codes I) or proof of competency in literary braille along with admission to the Teacher Preparation Program in Visual Impairments, or instructor permission.

**BVI 615 ASSISTIVE TECHNOLOGY FOR STUDENTS WITH VISUAL IMPAIRMENTS. (3)** This course introduces a wide variety of technologies for people who are blind or visually impaired. Students will

learn about Universal Design for Learning (UDL) as it relates to technology, as well as proprietary software and hardware. Technologies covered include, but are not limited to: Screen readers, screen magnification, electronic note takers, refreshable braille displays, braille translation programs, magnification hardware, scanning and OCR programs, and accessible digital book options. A wide variety of computers, tablets, and smart phone options will be explored. Instructional strategies for teaching technology skills will be emphasized. Prereq: Admission to the Teacher Preparation Program in Visual Impairments or instructor permission.

**BVI 616 EXPANDED CORE CURRICULUM FOR BLIND AND VISUALLY IMPAIRED. (3)** The Expanded Core Curriculum (ECC) is the body of knowledge and skills that are needed by students with visual impairments due to their unique needs. This course will explore all nine areas of the ECC including: compensatory or functional academic skills, orientation and mobility, social interaction skills, independent living skills, recreation and leisure skills, career education, use of assistive technology, sensory efficiency skills and self-determination. Participants will have the opportunity to observe and work with students in a summer program and teach skills from the ECC. Prereq: Admission to the Teacher Preparation Program in Visual Impairments or instructor permission.

**BVI 617 VISUAL IMPAIRMENTS AND MULTIPLE DISABILITIES. (3)** This course is designed to provide students with knowledge and skills necessary to design and implement programs for persons who have visual impairments and additional disabilities. Topics include assistive technology, augmentative and alternative communication, literacy instruction, sensory processing, adaptive behavior, and self-help skills. An emphasis will be placed on adaptations that enhance functioning for persons with developmental delays, autism, medical conditions, deaf-blindness, communication disorders, and those with common syndromes and eye disorders related to multiple disabilities. Prereq: Admission to the Teacher Preparation Program in Visual Impairments or instructor permission.

**BVI 618 ASSESSMENT OF STUDENTS WITH VISUAL IMPAIRMENTS. (3)** This course covers various types of assessments used to evaluate students who are blind or visually impaired. Participants will discuss testing and assessment including the development of standardized tests and their applicability for individuals with visual impairments, as well as alternate assessments. Students will practice assessing and planning educational programs for students with visual impairments by completing a Functional Vision/Learning Media Assessment, as well as assessments in assistive technology and the Expanded Core Curriculum. Prereq: Admission to the Teacher Preparation Program in Visual Impairments or instructor permission.

**BVI 710 STUDENT TEACHING/FIELD EXPERIENCE IN VISUAL IMPAIRMENTS. (3-12)** This is a supervised student teaching/field experience working with children, preschool through graduation age, who are blind or visually impaired. Candidates will apply best practices for working with children who are blind or have low vision, including those with additional disabilities. Successful completion of this course will demonstrate the candidate's ability to apply methods of teaching that include assessment, program planning and implementation, appropriate environmental and academic modifications, and instruction in the Expanded Core Curriculum. Candidates will also have to demonstrate appropriate classroom and/or caseload management strategies based on their placement. Prereq: Admission to the Teacher

Preparation Program in Visual Impairments and approval by the Visual Impairment Program Faculty Chair.

COLLEGE OF ENGINEERING

# Biomedical Engineering

## College of Engineering

The Department of Biomedical Engineering offers master's and doctoral degrees in addition to a minor in Biomedical Engineering. The graduate programs emphasize the application of engineering principles to the areas of medicine and biology and covers the broad aspects of mechanics, materials, fluids, optics, signal processing, systems analysis, instrumentation, physiology, cellular processes, and laboratory experimentation. Students in the program are provided with educational and research opportunities through the facilities and faculty of the Department and its ideal geographic location and close ties with other units of the University, ranging from engineering to basic science to clinical departments.

Areas of research include cardiac arrhythmia, cardiopulmonary control, magnetic resonance imaging, biomedical optics, orthopedic biomaterials and bone tissue engineering, and orthopedic biomechanics. The Department is housed in the centrally located Robotics and Manufacturing Building which makes it convenient for multidisciplinary research. Faculty and staff of the Department collaborate with investigators from other units of the University, including Anatomy & Neurobiology, Biochemistry, Biology, the Markey Cancer Center, Cardiovascular Medicine, Cardiothoracic Surgery, Center for Applied Energy Research, Chemical Engineering, Chemistry, Electrical Engineering, Mathematics, Mechanical Engineering, Neonatology, Nephrology, Neurosurgery, Oral Surgery, Orthopaedic Surgery, Otolaryngology, Pediatric Cardiology, Periodontics, Pharmacy, Physiology, and Plastic Surgery. Department faculty and staff provide opportunities and support for graduate students, medical residents, and selected undergraduates. Graduates of the program enter careers in research institutes, academia, hospitals, and the biomedical field.

**Admission Requirements**
Entering students are expected to have a baccalaureate degree in engineering. Some course work in the biological sciences is desirable but not required. Applicants with degrees purely in the physical or biological sciences may be required to complete select course work in the undergraduate engineering curriculum before being admitted to the graduate program. Admission to the biomedical engineering graduate program normally requires a GPA of at least 3.0/4.0 for all graduate and undergraduate work and Graduate Record Examination scores of ≥156 (Quantitative), ≥154 (Verbal) and ≥4.0 (Analytical). Additional application materials to be submitted to the Department include a statement describing your reasons for wanting to pursue graduate education in Biomedical Engineering and letters of recommendation from (3) faculty members who are familiar with your academic record. There is no specific form that is required for these letters. Satisfying the above requirements does not guarantee admission to the biomedical engineering graduate program.

### Master of Science

The Master of Science degree provides students with a combination of experiences in basic research, design, development, and practical applications. The M.S. degree requires successful completion of the core curriculum (26 credit hours) plus an accepable thesis. In special cases, a non-thesis option consisting of 31 credit hours is available for students with significant previous research or design experience or those who are concurrently employed in a biomedical engineering related industry. Enrollment in the non-thesis option requires approval of the Director of Graduate Studies and must be requested within the student's first 9 credit hours of graduate course work.

**Core M.S. Curriculum**

| | | |
|---|---|---|
| BME 530 | Biomedical Instrumentation | (3) |
| BME 605 | Biomedical Signal Processing | (3) |
| BME 661 | Biomaterials Science and Engineering | (3) |
| BME 6XX | Biomechanics Elective | (3) |
| BME XXX | BME Technical Elective | (3) |
| BME 772 | Seminar | (0) |
| BME 640 | Ethics in BME and Science | (1) |
| PGY 412G | Principles of Human Physiology | (4) |
| | Math Elective | (3) |
| | Technical Elective | (3) |

## Professional Master of Biomedical Engineering

The Professional Master of Biomedical Engineering degree seeks to develop a unique combination of managerial, technical and leadership skills for those who will direct the future course of biomedical technology. The P.B.M.E. degree requires successful completion of 42 credits, including the capstone Advanced Study Project, and a summer internship.

**Core P.B.M.E. Curriculum**

| | | |
|---|---|---|
| BME XXX | BME Technical Electives | (9) |
| BME 642 | Navigational Guides for Biomedical Product Designs | (2) |
| BME 766 | Advanced Study Project | (3) |
| BME 772 | Seminar | (0) |
| BME 777 | Advanced Study Project | (3) |
| HA 601 | Healthcare System Overview | (3) |
| HA 602 | Strategic Planning and Management of Healthcare Organizations | (3) |
| HA 621 | Quantitative Methods of Research | (3) |
| HA 637 | Health Finance | (3) |
| MKT 600 | Marketing Management | (3) |
| PA 623 | Decision Analysis | (3) |
| PA 642 | Public Organ Theory and Behavior | (3) |
| PGY 412G | Principles of Human Physiology | (4) |

## Doctor of Philosophy

The Doctor of Philosophy is a research degree granted on the basis of broad knowledge of engineering applications in biology and medicine and an in-depth study in a specific area leading to a dissertation reflecting original and independent work by the candidate. Applicants to the Ph.D. program are generally expected to have a master's degree. Under special circumstances, exceptional students may bypass the M.S. and be admitted directly to the Ph.D. program upon approval of the biomedical engineering faculty. Courses for advanced study are determined in consultation with an advisory committee and will be selected from the areas of engineering, mathematics, life sciences, and chemistry.

To earn a Ph.D. degree, students must:

1. Meet the requirements of the Graduate School.
2. Succesfully complete PGY 502.
3. Pass the Qualifying Examination. This exam, consisting of written and oral components, is designed and administered by the student's Doctoral Advisory Committee.

4. Present and satisfactorily defend a dissertation documenting independent and comprehensive scholarship.

Further information about the graduate programs may be obtained by writing to the Director of Graduate Studies, Department of Biomedical Engineering, 522 RMB, 143 Graham Avenue, University of Kentucky, Lexington, KY 40506-0108, by e-mail at bmedgs@uky.edu, or by visiting our web site at http://www.engr.uky.edu/cbme/future-students/programs/phd/.

# Course Descriptions

BME 501 FOUNDATIONS OF BIOMEDICAL ENGINEERING. (3)
This course demonstrates the application of diverse engineering principles to analysis and understanding of the structure, function, and control of biological systems. Quantitative measurements and analysis of homeostatic, regulatory, transport, biochemical, and biomechanical processes of the human body. Prereq: Engineering standing or consent of instructor.

BME 508 CELL MECHANICS AND MECHANOBIOLOGY. (3)
This course will serve as an introduction to cell and tissue level mechanobiology with focus on human physiological and disease processes. The primary focus is to introduce principles of cell-level mechanics in the context of the biology of living organisms, what we term mechanobiology. In effect, we treat biological processes and regulation as another variable(s) that must be accounted for when modeling the mechanical/physical behavior of human tissues. A large amount of the basic principles in this field of study arose as a result of the intense research in the cardiovascular field. We will draw many examples of mechanobiological principles as it relates to the circulatory system. Despite our cardiovascular focus, the basic principles can be applied to the whole range of mechanobiological research conducted in other applications (orthopedics, urological, pulmonary, etc.). Prereq: EM 302 and/or CME/ME 330 (or equivalent fluid mechanics course); or consent of instructor.

BME 515 MODELING OF PHYSIOLOGICAL SYSTEMS. (3)
This introductory course in mathematical modeling will teach students how to construct simple and elegant models of biological and physiological processes – for instance the absorption and elimination of drugs in the human body or the kinetics of tumour growth in tissue– and to analyze or predict the dynamics of these events by solving the models. Prereq: MA 113, 114, 213, 214, or consent of instructor; familiarity with computer programming.

BME 530 BIOMEDICAL INSTRUMENTATION. (3)
A comprehensive introduction to major aspects of biomedical instrumentation. Topics include basic concept of medical instrumentation, biopotentials, physiological pressure/flow/respiratory measurement, optical sensing, and clinical applications of all the above. The fundamental mathematics underlying each instrument will be reviewed and an engineering picture of the hardware and software needed to implement each system will be examined. Prereq: Consent of instructor.

BME 540 MECHANICAL MODELING OF HUMAN MOTION. (3)
An introduction to mechanical modeling of human motion (lectures) along with application of computational software to model and estimates internal tissues responses to physical demands of several different activities/tasks (lab activities). Prereq: EM 221, EM 313; or consent of instructor.

BME 541 OCCUPATIONAL BIOMECHANICS. (3)
This course will provide an understanding of physical interaction between workers and their tools, machines, and materials so as to enhance the workers performance while minimizing the risk of musculoskeletal disorders. Discussion of ergonomic methods for measurement, assessment, and evaluation, with major topics including manual materials handling, cumulative trauma disorders, environmental stresses, safety, and legal issues. Prereq: Engineering standing or with instructor permission. (Same as MFS 541.)

BME 579 NEURAL ENGINEERING: MERGING ENGINEERING WITH NEUROSCIENCE. (3)

A multidisciplinary approach combining engineering principles for systems analysis and control, knowledge of biological control mechanisms, and computational properties of biological neural networks in the development of engineering neural networks for control applications. Topics include: equivalent circuit models for biological neurons and networks, non-linear differential equation representations, biological control strategies for rhythmic movements, design and development of controller for robot function, proposal development and presentation. Prereq: EE 422G and Engineering Standing or consent of instructor. (Same as EE 579.)

BME 580 INTRODUCTION TO BIOMEDICAL IMAGING. (3)
A comprehensive introduction to bio-medical imaging systems used today, including xray imaging and computed tomography (CT), magnetic resonance imaging (MRI), ultrasound imaging (UI), and diffuse optical tomography (DOT). The course will review the fundamental mathematics underlying each imaging modality, the hardware needed to implement each system, and the image reconstruction and analysis. The class may involve homework, projects, and exams. Prereq: EE 305, or consent of instructor.

BME 599 TOPICS IN BIOMEDICAL ENGINEERING (Subtitle required). (3)
An interdisciplinary course devoted to detailed study of a topic of current significance in biomedical engineering, such as cellular mechanotransduction, systems biology, and tissue engineering. May be repeated to a maximum of six credits. Prereq: Consent of instructor.

BME 605 BIOMEDICAL SIGNAL PROCESSING I. (3)
Continuous and discrete signals, sampling, Fourier Transform, LaPlace Transform, Z-Transform, correlation and spectral analysis, digital filters. Prereq: Concurrent enrollment or completion of PGY 412G or PGY 502.

BME 610 BIOMEDICAL CONTROL SYSTEMS I. (3)
Homeostatic mechanisms, input-output analysis, steady state and transient response, feedback concepts, system identification and simulation from actual operating data. Prereq: PGY 502 and ME 440 or equivalent.

BME 615 BIOMEDICAL SIGNAL PROCESSING II. (3)
Stochastic processes, Fourier-based spectral analysis and linear system identification, modern spectral estimation (AR, MA, ARMA), parametric transfer function estimation, time-frequency analysis of nonstationary signals. Prereq: BME 605, BME 610, EE 640 recommended.

BME 640 BIOMEDICAL ENGINEERING ETHICS. (1)
This course presents an engineering-based approach to study the system of ethics applicable to biomedical engineering. This course will describe and examine the responsibilities of biomedical engineers to stakeholders, e.g., patients, research subjects, and engineering clients as well as to the legal system (where applicable) and the profession as an entity. As a scholarly discipline, biomedical engineering ethics draws upon principles from subjects such as: the philosophy of science, the philosophy of engineering, and the ethics of technology. Materials from these principles will be used in this course with adaption to the special circumstances attending the practice of Biomedical Engineering.

BME 642 NAVIGATIONAL GUIDES FOR BIOMEDICAL PRODUCT DEVELOPMENT. (3)
This course teaches engineers how biomedical product designs are influenced by government regulations, economic issues, and ethicalconcerns.

BME 661 BIOMATERIALS SCIENCE AND ENGINEERING. (3)

Study of biological and man-made materials that perform, improve, or restore natural functions. Structure and properties of connective tissue and commonly implanted metals, ceramics, and polymers; biocompatibility of materials used in orthopedic, soft tissue, and cardiovascular applications. Prereq: Undergraduate engineering degree or consent of instructor.

BME 662 TISSUE-IMPLANT INTERFACE. (3)
Study of the interface between implants and host tissues from both the materials and biological perspective. Structure of the tissue-implant interface; surface characterization of biomaterials; protein adsorption; mechanisms of cell responses; the methods for controlling the tissue-implant interface, with emphasis on orthopedic and cardiovascular applications. Prereq: BME 661 or consent of instructor.

BME 670 BIOSOLID MECHANICS. (3)
Application of laws of mechanics to study the behavior of human organ systems. Stress-strain analysis of soft and hard body tissues with emphasis on pulmonary and musculoskeletal systems. Viscoelastic properties. Prereq: Undergraduate engineering degree or consent of instructor.

BME 672 MUSCULOSKELETAL BIOMECHANICS. (3)
Application of laws of mechanics to study behavior of human musculoskeletal system. Materials science of bone, muscle, tendon are integrated into static and dynamic analyses of isolated (e.g., foot, arm, and hand) and whole body segment. Prereq: PGY 502, ME 330 or consent of instructor.

BME 685 BIOFLUID MECHANICS. (3)
Review of the rheology of circulatory processes in the body. Special emphasis on cardiovascular dynamics: pulsatile pressure and flow, vascular impedance, wave propagation/reflection, cardiac dynamics. Special topics. Lecture, three hours with periodic lab demonstrations. Prereq: Undergraduate engineering degree or consent of instructor.

BME 690 RESEARCH IN BIOMEDICAL ENGINEERING (Subtitle required). (1-3)
Individual study related to a special research project. Intended for M.S. candidates who want a research project experience independent of their M.S. thesis work. This course cannot be used to satisfy residency credit requirements. Lecture, 1-3 hours; laboratory, 3-6 hours per week. May be repeated to a maximum of six credits. Prereq: Consent of instructor and graduate standing in BME.

BME 699 SPECIAL TOPICS IN BIOMEDICAL ENGINEERING (Subtitle required). (1-3)
Special topics in biomedical engineering, addressed primarily in a lecture/discussion format. Presentation of focussed or specialized topics that are not available in standard courses. Lecture, three hours; laboratory 0-2 hours per week. May be repeated to a maximum of nine credits. Prereq: Consent of instructor and graduate standing in BME.

BME 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

BME 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

BME 766 MANAGEMENT OF TECHNOLOGY. (3)

Successfulness in developing new technologies relies upon knowing which technology advance, the ultimate scientific limits of that technology, and the forecasted rate of technological change. This course presents curricula that explore the direction of technological change and how this affects the rate and extent of innovation.

BME 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

BME 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

BME 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

BME 772 SEMINAR. (0)
Review of current literature in the field of biomedical engineering, general discussion and presentation of papers on research in biomedical engineering. Lecture, one hour per week. Required for all graduate students in biomedical engineering.

BME 774 GRADUATE BME SEMINAR. (0-1)
Scientists and engineers present current research in biomedical engineering. Students are required to prepare for and deliver a seminar on their own research. May be repeated to a maximum of 4 credits. Prereq: Graduate standing in Biomedical Engineering or consent of instructor.

BME 777 ADVANCED STUDY PROJECT. (3)
This is an independent study project, topic to be selected in consultation with the instructor. Purpose is to integrate all materials learned in the program and apply these principles to the solution of an actual problem in biomedical engineering technology. Prereq: Permission of instructor and completion of year 1 PBME studies.

BME 781 SPECIAL PROBLEMS IN BIOMEDICAL ENGINEERING (Subtitle required). (1-3)
Discussion of advanced and current topics in biomedical engineering. Individual work on research problems of current interest. May be repeated to a maximum of nine credits. Lecture/laboratory hours, variable. Prereq: Approval of instructor.

BME 790 RESEARCH IN BIOMEDICAL ENGINEERING. (1-9)
Graduate research in any area of biomedical engineering, subject to approval of the Director of Graduate Studies. May be repeated to a maximum of nine hours. Prereq: Consent of the Director of Graduate Studies.

# Biosystems & Agricultural Engineering

## College of Engineering

The Biosystems and Agricultural Engineering Department offers programs leading to the M.S. (Plan A and Plan B available) and the Ph.D. degree.

**Admission Requirements**
Admission into the M.S. graduate program of the Biosystems and Agricultural Engineering Department requires the concurrence of the Department Graduate Committee, and the Director of Graduate Studies, and the Department Chair and the availability of an advisor for the student. The Biosystems and Agricultural Engineering Graduate Committee reviews the applicant's three letters of recommendation, resume, statement of professional objective and transcripts with special emphasis given to the science and mathematics area. The department requires a minimum grade point average of 2.8 and a GRE score of at least 1500. An engineering B.S. degree from an ABET-accredited engineering program (or international equivalent) is generally required, however, non-engineering students may be admitted by agreeing to take additional undergraduate courses specified by the graduate committee. Exceptions to these requirements are considered on a case-by-case basis, taking into account the materials described above as well as GRE scores.

Admission into the Ph.D. graduate program of the Biosystems and Agricultural Engineering Department requires the concurrence of the Department Graduate Committee, the Director of Graduate Studies, and the Department Chair, and the availability of an advisor for the student. The Biosystems and Agricultural Engineering Graduate Committee reviews the applicant's previous graduate record, three letters of recommendation, resume, statement of professional objective, and transcripts with special emphasis given to the science and mathematics area. The department requires a minimum grade point average of 3.2 on all previous graduate work for unconditional admission. Exceptions to these requirements are considered on a case-by-case basis, taking into account the materials described above as well as GRE scores. Ph.D. students are admitted into candidacy after they have successfully completed the Qualifying Exam.

**Degree Requirements**
The objectives of the Biosystems and Agricultural Engineering graduate program are to develop and strengthen:

1. the ability to plan and conduct research and design involving the application of engineering science to biological and agricultural systems.
2. an understanding of mathematical, physical, and biological sciences that enables critical assessment of scientific literature in these and related fields.
3. the skills required to use precision instruments, techniques and computers in research and design.
4. the ability to make sound engineering and management decisions.
5. the ability to teach college level courses in Biosystems and Agricultural Engineering, particularly at the doctoral level.

Graduate students will combine courses in Biosystems and Agricultural Engineering, other engineering fields, the physical sciences, and the biological sciences to develop a program of study that facilitates these objectives. The advanced degrees, however, are primarily research degrees awarded for significant creative research accomplishment, not for the completion of a specified number of courses. Therefore, the program normally concentrates on a strong thesis or dissertation problem completed under the supervision of the graduate faculty of the department. A design-oriented, non-thesis option is also available for the master's degree.

# Graduate Courses

BAE 502 MODELING OF BIOLOGICAL SYSTEMS. (3)
This course will introduce students to mathematical modeling of biological systems, both from a conceptual and methodological perspective. The art and science of developing a computer simulation model will be presented and supported by examples/exercises in MATLAB. Prereq: BAE 402.

BAE 503 FUNDAMENTALS OF BIORENEWABLE RESOURCE ENGINEERING. (3)
This course introduces students to the science and engineering of converting biorenewable resources into bioenergy and biobased products.
Topics include: Defining the resource base; physical and chemical properties of biorenewable resources; description of biobased products; methods of production for biorenewable resources.

BAE 504 BIOFUELS PRODUCTION AND PROPERTIES. (3)
This course introduces students to the science and engineering of liquid biofuels for transportation. Topics include: physical and chemical properties; engine performance; processing technologies; and environmental impact of biofuels. Prereq: BAE 503 or consent of instructor.

BAE 505 THERMOCHEMICAL PROCESSING OF BIOMASS. (3)
Introduction to thermal and catalytic processes for the conversion of biomass to biofuels and other biobased products. Topics include gasification, fast pyrolysis, hydrothermal processing, syngas to synfuels, and bio-oil upgrading. Prereq: BAE 503, BAE 504, or consent of instructor.

BAE 506 LIFE CYCLE ASSESSMENTS FOR BIORESOURCE ENGINEERING. (3)
Life Cycle Assessment (LCA) is a method in which the energy and raw material consumption, different types of emissions and other important factors related to a specific production or service are measured, analyzed and summarized over the entire life cycle. This course will cover the theory, practice and application of Life Cycle Assessment. Life Cycle Assessment is one tool in a large tool box of methods, such as Life Cycle Costing (LCC), Substance Flow Analysis (SFA), and Risk Assessment (RA), used to evaluate goods, services and systems. Prereq: Senior or graduate student standing.

BAE 513 SOIL DYNAMICS IN TILLAGE AND TRACTION.

BAE 514 COMPONENT DESIGN. (3)
This course is intended to give students practical experience in the design and analysis of components used in agricultural machinery. Major topics include material properties, stress/strain analysis, failure theory, and mechanical components. Students will learn how to use computer software to conduct simulations and design components. Rapid prototyping and traditional fabrication techniques will be explored. Prereq: EM 302; ME 205 or CE 106.

BAE 515 FLUID POWER SYSTEMS. (3)
Analysis and design of fluid power systems used in agricultural, industrial and processing equipment. Selected topics to include: positive displacement components, control devices, actuators, fluid transmission and system dynamics. Lecture, two hours; laboratory, two hours per week. Prereq: ME 330, ME 340 and engineering standing.

BAE 516 CONTROL OF OFF-ROAD VEHICLES. (3)
This course is intended to give students practical experience in the design and analysis of control and communication systems used in offroad vehicles. Additional emphasis will be placed on implementing

simple feedback control methods using an industrial embedded controller. Prereq: BAE 305.

BAE 517 OFF-ROAD VEHICLE DESIGN. (3)
Morphology, operational characteristics, and design considerations of off-road vehicles used in agriculture, forestry and construction. This course provides an introduction to conceptualization, analysis and design of these vehicles. Topics to be addressed include: engine performance and design, vehicle testing, turbo chargers and intercoolers, drivetrains, chassis mechanics, electronic systems, hydraulic systems, and human factors. Prereq: BAE 417.

BAE 532 INTRODUCTION TO STREAM RESTORATION. (3)
Introduction to principles of fluvial geomorphology for application in restoring impaired streams. Topics include channel formation processes (hydrology/hydraulics), stream assessment, sediment transport, in-stream structures, erosion control, habitat, and monitoring. Prereq: CE 341 (or equivalent) and engineering standing or consent of instructor. (Same as CE 542.)

BAE 535 ENVIRONMENTAL CONTROL SYSTEM DESIGN AND RECLAMATION. (3)
Introduction to the principles of sustainable mine planning with a focus on environmental control system design, reclamation and restoration design, and environmental monitoring systems. Topics will include culvert and diversion design, hydrologic inputs, catchment delineation and routing, sedimentologic inputs, erosion control and best management practice selection, sediment pond design, design of silt fences, grass filters, and sediment ditches, weep berm and vegetated filter strip design, reforestation, grassland/wildlife establishment, stream restoration, wetlands/vernal ponds, environmental monitoring system design, and community integration. Prereq: MNG 291, MNG 463, and engineering standing or consent of instructor. (Same as MNG 535.)

BAE 536 FLUVIAL HYDRAULICS. (3)
Rainfall physics, principles of erosion on upland areas and construction sites, stable channel design in alluvial material, mechanics of sediment transport, river mechanics, reservoir sedimentation. Prereq: CE 341 or ME 330 and engineering standing. (Same as CE 546.)

BAE 537 IRRIGATION AND DRAINAGE ENGINEERING. (3)
Planning and design of irrigation system; sprinkler, traveling gun, center pivot, trickle, subirrigation and residential and commercial irrigating; pumps; water quality treatment and supply; ponds and wells; principles of water movement and plant-soil relationships; surface and subsurface drainage. Prereq: ME 330 or CE 341 or consent of instructor.

BAE 538 GIS APPLICATIONS FOR WATER RESOURCES. (3)
This course studies the principles, methodology and analysis of geographic information systems and spatially-referenced data unique to water resources and hydrologic modeling. Lectures will explore the latest GIS concepts, hydrologic modeling relationships and data sources and be complimented with computer-based laboratory exercises. Prereq: BAE 437, CE 461G, or consent of instructor. (Same as CE 568.)

BAE 541 INTERMEDIATE FLUID MECHANICS. (3)
Application of basic fluid mechanics to problems of importance to civil engineering practice. This includes flow measuring, closed conduit flow and pipe networks, open channel flow, turbomachinery (pumps), hydraulic structures, culvert flow. Prereq: CE 341, CS programming course, and engineering standing or consent of instructor. (Same as CE 541.)

BAE 543 SOLAR CELL DEVICES AND SYSTEMS FOR ELECTRICAL ENERGY GENERATION. (3)
Physics of photovoltaic (PV) devices, emerging technologies, design of PV cells and systems, electronic components for signal conditioning, integration, installation, performance evaluation and economic issues related to PV systems. Prereq: EE 211 or EE 305 and Engineering Standing, or consent of instructor. (Same as EE 543/EGR 543.)

BAE 545 ENGINEERING HYDRAULICS. (3)
Analysis and Design of flow in closed conduits and natural and artificial open channels. Design of hydraulic structures. Prereq: CE 461G and engineering standing, or consent of instructor. (Same as CE 549.)

BAE 547 WATERSHED SEDIMENTATION. (3)
The course objective is to gain an understanding of watershed sedimentation including: (1) erosion and sediment transport processes in a watershed and the mechanisms by which the processes are initiated, developed, and worked towards equilibrium; (2) measurement of the sediment budget for a watershed using sediment fingerprinting and sediment loading data; and (3) prediction of sediment loading in watersheds with different human disturbances using hydrologic-based modeling tools. Specific emphasis will be placed on the use of natural carbon and nitrogen isotopic tracer measurements within sediment fingerprinting as a data-driven approach to measure sediment loading from different sources in a watershed. In order to fulfill the course objective, the instructor will use traditional classroom learning as well as field and laboratory components of the course in order that students can participate in hands-on learning. Prereq: CE 461G (Pre- or Co-requisite or equivalent). (Same as CE 547.)

BAE 549 BIOLOGICAL PROCESS ENGINEERING. (3)
An analysis of processing operations for the conversion or generation of biological materials. The course material applies thermodynamics, heat transfer, mass and energy balances, and reaction kinetics to biological process operations such as sterilization, fermentation, product recovery, freezing, drying, evaporation, and refrigeration. Applications include biomedical, food processing, and biochemical and biofuel production from biomass. Prereq: BAE 447 or consent of instructor.

BAE 556 SOLID AND HAZARDOUS WASTE MANAGEMENT. (3)
Study of the generation and management of solid and hazardous wastes. Application of engineering principles to the collection, transport, processing, resource recovery and ultimate disposal of these wastes. Prereq: CE 471G, CE 521 or consent of instructor and engineering standing. (Same as CE 556.)

BAE 580 HEATING, VENTILATING AND AIR CONDITIONING. (3)
A course emphasizing the use of thermodynamics, fluid mechanics, and heat transfer principles in thermal environmental design. Building energy requirements will be computed and thermal comfort criteria will be studied. Prereq: BAE 427 or ME 321, or consent of instructor. This course is open only to graduate students or undergraduates with engineering standing. (Same as ME 580.)

BAE 581 PHYSICS OF PLANT AND ANIMAL ENVIRONMENTS. (3)
A study of the thermal, moisture, light, and gaseous components of plant and animal environments with emphasis on interactions between these biological systems and their environments. Prereq: BAE 427 or consent of instructor.

BAE 599 TOPICS IN BIOSYSTEMS ENGINEERING. (2-3)
A detailed investigation of a topic of current significance in biosystems engineering such as: design of small earth dams, vacuum dehydration systems, small particle mechanics, biofuels, environmental control in green houses, sprinkler irrigation, energy conversion in agriculture,bio-simulation. May be repeated to a

maximum of six credits, but only three credits can be earned under the same title. A particular topic may be offered at most twice under the BAE 599 number. Prereq: Variable; given when topic identified.

BAE 625 TOPICS IN ADVANCED ENVIRONMENT CONTROL AND ANALYSIS (Subtitle required). (3)
A study of current research in environment control and analysis of agricultural, commercial and residential structures. May be repeated three times for a maximum of nine credits, but not more than three credits may be earned under a particular topic. Prereq: Senior course in environment control and HVAC, BAE/ME 580, or consent of instructor.

BAE 642 OPEN CHANNEL FLOW. (3)
The study of open channel flow fundamentals and concepts. Topics include uniform flow, varied flow, steady and unsteady flow, energy dissipators, flow transitions, controls, analytical and numerical solutions in 1D and 2D applications. Prereq: CE 541 or consent of instructor. (Same as CE 642.)

BAE 643 MECHANICS OF SEDIMENT TRANSPORT. (3)
Fundamentals of turbulence in rivers and sediment transport will be taught including recent theory, derivation of governing equations, experimental methods, modeling, and design based on sediment thresholds. Prereq: CE 341 or consent of instructor. (Same as CE 643.)

BAE 647 SYSTEM OPTIMIZATION I. (3)
Introduction to linear and nonlinear optimization and their use in engineering design. Emphasis on numerical approaches and use of optimization methods for engineering systems (e.g. biological, mechanical, structural). Prereq: CS 221 or equivalent; one mathematics course beyond MA 214 or equivalent. (Same as ME 647.)

BAE 648 ENERGY AND MASS TRANSFER IN BIOSYSTEMS PROCESSING. (3)
A comprehensive and in-depth study of the principles of energy and mass transfer as they apply to the processing of agricultural and biological materials. Prereq: BAE 549 or consent of instructor.

BAE 652 BIOLOGICAL PROCESSES FOR WATER QUALITY CONTROL. (3)
Principles and applications of environmental biotechnology for water quality control. Process microbiology and kinetics for various water and wastewater treatment processes. Prereq: CE 351 or consent of instructor. (Same as CE 652.)

BAE 653 WATER QUALITY IN SURFACE WATERS. (3)
Principles of surface water quality modeling and control. Analysis of dispersion, advection, natural aeration, biological oxidation and photosynthesis; their effects on the physical, chemical, and biological quality of waters in streams, lakes, reservoirs, estuaries and other surface waters. Prereq: CE 351 or consent of instructor. (Same as CE 653.)

BAE 658 INSTRUMENTATION FOR ENGINEERING RESEARCH. (3)
Instrumentation and measuring system characteristics; transducers for engineering measurements; and data acquisition and analysis. Lecture, two hours; laboratory, two hours per week. Prereq: Consent of instructor.

BAE 660 SIMILITUDE IN ENGINEERING.

BAE 662 STOCHASTIC HYDROLOGY. (3)

Hydrologic random variables and probability distributions. Statistical measures, development and use of Monte Carlo simulations in the generation of precipitation fields. Statistical tests of hydrologic data. Point frequency and regional frequency analysis. Analysis of hydrologic time series. Long-term trend, harmonic analysis of periodicity, autocorrelation, spectral analysis. Correlation and regression analysis. Linear stochastic models. Introduction to stochastic processes in hydrology, real-time hydrologic forecast (Kalman filter), pattern recognition, and stochastic differential equations. Prereq: MA 214, CE 461G or equivalent. (Same as CE 662.)

#BAE 664 WATERSHED MANAGEMENT. (3)
This course provides an overview of the scientific principles and management strategies used to effectively manage the physical, chemical,
biological and social resources within a watershed so as to improve and sustain the integrity of the watershed system. The course will examine watershed management from both a scientific/engineering perspective as well as from a social science/policy perspective. Examples of effective watershed management will be drawn from cases studies in Kentucky and the United States. Students will be provided with an introduction to those spatial data sets, computer software, and methods currently used in watershed management practice. Prereq: BAE 437 or CE 461G or an equivalent course in hydrology, or consent of instructor. (Same as CE 664.)

BAE 665 WATER RESOURCES SYSTEMS. (3)
Application of systems analysis, mathematic modeling, and optimization in water resources management and design. Solution of engineering problems found in water supply, water quality, urban drainage, and river basin development and management by use of linear, nonlinear, and dynamic programming models. Prereq: Consent of instructor. (Same as CE 665.)

BAE 667 STORMWATER MODELING. (3)
Introduction to deterministic and parametric modeling approaches for mathematically simulating stormwater runoff and quality. Emphasis on modeling concepts and model formulation. Analysis of deterministic component models and their linkage. Formulation of existing parametric models. Presentation of methods for parameter optimization and regionalization. Demonstration of linkage between the two approaches with illustrative examples. Prereq: CE 341 and CE 461G, or consent of instructor. (Same as CE 667.)

BAE 672 LANDFILL DESIGN. (3)
This course deals with the geotechnical aspects of the design of landfills for the disposal of municipal solid waste. Since landfill design is driven by state and federal regulations, time is taken to review these regulations. Landfills are evaluated as engineered systems consisting of multiple components. Each component is investigated individually, and methods are developed to predict and quantify the performance of these components so that appropriate materials, design criteria, and construction methods can be selected to assure that the landfill will function with minimal environmental impact. Prereq: CE 471G. (Same as CE 672.)

BAE 680 BIOCHEMICAL ENGINEERING. (3)
Principles and design of processes involving biochemical reactions, including aerobic and anaerobic respirations and fermentations, and involving pure and mixed cultures. Energy considerations, heat and mass transfer, biochemical kinetics, and application to biological waste treatment. Prereq: CME 550, CME 630, CHE 440G or consent of instructor. (Same as CME 680.)

BAE 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course

work toward the degree must be completed.

BAE 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

BAE 750 SPECIAL PROBLEMS IN BIOSYSTEMS ENGINEERING. (1-3)
Independent work on selected research problems in one of the various fields of biosystems and agricultural engineering. Consultation and laboratory by appointment. May be repeated three times for a maximum of nine credits. Prereq: Approval of chairperson of department.
BAE 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

BAE 768 RESIDENCE CREDIT FOR MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

BAE 769 RESIDENCE CREDIT FOR DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

BAE 775 PROFESSIONAL PRACTICES SEMINAR. (2)
Review of current research topics, methods, management tools and communications techniques with applications. Required of all departmental graduate students. May be repeated once for credit. Lecture, two hours per week. Prereq: Graduate standing.

BAE 795 THESIS. (0)
May be repeated twice

# Chemical Engineering

## College of Engineering

The Department of Chemical and Materials Engineering offers programs leading to the M.S. and Ph.D. degrees in Chemical Engineering, with research specialization in the following areas:

- Biomaterials
- Drug Delivery
- Energy and Batteries
- Environmental Engineering
- Interfacial Engineering
- Materials Synthesis and Nanomaterials
- Membranes/Advanced Separations
- Molecular Dynamics
- Nanomaterials
- Polymer Science and Engineering
- Process Design
- Water Treatment

**Admission Requirements**
Admission to the M.S. and Ph.D. degree programs is on a competitive basis, and financial assistance is available through teaching and research assistantships, as well as a limited number of fellowships. Applicants should have a minimum grade point average of 3.0/4.0 on all undergraduate work, and should hold a Bachelor of Science degree in Chemical Engineering or its equivalent. Meeting the minimum requirements does not guarantee admission, as acceptance is on a competitive and space-available basis. Students with undergraduate majors not in chemical engineering (for example, chemistry or physics) may be eligible for direct admission into the M.S. or Ph.D. graduate programs; these individuals are expected to complete a program of selected undergraduate core courses during their first year of study.

## Master of Science

The M.S. degree in Chemical Engineering requires 24 hours of course work, plus completion of an acceptable thesis (Plan A). This course work includes the chemical engineering graduate core, which is comprised of CME 505, CME 620, CME 630, CME 650, and a graduate-level mathematics elective. In certain exceptional cases (as determined by the faculty), a non-thesis M.S. may be undertaken (Plan B). The non-thesis option requires 30 hours of course work which includes the chemical engineering core, as well as 3 hours of CME 780 (Special Problems in Chemical Engineering). The non-thesis option is only available to those students with prior research or industrial experience. For both Plan A and Plan B, at least half of all graduate course work must be at the 600 level or above.

## Doctor of Philosophy

The Ph.D. degree is a research degree granted on the basis of broad knowledge of chemical engineering and specialized study in a specific area of interest. The student must conduct original and significant research and must submit and defend a dissertation based on that research. Course work requirements include the chemical engineering graduate core, and additional courses so as to fulfill the pre-candidacy residency requirements set forth by the Graduate School; the plan of study is developed by the student in consultation with the research advisor and the Director of Graduate Studies. Advancement to doctoral candidacy is contingent upon successful completion of both the written and oral portions of the Qualifying Examination. The written portion addresses three fundamental areas of the chemical engineering

discipline: Kinetics and Reactor Design, Thermodynamics, and Transport. The oral portion consists of a presentation and defense of the student's proposed dissertation research; a prospectus prepared by the student must be submitted to the doctoral advisory committee prior to the examination. There is no language requirement for the M.S. or Ph.D. degrees in Chemical Engineering.

A wide selection of research topics is available under the direction of the Chemical Engineering faculty. Recent graduate-level elective courses include Biochemical Engineering, Biomedical Micro & Nanotechnology, Computational Materials Science, Drug Delivery, Energy Systems, Interfacial Engineering, Membrane Science and Technology, and Polymer Processing.

For more information please contact the Director of Graduate Studies.

## Course Descriptions

CME 505 ANALYSIS OF CHEMICAL ENGINEERING PROBLEMS. (3)
The application of differential and integral equations to traditional and non-traditional chemical engineering problems. Prereq: CME 425, CME 550 concurrent or consent of instructor.

CME 515 AIR POLLUTION CONTROL. (3)
Kinetics and equilibria of photochemical and "dark" atmospheric reactions. Atmospheric statics and dynamics including lapse rates, inversions, and vertical and horizontal air motion. Single and area source diffusion. Stack meterology. Prereq: CME 320 or ME 220.

CME 523 CONCEPTS, ASSESSMENT TOOLS AND METHODS IN SUSTAINABLE POWER AND ENERGY. (3)
A multidisciplinary course presenting an overview of key topics in sustainability and environmental impact assessment for engineers. Topics will include assessment of current and future energy systems, renewable and conventional energy technologies, supply chain management, sustainability metrics, energy assessment tools, environmental impact assessment and life cycle assessment. Topics will be presented and their attributes described within a framework that aids in evaluation and analysis of energy technology systems and designs in the context of political, social, economic, and environmental goals. Prereq: Engineering Standing and Senior Classification or Consent of Instructor. (Same as EGR/MFS 523.)

CME 542 ELECTRIC POWER GENERATION TECHNOLOGIES. (3)
Overview of technologies used for generating electricity from location, recovery, transportation and storage of fuel to the types of technologies used to convert the fuel to electricity. Included is a discussion of the advantages and disadvantages of each technology and how they must adapt to be viable in the future. Technologies covered include coal, natural gas, nuclear, biomass, wind, solar and advanced technologies. Prereq: Engineering standing or consent of instructor. (Same as EGR 542.)

CME 550 CHEMICAL REACTOR DESIGN. (3)
A lecture and problem course dealing with interpretation of rate data and development of performance equations for single and multiple reactor systems. A design problem will be selected for an industrially important chemical reaction system requiring computer solution. Prereq: Engineering standing; CME 420, 425.

CME 552 AUTOMOTIVE PLASTICS. (3)
Overview of materials and processes for the application of plastics in the automotive industry. Engineering properties of plastics, rheology and governing relations for melt process flows. Plastic injection molding

including design, control, and simulation of molding operations. Plastic part design and material selection; material testing and quality control. Prereq: Engineering Standing, MSE 201 or enrollment in the Production Engineering Certificate. (Same as MSE 552.)

CME 554 CHEMICAL AND PHYSICAL PROCESSING OF POLYMER SYSTEMS. (3)
Theory and practice as related to the chemical and physical processing of polymer systems. Polymer rheology, heat transfer in polymer flows, polymer engineering properties. Polymer processing operations and materials selection; flow instabilities. Prereq: CME 330, CME 425 or ME 325; or consent of instructor. This course is open only to graduate students or undergraduates with engineering standing. (Same as ME/MFS/MSE 554.)

CME 556 INTRODUCTION TO COMPOSITE MATERIALS. (3)
Modern composite materials and their applications. Basic concepts and definitions. Fundamental properties of fibers and polymer resins. Manufacturing methods. Analysis and design of laminated and chopped fiber reinforced composites. Micro- and macro-mechanical analysis of elastic constants. Failure theory of composite materials. Computational design of composites. Prereq: Engineering Standing, and EM 302 or with instructor permission. (Same as ME/MFS/MSE 556.)

CME 570 BIONANOTECHNOLOGY: INTERFACES AND DEVICES. (3)
This course introduces the broad impact of small-scale biological and synthetic structures and resulting miniature technologies on the biological, medical, and environmental fields, focusing on interfaces and devices. It will discuss the fundamental science behind the technologies, highlighting the advantages that result at the micro- and nanoscale (e.g. mass and energy transport). In particular, medical (diagnostic and therapeutic devices) and environmental applications will be examined, with several examples of micro- and nanoscale systems exhibiting enhanced properties highlighted. The student will be introduced to the fundamental science, the cutting-edge research activities, and the current commercially available technologies. Prereq: Upper level in CME or consent of instructor.

CME 580 DESIGN OF RATE AND EQUILIBRIUM PROCESSES FOR WATER POLLUTION CONTROL. (3)
The design of chemical and physical processes for the removal and concentration of organic, inorganic, and particulate pollutants from aqueous solution/suspension: adsorption, destabilization, disinfection, membrane processes, thermal processes, flow through beds of solids, etc. Prereq: CHE 440G, CME 425 and prereq or concur: CME 550 or consent of instructor.

*CME 599 TOPICS IN CHEMICAL ENGINEERING. (3)
A detailed investigation of a topic of current significance in chemical engineering such as: contemporary energy topics, fuels development, membrane science, computer control of chemical processing. A particular topic may be offered twice under the CME 599 number. May be repeated to a maximum of nine credits. Prereq: Engineering standing.

PREREQUISITE FOR GRADUATE WORK
Students desiring to take any of the following courses should have a thorough working knowledge of chemistry, physics, and mathematics. For major work, a candidate must hold a bachelor's degree in chemical engineering or its equivalent.

CME 620 EQUILIBRIUM THERMODYNAMICS. (3)
The criteria for physical and chemical equilibria, including: predictive equations, solution theory, chemical activity, coupled chemical equilibria, and external constraints. Emphasis may be on vapor-liquid equilibrium, chemical reaction equilibrium, or complex ionic equilibria in dilute aqueous solutions and

suspensions. Prereq: CHE 440G and CME 320 or consent of instructor.

CME 630 TRANSPORT I. (3)
A unified study of physical rate processes in liquids and vapors, including: mass, energy, and momentum transport, transport in chemically reacting systems, similarities, turbulence modeling, buoyance-induced transport and multicomponent diffusion. Prereq: ME 330, CME 425, CME 505 concurrent or consent of instructor.

CME 650 ADVANCED CHEMICAL REACTOR DESIGN. (3)
Rate expressions for heterogeneous reaction kinetics; energy and mass transport within and external to reacting porous catalysts; design equations for multiphase fixed and moving bed reactors. Prereq: CME 550, CME 630, CME 505, or instructor consent.

CME 664 MULTIDISCIPLINARY SENSORS LABORATORY. (3)
A multidisciplinary laboratory course with laboratory experiences in areas related to sensors and sensing architectures, typically including chemistry, chemical and materials engineering, and electrical engineering. Lecture, 1 hour; laboratory, 2 hours. Prereq: One year of college chemistry, calculus and physics. GS 660 or by consent of instructor. (Same as CHE/EE/MSE 664.)

CME 680 BIOCHEMICAL ENGINEERING. (3)
Principles and design of processes involving biochemical reactions, including aerobic and anaerobic respirations and fermentations, and involving pure and mixed cultures. Energy considerations, heat and mass transfer, biochemical kinetics, and application to biologicalwaste treatment. Prereq: CME 550, CME 630, CHE 440G or consent of instructor. (Same as BAE 680.)
CME 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

CME 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

CME 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

CME 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

CME 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (0-12)

CME 771 SEMINAR. (0)
Review of current literature in the field of chemical engineering, general discussion and presentation of papers on departmental research. Lecture, one hour per week. Required for all graduate students in chemical engineering.

CME 779 MEMBRANE SCIENCES COLLOQUIUM. (1)
Outstanding membrane scientists present their current research on biological and/or synthetic

membranes. Students read a pertinent paper by the speaker prior to his/her talk and write a short paper on the talk; especially important is relevance of the main points of the talk to membrane science in general and the student's own research in particular. May be repeated to a maximum of six credits. (Same as BCH/CHE/PHA/PHR 779.)

CME 780 SPECIAL PROBLEMS IN CHEMICAL ENGINEERING. (1-3)
Independent study, design, or research in chemical engineering topics. May be repeated to a maximum of 12 credits. Prereq: Approval of the departmental director of Graduate Studies.

CME 790 RESEARCH IN CHEMICAL ENGINEERING. (1-9)
Graduate Research in Chemical Engineering on a topic approved by the Departmental Graduate Studies Committee. May be repeated to a maximum of two semesters. Prereq: Consent of the Director of Graduate Studies.

# Civil Engineering

## College of Engineering

The Department of Civil Engineering offers the Master of Science in Civil Engineering (Plan A and Plan B available), and Ph.D. with specialization in the following areas:

Civil Engineering Materials
Construction Engineering and Management
Environmental Engineering
Geotechnical Engineering
Hydraulics Engineering
Structural Engineering
Transportation Engineering
Water Resources Engineering

These areas utilize courses from other departments and such inter-departmental programs are encouraged. Mechanical Engineering, Chemical Engineering, Agricultural Engineering, Mining Engineering, Mathematics, Computer Science, Geology, Biology, and Chemistry are some of the departments whose offerings contribute to the programs in Civil Engineering.

For the Master of Science in Civil Engineering (M.S.C.E.) degree Plan A, 24 credit hours of course work and a thesis are required to fulfill degree requirements. For the Master of Science in Civil Engineering (M.S.C.E.) degree Plan B, a minimum of 30 credit hours of graduate work are required, including at least 3 credit hours of independent work. The requirement for independent work may be satisfied by either taking an approved curriculum of courses which contain integral independent study components totaling a minimum of 3 credit hours, or by completing at least three credit hours of CE 790 and/or CE 791.

Students who wish to complete the independent work requirement by choosing from an approved curriculum of courses containing integral independent study components, shall present a plan of study which satisfies this requirement, and all other Graduate School requirements, to the Director of Graduate Studies for approval before the completion of 12 credit hours of graduate course work. Preferably this should occur no later than the end of the first semester of graduate residence. The requirement for all independent work must be satisfied under the direction of one faculty member (for students choosing a CE 790 and/or CE 791), or several faculty members (for students following an approved curriculum of courses), who will assign, monitor, and evaluate the student's work as part of the specific course. Written reports will usually represent the work product to be evaluated.

All students must pass a Final Examination as specified by the rules of the Graduate School. The contents and style of the examination, and the evaluation of the student's performance, are the responsibility of a Graduate Faculty committee appointed by the Dean of the Graduate School. The Ph.D. degree has no formal course requirement, but students must pass the Qualifying Examination before entering candidacy. There is no language requirement for the M.S.C.E. and Ph.D. degrees in Civil Engineering.

**Admission Requirements**
In addition to satisfying general Graduate School and College of Engineering admissions requirements (a GPA of 2.8/4.0 on all undergraduate work is normally required), applicants for admission to the M.S.C.E., and Ph.D. degree programs in Civil Engineering must have been awarded a Bachelor of Science degree

from an engineering program accredited by the Accrediting Board for Engineering and Technology (ABET). This requirement may be waived for applicants who have been awarded bachelor's degrees other than in engineering or from unaccredited engineering programs (including those offered by foreign institutions) if the applicant has received an acceptable score on the Graduate Record Examination (GRE).

Students with undergraduate majors not in engineering must also take a certain number of undergraduate remedial courses. Neither the M.S.C.E. degree nor the Ph.D. degree in Civil Engineering will be conferred unless the candidates have successfully completed, during their undergraduate and/or graduate careers, at least one basic course in at least four of the following seven areas: civil engineering materials, construction engineering and management, environmental engineering, geotechnical engineering, hydraulics and water resources engineering, structural engineering, and transportation engineering.

Another admission requirement is a minimum combined verbal and quantitative scores of GRE as follows: 1000 (300: New GRE), and 1100 (330: New GRE) for Master's and Ph.D. degree applicants, respectively. Scores on the analytical portion are not considered. Foreign applicants whose native language is other than English must take the Test of English as a Foreign Language (TOEFL) and score at least 550 (Computer Based TOEFL: 213, iBT TOEFL: 80).

The Department of Civil Engineering has many well-equipped laboratories with active research programs in most areas. The research programs provide financial assistance for graduate students. In addition, financial assistance is available through teaching assistantships, fellowships, and scholarships.

Information about the graduate program in Civil Engineering can be obtained by writing the Director of Graduate Studies, Department of Civil Engineering.

## Graduate Courses

| | | |
|---|---|---|
| CE 461G | Hydrology | (3) |
| CE 471G | Soil Mechanics | (4) |
| CE 486G | Reinforced Concrete Structures | (3) |
| CE 487G | Steel Structures | (3) |
| CE 508 | Design And Optimization Of Construction Operations | (3) |
| CE509 | Control Of The Construction Project | (3) |
| CE517 | Boundary Location Principles | (3) |
| CE 525 | CE Applications Of Geographic Information Systems | (3) |
| CE 531 | Transportation Facilities Design And Operations | (3) |
| CE 533 | Railroad Facilities Design And Analysis | (3) |
| CE 534 | Pavement Design, Construction And Management | (3) |
| CE 539 | Transportation Systems Design | (3) |
| CE 541 | Intermediate Fluid Mechanics (Same As BAE 541) | (3) |
| CE 542 | Introduction To Stream Restoration (Same As BAE 532) | (3) |
| CE 546 | Fluvial Hydraulics (Same As BAE 536) | (3) |
| CE 547 | Watershed Sedimentation (Same As BAE 547) | (3) |
| CE 549 | Engineering Hydraulics(Same As BAE 545) | (3) |
| CE 551 | Water And Wastewater Treatment Engineering | (3) |
| CE 553 | Environmental Consequences Of Energy Production (Same As EGR 553) | (3) |
| CE 555 | Microbial Aspects Of Environmental Engineering | (3) |
| CE 568 | GIS Applications For Water Resources (Same As BAE 538) | (3) |
| CE 579 | Geotechnical Engineering | (3) |
| CE 581 | Civil Engineering Materials Ii | (3) |

| | | |
|---|---|---|
| CE 582 | Advanced Structural Mechanics | (3) |
| CE 584 | Design Of Timber And Masonry Structures | (3) |
| CE 585 | Civil Engineering Failure | (3) |
| CE 586 | Prestressed Concrete | (3) |
| CE 589 | Design Of Structural Systems | (3) |
| CE 599 | Topics In Civil Engineering (Subtitle Required) | (1-4) |
| CE 602 | Construction Project Management | (3) |
| CE 605 | New Engineering Enterprises | (3) |
| CE 621 | Introduction To Finite Element Analysis | (3) |
| CE 631 | Urban Transportation Planning | (3) |
| CE 633 | Air Transport Engineering | (3) |
| CE 634 | Traffic Characteristics | (3) |
| CE 635 | Highway Safety | (3) |
| CE 642 | Open Channel Flow (Same As BAE 642) | (3) |
| CE 643 | Mechanics Of Sediment Transport | (3) |
| CE 651 | Fundamentals Of Water Quality Control I | (3) |
| CE 652 | Fundamentals Of Water Quality Control Ii | (3) |
| CE 653 | Water Quality In Surface Waters (Same As BAE 653) | (3) |
| CE 655 | Water Sanitation And Health | (3) |
| CE 662 | Stochastic Hydrology (Same As BAE 667) | (3) |
| CE 664 | Watershed Management | (3) |
| CE 665 | Water Resources Systems | (3) |
| CE 667 | Stormwater Modeling | (3) |
| CE 671 | Advanced Soil Mechanics | (3) |
| CE 672 | Landfill Design | (3) |
| CE 673 | Stability Of Earth Slopes | (3) |
| CE 676 | Groundwater And Seepage | (3) |
| CE 679 | Geotechnical Earthquake Engineering | (3) |
| CE 681 | Advanced Civil Engineering Materials | (3) |
| CE 682 | Advanced Structural Analysis | (3) |
| CE 684 | Slab And Folded Plate Structures | (3) |
| CE 686 | Advanced Reinforced Concrete Theory | (3) |
| CE 687 | Advanced Metal Structures | (3) |
| CE 699 | Topics In Civil Engineering (Subtitle Required) | (1-4) |
| CE 748 | Master's Thesis Research | (0) |
| CE 749 | Dissertation Research | (0) |
| CE 767 | Dissertation Residency Credit | (2) |
| CE 768 | Residence Credit For Master's Degree | (1-6) |
| CE 769 | Residence Credit For Doctor's Degree | (0-12) |
| CE 779 | Advanced Geotechnical Engineering | (3) |
| CE 782 | Dynamics Of Structures | (3) |
| CE 783 | Structural Finite Element Analysis | (3) |
| CE 784 | Shell Structures | (3) |
| CE 790 | Special Research Problems In Civil Engineering | (1-6) |
| CE 791 | Special Design Problems In Civil Engineering | (1-6) |

# Course Descriptions

CE 507 CONSTRUCTION SAFETY AND HEALTH. (3)
The course will develop an understanding of safety and health; cost and human impact; hazard and risk analyses; psychological facts of organizational culture and climate; design safe work procedures for the execution of particular types of work; and individual versus management level improvement in safety and health procedures in the construction process. Prereq: Engineering standing and CE 303 or consent of instructor.

CE 508 DESIGN AND OPTIMIZATION OF CONSTRUCTION OPERATIONS. (3)
The course critically examines repetitive operations that occur from project to project and the deterministic approaches used to design and optimize their effectiveness. Scientific techniques used to field measure the efficiency of construction operations are also examined. The primary metrics used to optimization include cost, schedule, and sustainability. Prereq: C in CE 303, C in CE 381, and engineering standing or graduate standing.

CE 509 CONTROL OF THE CONSTRUCTION PROJECT. (3)
This course investigates the principles and practices for the control of budget and schedule for construction projects. Topics studied include: estimating construction costs and developing a project budget, planning construction operations and developing a project schedule, documenting and reporting of project progress and spending, and the management of change of contract amount, contract time, and contract scope work. Prereq or coreq: CE 508 or consent of instructor.

CE 517 BOUNDARY LOCATION PRINCIPLES. (3)
Procedures for locating or relocating the boundaries of real property; records searching, technical aspects of field work, preparation of descriptions and survey reports, land data systems, legal aspects, special problems. Prereq: C in CE 211, engineering standing, or consent of instructor.

CE 525 CIVIL ENGINEERING APPLICATIONS OF GEOGRAPHIC INFORMATION SYSTEMS. (3)
CE 525 focuses on GIS as a tool in Civil Engineering. The terms and concepts related to Geographic Information Systems are introduced. The management of spatial databases, particularly those related to Civil Engineering, is covered. Students will collect data using a Global Positioning System (GPS). Students will be required to use the GIS ArcInfo to solve a specific individual spatial problem that they propose based on several Civil Engineering databases available to them. Lecture, two hours; laboratory, three hours per week. Prereq: Engineering standing and one of the following: C in CE 331, C in CE 341, or CE 471G.

CE 531 GEOMETRIC DESIGN AND OPERATIONS OF ROADWAYS. (3)
Analysis of transportation facilities through a diagnostic study of transportation systems with emphasis on design, capacity and safety. Engineering practice oriented toward open-ended design solutions, mostly focused on roadway design. Prereq: C in CE 331, and engineering standing.

CE 533 RAILROAD FACILITIES DESIGN AND ANALYSIS. (3)
Principles of railroad location, construction, rehabilitation, maintenance, and operation with emphasis on track structure design and analysis, bridges and bridge loading, drainage considerations, track geometry effects, and operating systems analysis. Coreq or prereq: CE 471G or graduate standing or consent of instructor.

CE 534 PAVEMENT DESIGN, CONSTRUCTION AND MANAGEMENT. (3)
Design, analysis, construction, and management of flexible and rigid pavements. Stresses and strains, pave-

ment materials, subgrade soil stabilization, bases and subbases, quality control, drainage, pavement-type selection, and pavement management. Prereq: C in CE 381; prereq or concur: CE 471G, and engineering standing.

CE 539 TRANSPORTATION SYSTEMS DESIGN. (3)
This course focuses on the design of urban intersections and the procedures used to evaluate the operational level of urban roadwaysystems. First, a review of urban intersection design principles and aspects is presented. Second, traffic signal timing techniques are reviewed and students are required to use two software packages for evaluation of traffic operation of urban roadway systems. The focal point of the course is a group design project where solutions to accommodate all transportation modes and their issues along a corridor in Lexington are sought. Fieldwork and data collection are part of this course. Lecture, two hours; laboratory, one hour. Prereq: C in CE 331; CE 531 prereq or concur.

CE 541 INTERMEDIATE FLUID MECHANICS. (3)
Application of basic fluid mechanics to problems of importance to civil engineering practice. This includes flow measuring, closed conduit flow and pipe networks, open channel flow, turbomachinery (pumps), hydraulic structures, culvert flow. Prereq: CE 341, CS programming course, and engineering standing or consent of instructor. (Same as BAE 541.)

CE 542 INTRODUCTION TO STREAM RESTORATION. (3)
Introduction to principles of fluvial geomorphology for application in restoring impaired streams. Topics include channel formation processes (hydrology/hydraulics), stream assessment, sediment transport, in-stream structures, erosion control, habitat, and monitoring. Prereq: CE 341 (or equivalent) and engineering standing or consent of instructor. (Same as BAE 532.)

CE 546 FLUVIAL HYDRAULICS. (3)
Rainfall physics, principles of erosion on upland areas and construction sites, stable channel design in alluvial material, mechanics of sediment transport, river mechanics, reservoir sedimentation. Prereq: CE 341 or ME 330 and engineering standing. (Same as BAE 536.)

CE 547 WATERSHED SEDIMENTATION. (3)
The course objective is to gain an understanding of watershed sedimentation including: (1) erosion and sediment transport processes in a watershed and the mechanisms by which the processes are initiated, developed, and worked towards equilibrium; (2) measurement of the sediment budget for a watershed using sediment fingerprinting and sediment loading data; and (3) prediction of sediment loading in watersheds with different human disturbances using hydrologic-based modeling tools. Specific emphasis will be placed on the use of natural carbon and nitrogen isotopic tracer measurements within sediment fingerprinting as a data-driven approach to measure sediment loading from different sources in a watershed. In order to fulfill the course objective, the instructor will use traditional classroom learning as well as field and laboratory components of the course in order that students can participate in hands-on learning. Prereq: CE 461G (Pre- or Co-requisite or equivalent). (Same as BAE 547.)

CE 549 ENGINEERING HYDRAULICS. (3)
Analysis and Design of flow in closed conduits and natural and artificial open channels. Design of hydraulic structures. Prereq: CE 461G and engineering standing, or consent of instructor. (Same as BAE 545.)

CE 551 WATER AND WASTEWATER TREATMENT ENGINEERING. (3)
This course examines the scientific and engineering aspects of water and wastewater treatment. Conventional water treatment processes such as rapid mixing, flocculation, sedimentation, filtration, and disinfection as well as biological processes for wastewater treatment areanalyzed. Sustainable alternative treatment

techniques are also discussed. Prereq: C in CE 341, C in CE 351, and engineering standing or consent of instructor.

CE 553 ENVIRONMENTAL CONSEQUENCES OF ENERGY PRODUCTION. (3)
This course will introduce the relationship of energy, pollution control technology, and the environment. The scientific and engineering aspects of energy production are examined and the associated environmental problems and control technologies are discussed. Prereq: CHE 105, MA 214, and engineering standing or consent of instructor. (Same as EGR 553.)

CE 555 MICROBIAL ASPECTS OF ENVIRONMENTAL ENGINEERING. (3)
Environmental microbiology for engineering students with emphasis on microbially mediated chemical cycles, microbial ecology, and industrial microbiology. Prereq: C in CE 351, engineering standing, graduate status or consent of instructor.

CE 568 GIS APPLICATIONS FOR WATER RESOURCES. (3)
This course studies the principles, methodology and analysis of geographic information systems and spatially-referenced data unique to water resources and hydrologic modeling. Lectures will explore the latest GIS concepts, hydrologic modeling relationships and data sources and be complimented with computer-based laboratory exercises. Prereq: BAE 437, CE 461G, or consent of instructor. (Same as BAE 538.)

CE 579 GEOTECHNICAL ENGINEERING. (3)
Application of the principles of soil mechanics and structural mechanics to the design of retaining walls, bracing for excavations, footings, mat and pile foundations and to the analysis of the stability of earth slopes. Prereq: CE 471G and engineering standing.

CE 581 CIVIL ENGINEERING MATERIALS II. (3)
Design, evaluation, and construction of portland cement concrete and hot mix asphalt (HMA). Advanced topics related to high performance concrete and asphalt materials are covered in this course. Prereq: C in CE 381 and engineering standing.

CE 584 DESIGN OF TIMBER AND MASONRY STRUCTURES. (3)
Current and historic design methods of buildings and their components using wood, wood products, bricks, and concrete blocks. Prereq: Courses in steel and reinforced concrete design at the senior level, or consent of instructor. (Same as ARC 584.)

CE 585 CIVIL ENGINEERING FAILURES. (3)
Fundamentals of failure investigation and forensic engineering; Failure types and mechanisms; Case studies and discussions on various constructed facilities. Prereq: CE 382 or consent of instructor, and engineering standing.

CE 586 PRESTRESSED CONCRETE. (3)
Fundamental basis and underlying principles for the analysis and design of prestressed concrete. Working stress and ultimate strength design methods, full and partial prestressing. Design for shear and torsion, deflection, crack control, and long-term effects, and prestress losses. Composite beams, continuous beams, slabs, short and slender columns, precast structures and their connections. Prereq: CE 486G and engineering standing.

CE 589 DESIGN OF STRUCTURAL SYSTEMS. (3)
Building codes, design loads, computerized structural analysis and design, gravity and lateral system design, structural system descriptions

and selection considerations, and structural contract documents. Prereq: CE 486G and CE 487G, engineering standing or consent of instructor.

CE 595 INDEPENDENT WORK IN CE. (1-4)
Individual work on some selected problem in the field of civil engineering. May be repeated for a maximum of six credits. Prereq: Consent of department chairperson and the instructor; with engineering standing.

CE 599 TOPICS IN CIVIL ENGINEERING (Subtitle required). (1-4)
A detailed investigation of a topic of current significance in civil engineering such as: design of small earth dams, man and the environment, drilling and blasting, scheduling construction operations, construction equipment and methods, traffic safety, optimum structural design, environmental impact analysis, systems analysis in civil engineering, motor vehicle noise and its control. May be repeated to a maximum of eight credits, but only four credits can be earned under the same title. A particular topic may be offered at most twice under the CE 599 number. Prereq: Variable; given when topic is identified; plus engineering standing.

PREREQUISITE FOR GRADUATE WORK: Students desiring to take any of the following courses should have a thorough working knowledge of chemistry, physics and mathematics. For major work, a candidate must hold a bachelor's degree in civil engineering or its equivalent.

CE 602 CONSTRUCTION PROJECT MANAGEMENT. (3)
Management of construction projects: planning, estimating, scheduling and control; organization; site management; material management; safety management; quality management; construction labor relations; productivity management; claims. Prereq: Engineering Standing, graduate status, or consent of instructor.

CE 605 NEW ENGINEERING ENTERPRISES. (3)
The course covers the theory and actual practices of organization, management and operation of engineering companies. Primary emphasis on construction companies; however, the principles apply to most service oriented engineering companies. Students will be required to do several independent exercises related to establishing an engineering company. Prereq: Graduate standing in engineering or consent of instructor.

CE 608 BUILDING INFORMATION MODELING FOR CONSTRUCTION. (3)
The course focuses on advanced information systems used to control and predict project performance (cost and schedule) in construction. Building Information Modeling is examined as a systems approach of integrating design and construction for the benefit of developing construction work packages, 4D simulations, clash detection, trade coordination, and status visualization. Prereq: CE 509 and enrollment in the Graduate School or consent of the instructor.

CE 621 INTRODUCTION TO FINITE ELEMENT ANALYSIS. (3)
Theoretical, conceptual, and computational aspects of the finite element method are developed. Development of the element relationships, element calculations, and assembly of the finite element equations are covered. Both one- and two-dimensional finite element problems are considered. One-dimensional problem areas include elastic deformation, heat conduction, fluid flow, electrostatics, groundwater flow, mass transport, beams on elastic foundations, etc. Two-dimensional problem areas include Poisson's equation, viscous incompressible flow, plane elasticity, and bending of elastic plates. Prereq: MA 432G, MA 537 or consent of instructor. (Same as ME 601.)

CE 631 URBAN TRANSPORTATION PLANNING. (3)
A detailed review of the transportation planning process; inventory methodologies; trip generation, distribution and assignment with associated mathematical models and theories; prediction of future travel; land and use models; modal split; developing and testing proposed systems; simulation. Prereq: CE 531 or equivalent and STA 381, or 681 or equivalent statistics course. (Same as GEO 643.)

CE 633 AIR TRANSPORT ENGINEERING. (3)
Planning location and design of airports, STOL ports, and heliports. Air traffic operations, performance and control as related to facility requirements. Role of governmental agencies. Prereq: CE 531 or consent of instructor.

CE 634 TRAFFIC CHARACTERISTICS. (3)
Vehicle operating characteristics; driver, pedestrian and roadway characteristics as they individually, and collectively as traffic stream characteristics, are related to the planning design and operation of highway facilities.

CE 635 HIGHWAY SAFETY. (3)
A detailed review of the impacts of safety considerations on highway design and planning, focusing on the highway environment, its users (both vehicles and drivers) and their interactions. The role of special interest groups (tracking industry, insurance agencies) is also examined. Prereq: CE 539 or consent of instructor.

CE 641 MECHANICS OF LIQUID FLOW IN PIPES. (3)
Steady and unsteady one-dimensional pipe flow. Water hammer and surge tank analysis. Steady two-dimensional pipe flow. Digital and analog computer applications. Prereq: CE 549.

CE 642 OPEN CHANNEL FLOW. (3)
The study of open channel flow fundamentals and concepts. Topics include uniform flow, varied flow, steady and unsteady flow, energy dissipators, flow transitions, controls, analytical and numerical solutions in 1D and 2D applications. Prereq: CE 541 or consent of instructor.(Same as BAE 642.)

CE 643 MECHANICS OF SEDIMENT TRANSPORT. (3)
Fundamentals of turbulence in rivers and sediment transport will be taught including recent theory, derivation of governing equations, experimental methods, modeling, and design based on sediment thresholds. Prereq: CE 341 or consent of instructor. (Same as BAE 643.)

CE 652 BIOLOGICAL PROCESSES FOR WATER QUALITY CONTROL. (3)
Principles and applications of environmental biotechnology for water quality control. Process microbiology and kinetics for various water and wastewater treatment processes. Prereq: CE 351 or consent of instructor. (Same as BAE 652.)

CE 653 WATER QUALITY IN SURFACE WATERS. (3)
Principles of surface water quality modeling and control. Analysis of dispersion, advection, natural aeration, biological oxidation and photosynthesis; their effects on the physical, chemical, and biological quality of waters in streams, lakes, reservoirs, estuaries and other surface waters. Prereq: CE 351 or consent of instructor. (Same as BAE 653.)

CE 655 WATER SANITATION AND HEALTH. (3)
Prevention of water-related diseases by appropriate supply and sanitation practices with designs applicable to small systems and rural areasof developing nations. (Same as CPH 790.)

CE 662 STOCHASTIC HYDROLOGY. (3)
Hydrologic random variables and probability distributions. Statistical measures, development and use of Monte Carlo simulations in the generation of precipitation fields. Statistical tests of hydrologic data. Point frequency and regional frequency analysis. Analysis of hydrologic time series. Long-term trend, harmonic analysis of periodicity, autocorrelation, spectral analysis. Correlation and regressionbanalysis. Linear stochastic models. Introduction to stochastic processes in hydrology, real-time hydrologic forecast (Kalman filter), pattern recognition, and stochastic differential equations. Prereq: MA 214, CE 461G or equivalent. (Same as BAE 662.)

CE 664 WATERSHED MANAGEMENT. (3)
This course provides an overview of the scientific principles and management strategies used to effectively manage the physical, chemical, biological and social resources within a watershed so as to improve and sustain the integrity of the watershed system. The course will examine watershed management from both a scientific/engineering perspective as well as from a social science/policy perspective. Examples of effective watershed management will be drawn from cases studies in Kentucky and the United States. Students will be provided with an introduction to those spatial data sets, computer software, and methods currently used in watershed management practice. Prereq: BAE 437 or CE 461G or an equivalent course in hydrology, or consent of instructor. (Same as BAE 664.)

CE 665 WATER RESOURCES SYSTEMS. (3)
Application of systems analysis, mathematic modeling, and optimization in water resources management and design. Solution of engineering problems found in water supply, water quality, urban drainage, and river basin development and management by use of linear, nonlinear, and dynamic programming models. Prereq: Consent of instructor. (Same as BAE 665.)

CE 667 STORMWATER MODELING. (3)
Introduction to deterministic and parametric modeling approaches for mathematically simulating stormwater runoff and quality. Emphasis on modeling concepts and model formulation. Analysis of deterministic component models and their linkage. Formulation of existing parametric models. Presentation of methods for parameter optimization and regionalization. Demonstration of linkage between the two approaches with illustrative examples. Prereq: CE 341 and CE 461G, or consent of instructor. (Same as BAE 667.)

CE 671 ADVANCED SOIL MECHANICS. (3)
Detailed study of soil behavior. Specific topics include soil classification and structure, strength and deformational behavior, compaction, consolidation, and stress distribution in earth masses. Prereq: CE 471G or consent of instructor.

CE 672 LANDFILL DESIGN. (3)
This course deals with the geotechnical aspects of the design of landfills for the disposal of municipal solid waste. Since landfill design is driven by state and federal regulations, time is taken to review these regulations. Landfills are evaluated as engineered systems consisting of multiple components. Each component is investigated individually, and methods are developed to predict and quantify the performance of these components so that appropriate materials, design criteria, and construction methods can be selected to assure that the landfill will function with minimal environmental impact. Prereq: CE 471G. (Same as BAE 672.)

CE 673 STABILITY OF EARTH SLOPES. (3)
Review of shear strength principle including laboratory and field tests for shear strength and shear strength of unsaturated soils; theoretical and practical aspects of infinite slopes, block analysis, method of slices, effective and total stress analysis, analysis of unsaturated slopes,

commercial software packages for slope stability analysis, probabilistic analysis of slope stability problems, rapid drawdown, and slope failure mitigation.
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CE 676 GROUNDWATER AND SEEPAGE. (3)
Permeability and capillary flow in soils, mathematical theory of flow through porous media. Flow through anisotropic, stratified and composite sections. Solution by flow net, conformal mapping and numerical methods. Seepage toward wells. Dewatering and drainage of soils. Prereq: CE 471G or consent of instructor.

CE 679 GEOTECHNICAL EARTHQUAKE ENGINEERING. (3)
Introduction to seismology. Dynamic and earthquake response of soils using standard analysis. Liquefaction of soils under cyclic loading. Measurements of dynamic properties of soils. Earthquake resistant design of retaining walls, foundations, slopes, and earth dams. Soil improvement methods for seismic resistant design. Current state-of-the-art techniques in geotechnical earthquake engineering. Prereq: CE 579.

CE 681 ADVANCED CIVIL ENGINEERING MATERIALS. (3)
Fundamental aspects of mechanical behavior of civil engineering materials. Rheology and fracture of asphalt and Portland cement concrete materials. Prereq: CE 381.

CE 682 ADVANCED STRUCTURAL ANALYSIS. (3)
Theory and application of energy principles for plane and space frames; shear wall structures; geometric and material nonlinear formations; and nonlinear solution strategies. Solution techniques for the analysis of large complex structures. Introduction to plane stress/strain, axisymmetric and plate bending finite element analysis.

CE 684 SLAB AND FOLDED PLATE STRUCTURES. (3)
Design and analysis of reinforced concrete floor slabs and folded plate roofs. Elastic and inelastic methods.

CE 686 ADVANCED REINFORCED CONCRETE THEORY. (3)
Background and origin of modern reinforced concrete design procedures and codes. Comparison of American and foreign methods of analysis. Review of current research and projection to anticipated future changes in design and construction practices. Prereq: CE 486G or consent of instructor.

CE 687 ADVANCED STEEL DESIGN. (3)
Strength of structural steel columns, including asymmetry and slender compression elements. Flexural strength of slender plate girders. Shear strength with and without post-buckling strength. Frame stability. Steel connections. Floor vibration serviceability. Prereq: CE 487G or consent of instructor.

CE 699 TOPICS IN CIVIL ENGINEERING (Subtitle required). (1-4)
An advanced level presentation of a topic from one of the major areas of civil engineering such as hydraulics, geotechnics, structures, transportation, surveying, or water resources. Course with a given subtitle may be offered not more than twice under this number. Prereq: Variable; given when topic identified; graduate standing.

CE 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

CE 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq:

Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

CE 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

CE 768 RESIDENCE CREDIT FOR MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

CE 769 RESIDENCE CREDIT FOR DOCTOR'S DEGREE. (0-12)

CE 779 ADVANCED GEOTECHNICAL ENGINEERING. (3)
Application of the principles of soil mechanics to the design and analysis of foundations and earth structures. Prereq: CE 579 and CE 671 or consent of instructor.

CE 782 DYNAMICS OF STRUCTURES. (3)
Review of methods of analysis of simple structural systems. Effects of wind, earthquake, traffic and machinery loads. Matrix methods for complex dynamic structural systems, random vibrations of structures.

CE 784 SHELL STRUCTURES. (3)
Design and analysis of reinforced concrete shell structures, including domes, barrel shells, hyperbolic paraboloids and cylindrical tanks. Prereq: CE 684 or consent of instructor.

CE 790 SPECIAL RESEARCH PROBLEMS IN CIVIL ENGINEERING. (1-6)
Individual work on some selected problems in one of the various fields of civil engineering. Laboratory, six hours. May be repeated to a maximum of nine credits. Prereq: Consent of the chairperson of the department.

CE 791 SPECIAL DESIGN PROBLEMS IN CIVIL ENGINEERING. (1-6)
Individual work on some selected problems in one of the various fields of civil engineering. Laboratory, six hours. May be repeated to a maximum of nine credits. Prereq: Consent of the chairperson of the department.

# Computer Science

## College of Engineering

The Department of Computer Science offers programs of study leading to the Master of Science in Computer Science and Doctor of Philosophy degrees. Admission to these programs is highly competitive and based upon academic record, GRE scores, and letters of recommendation. It is strongly suggested that applicants present evidence of mathematical maturity as well as competence in computer science. Full details of the requirements for degree programs are available from the department upon request.

Since very few specific courses are required for the graduate degree programs, all candidates in the M.S. program are expected to demonstrate proficiency in the fundamental areas of computer science by taking four core courses in specific areas.

Both thesis (Plan A) and non-thesis (Plan B) options are available in the program leading to the Master of Science degree. A project is required of non-thesis candidates. No language requirement (other than proficiency in English) is mandated.

The doctoral program in Computer Science is a research degree granted primarily on the demonstration of substantial research achievement. To be admitted to candidacy for this degree, candidates must satisfy the requirements of the Graduate School and pass the qualifying examination. This examination consists of written and oral sections covering breadth in computer science as well as depth in a specific area.

Areas of research actively pursued by faculty and students within the department include: artificial intelligence, numerical methods, computational science, operating systems, distributed computing and networking, theory of computation, data base technology, design and analysis of algorithms, cryptography, graphics and vision, parallel processing, data mining, bioinformatics and software engineering. Courses in these and other areas are available to permit students to complete studies of sufficient breadth and depth prior to engaging in independent research.

**Admissions**
The admission decision is made by the Higher Degrees Committee based on the overall application file consisting of GRE scores, TOEFL scores (for international students), GPA, grades in CS and Math courses, background in computer science, letters of recommendation, and statement of purpose.

Students admitted to the doctoral program in Computer Science who have been awarded a master's degree in Computer Science from another institution are not eligible to receive a master's degree in Computer Science from the University of Kentucky. Exceptions to this policy must be approved by the Graduate School Dean upon petition by the Director of Graduate Studies.

## Course Descriptions

CS 505 INTERMEDIATE TOPICS IN DATABASE SYSTEMS. (3)
The course introduces a variety of modern techniques in database and distributed database systems. The major topics include, but are not limited to: object-oriented database systems; distributed, heterogeneous and web-based databases; knowledge based systems; physical database design; and security. The course covers a variety of methods that allow for a solution of database problems where the traditional relational database techniques are not viable or not sufficient. Prereq: CS 405 or consent of instructor.

CS 515 ALGORITHM DESIGN. (3)
The design and analysis of efficient algorithms on data structures for problems in sorting, searching, graph theory, combinatorial optimization, computational geometry, and algebraic computation. Algorithm design techniques: divide-and-conquer, dynamic programming, greedy method, and randomization, approximation algorithms. Prereq: CS 315 and engineering standing.

CS 521 COMPUTATIONAL SCIENCES. (3)
Study of computer science techniques and tools that support computational sciences and engineering. Emphasis on visualization, performance evaluation, parallel computing, and distributed computing. Prereq: Either EGR 102 or CS 115, and CS 380/EE 380 and engineering standing.

CS 522 MATRIX THEORY AND NUMERICAL LINEAR ALGEBRA I. (3)
Review of basic linear algebra from a constructive and geometric point of view. Factorizations of Gauss, Cholesky and Gram-Schmidt. Determinants. Linear least squares problems. Rounding error analysis. Stable methods for updating matrix factorizations and for linear programming. Introduction to Hermitian eigenvalue problems and the singular value decomposition via the QR algorithm and the Lanczos process. Method of conjugate gradients. Prereq: MA 322. (Same as MA 522.)

CS 535 INTERMEDIATE COMPUTER GRAPHICS. (3)
Three-dimensional graphics primitives such as 3D viewing, lighting, shading, hidden line/surface removal, and more advanced topics such as solid modeling, image storage and representation, advanced raster graphics architecture and algorithms, advanced modeling techniques, and animation will be covered. Prereq: CS 335, CS 315, CS 321, and engineering standing.

CS 536 SITUATED COMPUTING. (3)
This course covers the fundamental concepts involved in understanding and engineering a closed-loop, sensing, reasoning, and actuating agent. Biological models of sensing and actuation will be discussed and related to modern artificial counterparts. The course consists of three major topic areas: vision, brain, and robotics. It will introduce students to the issues in computer and biological vision, to models of belief representation and modification, architectures for percept processing and reasoning, machine learning for vision, neural networks, path planning, intelligent localization based on visual cues, and to forward and inverse kinematics, intelligent grasping, and the integration of perception and action. Prereq: CS 460G or consent of instructor.

CS 537 NUMERICAL ANALYSIS. (3)
Floating point arithmetic. Direct methods for the solution of systems of linear algebraic equations. Polynomial and piecewise polynomial approximation, orthogonal polynomials. Numerical integration: Newton Cotes formulas and Gaussian quadrature. Basic methods for initial value problems for ordinary differential equations. The emphasis throughout is on the understanding and use of software packages for the solution of commonly occurring problems in science and engineering. Prereq: CS/MA 321 or equivalent or graduate standing or consent of instructor. Knowledge of a procedural computer language is required. (Same as EGR/MA 537.)

CS 541 COMPILER DESIGN. (3)
Intermediate aspects of a compilation process with an emphasis on front-end issues. Practical issues in using compiler writing tools. Code generation for expressions, control statements and procedures (including parameter passing). Symbol tables, runtime organization for simple and structured variables. Using compilers and translators for automation (filters, programs writing programs). Prereq: CS 441 or consent of instructor.

CS 555 DECLARATIVE PROGRAMMING. (3)

The course covers fundamentals of propositional and predicate logic, and their uses in declarative programming to model and solve computational problems. Topics include propositional satisfiability, satisfiability testing techniques such as the DPLL algorithm, automated reasoning techniques for predicate logic such as resolution with unification and logic programming. Prereq: CS 315 and CS 375 or consent of instructor.

CS 564 COMPUTER SECURITY. (3)
This course will introduce students to the basics of computer and software security. It will expose students to topics such as cryptography, secure hash functions, access control models, audit of computer systems, attacks on computer systems and countermeasures, elements of computer forensics, and elements of database and network security. Prereq: CS 270 or EE 287 or consent of the instructor.

CS 570 MODERN OPERATING SYSTEMS. (3)
Brief review of classical operating system concepts (process and memory management, process coordination, device drivers, file systems, starvation/deadlock). Modern topics of files systems (log-structured file systems, distributed file systems, memory-based file systems), operating system design (monolithic, communication-kernel, extensible/adaptable, distributed shared memory), multiprocessor issues (scheduling, synchronization, IPC), security (internet attacks, encryption, defenses). Inspection and modification of actual operating system code (Linux). Prereq: CS 470 and engineering standing.

CS 571 COMPUTER NETWORKS. (3)
Principles of computer networks using current Internet technologies and protocols as examples. Routing algorithms and protocols; endto-end transport; flow control; congestion avoidance and control; mail, web, and file transfer protocols; designing and implementing applications using common network APIs. Advanced topics, included as time permits, include network security, multicast, and quality of service. Prereq: CS 471G or consent of instructor.

CS 572 NETWORK SECURITY. (3)
This course introduces students to the state of the art of network security problems and solutions. Topics include security issues in computer networks, the Public Key Infrastructure ecosystem, key exchange protocols, and security mechanisms and protocols at the application, transport, network and data link layers. It will also discuss up-to-date development in the field of network security. Prereq: CS 270 or EE 287 or consent of the instructor.
CS 575 MODELS OF COMPUTATION. (3)
The formal study of computation, including computability and computation with limited resources. Church's thesis and models of computation. Formal languages and machines as recognizers of languages. The Chomsky Hierarchy of language types. Topics may include Turing machines or other basic models of computation; decidability and undecidability; basic complexity theory; finite automata and regular languages; pushdown automata and context-free languages. The course will cover primarily theory, including assignments that utilize concepts covered in lectures. Prereq: CS 375 and engineering standing, or consent of instructor.

CS 585 INTERMEDIATE TOPICS IN COMPUTER SCIENCE (Subtitle required). (3)
Topics to be selected by staff. May be repeated to a maximum of six credits, but only three credits may be earned by a student under the same topic. Prereq: Restricted to computer science and electrical engineering majors. Others by permission.

CS 587 ADVANCED EMBEDDED SYSTEMS. (3)
An advanced course in the design of embedded systems using state-of-the art microcontroller hardware and software development tools. Topics include architecture support for real-time operating systems,

language support for embedded and real-time processing, embedded and wireless networking. Prereq: EE/CPE 580 and engineering standing or consent of instructor. (Same as EE/CPE 587.)

CS 610 MASTER'S PROJECT. (3)
Design and implementation of a large computing project under the supervision of a member of the graduate faculty. Prereq: Satisfactory completion of the departmental foundational examinations.

CS 611 RESEARCH IN COMPUTER SCIENCE. (1-9)
Doctoral students conduct research work in computer science under supervision of a faculty member from the Department of Computer Science. May be repeated to a maximum of 4 semesters. Prereq: 36 credit hours of graduate course work in computer science and approval of the Departmental Committee on Higher Degrees.

CS 612 INDEPENDENT WORK IN COMPUTER SCIENCE. (1-3)
Reading course for graduate students in computer science. May be repeated to a maximum of nine credits. Prereq: Overall standing of 3.0, and consent of instructor.

CS 616 SOFTWARE ENGINEERING. (3)
This course provides an overview of the software engineering discipline: software requirements, software design, software construction, software management, and software quality. Testing and validation techniques will be emphasized throughout the course. Programs and program fragments will be developed and studied throughout the course to illustrate specific problems encountered in the lifecycle development of software systems. Prereq: At least nine hours of graduate computer science courses.

CS 617 REQUIREMENTS ENGINEERING. (3)
The course examines the requirements phase of the Systems Engineering and Software Engineering lifecycles in detail. Topics include: requirements elicitation, requirements specification, and requirements analysis. Verification and validation techniques are emphasized throughout the course. Students work in small groups to research and present a related topic. Prereq: Nine hours of graduate study.

CS 618 SOFTWARE DESIGN. (3)
This course provides an overview of the software design field: software design overview, software design process, a survey of software
design method (such as structured design methods, object-oriented design methods, concurrent design methods), design reviews, as well as discussing current topics such as aspect-oriented programming, refactoring, and design patterns. Testing and validation techniques are emphasized through the course. Program designs are developed and validated throughout the course. Readings and summaries of current and seminal journal papers and texts are required. Prereq: Nine hours of graduate study.

CS 621 PARALLEL AND DISTRIBUTED COMPUTING. (3)
This course provides graduate students in computer science and in other fields of science and engineering with experience of parallel and distributed computing. It gives an overview of parallel and distributed computers, and parallel computation. The course addresses architectures, languages, environments, communications, and parallel programming. Emphasis on understanding parallel and distributed computers and portable parallel programming with MPI. Prereq: Two 500 level CS courses, or consent of the instructor.

CS 622 MATRIX THEORY AND NUMERICAL LINEAR ALGEBRA II. (3)
Numerical solution of matrix eigenvalue problems and applications of eigenvalues. Normal forms of Jordan and Schur. Vector and matrix norms. Perturbation theory and bounds for eigenvalues. Stable matrices

and Lyapunov theorems. Nonnegative matrices. Iterative methods for solving large sparse linear systems. Prereq: MA 522 or equivalent. (Same as MA 622.)

CS 623 PARALLEL ITERATIVE COMPUTING. (3)
The course will present advanced computational science techniques needed to support large scale engineering and scientific computations. Emphasis on iterative methods for solving large sparse linear systems and parallel implementations of iterative techniques. Prereq: CS 537
or consent of the instructor.

CS 626 LARGE SCALE DATA SCIENCE. (3)
This course will offer an opportunity for students to learn big data techniques and apply them to tackle real-world data science challenges (e.g., processing, storing, querying, exploring, and mining big data). Topics include big data systems and programming models, parallel computing framework, scalable data management and processing solutions, scalable data mining techniques for large datasets, and advanced applications. Prereq: CS 505 or consent of the instructor.

CS 630 FREE-FORM SOLID MODELING. (3)
This course covers the path from a conceptual vision of a shape to a concrete computer-based description that is suitable for manufacturing. It covers various solids modeling techniques, including volume representations, boundary representations, instantiation and Boolean combinations of shapes, and procedural generation such as sweeps. It discusses effective data structures and consistent and unambiguous part description formats to transfer a shape from a designer to a fabrication house, as well as problems with maintaining unambiguous topology in the presence of finite-precision geometry. Prereq: CS 535 or consent of instructor.

CS 631 COMPUTER-AIDED GEOMETRIC DESIGN. (3)
Overview of current concepts and issues in CAGD with emphasis on free-form surface design; mathematics of free-form curve and surface representations, including Coons patches, Gregory patches, Bezier method, B-splines, NURBS, triangular interpolants, and their geometric consequences; creating objects with smooth surfaces, covering assembling spline patches, geometric and parametric continuity, texture mapping onto complex shapes, subdivision surfaces, surface evolution, and global optimization. Prereq: CS 535 and CS 321, or consent of instructor.

CS 633 3D COMPUTER ANIMATION. (3)
This course covers the underlying principles and techniques of 3D computer animation. The topics covered include (1) modeling: the process of building the forms that will be animated, (2) rendering; the process of defining how the final picture in the model will look, (3) animation techniques: the process of creating in-between frames and keyframes, (4) compositing and special effects: the process of assembling various pieces of an image to get special two-dimensional effects, and (5) recording: the principles and techniques involved in putting animation frames onto film or video. Prereq: CS 335 or CS 535, or consent of instructor.

CS 634 MULTIMEDIA SYSTEMS. (3)
This course covers fundamental techniques in multimedia systems for capturing, managing, accessing and delivering digital media over local, wide-area and wireless network technology. The core topics will emphasize the digital media (images, video, audio) and the algorithms to generate, store, access and process it. Network concepts will be presented at a high level only. Prereq: CS 335 or consent of instructor.

CS 635 IMAGE PROCESSING. (3)
The course outlines applications of image processing and addresses basic operations involved. Topics

covered include image perception, transforms, compression enhancement, restoration, segmentation, and matching. Prereq: Graduate standing and consent of instructor. (Same as EE 635.)

CS 636 COMPUTER VISION. (3)
This course covers digital image processing as well as advanced topics in computer vision. Initial topics include image formation, digital filtering, sensor modeling and feature detection techniques. The course will discuss how these algorithms are used to address general computer vision problems including three-dimensional reconstruction, scene understanding, object recognition, and motion analysis. Prereq: CS 536 or consent of instructor.

CS 637 EXPLORING VIRTUAL WORLDS. (3)
This course covers a mixture of core techniques related to systems for constructing and modeling virtual environments, such as modelbuilding, image-based rendering, head-mounted hardware, stereo image generation, head-tracking, and immersive display technology. The core topics will be presented using textbooks and papers from the current literature. A substantial group project will provide hands-on experience with the concepts, algorithms and technology. Prereq: CS 335 and CS 635.

CS 642 DISCRETE EVENT SYSTEMS. (3)
The objective of the course is to prepare students for research in the field of supervisory control of discrete event systems (DES's). Logical models, supervising control. Stability and optimal control of DES, complexity analysis and other related research areas will be covered. Prereq: Graduate standing or consent of instructor. (Same as EE 642.)

CS 655 PROGRAMMING LANGUAGES. (3)
Overview of programming-language styles: imperative, functional, declarative, object-oriented, concurrent, simulation, glue. Non-local referencing environments, combinatorial control structures (backtracking, coroutines), higher-order types, lazy/eager evaluation. This course looks at features, not complete languages, touching on such languages as Ada, CLU, FP, Haskell, Icon, Lisp, ML, Modula-2, Modula-3, Pascal, Post, Prolog, Russell, CSim, Simula-67, and Smalltalk-80. Students will not become proficient in any of these languages, but rather will learn what contributions each has made to the state of the art in language design. Compiler-construction issues will be touched on only in passing. Prereq: CS 450G or consent of instructor.

CS 660 TOPICS IN ARTIFICIAL INTELLIGENCE (Subtitle required). (3)
Advanced topics chosen from the following: knowledge representation, knowledge acquisition, problem solving, very high-level programming languages, expert systems, intelligent and deductive databases, automated theorem proving. May be repeated to a maximum of six credits, but only three credits may be earned under the same topic. Prereq: CS 505 and CS 560 or consent of instructor.

CS 663 ARTIFICIAL INTELLIGENCE. (3)
Overview of modern artificial intelligence. Covers topics such as searching and game trees, knowledge representation techniques, methods to represent uncertain information and to reason about it, reasoning about action and planning, expert systems, machine learning and neural networks. Prereq: CS 555 or consent of instructor.

CS 670 DISTRIBUTED OPERATING SYSTEM THEORY. (3)
This course covers advanced distributed operating system algorithms and theory. Topics such as distributed mutual exclusion, distributed event ordering, distributed deadlock detection/avoidance, agreement protocols, consistent global snapshot collection, stable predicate detection, failure recovery, faulty-tolerant consensus, leader election, process groups and group communication. Case studies of

distributed operating systems such as LOCUS, Grapevine, V System, ISIS, Amoeba, Sprite, and Mach will be used as illustrations of the above algorithms. Prereq: CS 570 or consent of instructor.

CS 671 ADVANCED COMPUTER NETWORKS. (3)
This course is intended to provide students with a solid understanding of the state of the art in computer network systems and protocols. Topics are covered in some depth, including both abstract and concrete aspects. The course begins with a study of implementations of the current Internet Protocols (TCP, UDP and IP); this provides a concrete backdrop for the rest of the course. The emphasis is on learning by doing, with programming and other hands-on assignments associated with most topics. Prereq: CS 571 or consent of instructor.

CS 673 ERROR CORRECTING CODES. (3)
The problem of correct transmission of data in a noisy environment. The design and analysis of codes that efficiently (in terms of data rate and encryption and decryption speed) correct errors. Linear and nonlinear block codes, general encoding and decoding techniques, fundamental bounds, dual codes, cyclic codes. Specific codes will be studied, including Hamming, BCH, Reed-Muller, Reed-Solomon, trellis, and convolutional codes. Prereq: CS 515 or consent of the instructor.

CS 674 HEURISTIC ALGORITHMS. (3)
Solving problems that are intractable. Exact techniques such as search integer programming and dynamic programming. Approximation techniques including local search, divide and conquer, and greedy algorithms. Methods based upon natural models such as force-directed iteration, simulated annealing, genetic algorithms, and neural networks. Examples will be selected from active research areas. Prereq: CS 515 or consent of instructor.

CS 675 COMPUTABILITY AND COMPLEXITY. (3)
The formal study of computation, including computability and computation with limited resources. Church's thesis and models of computation. Topics will include Turing machines or other basic models of computation; reductions; computable and computably enumerable sets; Rice's Theorem; decidability and undecidability; basic complexity theory; NP-completeness and notions of intractability. Additional topics may include primitive recursive functions and Grzegorczyk hierarchy; nondeterminism; the arithmetic hierarchy; formal complexity measures; time and space hierarchy theorems; the polynomial hierarchy and PSPACE; probabilistic complexity classes; circuit complexity. Prereq: CS 575 or consent of instructor.

CS 677 COMPUTATIONAL GEOMETRY. (3)
Design and analysis of algorithms and data structures for geometric problems. The particular groups of problems addressed include convex hull construction, proximity, Voronoi Diagrams, geometric search, intersection. Prereq: CS 580.

CS 678 CRYPTOGRAPHY. (3)
The study of security in communications and electronic computing. The encryption of data using public key systems, block ciphers, and stream ciphers. The basic tools for the design and analysis of such systems. Topics may include information theory, authentication, digital signatures, secret sharing schemes, complexity theoretic issues, probabilistic encryption, electronic commerce and others. Prereq: CS 515 or consent of the instructor.

CS 680 SEMINAR IN COMPUTER SCIENCE. (2)
May be repeated to a maximum of four credits. Prereq: Consent of instructor, or two 500-level computer science courses.

CS 683 FINITE-STATE MACHINES. (3)

Analysis and synthesis of sequential machines via state-tables and regular expressions. Equivalence, minimization and decomposition of machines. Partitions and structure-theory. Identification and diagnosis of finite-state machines by means of input-output experiments. Linear, finite-memory, and information-lossless machines. Prereq: EE 280.

CS 684 SPECIAL TOPICS IN VISION, GRAPHICS AND MULTIMEDIA (Subtitle required). (3)
Advanced topics in computer graphics, computer vision, and multimedia systems. Specific topics include but are not limited to: isophotes, volume rendering, displacement mapping, geographic information systems (GIS), remote sensing topics, large scale sensor networks, video and audio encoding, visualization, immersive environments, and multimedia interfaces. May be repeated to a maximum of up to 6 credit hours, with no more than 3 in the same topic. Prereq: Consent of instructor.

CS 685 SPECIAL TOPICS IN COMPUTER SCIENCE (Subtitle required). (3)
Topics to be selected by staff. May be repeated to a maximum of six credits but only three credits may be earned under the same topic. Prereq: Consent of instructor or two 500-level computer science courses.

CS 686 SPECIAL TOPICS IN THE THEORY OF COMPUTATION (Subtitle required). (3)
Advanced topics in the theory of computation and the design and analysis of algorithms, including heuristic approaches for algorithm design, parallel computation, flow problems, parallel and concurrent processes and other areas of current research interest. May be repeated to a maximum of six credits but only three credits may be earned under the same topic. Prereq: Consent of instructor or CS 575 and CS 580.

CS 687 SPECIAL TOPICS IN SYSTEMS. (3)
This course is a special topics course. The topic and syllabus will change each time the course is offered, reflecting the interests of the instructor. Typically the course will survey new research in the topic area but may also look back at canonical and ground breaking work from the past. Example course topics might include things such as web operating systems, global file systems, distributed object-based systems, fault tolerance/distributed check pointing, high-speed networking, network security, active networking, group communication models, compilers for parallel/distributed computing, recent programming languages, and data mining. Prereq: Consent of instructor.

CS 689 SPECIAL TOPICS IN NUMERICAL AND SCIENTIFIC COMPUTING (Subtitle required). (3)
Advanced topics in numerical analysis, scientific computation, and complexity of continuous problems. Specific topics may include, but are not limited to: iterative methods, advanced parallel algorithms in numerical linear algebra, multivariate function approximation and integration. Prereq: CS 537 or consent of instructor.

CS 690 OPERATING SYSTEMS THEORY. (3)
An advanced study of operating systems theory including cooperating sequential processes, processor scheduling, paging systems, and memory management. Prereq: CS 570.

CS 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

CS 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

CS 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

CS 768 RESIDENCE CREDIT FOR MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

CS 769 RESIDENCE CREDIT FOR DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

# Computer Engineering

## College of Engineering

The MS and PhD programs in Computer Engineering (CPE) are offered in the College of Engineering jointly by the departments of Computer Science and Electrical and Computer Engineering. The field of computer engineering integrates expertise from both electrical engineering and computer science, emphasizing an understanding of computer architecture, hardware/software interface, and the integration of computers into products and systems at a larger scale. It involves developing technical skills in traditional areas of electrical engineering, such as analog and digital circuit design and communications systems, as well as in areas related to computer science, such as software development and operating systems. As might be expected in such a broad field, there are a great many specialty areas as well, which change regularly to match the needs of the job market. The programs support the College of Engineering's mission "to provide education, research, and service in a scholarly environment in a way that prepares our students for successful professional careers, addresses the changing needs of our other constituents, and responds to the technological challenges facing the Commonwealth and the Nation."

## Degrees Offered

- Master of Science in Computer Engineering
  - **Plan A:** 30 credits, including 6 credits of thesis research, plus a Master's thesis
  - **Plan B:** 30 credits, plus a Master's project
- Doctor of Philosophy in Computer Engineering
  - 36 credits (pre-Qualifying exam), the Qualifying Exam, plus a doctoral dissertation

## Application Requirements

### Master of Science in Computer Engineering

- CV (Optional)
- Personal Statement
- Transcript showing a Bachelor's degree with a minimum GPA of 3.0 in an ABET or CSAB accredited undergraduate program in Computer Engineering, Computer Science, or Electrical Engineering.
- Background in discrete math, programming, data structures, circuits, digital logic, and computer architecture.
- Assistantship Application (Optional)
- Official GRE scores
- Three letters of recommendation

- Application Deadlines:
    - Fall: July 15 (domestic applicants), March 15 (international applicants)
    - Spring: November 30 (domestic applicants), August 15 (international applicants)

### Doctor of Philosophy in Computer Engineering

- CV
- Personal Statement
- Transcript showing a Bachelor's degree with a minimum GPA of 3.0 in an ABET or CSAB accredited undergraduate program in Computer Engineering, Computer Science, or Electrical Engineering.
- Background in discrete math, programming, data structures, circuits, digital logic, and computer architecture.
- Assistantship Application (Optional)
- Official GRE scores
- Three letters of recommendation
- Application Deadlines:
    - Fall: July 15 (domestic applicants), March 15 (international applicants)
    - Spring: November 30 (domestic applicants), August 15 (international applicants)

## Curriculum

Both the MS and the PhD program require students to take nine credits of core coursework, to include 3 of the following courses:

- CS570 Modern Operating Systems
- EE685 Digital Computer Structure
- CS541 Compiler Design
- EE580 Embedded System Design

Students can focus their curriculum on a variety of areas, including cybersecurity, VLSI, computer architecture, quantum computing, advanced compiler techniques, and distributed operating systems. Any course in the CS and ECE departments may be used to complete the credit-hour requirements, and courses outside these departments may also apply, subject to DGS approval.

Students must maintain a 3.0 or better GPA across all CS and ECE courses, and they must have an overall GPA of 3.0 or better to complete the MS degree.

Incoming students are informed of the graduate-school and program-specific academic policies at the orientation held before classes begin each fall. A handbook is also on the CS and ECE websites.

# Course Descriptions

**CS 541 COMPILER DESIGN. (3)** Intermediate aspects of a compilation process with an emphasis on front-end issues. Practical issues in using compiler writing tools. Code generation for expressions, control statements and procedures (including parameter passing). Symbol tables, runtime organization for simple and structured variables. Using compilers and translators for automation (filters, programs writing programs). Prereq: CS 441 or consent of instructor.

**CS 570 MODERN OPERATING SYSTEMS. (3)** Brief review of classical operating system concepts (process and memory management, process coordination, device drivers, file systems, starvation/deadlock). Modern topics of files systems (log-structured file systems, distributed file systems, memory-based file systems), operating system design (monolithic, communication-kernel, extensible/adaptable, distributed shared memory), multiprocessor issues (scheduling, synchronization, IPC), security (internet attacks, encryption, defenses). Inspection and modification of actual operating system code (Linux). Prereq: CS 470 and engineering standing.

**EE 580 EMBEDDED SYSTEM DESIGN. (3)** Embedded System Design covers the design and implementation of hardware and software for embedded computer systems. Topics include architectural support for embedded systems, power management, analog and digital I/O, real-time processing design constraints and the design of embedded systems using a real-time operating system. Prereq: EE/CPE 287, EE/CPE 380, and engineering standing or consent of instructor. (Same as CPE 580.)

**EE 685 DIGITAL COMPUTER STRUCTURE. (3)** Study of fundamental concepts in digital computer system structure and design. Topics include: computer system modeling based on instruction set processor (ISP) and processor-memory-switch (PMS) models, design and algorithms for ALU, processor, control unit and memory system. Special topics include floating-point arithmetic, cache design, pipeline design technologies, and parallel computer architectures. Prereq: EE 380 and EE 581 or consent of instructor.

# Data Science

## College of Engineering

The College of Engineering offers a Master of Science degree in Data Science with a concentration in Biomedical Informatics.

## Application Requirements

- CV
- Personal Statement
- GRE or GMAT
- Three letters of recommendation
- Additional requirements:
    - A GPA of at least 3.0 on a 4.0 scale
    - Successful completion of the following courses: multivariate calculus (MA 213), linear algebra (MA 322), and computer programming (CS 215)
    - Exceptions may be made if persuasive evidence of applicant's potential is presented. Students without sufficient mathematical or programming background will be considered for admission but may be required to take preparatory coursework in addition to required courses.

### Application Deadlines

- Spring: December 9 (domestic applicants), October 15 (international applicants)
- Fall: July 16 (domestic applicants), March 15 (international applicants)

## Degree Requirements

### Core Requirement:

Earn a B or better in each core course in the program (see table below).

| Course Number | Course Title | | Credit |
|---|---|---|---|
| CS626 | Large Scale Data Science | Core | 3 |
| CPH580/STA580 | Biostatistics I | Core | 3 |
| CPH630/STA681 | Biostatistics II | Core | 3 |

| | | | |
|---|---|---|---|
| DS710 | Data Science Seminar (three credits of this course are required; will be repeated three times) | Core | 1 |
| DS711 | MS project in Data Science | Core | 3 |

## Guided Electives

Each student completes at least one course from the following list.

| Course Number | Course Title | | Credit |
|---|---|---|---|
| CS405G | Introduction to Database Systems | Elective | 3 |
| CS460G | Machine Learning | Elective | 3 |
| CS515 | Algorithm Design | Elective | 3 |

## Concentration Requirement

Each student completes BMI633 and one of the elective courses listed below.

| Course Number | Course Title | | Credit |
|---|---|---|---|
| BMI633 | Introduction to Bioinformatics | Core | 3 |
| BMI730 | Principles of Clinical Informatics | Elective | 3 |
| BMI733 | Biomedical Natural Language Processing | Elective | 3 |
| BMI734 | Introduction to Biomedical Image Analysis | Elective | 3 |

## Elective Requirement

Each student completes three elective courses (9 credit hours), with at least two courses having a significant data science component in the subject of the student's MS project.

### Project Requirement

Complete an MS project, which will be supervised by a faculty member, that includes a written report and oral presentation to a committee.

## Course Descriptions

**BMI 633 INTRODUCTION TO BIOINFORMATICS. (3)** This is an introductory course aimed at a multi-disciplinary audience with an interest in applying the principles of information sciences for obtaining insight into biological processes and systems that can eventually be used to make informed decisions.

**BMI 730 PRINCIPLES OF CLINICAL INFORMATICS. (3)** This course offers an overview of Clinical informatics, which is the application of informatics principles, methods, and tools to support healthcare practice and research activities as well as business processes.

**BMI 733 BIOMEDICAL NATURAL LANGUAGE PROCESSING. (3)** This course is a technical introduction to the area of biomedical natural language processing (NLP). In the field of biomedical informatics, this focuses on the common steps in extracting information from textual data that arises from biomedical literature and clinical documents. Topics involve n-gram models, tokenization, POS tagging, and parsing. Prereq: MA 123 (or equivalent) or consent of instructor.

**BMI 734 INTRODUCTION TO BIOMEDICAL IMAGE ANALYSIS. (3)** This class aims to give students a broad overview of biomedical image analysis and imaging informatics. We will introduce the state-of-the-art knowledge to understand, develop, and apply existing methods and software to handle biomedical image data to extract quantitative matrices.

**CPH 580 BIOSTATISTICS I. (3)** CPH 580 covers univariate statistical methods commonly encountered in public health studies. This includes descriptive statistics, hypothesis testing, paired and unpaired t tests, ANOVA, contingency tables, log rank test, regression and correlation. Prereq: MA 109 or higher. (Same as STA 580.)

**CPH 630 BIOSTATISTICS II. (3)** Students will learn statistical methods used in public health studies. This includes receiver operator curves, multiple regression, logistic regression, confounding and stratification, the Mantel-Haenzel procedure, and the Cox proportional hazards model. Prereq: STA 570, CPH 603, STA 580/CPH 580, or equivalent. (Same as STA 681.)

**CS 626 LARGE SCALE DATA SCIENCE. (3)** This course will offer an opportunity for students to learn big data techniques and apply them to tackle real-world data science challenges (e.g., processing, storing, querying, exploring, and mining big data). Topics include big data systems and programming models, parallel computing framework, scalable data management and processing solutions, scalable data mining techniques for large datasets, and advanced applications. Prereq: CS 505 or consent of the instructor.

**CS 405G INTRODUCTION TO DATABASE SYSTEMS. (3)** Study of fundamental concepts behind the design, implementation and application of database systems. Brief review of entity relationship, hierarchical and network database models and an in-depth coverage of the relational model including relational algebra and calculi, relational database theory, concepts in schema design and commercial database languages. Prereq: CS 315 and graduate or engineering standing.

**CS 460G MACHINE LEARNING. (3)** Study of computational principles and techniques that enable software systems to improve their performance by learning from data. Focus on fundamental algorithms, mathematical models and programming techniques used in Machine Learning. Topics include: different learning settings (such as supervised, unsupervised and reinforcement learning), various learning algorithms (such as decision trees, neural networks, k-NN, boosting, SVM, k-means) and crosscutting issues of generalization, data representation, feature selection, model fitting and optimization. The course covers both theory and practice, including programming and written assignments that utilize concepts covered in lectures. Prereq: Strong programming ability (CS 315), basic probability and statistics (STA 281), and basic concepts of linear algebra (MA/CS 321 or MA/CS 322), or instructor's consent.

**CS 515 ALGORITHM DESIGN. (3)** The design and analysis of efficient algorithms on data structures for problems in sorting, searching, graph theory, combinatorial optimization, computational geometry, and algebraic computation. Algorithm design techniques: divide-and-conquer, dynamic programming, greedy method, and randomization, approximation algorithms. Prereq: CS 315 and engineering standing.

**DS 710 RESEARCH SEMINAR IN DATA SCIENCE. (1)** An independent study course that aims to expose students to a broad range of research and professional topics in data science, and enhance students' ability to do research. Students read research papers and professional articles, attend colloquium/seminar talks on topics in data science as directed by the instructor, prepare written reports on topics and make in-class presentations. Prereq: Enrollment in the MS or PhD program in Data Science.

**DS 711 MASTER'S PROJECT IN DATA SCIENCE. (3)** Design and implementation of a large data science project under the supervision of a faculty member. Prereq: The course is open only to students in the MS program in Data Science who completed the program's core requirement.

# Electical Engineering

## College of Engineering

The Department of Electrical and Computer Engineering offers advanced studies leading to either a Master of Science in Electrical Engineering or a Doctor of Philosophy in Electrical Engineering.

**Admission Requirements**
A minimum grade point average of 3.0/4.0 on all undergraduate work is required for admission to the graduate program. A minimum GRE general test scores of 301 (combination of Verbal and Quantitative sections) and analytical writing of at least 2.5 for the M.S. degree. The corresponding minimum GRE scores for Ph.D degree are 310 (V+Q) and 3.0 (Writing). Meeting the minimum requirements does not guarantee admission will be granted. Acceptance is based upon a competitive evaluation and on a space-availability basis. An undergraduate degree in electrical engineering is preferred. Those applicants without a B.S.E.E. degree from an ABET accredited EE program should develop competence and demonstrate ability in the fundamentals of electrical engineering. Such students, before being admitted to full graduate standing within the department, must take (or have taken an equivalent of) a set of prescribed electrical engineering remedial courses. A minimum grade of C must be made in these courses.

**Degree Requirements**
For the M.S.E.E. degree, both the thesis and non-thesis options are available. The thesis option requires 24 hours of acceptable graduate level work plus the satisfying of the usual requirements for the thesis. The non-thesis option, Plan B, requires 30 hours of acceptable graduate work plus an additional three hours of EE 784 (Research Project in Electrical Engineering). All students in their first semester of regular graduate work must select an academic advisor who will assist the student in formulating a graduate plan of study leading to their particular degree. This plan, which must receive the approval of the Director of Graduate Studies, must contain specific courses and a proposed thesis area or specialized project topic.

For the PhD degree, students who only have a B.S. degree must complete 42 hours of course work. Students who have a M.S. degree from an accredited institution must complete 18 hours of course work. Students who have a M.S. degree from a non accredited institution must complete 24 hours of course work.

In order to assure a minimum breadth and level of understanding at the graduate level, all EE graduate students must take three of six specified courses from the major areas of electrical engineering. These courses are: EE 611 Deterministic Systems, EE 621 Electromagnetic Systems, EE 640 Stochastic Systems, EE641 Advanced Power Systems, EE 661 Solid State Electronics, EE 685 Digital Computer Structure. PhD students must also take a course in technical writing such as WRD 204.

The Department of Electrical and Computer Engineering has active research programs in the following areas: power electronics, power systems, electromechanics, computer engineering, control systems, electromagnetics, electro-optics, micro and nano-electronics, signal processing, communication systems, and controls. Departmental laboratories are well-equipped for students' research. In addition, the Power and Energy Institute of Kentucky provides additional research opportunities.

**Course Descriptions**

EE 503 POWER ELECTRONICS. (3)
Study of solid-state power electronic devices and their applications. Examination of control philosophies, steady-state models, and numerical simulation of characterizing differential equations. Current topics of

interest from the literature. Prereq: EE 415G and EE 461 or consent of instructor.

EE 511 INTRODUCTION TO COMMUNICATION SYSTEMS. (3)
An introduction to the basic signal processing operations in communications systems. Topics include frequency and time domain signal and system representation, random signals, modulation, sampling, pulse modulation, information theory. Prereq: EE 421G, MA 320, and engineering standing.

EE 512 DIGITAL COMMUNICATION SYSTEMS. (3)
A treatment of the basic signaling concepts involved in the communication of digital information. Topics include transmission requirements and distortion of digital signals; discrete amplitude, frequency, and phase modulation; error control coding. Prereq: EE 421G, EE 422G, engineering standing or consent of instructor.

EE 513 AUDIO SIGNALS AND SYSTEMS. (3)
An introduction to digital signal processing and classification methods for audio signals. Topics include signal analysis and system design using correlation functions, power spectra, difference equations, and transfer functions; implementations of filters, classifiers, and audio effects; characteristics and modeling of common audio signals such as speech, music, and noise. Prereq: EE 422G, engineering standing.

EE 517 ADVANCED ELECTROMECHANICS. (3)
Dynamics of electromechanical systems and rotating electrical machines. Applications of electro-magnetic theory to electrical machines. Certain special topics of current interest. Prereq: EE 415G, EE 421G, and engineering standing.

EE 518 ELECTRIC DRIVES. (3)
Introduction to common power electronic converters used in electric motor drives. Steady-state analysis methods for electric machines fed by power conditioning converters. Performance prediction of electric machines by electromagnetic field theory and by coupled oil models. Prereq: EE 415G, EE 421G, and engineering standing.

EE 521 INTRODUCTION TO WIRELESS COMMUNICATIONS. (3)
Study of analog RF electronics for wireless communications through a combination of course and laboratory work. Topics covered in the course include: modulation/demodulation, filters, RF transformers, mixers, transistor switches and amplifiers, class A, B, AB, C, D, E, and F amplifiers, quartz crystals, transmission lines, impedance inverters, acoustics, oscillators, audio circuitry, noise and inter-modulation, and antennas. Prereq: Engineering standing.

EE 522 ANTENNA DESIGN. (3)
Principles of radiation, potential solution to Maxwell's equations for current in empty space, electrically small antennas, antenna arrays, wire antenna principles, introduction to numerical methods, aperture antennas, frequency scaling antennas, receiving properties of antennas, antenna measurement techniques. Prereq: EE 468G and engineering standing.

EE 523 MICROWAVE CIRCUIT DESIGN. (3)
Physical and mathematical descriptions of wave propagation in guided structures; microstrip lines; microwave integrated circuits; passive components; two-terminal devices; four-terminal devices; S-parameter concept; equivalent circuit concept; solid state microwave amplifiers and oscillators. Prereq: EE 468G and engineering standing.

EE 524 SOLID STATE PHYSICS. (3)

Introductory solid state physics with emphasis on the properties of electrons in crystals; crystal structure, crystal diffraction, reciprocal lattice, lattice vibrations and phonons, free electron theory, energy bands in solids, semiconductors. Prereq: PHY 520, or consent of instructor. Engineering standing required for EE 524. (Same as PHY 524.)

EE 525 NUMERICAL METHODS AND ELECTROMAGNETICS. (3)
This course covers the basics of numerical methods and programming with applications in electromagnetics. Examples range from statics to radiation/scattering problems involving numerical solutions to integro-differential and finite difference equations. Prereq: EE 468G and engineering standing, or consent of instructor.

EE 526 LEAN OPERATIONS MANAGEMENT. (3)
This course will cover topics in basic lean system operations as well as the management system to support the attainment of highest customer satisfaction with respect to Safety, Quality, Cost, Productivity, Delivery and Human Resource Development. Working in teams, students apply fundamental lean tools and concepts to develop a lean operations environment capable of driving continuous improvement in a simulated factory. As the operational environment evolves, key management principles and tools are explored using the teachings of Taiichi Ohno and others considered to be the pillars of the Toyota Production System. All students must have a webcam and microphone or headset to participate in on-line team and class meetings. Prereq: Enrollment restricted to junior-level or above students. Prior enrollment in the Lean Student certificate course or MFS 503 is required or with the consent of the instructor. (Same as ME 526/MFS 526.)

EE 527 ELECTROMAGNETIC COMPATIBILITY. (3)
Design of electronic systems to minimize 1) emission of electromagnetic signals that cause interference in other electronic systems, 2) the susceptibility of that system to electromagnetic signal from other electronic systems, and 3) the susceptibility of that system to its own, internally generated signals. A set of brief laboratory experiments demonstrate the design principles and provide familiarity with modern test equipment. Prereq: EE 468G and engineering standing.

EE 528 AUTOMOTIVE BODY WELDING. (3)
The objective of this course is to introduce students to automotive Body Production Engineering (BPE). The course will introduce students to the joining methods to produce subassemblies and the main body assembly. The course will cover joining methods, joining theory, quality assessment, and design of experiment to prove welding joints. Prereq: Engineering Standing and enrollment in the Production Engineering Certificate.

EE 531 ALTERNATIVE AND RENEWABLE ENERGY SYSTEMS. (3)
Study of non-traditional, electric generating systems, and the use of renewable energy sources. Energy sources include solar, wind, hydro, and biomass/biogas. Generating technologies include both inverter based equipment and rotating machinery. Prereq: EE 415G, EngineeringnStanding or consent of instructor.

EE 532 SMART GRID: AUTOMATION AND CONTROL OF POWER SYSTEMS. (3)
This course covers introduction to smart grid, key technologies in transmission and distribution systems that enable smart grid, power market structure, and real time pricing. Prereq: Engineering standing, or consent of instructor.

EE 533 ADVANCED POWER SYSTEM PROTECTION. (3)
This course teaches philosophies for protecting power systems, covers micro-processor based relays, and provides projects on relay setting and relay testing. Prereq: Engineering standing, or consent of instructor.

EE 535 POWER SYSTEMS: GENERATION, OPERATION AND CONTROL. (3)
This course covers essential aspects of the energy management system of power systems. Will cover topics: power system economics, state estimation, power system stability, power quality, and fault location. Prereq: EE 537 or concurrent, and Engineering Standing.

EE 536 POWER SYSTEM FAULT ANALYSIS AND PROTECTION. (3)
This course teaches computer based methods for performing fault analysis of power systems, and principles for protecting power systems.
*EE 537 ELECTRIC POWER SYSTEMS I. (3)
A study of power flow, elements of power factor correction, the one-line diagram, the per-unit system, transformer modeling, generator modeling, transmission line modeling, transmission line performance calculations from equivalent circuits, and general methods for network calculations. Prereq: Engineering standing, or consent of instructor.

EE 538 ELECTRIC POWER SYSTEMS II. (3)
Introduction to modern power system practices, basic transient and steady-state stability analysis with emphasis on digital techniques. Prereq: Engineering standing and consent of instructor.
EE 539 POWER DISTRIBUTION SYSTEMS. (3)
Study of electric utility distribution power systems. Topics include configurations, equipment, customer class data, load flow, phase balancing, capacitor placement, system protection, power quality, and distributed generation. Prereq: EE 537, engineering standing or consent of instructor.

EE 543 SOLAR CELL DEVICES AND SYSTEMS FOR ELECTRICAL ENERGY GENERATION. (3)
Physics of photovoltaic (PV) devices, emerging technologies, design of PV cells and systems, electronic components for signal conditioning, integration, installation, performance evaluation and economic issues related to PV systems. Prereq: EE 211 or EE 305 and Engineering Standing, or consent of instructor. (Same as BAE 543/EGR 543.)

EE 546 ELECTRIC POWER SYSTEM FUNDAMENTALS. (3)
Introduction to power transmission basics, power system components, power flow, fault analysis and protection, control, stability, and economic operation of the power grid. This course will also introduce modern trends such as distributed generation, communications, and cybersecurity. Prereq: Graduate or engineering standing and EE 221, EE 305, or equivalent. (Same as EGR 546.)

EE 555 INTRODUCTION TO MICRO-/NANO-ELECTROMECHANICAL SYSTEMS. (3)
This course provides an overview of micromachined structures with an emphasis on operational theory and fabrication technology. Prereq: Engineering standing or consent of instructor. (Same as ME/MSE 555.)
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EE 560 SEMICONDUCTOR DEVICE DESIGN. (3)
Theory, development and discussion of equivalent circuit models of transistor devices, negative resistance, semiconductor devices and praetersonic devices based on electronic processes in solid state elements. High and low frequency, as well as the Ebers-Moll and charge control switching models and their application in computerized electronic circuit analysis will be developed. Prereq: EE 461G or equivalent,
and engineering standing.

EE 562 ANALOG ELECTRONIC CIRCUITS. (3)
Feedback amplifiers, tuned and untuned amplifiers, oscillators, AM and FM transmitters. Prereq: EE 360, EE 461G and engineering standing.

EE 566 ENGINEERING OPTICS. (3)
Fundamentals of geometrical and physical optics; applications as related to problems in engineering design and research, details of some optical measurement techniques; introduction to lasers; techniques for determining optical properties. Prereq: Engineering standing. (Same as ME 560.)

EE 567 INTRODUCTION TO LASERS AND MASERS. (3)
Basic principles of laser action; atomic transitions; population inversion; two and three level systems; optical resonators; pumping methods;
applications. Prereq: EE 360, EE 468G, or PHY 417G, or consent of instructor. (Same as PHY 567.)

EE 568 FIBER OPTICS. (3)
The course presents theory and practice related to (a) fiber optic cable and their fabrication, (b) fiber optic transmitters and detectors, (c) fiber optic communication systems and (d) fiber optic remote sensors. Prereq: EE 468G. (Same as MSE 568.)

EE 569 ELECTRONIC PACKAGING SYSTEMS AND MANUFACTURING PROCESSES. (3)
Study of packaging systems which interconnect, support, power, cool, protect, and maintain electronic components. The course will address systems at the chip, board, and product levels. Topics include design, properties, materials, manufacture, and performance of various packaging systems. Laboratory will provide familiarity with design software and production equipment and processes. Prereq: EE 211 or EE 305, EE 360 or MSE 402G, or consent of instructor. (Same as MSE 569.)

EE 570 FUNDAMENTALS OF NANOELECTRONIC DEVICES AND MATERIALS. (3)
Energy bonds in crystals; heterostructures; quantum wells and low dimensional systems; the two-dimensional electron gas and MODFET; transmission in nanostructures; current topics in nanoscale devices. Prereq: EE 360 and engineering standing, or consent of instructor. (Same as ME/MSE 570.)

EE 571 FEEDBACK CONTROL DESIGN. (3)
System representation via transfer function and state variables, root locus analysis; Bode plots; compensation by root-locus and frequency response methods; state variable feedback; sensitivity analysis; tracking via output feedback; digital control systems. Prereq: EE 421G, EE 422G, engineering standing, and consent of instructor.

EE 572 DIGITAL CONTROL OF DYNAMIC SYSTEMS. (3)
Zero and first order hold, theory of analog to digital and digital to analog conversion. Z-transform analysis, discrete state variable analysis, discrete estimation techniques, error analysis of discrete systems. Prereq: EE 422G, engineering standing.

EE 575 INDUSTRIAL CONTROL. (3)
Control technologies for industrial and process control systems, including sensors, actuators, PLCs, and hydraulic and pneumatic control elements. Prereq: Engineering standing or graduate standing.

EE 579 NEURAL ENGINEERING: MERGING ENGINEERING WITH NEUROSCIENCE. (3)
A multidisciplinary approach combining engineering principles for systems analysis and control, knowledge of biological control mechanisms, and computational properties of biological neural networks in the development of engineering neural networks for control applications. Topics include: equivalent circuit models for biological neurons and networks, non-linear differential equation representations, biological control strategies for rhythmic movements, design and development of controller for robot function, proposal development and presentation. Prereq: EE 422G and Engineering Standing or consent

of instructor. (Same as BME 579.)

EE 580 EMBEDDED SYSTEM DESIGN. (3)
Embedded System Design covers the design and implementation of hardware and software for embedded computer systems. Topics include architectural support for embedded systems, power management, analog and digital I/O, real-time processing design constraints and the design of embedded systems using a real-time operating systems. Prereq: EE/CPE 287, EE/CPE 380, and engineering standing or consent of instructor. (Same as CPE 580.)

EE 582 HARDWARE DESCRIPTION LANGUAGES AND PROGRAMMABLE LOGIC. (3)
A study of hardware description languages including netlists, VHDL and Verilog; their use in digital design methodologies including modeling techniques, design verification, simulation, synthesis, and implementation in programmable and fabricated logic media. Programmable logic topics include CPLD and FPGA architectures, programming technologies and techniques. Prereq: EE/CS 380 and engineering standing.

EE 584 INTRODUCTION OF VLSI DESIGN AND TESTING. (3)
Introduction to the design and layout of Very Large Scale Integrated (VLSI) Circuits for complex digital systems; fundamentals of the VLSI fabrication process; and introduction to VLSI testing and structured design for testability techniques. Prereq: Engineering standing or consent of instructor. (Same as CPE 584.)

EE 585 FAULT TOLERANT COMPUTING. (3)
Students in this course study the theory and practice of fault-tolerant and dependable computing systems. The course will introduce sources of faults, error and failures in computer controlled systems and approaches to design masking and recovery techniques at the hardware, software, and systems level. Prereq: EE/CPE 380 and engineering standing or consent of the instructor. (Same as CPE 585.)

EE 586 COMMUNICATION AND SWITCHING NETWORKS. (3)
Fundamentals of modern communication networking and telecommunications, data transmission, multiplexing, circuit switching networks, network topology routing and control, computer communication, packet switching networks, congestion control, frame relay, ATM switching networks, traffic and congestion control. Prereq: EE/CPE 282 and engineering standing. (Same as CPE 586.)

EE 587 ADVANCED EMBEDDED SYSTEMS. (3)
An advanced course in the design of embedded systems using state-of-the art microcontroller hardware and software development tools. Topics include architecture support for real-time operating systems, language support for embedded and real-time processing, embedded and wireless networking. Prereq: EE/CPE 580 and engineering standing or consent of instructor. (Same as CPE/CS 587.)

EE 588 REAL-TIME COMPUTER SYSTEMS. (3)
This course covers features typically found in real-time and embedded systems. Topics include real-time operating systems, scheduling synchronization, and architectural features of single and multiple processor real-time and embedded systems. Prereq: EE/CPE 580 and engineering standing or consent of instructor. (Same as CPE 588.)

EE 589 ADVANCED VLSI. (3)
An advanced class in topics related to Very Large Scale Integration. Example topics are advanced simulation, yield impact, memory design, statistical analysis and date reduction. Prereq: EE 584, engineering standing.

EE 595 INDEPENDENT PROBLEMS. (1-3)
For electrical engineers. A problem, approved by the chairperson of the department, provides an objective for study and research. May be repeated to a maximum of six credits. Prereq: 2.5 standing and engineering standing.

EE 598 SPEC. TOPICS MULTI-INST (Subtitle required). (3)
This course covers advanced topics on various aspects of electrical engineering, and is a template for courses to be shared among multiinstitutions via distance learning technologies.

EE 599 TOPICS IN ELECTRICAL ENGINEERING (Subtitle required). (3)
A detailed investigation of a topic of current significance in electrical engineering such as biomedical instrumentation, digital filter design, active networks, advanced electrical devices, digital communications, display of electronics. May be repeated, but only three credits can be earned under the same title. Only nine credit hours may count toward degree requirements. A particular topic may be offered at most twice under the EE 599 number. Prereq: Equivalent of two 400-level courses in electrical engineering, consent of instructor and engineering standing.

EE 601 ELECTROMAGNETIC ENERGY CONVERSION I. (3)
Generalized electric machine theory; parameter determination. Energy conversion in continuous media including magnetohydrodynamics. Prereq: Consent of instructor.

EE 603 POWER ELECTRONICS. (3)
Study of solid-state power electronic devices and their applications. Examination of control philosophies, steady-state models, and numerical simulation of characterizing differential equations. Current topics of interest from the literature. This course may not be used to satisfy degree requirements if credit is earned in EE 503. Prereq: EE 517 and EE 571 or consent of instructor.

EE 604 SWITCH MODE CONVERTERS. (3)
Study of analysis techniques for switching mode converters and associated control practices. Boost, buck, buck-boost, flyback, and Cuk topologies in both continuous and discontinuous conduction modes are presented. Numerical solution, state-space averaging, and linearization techniques are applied to predict performance and formulate transfer characteristics. Prereq: EE 517 or consent of instructor.

EE 605 MODELING, SIMULATION AND CONTROL FOR MANUFACTURING. (3)
The purpose of this course is to examine methods and systems from the perspectives of modeling, simulation, and control of manufacturing facilities. The emphasis will be primarily on techniques that can be used to model and evaluate performance of systems. Students are encouraged to think critically about available technologies, identify relative strengths and weaknesses, and analyze the technologies toward developing improved solutions to factory control and information management problems. Prereq: Graduate Standing. (Same as ME/MFS605.)

EE 606 GLOBAL ISSUES IN MANUFACTURING. (3)
The need to increase quality, productivity, efficiency and sustainability in manufacturing operations spanning the product, process and systems (manufacturing systems as well as supply chain) domains is essential for companies to be successful. The increased globalization of markets and manufacturing operations, declining natural resources and negative consequences of some manufacturing practices as well as increased legislation in many regions has led to many new challenges that companies must overcome to be successful in competitive markets. This seminar course will introduce students to a variety of global issues in manufacturing through presentations by leading national and international experts in these domains. The seminars will cover a broad range of manufacturing related topics relevant to many

disciplines including manufacturing, mechanical and electrical engineering. The course can also help graduate students identify topical issues that need further investigation and could become potential research topics. (Same as ME/MFS 606.)

EE 611 DETERMINISTIC SYSTEMS. (3)
Concepts of linear systems, singularity functions, convolution and superposition integrals, state-variable method for linear systems, relation between transfer function and state-variable equations, fundamental matrix, state-transition matrix, unit-impulse response matrix, and transmission matrix. Prereq: EE 421G.

EE 613 OPTIMAL CONTROL THEORY. (3)
State-space modeling of control systems; variational techniques; system optimization by maximum principle, dynamic programming; Hamilton-Jacobi equations design of linear optimal systems; computational methods for solving boundary value problems. Prereq: EE 611.

EE 614 ADAPTIVE CONTROL. (3)
Real-time parameter estimation; deterministic self-tuning regulators; stochastic and predictive self-tuning regulators; model-reference systems; auto-tuning; gain scheduling; practical issues; design and simulation projects. Prereq: EE 611.

EE 619 PROBLEMS SEMINAR IN OPERATIONS RESEARCH. (3)
In this course, the student is exposed to the art of applying the tools of operations research to real world problems. The seminar is generally conducted by a group of faculty members from the various disciplines to which operations research is applicable. Prereq: MA 617 and STA 525 or consent of instructor.

EE 621 ELECTROMAGNETIC FIELDS. (3)
Development of electromagnetic field theory from the basic postulates of Maxwell's equations in differential and integral forms, solution to static, quasistatic, and wave-propagation problems. Radiation from dipole antenna elements. Prereq: EE 468G.

EE 622 ADVANCED ELECTRODYNAMICS. (3)
Solution methods for applied electrodynamics problems; uniqueness, equivalence, duality, reciprocity; linear space methods; wave solutions in separable coordinate systems; classical problems in cartesian, cylindrical, and spherical coordinates. Prereq: EE 468G.

EE 624 COMPUTATIONAL ELECTROMAGNETICS: THE FINITE-DIFFERENCE TIME-DOMAIN. (3)
A course on the application of the finite-difference time-domain (FDTD) technique for the full-wave simulation of time-dependent electromagnetic waves in complex media. Representative topics in the course include: The Yee-algorithm, numerical dispersion and stability, physical source models, absorbing boundaries and perfectly matched layered media, near-field to far-field transformations, modeling of microwave circuits and antennas, parameter extraction, lumped load models, non-uniform and non-orthogonal grid methods, and current topics in FDTD. Prereq: EE 621 or consent of instructor.

EE 625 COMPUTATIONAL ELECTROMAGNETICS. (3)
This advanced course in computational electromagnetics primarily covers moment method and finite element method solutions to scattering problems. Representative topics of the course include surface and volume equivalence principles, scattering by material cylinders, scattering by periodic structures and absorbing boundary condition models. Prereq: EE 525, EE 621, or consent of instructor.

EE 630 DIGITAL SIGNAL PROCESSING. (3)
An introductory treatment of the basic concepts of signal processing via time and frequency domain

(Z-transform) methods and a survey of procedures for designing, implementing and using digital signal processors. Prereq: EE 512 or consent of instructor.

EE 635 IMAGE PROCESSING. (3)
The course outlines applications of image processing and addresses basic operations involved. Topics covered include image perception, transforms, compression, enhancement, restoration, segmentation, and matching. Prereq: Graduate standing and consent of instructor. (Same as CS 635.)

EE 639 ADVANCED TOPICS IN SIGNAL PROCESSING AND COMMUNICATIONS. (3)
Advanced topics in signal processing and communications research and design topics of current interests, such as optical processing, pattern recognition, satellite systems, and digital communication networks. A review and extension of current literature and selected papers and reports. May be repeated to a maximum of nine credits. Prereq: Advanced graduate standing.

EE 640 STOCHASTIC SYSTEMS. (3)
Random variables, stochastic processes, stationary processes, correlation and power spectrum, mean-square estimation, filter design, decision theory, Markoff processes, simulation. Prereq: EE 421G.

EE 641 ADVANCED POWER SYSTEMS. (3)
This course covers advanced topics on electric power systems including power system analysis, operation, monitoring, protection, optimization and control. Prereq: Graduate student, AND EE 415 or equivalent or consent of instructor.

EE 645 ADVANCED CONTROL SYSTEM ANALYSIS. (3)
Conceptual development and study of complex systems; their synthesis and design; analysis and optimization of system parameters. Inputoutput relationships; formulation of mathematical models, parameters and constraints on physical systems. Prereq: ME 440 or instructor consent. (Same as ME 645.)

EE 661 SOLID-STATE ELECTRONICS. (3)
A study of semiconductor fundamentals including crystal structure, basic quantum mechanics, energy-band theory, carrier distributions, carrier transport, and recombination-generation. Analysis of semiconductor devices including PN junction diodes, bipolar-junction transistors, metal-semiconductor diodes, and metal-oxide semiconductor field effect transistors. Prereq: EE 360 and EE 461G or consent of instructor.

EE 663 OPTOELECTRONIC DEVICES. (3)
Theory and applications of photodetectors, solar cells, semiconductor lasers, light emitting diodes and display devices, nanocrystalline structures and organic semiconductors applications in optoelectronic devices. Prereq: EE 360 or MSE 402G, consent of instructor and/ or graduate standing. (Same as MSE 663.)

EE 664 MULTIDISCIPLINARY SENSORS LABORATORY. (3)
A multidisciplinary laboratory course with laboratory experiences in areas related to sensors and sensing architectures, typically including chemistry, chemical and materials engineering, and electrical engineering. Lecture, 1 hour; laboratory, 2 hours. Prereq: One year of college chemistry, calculus and physics. GS 660 or by consent of instructor. (Same as CHE/CME/MSE 664.)

EE 672 NONLINEAR SYSTEMS AND CONTROL. (3)
This course presents methods for analyzing and controlling nonlinear dynamic systems. The major topics are: 1) fundamental properties of nonlinear ordinary differential equations such as existence and uniqueness; 2) Lyapunov stability theory; and 3) nonlinear feedback control techniques such as

backstepping, feedback linearization, and Lyapunov-based design. (Same as ME 672.)

EE 684 INTRODUCTION TO COMPUTER AIDED DESIGN OF VLSI CIRCUITS. (3)
Computer aided design of Very Large Scale Integration (VLSI) circuits. Topics include: VLSI technologies, CMOS circuit characteristics, computer aids in the design of VLSI circuits, use of various CAD tools for layout, circuit design, logic design, and functional design, and the use of VLSI circuits in the system design. A design project is required. Prereq: EE 581 and EE 461G or consent of instructor.

EE 685 DIGITAL COMPUTER STRUCTURE. (3)
Study of fundamental concepts in digital computer system structure and design. Topics include: computer system modeling based on instruction set processor (ISP) and processor-memory-switch (PMS) models, design and algorithms for ALU, processor, control unit and memory system. Special topics include floating-point arithmetic, cache design, pipeline design technologies, and parallel computer architectures. Prereq: EE 380 and EE 581 or consent of instructor.

EE 686 ADVANCED COMPUTER ARCHITECTURE DESIGN. (3)
A study of current diverse advanced architectures such as microprogrammed, parallel, array and vector, networked, and distributed architectures; applications and example systems employing these architectures; matching applications to architectures; consideration of architectures of the future. Prereq: EE 685.

EE 698 SPEC. TOPICS MULTI-INST (Subtitle required). (3)
This course covers advanced topics on various aspects of electrical engineering, and is a template for courses to be shared among multiinstitutions via distance learning technologies.

EE 699 TOPICS IN ELECTRICAL ENGINEERING (Subtitle required). (3)
A detailed study of a topic of current interest in electrical engineering. May be repeated to a maximum of six credits, but only three credits may be earned under the same subtitle. A particular topic may be offered at most twice under the EE 699 number. Prereq: Consent of instructor.

EE 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

EE 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

EE 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

EE 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

EE 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

EE 780 ADVANCED PRACTICE IN ELECTRICAL AND COMPUTER ENGINEERING. (1-3)
Apply advanced training in electrical/computer engineering to solve complex practical problems through analysis, design, implementation, experiments, and/or developments subject to approval of the course instructor. This course may be repeated for a maximum of six credit hours in combination with EE 783. Prereq: 18 hours of graduate courses.

EE 783 SPECIAL PROBLEMS IN ELECTRICAL ENGINEERING. (1-3)
Open to graduate students only. Individual work on an assignment approved by the chairperson of the department. May be repeated to
a maximum of nine credits.

EE 784 RESEARCH PROJECT IN ELECTRICAL ENGINEERING. (3)
Individual study related to a special research project supervised by the student's advisor. A final written report on the project is required. This course is open only to and required by students pursuing the MSEE degree with a non-thesis option (Plan B). The course cannot satisfy part of the required 30 hours of course work for Plan B. Prereq: Approval of student's MSEE advisor.

EE 790 RESEARCH IN ELECTRICAL ENGINEERING. (1-9)
Research in any field of electrical and/or computer engineering subject to approval of the Director of Graduate Studies. This course can be taken prior to the qualifying examination, but will not count for pre-qualifying examination residency credit. This course may be repeated to a maximum of 18 credit hours. Prereq: Consent of DGS.

# Manufacturing Systems Engineering

## College of Engineering

The Department of Mechanical Engineering at the University of Kentucky provides an intellectually challenging environment in which to pursue advanced studies and engage in research. In addition to programs of study leading to M.S. and Ph.D. Degrees in Mechanical Engineering, the Mechanical Engineering Department also offers a master's degree program in Manufacturing Systems Engineering. Students in this program are able to earn their degree entirely online or by taking a combination of courses offered online and in the face-to-face mode.
Graduate degree programs in the field of manufacturing systems engineering are important for enhancing manufacturing productivity and quality in the U.S. The Master of Science in Manufacturing Systems Engineering is designed to equip the student for opportunities in modern manufacturing processes and systems. Some of the possible areas of concentration for research and study are: Manufacturing Processes and Equipment, Design for Manufacturing, Plastic and Polymer Processing, Electronics Design and Manufacturing, Computer-aided Design and Manufacturing, Manufacturing Systems Planning and Control, Automated Assembly, and Lean Manufacturing.

The UK Center for Manufacturing, a part of the College of Engineering, conducts graduate-level academic research of the highest quality and transmits that knowledge to industry and government. Housing a 68,000-square-foot building, completed in the fall of 1989, the Center contains: R & D laboratories and offices including machining research lab, metrology lab, rapid prototyping lab, electronics assembly lab, welding lab, automation equipment lab, CAD/CAM/CAE lab, instructional TV classrooms, and TV satellite uplink and downlink equipment.

**Admission Requirements**
Applicants normally have a bachelor's degree in engineering from an ABET accredited institution (or equivalent). For students with an undergraduate degree other than engineering, completion of a set of identified courses (or their equivalent) in an Engineering discipline will be required prior to admission to the program with full graduate standing. If a student does not meet these criteria, an evaluation of the student's overall education and experience may allow admission, subject to evaluation by the Director of Graduate Studies. GRE scores are NOT required for admission to the Manufacturing Systems Engineering MS program. However, applicants must note that, GRE scores must be submitted if they are interested in being considered for any graduate fellowships. .

**Curriculum & Degree Requirements**
The Plan A provides for study and research leading to the degree of Master of Science in Manufacturing Systems Engineering. The thesis plan requires twenty-four credit hours of course work and a thesis. All students will be required to complete four specified core courses [MFS 606, MFS 605, MFS 505, MFS 613 (MFS 611, if enrolled prior to Spring 2016)]. The electives for each student will be developed in conjunction with an advisor to insure that the program provides breadth and depth of content for the student, and meets his or her specific needs and interests. Appropriate electives are drawn from areas of Engineering, Computer Science, Business and Economics, or Mathematics. Two electives are designated as Manufacturing Specialization electives.

The Plan B (non-thesis option) is reserved for students who have significant engineering research or development experience in a manufacturing environment, for which completion of a thesis would be less beneficial than the additional course work involved in Plan B. The Plan B requires thirty (30) credit hours of course work and the satisfactory completion of a final examination. All students will be required to

complete four specified core courses [MFS 606, MFS 605, MFS 505, MFS 613 (MFS 611, if enrolled prior to Spring 2016)], as well as MFS 784 Research Project in Manufacturing Systems Engineering, nine credit hours of Manufacturing Specialization electives, and nine credit hours of other appropriate electives. Approval of the student's advisor and of the Director of Graduate Studies is necessary for a student to pursue Plan B.

**Course Descriptions**

MFS 501 MECHANICAL DESIGN WITH FINITE ELEMENT METHODS. (3)
This course emphasizes mechanical design techniques based on the finite element method, using machine design background as the starting point. Techniques for modeling machine elements will be shown in relation to the basic FEM theory. Emphasis will be on quantifying loads, the resulting stress and deflection, and relating them to design allowables, leading to an acceptable design solution. Prereq or concur: Engineering Standing, ME 344 and ME 205; or Graduate standing or consent of instructor. (Same as ME 501.)

MFS 503 LEAN MANUFACTURING PRINCIPLES AND PRACTICES. (3)
This course will introduce students to the fundamental concepts of production improvement utilizing lean manufacturing principles and practices. In addition to the lectures, web-based simulations/experiments/games will be used to help learn the application of the tools supported by industry case studies. A Capstone Simulation will be used to demonstrate the collective application of all the tools and techniques (details included below). An application project is also included where students will work in teams to study a real-life manufacturing or service environment to assess the current state, identify improvement opportunities and develop countermeasures for implementation. Prereq: Engineering standing or with instructor permission. (Same as ME 503.)

MFS 505 MODELING OF MANUFACTURING PROCESSES AND MACHINES. (3)
This course is aimed at providing the undergraduate and graduate students in mechanical and manufacturing engineering basic knowledge and understanding of the major manufacturing processes for modeling, monitoring and control of these processes through a series of analytical and experimental techniques and tools, including group work for assignments and experiments. Prereq: EM 302, EM 313, and engineering standing; or graduate standing with instructor consent. (Same as ME 505.)

MFS 507 DESIGN FOR MANUFACTURING. (3)
This course will provide a strong foundation in the concepts, theories and applications of design engineering methodologies for effective manufacture of high quality products at low costs and high productivity. In addition to the lectures, the assembly and design analysis of "product based assembly kits" will be used to apply and help learn the tools presented in class. The final project includes the application of these tools to re-design a given product from a manufacturing and assembly perspective. Prereq: ME 344 or instructor permission. (Same as ME 507.)

MFS 509 LEADERSHIP FOR A LEAN ENTERPRISE. (3)
Perhaps the most difficult part of a so-called "lean" transformation is to establish an appropriate culture which is greatly influenced by actions of leadership. The goal of leadership is to foster the creation of a culture which allows team member engagement and drives continuous improvement focused on creating the highest value for the customer. This is accomplished by developing a 'True Lean' operational environment in which the group by themselves uses systematic problem solving to improve the work they do to help meet the organizations' targets and goals without the need for direct management involvement. The challenge is to understand how this can be accomplished. This is a distance learning course designed to provide an introduction to important leadership thinking and activities required to create and sustain a lean culture within an organization as practiced by Toyota. The primary content for this course comes

from the internationally recognized University of Kentucky Lean System Program's public Lean Executive Leadership Institute and Lean Certification courses. In addition to weekly presentations by experienced Toyota executives and others, there will be weekly activities/ discussions designed to explore each topic in more depth. Topics will include: understanding the True Lean destination and core thinking, management led problem solving, understanding the path to True Lean, and developing a vision and strategy to achieve it. Other important topics discussed include the pillars of a lean business philosophy, the people side of lean, lean system operations management structure and measurement systems that support and sustain an ongoing lean transformation. Prereq: Student Lean Certification, or MFS 503 (Lean Principles and Practices), or MFS 526 (Lean Operations Management), or consent of instructor.

MFS 512 MANUFACTURING SYSTEMS. (3)
This course introduces students to fundamentals of design, planning and control of manufacturing systems aided by computers. Concepts of control hardware, NC programming languages, software aspects related to NC manufacturing, programmable controllers, performance modeling of automated manufacturing systems, group technology and flexible manufacturing systems, etc. will be addressed. Prereq: Engineering standing. (Same as ME 512.)

MFS 513 MECHANICAL VIBRATIONS. (3)
The analysis of vibrational motion of structural and mechanical systems. Single-degree-of-freedom systems; free vibrations; nonperiodic excitation; harmonic excitation. Modal analysis of multiple-degree-of-freedom systems. Vibration of continuous bodies, including strings and bars (axial, torsional and flexural modes). Energy methods. Prereq: EM 313 and EM 302, engineering standing or consent of instructor. (Same as ME 513.)

MFS 515 ROTORDYNAMICS OF TURBOMACHINERY. (3)
Review of dynamic characteristics unique to high speed rotating shafts in turbomachinery. Equations of motion for a rotor, including
gyroscopic effects; computational methods, including finite element; effects of bearings and nonlinearities, stability; application to design situations in high-speed equipment, including aerospace, energy generation, and other industrial applications. Prereq: EM 313 and Engineering standing; pre/co-requisite for Western Kentucky University students: ME 415 and ME 344; pre/co-requisites for UK students: ME 344 and ME 501; or Graduate Standing or consent of instructor. (Same as ME 515.)

MFS 520 INDUSTRIAL AUTOMATION AND CONTROL. (3)
Automation techniques for controlling equipment and processes, including applications of sensors, transducers, motor starters, variablefrequency motor drives, linear actuators, and proportional hydraulic valves. Ladder logic programming of programmable automation controllers (PACs) and programming human-machine interface (HMI) touch-screen panels. Prereq: Engineering standing or permission of the instructor. (Same as MNG 520.)

MFS 523 CONCEPTS, ASSESSMENT TOOLS AND METHODS IN SUSTAINABLE POWER AND ENERGY. (3)
A multidisciplinary course presenting an overview of key topics in sustainability and environmental impact assessment for engineers. Topics will include assessment of current and future energy systems, renewable and conventional energy technologies, supply chain management, sustainability metrics, energy assessment tools, environmental impact assessment and life cycle assessment. Topics will be presented and their attributes described within a framework that aids in evaluation and analysis of energy technology systems and designs in the context of political, social, economic, and environmental goals. Prereq: Engineering Standing and Senior Classification or Consent of Instructor. (Same as CME/EGR 523.)

MFS 525 ORGANIZATIONAL LEARNING FOR LEAN MANUFACTURING. (3)
Learning organizations are skilled at creating, acquiring, and transferring knowledge, and at modifying their behavior to reflect the new knowledge and insights. In this context, this course will discuss leadership styles, adult learning principles, communication, organizational behaviors, and a structure for learning. Prereq: MFS 503 or consent of instructor.

MFS 526 LEAN OPERATIONS MANAGEMENT. (3)
This course will cover topics in basic lean system operations as well as the management system to support the attainment of highest customer satisfaction with respect to Safety, Quality, Cost, Productivity, Delivery and Human Resource Development. Working in teams, students apply fundamental lean tools and concepts to develop a lean operations environment capable of driving continuous improvement in a simulated factory. As the operational environment evolves, key management principles and tools are explored using the teachings of Taiichi Ohno and others considered to be the pillars of the Toyota Production System. All students must have a webcam and microphone or headset to participate in on-line team and class meetings. Prereq: Enrollment restricted to junior-level or above students. Prior enrollment in the Lean Student certificate course or MFS 503 is required or with the consent of the instructor. (Same as EE 526/ME 526.)

MFS 541 OCCUPATIONAL BIOMECHANICS. (3)
This course will provide an understanding of physical interaction between workers and their tools, machines, and materials so as to enhance the workers performance while minimizing the risk of musculoskeletal disorders. Discussion of ergonomic methods for measurement, assessment, and evaluation, with major topics including manual materials handling, cumulative trauma disorders, environmental stresses, safety, and legal issues. Prereq: Engineering standing or with instructor permission. (Same as BME 541.)

MFS 554 CHEMICAL AND PHYSICAL PROCESSING OF POLYMER SYSTEMS. (3)
Theory and practice as related to the chemical and physical processing of polymer systems. Polymer rheology, heat transfer in polymer flows, polymer engineering properties. Polymer processing operations and materials selection; flow instabilities. Prereq: CME 330, CME 425 or ME 325; or consent of instructor. This course is open only to graduate students or undergraduates with engineering standing. (Same as CME/ME/MSE 554.)

MFS 556 INTRODUCTION TO COMPOSITE MATERIALS. (3)
Modern composite materials and their applications. Basic concepts and definitions. Fundamental properties of fibers and polymer resins. Manufacturing methods. Analysis and design of laminated and chopped fiber reinforced composites. Micro- and macro-mechanical analysis of elastic constants. Failure theory of composite materials. Computational design of composites. Prereq: Engineering Standing, and EM 302 or with instructor permission. (Same as CME/ME/MSE 556.)

MFS 599 TOPICS IN MANUFACTURING SYSTEMS ENGINEERING (Subtitle required). (3)
A detailed investigation of a topic of current significance in manufacturing systems engineering such as: computer-aided manufacturing, special topics in robotics, and lean/agile manufacturing. May be repeated under different subtitles to a maximum of six credits. A particular topic may be offered at most twice under the MFS 599 number. Prereq: Variable; given when topic is identified.

MFS 603 MANAGEMENT FOR A LEAN SYSTEM. (3)
This course provides the MFS student an opportunity to develop skills in managing a lean system at the ‘shop floor’ level. MFS 605 MODELING, SIMULATION AND CONTROL FOR MANUFACTURING. (3)

The purpose of this course is to examine methods and systems from the perspectives of modeling, simulation, and control of manufacturing facilities. The emphasis will be primarily on techniques that can be used to model and evaluate performance of systems. Students are encouraged to think critically about available technologies, identify relative strengths and weaknesses, and analyze the technologies toward developing improved solutions to factory control and information management problems. Prereq: Graduate Standing. (Same as EE/ME 605.)

MFS 606 GLOBAL ISSUES IN MANUFACTURING. (3)
The need to increase quality, productivity, efficiency and sustainability in manufacturing operations spanning the product, process and systems (manufacturing systems as well as supply chain) domains is essential for companies to be successful. The increased globalization of markets and manufacturing operations, declining natural resources and negative consequences of some manufacturing practices as well as increased legislation in many regions has led to many new challenges that companies must overcome to be successful in competitive markets. This seminar course will introduce students to a variety of global issues in manufacturing through presentations by leading national and international experts in these domains. The seminars will cover a broad range of manufacturing related topics relevant to many disciplines including manufacturing, mechanical and electrical engineering. The course can also help graduate students identify topical issues that need further investigation and could become potential research topics. (Same as EE/ME 606.)

MFS 607 ANALYSIS OF METAL CUTTING PROCESSES. (3)
Advanced study of metal cutting involving the mechanics of metal cutting including cutting forces, tool-wear/tool-life and temperature analysis, surface finish and integrity, chip control, machinability assessments and advances in cutting tool technology. Prereq: ME 505. (Same as ME/MSE 607).

MFS 611 MANAGING EFFECTIVE ORGANIZATIONS. (3)
A critical examination of behavior and performance within organizations and between organizations. Special attention is paid to the problem of performance at the individual, group, and formal organizational level. (Same as MGT 611.)

MFS 612 DESIGN OF LEAN MANUFACTURING SYSTEMS. (3)
Technical design of manufacturing systems in accordance with lean manufacturing principles. Topics include models for characterization and analysis of factory flow dynamics, production flow analysis, work cell design, and design of pull-based production control systems. Prereq: MFS 503 Lean Manufacturing Principles and Practices.

MFS 613 SUSTAINABILITY, ETHICS, AND LEADERSHIP IN MANUFACTURING ORGANIZATIONS. (3)
This course is intended to provide future manufacturing managers and leaders a basic understanding ofimportant theories and practices necessary to successfully manage and lead teams to achieve manufacturing organizational objectives. The course is organized into several modules. The first module will focus on developing an understanding and capability to approach ethical and sustainability concerns confronted by manufacturing organizations. This will include coverage of tools to help identify and address societal and environmental obligations of manufacturing organizations and issues confronting them that span multiple cultures and nations. Because people are one of the most important resources in any organization, the second and third modules will address organizational behavior (OB) and individual effectiveness. OB theories and practices that can be used to increase the capability to observe, understand and manage people's behavior will be covered. The last module considers safety and ergonomics as they

relate to manufacturing organizations. Coverage will include tools and techniques that can be used to analyze the manufacturing workplaces and ensure its ergonomic design as well as an overview of the current state of occupational safety and health regulations. Prereq: Graduate standing.

MFS 681 SUSTAINABLE QUALITY SYSTEMS DESIGN. (3)
This course provides the theory and principles of sustainable quality production systems as originally developed by Shewhart and Deming. The course will focus on statistical methods from the viewpoint of quality control: at the product specification level; at the product production level; and at the judgment of quality at the inspection level. Prereq: Basic statistics.

MFS 699 TOPICS IN MANUFACTURING SYSTEMS ENGINEERING (Subtitle required). (3)
A detailed investigation of a topic of current significance in manufacturing systems engineering such as: computer-aided manufacturing, special topics in robotics, and lean/agile manufacturing. May be repeated under different subtitles to a maximum of six credits. A particular topic may be offered at most twice under the MFS 699 number. Prereq: Variable; given when topic is identified.

MFS 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

MFS 768 RESIDENCE CREDIT FOR MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

MFS 780 SPECIAL PROBLEMS IN MANUFACTURING SYSTEMS ENGINEERING. (3)
This course involves specialized individual work in manufacturing systems engineering. Prereq: Approval of instructor.

MFS 784 RESEARCH PROJECT IN MANUFACTURING SYSTEMS ENGINEERING. (3)
This course involves individual study related to a special research project supervised by the instructor. A full written report on the project is required.

# Materials Science & Engineering

## College of Engineering

The Department of Chemical and Materials Engineering offers programs leading to the M.S. and Ph.D. degrees in Materials Science and Engineering, with research specialization in the following areas:

- Ceramics
- Electronic Materials
- Metals and Alloys
- Micro-Materials
- Nanomaterials
- Polymers and Composites
- Surfaces and Interfaces
- Thin Films

**Admission Requirements**
Admission to the M.S. and Ph.D. degree programs is on a competitive basis, and financial assistance is available through teaching and research assistantships, as well as a limited number of fellowships. Applicants should have a minimum grade point average of 3.0/4.0 on all undergraduate work. Persons with backgrounds in any physical science or engineering discipline are encouraged to apply, as each applicant's qualifications are reviewed individually. Minimum requirements for admission include a bachelor's degree and four semesters of university-level calculus, calculus-based physics, and chemistry. Please note that meeting the minimum requirements does not guarantee admission, as acceptance is on a competitive and space-available basis.

## Master of Science

The master's degree is offered under Plan A (thesis option) and Plan B (non-thesis option). Candidates for the degree under Plan A must complete 24 credit hours of course work and submit and defend a thesis that demonstrates research ability. The required course work includes the materials science core (MSE 632, 635, 650, 781) as well as appropriate electives selected in consultation with the Director of Graduate Studies. In certain exceptional cases (as determined by the faculty), a non-thesis M.S. may be undertaken (Plan B). The non-thesis option requires 30 hours of course work that includes the materials science core, and is only available to those students with prior research or industrial experience. For both Plan A and Plan B, at least half of all graduate course work must be at the 600 level or above.

## Doctor of Philosophy

The Ph.D. program offers broad training in materials science and engineering while providing options to suit the student's particular interests and designated area of specialization. The student must conduct original and significant research and must submit and defend a dissertation based on that research. Doctoral students complete the materials science core, and work with their doctoral advisory committee to develop a program of elective courses designed to address deficiencies and to enhance the specialization area of interest. In addition, students must demonstrate proficiency in a minor area selected from the fields of mathematics, physical sciences, or engineering.

In order to advance to candidacy, doctoral students must pass an oral qualifying examination that tests the candidate's knowledge in three fundamental areas of Materials Science and Engineering: Structure of Materials, Mechanical Behavior of Materials, and Thermodynamics of Materials. There is no language requirement for the M.S. or Ph.D. degrees in Materials Science and Engineering.

## Course Descriptions

MSE 506 MECHANICS OF COMPOSITE MATERIALS. (3)
A study of structural advantages of composite materials over conventional materials, considering high strength-to-weight and stiffnessto-weight ratios. Fiber reinforced, laminated and particulate materials are analyzed. Response of composite structures to static and dynamic loads, thermal and environmental effects, and failure criteria are studied. Prereq: EM 302, engineering standing or consent of instructor. (Same as EM/ME 506.)

MSE 531 POWDER METALLURGY. (3)
Study of the principles of powder metallurgy relating to alloys of unusual compositions, metal and nonmetal combinations, porousand laminated products, composite metals, and high-melting alloys. Prereq:
MSE 535 MECHANICAL PROPERTIES OF MATERIALS. (3)
Introductory elasticity and plasticity theory; crystallographic nature of slip and twinning; fracture. Prereq: MSE 201, EM 302 and engineering standing or consent of instructor.

MSE 538 METALS PROCESSING. (3)
Solidification of molten alloys; fundamentals of metal working; application of metal working theories to forging,

MSE 569 ELECTRONIC PACKAGING SYSTEMS AND MANUFACTURING PROCESSES. (3)
Study of packaging systems which interconnect, support, power, cool, protect, and maintain electronic components. The course will address systems at the chip, board, and product levels. Topics include design, properties, materials, manufacture, and performance of various packaging systems. Laboratory will provide familiarity with design software and production equipment and processes. Prereq: EE 211 or EE 305, EE 360 or MSE 402G, or consent of instructor. (Same as EE 569.)

MSE 570 FUNDAMENTALS OF NANOELECTRONIC DEVICES AND MATERIALS. (3)
Energy bonds in crystals; heterostructures; quantum wells and low dimensional systems; the two-dimensional electron gas and MODFET; transmission in nanostructures; current topics in nanoscale devices. Prereq: EE 360 and engineering standing, or consent of instructor. (Same as EE/ME 570.)

MSE 585 MATERIALS CHARACTERIZATION TECHNIQUES. (3)
This course will present the fundamentals of x-ray and electron beam interactions with solid-state materials. Both elastic and inelastic interactions will be treated, with emphasis on elastic diffraction effects. Prereq: MSE 301 and Engineering standing, or graduate status or consent of instructor.

MSE 599 TOPICS IN MATERIALS SCIENCE AND ENGINEERING (Subtitle required). (1-4)
A detailed investigation of a topic of current significance in engineering and materials science such as: biomedical synthetics, electronic properties of materials, advances in metal working, history of materials technology, quantitative metallography. Theory of disclinations, scanning electron microscopy. May be repeated to a maximum of eight credits, but only four credits can be earned under the same title. A particular topic may be offered at most twice under the MSE 599 number. Prereq: Variable; given when topic identified.

PREREQUISITE FOR GRADUATE WORK: Students desiring to take any of the following courses should have a thorough working knowledge of chemistry, physics and mathematics.

MSE 601 INTRODUCTION TO MATERIALS SCIENCE AND ENGINEERING. (3)
The purpose of this course is to provide a general background in the field of materials science and engineering for graduate level students. Fundamental topics include chemical bonding in materials, crystal

structure and defects, diffusion and phase diagrams. The mechanical, electrical and optical properties of materials will be discussed in the context of processing history and application. Important concepts such as anisotropic properties of materials and their tensor representation will be introduced. The course covers major materials systems (metals, ceramics, polymers, composites, and electronic materials) and offers examples of materials applications in a range of technical areas. Prereq: Graduate standing in chemical engineering or materials science and engineering, or consent of instructor.

MSE 607 ANALYSIS OF METAL CUTTING PROCESSES. (3)
Advanced study of metal cutting involving the mechanics of metal cutting including cutting forces, tool-wear/tool-life and temperature analysis, surface finish and integrity, chip control, machinability assessments and advances in cutting tool technology. Prereq: ME 505. (Same as ME/MFS 607).

MSE 620 COMPUTATIONAL MATERIALS SCIENCE ENGINEERING. (3)
The effective use of existing computer software in the area of materials science engineering. Use of computers to model processes and examine and predict materials properties at the macroscopic and atomistic level. Prereq: Graduate standing in physical sciences and engineering, strong background in material properties and structure similar to the material covered in MSE 401G, MSE 403G, and MSE 404G, and some programming experience in C or FORTRAN; or consent of instructor.

MSE 632 ADVANCED MATERIALS SCIENCE. (3)
Classification of solids, atomic structure and bonding, relation of structure to properties, deformation behavior and failure. Prereq: Consent of instructor.

MSE 635 ADVANCED MECHANICAL METALLURGY. (3)
Theory of dislocations in crystals and their role in strength, plasticity, work hardening and fracture of crystalline solids. Prereq: Consent of instructor.

MSE 636 DISLOCATION THEORY. (3)
Fundamentals of elastic theory of dislocations and the kinematics of dislocation motion: straight dislocations, curved dislocation, selfenergies, interactions with other crystal defects, dislocation multiplication. Prereq: MSE 535 or EM 531 or equivalent.

MSE 650 ADVANCED MATERIALS THERMODYNAMICS. (3)
Study of reactions of materials with chemical environments. Introduction to irreversible thermodynamics. Emphasis on current literature. Prereq: Consent of instructor.

MSE 663 OPTOELECTRONIC DEVICES. (3)
Theory and applications of photodetectors, solar cells, semiconductor lasers, light emitting diodes and display devices, nanocrystalline structures and organic semiconductors applications in optoelectronic devices. Prereq: EE 360 or MSE 402G, consent of instructor and/ or graduate standing. (Same as EE 663.)

MSE 664 MULTIDISCIPLINARY SENSORS LABORATORY. (3)
A multidisciplinary laboratory course with laboratory experiences in areas related to sensors and sensing architectures, typically including chemistry, chemical and materials engineering, and electrical engineering. Lecture, 1 hour; laboratory, 2 hours. Prereq: One year of college chemistry, calculus and physics. GS 660 or by consent of instructor. (Same as CHE/CME/EE 664.)

MSE 699 ADVANCED TOPICS IN MATERIALS SCIENCE AND ENGINEERING (Subtitle required.) (3)
A detailed investigation of an advanced topic of current significance in materials science and engineering such as (1) nanometer materials, (2) structures of superconductors and (3) materials characterization under high rates of deformation. May be repeated under different subtitles to a maximum of nine credits, but

only three credits can be earned under the same title. A particular topic may be offered at most twice under the MSE 699 number. Prereq: Variable, given when topic is identified.

MSE 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

MSE 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.
MSE 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

MSE 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

MSE 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

MSE 771 SEMINAR. (0)
Review of current literature in the field of metallurgical engineering and presentation of papers thereon. Presentation of talks on departmental research. Group and panel discussions. Required of all graduate students every semester. Lecture, one hour per week.

MSE 781 SPECIAL PROBLEMS, LITERATURE AND LABORATORY. (1-3)
Literature research and planning of research programs; shop problems and technical writing, including a term paper, are required. Consultation and lecture by appointment. May be repeated to a maximum of nine credits.

MSE 782 SPECIAL PROBLEMS, LITERATURE AND LABORATORY. (3)
A continuation of MSE 781. Laboratory, six hours; consultation and lecture by appointment. May be repeated to a maximum of nine credits.

MSE 790 RESEARCH IN MATERIALS SCIENCE. (3-9)
Active research (experiments, library work, theory) toward Ph.D. degree. May be repeated indefinitely.

# Mechanical Engineering

## College of Engineering

The Department of Mechanical Engineering at the University of Kentucky provides an intellectually challenging environment in which to pursue advanced studies and engage in research. The department offers programs of study leading to M.S. and Ph.D. Degrees in Mechanical Engineering. Financial assistance is available to qualified applicants in the form of graduate teaching assistantships, research assistantships and fellowships. Stipends vary depending on the student's program level and type of support.

Graduate students work closely with faculty, often recognized as renowned authorities in their discipline, in conducting research at the forefront of science and technology. Such graduate studies may be focused in any of the following areas:

- Manufacturing: analytical and numerical modeling, optimization of machining processes and systems, lean, sustainable, precision manufacturing, and robotics and machine vision.
- Mechanics: dynamic analysis of solids, contact mechanics, system identification of structures, thermal stress and boundary element methods.
- Systems and Design: application of nontraditional materials, finite element methods, vibration and noise prediction, rotating machinery dynamics, engineered surfaces, magnetic bearing technology, control of systems, micro-scale design and fabrication, MEMS, biologically-inspired design, and boundary element methods in acoustics.
- Thermal-Fluid Sciences: experimental and computational combustion and fire research, computational and experimental fluid dynamics, turbulence research and nonlinear dynamical systems, convection, phase change and radiation heat transfer, nano-technology, optics, and painting technology.

**Admission Requirements**
Applicants seeking admission to a graduate program in the Department of Mechanical Engineering (ME) as regular students must have been awarded a baccalaureate degree. Admission to the ME graduate programs normally requires a bachelor's degree in engineering (not necessarily in mechanical engineering), a minimum grade point average (GPA) of 3.0/4.0 or 70% on all graduate and undergraduate works, and Graduate Record Examination (GRE) scores of at least 1200 for the combined Quantitative and Verbal sections and 3.5 for the Analytical section. An undergraduate degree in mathematics, chemistry or physics combined with a strong interest in engineering topics may be suitable preparation when certain required undergraduate courses are taken. Exceptions to these requirements may be made if other persuasive evidence indicating the student's potential of success is available.

In addition, all international students (except those with a degree from a U.S. institution) must have a minimum score of 550 (paper) / 213 (computer) / 80 (Internet) on the Test of English as a Foreign Language (TOEFL).

## The Master of Science Degree (M.S.)

There are two options, A and B, for fulfilling the requirements for the M.S. degree. Students are admitted into Option A by default. Transfers between options must be approved by the DGS.

*Option A (Thesis Plan)*
A minimum of 24 semester hours of course work and a research thesis are required. The thesis must be actively supervised by a full or associate member of the Graduate Faculty. In no case will independent work, taken as ME 699, ME 780-783 or ME 790, be counted as part of the 24 hours of coursework when

the course material is related to the student's thesis. No more than two special courses such as ME 599, ME 699, ME 780-783 or ME 790 or independent courses/projects may be counted towards fulfilling requirements for the Master's degree. At least half of all graduate course work must be at the 600 level or above.

Instructors of independent course projects must provide the DGS with a course syllabus in order to obtain approval for use of the course toward satisfaction of M.S. requirements.

*Option B (Non-Thesis Plan)*
A minimum of 30 semester hours of coursework is required for this program. This option is only allowed on a case-by-case basis with approval of the DGS, and is intended primarily for students with significant industrial experience and a desire to complete degree requirements on a part-time basis. At least half of all graduate course work must be at the 600 level or above. A final oral examination administered by the student's committee must be passed to complete degree requirements.

## Doctor of Philosophy

The Ph.D. degree is a research degree granted on the basis of broad knowledge of mechanical engineering and specialized study in a specific area of interest. The student must conduct original and significant research and must submit and defend a dissertation based on that research. To obtain a Ph.D. degree from the Department of Mechanical Engineering, a student must Earn 36 graduate credit-hours taken at the University of Kentucky while in graduate standing after receiving a bachelor's degree. Residency and research courses may not be used to satisfy this requirement. Students who have a M.S. degree from an accredited institution must complete 18 hours of course work. In order to advance to candidacy, doctoral students must pass a qualifying examination consisting of both written and oral components. The written component tests the candidate's knowledge in three fundamental areas of Mechanical Engineering. The oral component consists of a presentation and defense of the student's proposed dissertation research; a prospectus prepared by the student must be submitted to the doctoral advisory committee prior to the examination.

For a more detailed description of these requirements, contact the Director of Graduate Studies.

### Course Descriptions

ME 501 MECHANICAL DESIGN WITH FINITE ELEMENT METHODS. (3)
This course emphasizes mechanical design techniques based on the finite element method, using machine design background as the starting point. Techniques for modeling machine elements will be shown in relation to the basic FEM theory. Emphasis will be on quantifying loads, the resulting stress and deflection, and relating them to design allowables, leading to an acceptable design solution. Prereq or concur: Engineering Standing, ME 344 and ME 205; or Graduate standing or consent of instructor. (Same as MFS 501.)

ME 503 LEAN MANUFACTURING PRINCIPLES AND PRACTICES. (3)
This course will introduce students to the fundamental concepts of production improvement utilizing lean manufacturing principles and practices. In addition to the lectures, web-based simulations/experiments/games will be used to help learn the application of the tools supported by industry case studies. A Capstone Simulation will be used to demonstrate the collective application of all the tools and techniques (details included below). An application project is also included where students will work in teams to study a real-life manufacturing or service environment to assess the current state, identify improvement opportunities and develop countermeasures for implementation. Prereq: Engineering standing or with instructor permission. (Same as MFS 503.)

ME 505 MODELING OF MANUFACTURING PROCESSES AND MACHINES. (3)
This course is aimed at providing the undergraduate and graduate students in mechanical and manufacturing engineering basic knowledge and understanding of the major manufacturing processes for modeling, monitoring and control of these processes through a series of analytical and experimental techniques and tools, including group work for assignments and experiments. Prereq: EM 302, EM 313, and engineering standing; or graduate standing with instructor consent. (Same as MFS 505.)

ME 506 MECHANICS OF COMPOSITE MATERIALS. (3)
A study of the structural advantages of composite materials over conventional materials, considering high strength-to-weight and stiffnessto-weight ratios. Fiber reinforced, laminated and particulate materials are analyzed. Response of composite structures to static and dynamic loads, thermal and environmental effects, and failure criteria are studied. Prereq: EM 302, engineering standing or consent of instructor. (Same as EM/MSE 506.)

ME 507 DESIGN FOR MANUFACTURING. (3)
This course will provide a strong foundation in the concepts, theories and applications of design engineering methodologies for effective manufacture of high quality products at low costs and high productivity. In addition to the lectures, the assembly and design analysis of "product based assembly kits" will be used to apply and help learn the tools presented in class. The final project includes the application of these tools to re-design a given product from a manufacturing and assembly perspective. Prereq: ME 344 or instructor permission. (Same as MFS 507.)

ME 510 VIBRO-ACOUSTIC DESIGN IN MECHANICAL SYSTEMS. (3)
Application of basic acoustics and vibrations to engineering problems in vibro-acoustic design. The objective is to acquaint the student with the tools used in industry for noise and vibration control and to make the student aware of the major applications of such tools in the automotive, aerospace, and consumer product industries. Prereq: ME 310, ME 340. This course is open only to graduate students or undergraduates with engineering standing.

ME 512 MANUFACTURING SYSTEMS. (3)
This course introduces students to fundamentals of design, planning and control of manufacturing systems aided by computers. Concepts of control hardware, NC programming languages, software aspects related to NC manufacturing, programmable controllers, performance modeling of automated manufacturing systems, group technology and flexible manufacturing systems, etc. will be addressed. Prereq: Engineering standing. (Same as MFS 512.)

ME 513 MECHANICAL VIBRATIONS. (3)
The analysis of vibrational motion of structural and mechanical systems. Single-degree-of-freedom systems; free vibrations; nonperiodic excitation; harmonic excitation. Modal analysis of multiple-degree-of-freedom systems. Vibration of continuous bodies, including strings
and bars (axial, torsional and flexural modes). Energy methods. Prereq: EM 313 and EM 302, engineering standing or consent of instructor. (Same as MFS 513.)

ME 514 COMPUTATIONAL TECHNIQUES IN MECHANICAL SYSTEM ANALYSIS. (3)
Computer-based methods of analyzing mechanical systems are studied. The studies include the numerical solution techniques on which the analyses are based. Linear and nonlinear static and dynamic systems are analyzed. Finite element and other engineering software packages are used. Prereq: ME 340. This course is open only to graduate students or undergraduates with engineering standing.

ME 515 ROTORDYNAMICS OF TURBOMACHINERY. (3)
Review of dynamic characteristics unique to high speed rotating shafts in turbomachinery. Equations of motion for a rotor, including gyroscopic effects; computational methods, including finite element; effects of bearings and nonlinearities, stability; application to design situations in high-speed equipment, including aerospace, energy generation, and other industrial applications. Prereq: EM 313 and Engineering standing; pre/co-requisite for Western Kentucky University students: ME 415 and ME 344; pre/co-requisites for UK students: ME 344 and ME 501; or Graduate Standing or consent of instructor. (Same as MFS 515.)

ME 516 SYSTEMS ENGINEERING. (3)
Systems Engineering is a discipline necessary for cost-effective development of complex multi-disciplinary systems. Optimal design of modern systems for defense, transportation, telecommunications and energy, among other industries, requires a different perspective than the design of subsystems operating within them. This course presents principles and the practice of Systems Engineering, along with its origins in the aerospace and software industries, historical perspective and case studies of current interest. Topics include system lifecycle, requirements definition, modeling, personality, trade studies, design optimization (with minimal information), risk management, proposal writing and others. Guest lecturers and case studies provide a realistic setting for understanding the application of course materials. Prereq: Engineering Standing.

ME 526 LEAN OPERATIONS MANAGEMENT. (3)
This course will cover topics in basic lean system operations as well as the management system to support the attainment of highest customer satisfaction with respect to Safety, Quality, Cost, Productivity, Delivery and Human Resource Development. Working in teams, students apply fundamental lean tools and concepts to develop a lean operations environment capable of driving continuous improvement in a simulated factory. As the operational environment evolves, key management principles and tools are explored using the teachings of Taiichi Ohno and others considered to be the pillars of the Toyota Production System. All students must have a webcam and microphone or headset to participate in on-line team and class meetings. Prereq: Enrollment restricted to junior-level or above students. Prior enrollment in the Lean Student certificate course or MFS 503 is required or with the consent of the instructor. (Same as EE 526/MFS 526.)

ME 527 APPLIED MATHEMATICS IN THE NATURAL SCIENCES I. (3)
Construction, analysis and interpretation of mathematical models applied to problems in the natural sciences. Physical problems whose solutions involve special topics in applied mathematics are formulated, various solution techniques are introduced, and the mathematical results are interpreted. Fourier analysis, dimensional analysis and scaling rules, regular and singular perturbation theory, random processes and diffusion are samples of selected topics studied in the applications. Intended for students in applied mathematics, science and engineering. Prereq: MA 432G or three hours in an equivalent junior/senior level mathematics course, or consent of instructor. This course is open only to graduate students or undergraduates with engineering standing. (Same as MA 527.)

ME 530 GAS DYNAMICS. (3)
Consideration of the mass, energy and force balances applied to compressible fluids. Isentropic flow, diabatic flow, flow with friction, wave phenomena and one-dimensional gas dynamics. Applications to duct flows and to jet and rocket propulsion engines. Prereq: ME 321, ME 330 and Engineering standing.

ME 531 FLUID DYNAMICS I. (3)
Stress at a point (introduced as a tensor of rank two). Equation of conservation of mass, rate of strain tensor, derivation of Navier-Stokes equation, source-sink flows, motion due to a doublet, vortex flow, two- and three-dimensional irrotational flow due to a moving cylinder with circulation, two-dimensional

airfoils. Prereq: ME 330, MA 432G and Engineering standing.

ME 532 ADVANCED STRENGTH OF MATERIALS. (3)
Unsymmetrical bending of beams, thin plates, stress analysis of thick-walled cylinders, and rotating discs. Theory of elastic energy, curved beams, stress concentration, and fatigue. Prereq: EM 302 and engineering standing. (Same as EM 531.)

ME 548 AERODYNAMICS OF TURBOMACHINERY. (3)
Aerodynamic analysis and design of turbomachines (pumps, compressors and turbines). Blade element performance (deflection and losses), and models for performance prediction are present. Special topics - rotating stall and surge, and aeromechanical considerations. Prereq: ME 321 and ME 330. This course is open only to graduate students or undergraduates with engineering standing

ME 549 POWER GENERATION. (3)
Modern powerplants for electric power generation and cogeneration. Thermodynamic analysis of different concepts of powerplants. Design studies of specific powerplants. Prereq: ME 321 and ME 330. This course is open only to graduate students or undergraduates with engineering standing.

ME 554 CHEMICAL AND PHYSICAL PROCESSING OF POLYMER SYSTEMS. (3)
Theory and practice as related to the chemical and physical processing of polymer systems. Polymer rheology, heat transfer in polymer flows, polymer engineering properties. Polymer processing operations and materials selection; flow instabilities. Prereq: CME 330, CME 425 or ME 325; or consent of instructor. This course is open only to graduate students or undergraduates with engineering standing. (Same as CME/MFS/MSE 554.)

ME 555 INTRODUCTION TO MICRO-/NANO-ELECTROMECHANICAL SYSTEMS. (3)
This course provides an overview of micromachined structures with an emphasis on operational theory and fabrication technology. Prereq: Engineering standing or consent of instructor. (Same as EE/MSE 555.)

ME 556 INTRODUCTION TO COMPOSITE MATERIALS. (3)
Modern composite materials and their applications. Basic concepts and definitions. Fundamental properties of fibers and polymer resins. Manufacturing methods. Analysis and design of laminated and chopped fiber reinforced composites. Micro- and macro-mechanical analysis of elastic constants. Failure theory of composite materials. Computational design of composites. Prereq: Engineering Standing, and EM 302 or with instructor permission. (Same as CME/MFS/MSE 556.)

ME 560 ENGINEERING OPTICS. (3)
Fundamentals of geometrical and physical optics; applications as related to problems in engineering design and research, details of some optical measurement techniques; introduction to lasers; techniques for determining optical properties. Prereq: Engineering standing. (Same as EE 566.)

ME 563 BASIC COMBUSTION PHENOMENA. (3)
Simultaneous application of fluid mechanics, heat and mass transfer, chemical kinetics and thermodynamics to combustion. Topics covered include chemical kinetics, chain and thermal explosions, detonation and deflagration, flammability limits, stirred reactors. Flame stabilization in high and low velocity streams, laminar and turbulent diffusion flames, droplet burning, and metal combustion. Prereq: ME 321, ME 330, ME 325 and engineering standing; or graduate standing.

ME 565 SCALE MODELING IN ENGINEERING. (3)
A study of concepts of scale modeling in engineering applications. The course will include dimensionless

numbers, scaling laws, and their application in engineering design and research. Prereq: ME 310, ME 321, ME 325. This course is open only to graduate students or undergraduates with engineering standing.

ME 570 FUNDAMENTALS OF NANOELECTRONIC DEVICES AND MATERIALS. (3)
Energy bonds in crystals; heterostructures; quantum wells and low dimensional systems; the two-dimensional electron gas and MODFET; transmission in nanostructures; current topics in nanoscale devices. Prereq: ME 310, ME 321, ME 325. This course is open only to graduate students or undergraduates with engineering standing. (Same as EE/MSE 570.)

ME 580 HEATING, VENTILATING AND AIR CONDITIONING. (3)
A course emphasizing the use of thermodynamics, fluid mechanics, and heat transfer principles in thermal environmental design. Building energy requirements will be computed and thermal comfort criteria will be studied. Prereq: BAE 427 or ME 321, or consent of instructor. This course is open only to graduate students or undergraduates with engineering standing. (Same as BAE 580.)

ME 585 FOURIER SERIES AND BOUNDARY VALUE PROBLEMS. (3)
An introductory treatment of Fourier series and its application to the solution of boundary value problems in the partial differential equations of physics and engineering. Orthogonal sets of functions, Fourier series and integrals, solution of boundary value problems, theory and application of Bessel functions and Legendre polynomials. Prereq: MA 432G or equivalent. This course is open only to graduate students or undergraduates with engineering standing. (Same as MA 485G.)

ME 599 TOPICS IN MECHANICAL ENGINEERING (Subtitle required). (3)
A detailed investigation of a topic of current significance in mechanical engineering such as: computer-aided manufacturing, special topics in robotics, and current topics in heat transfer. May be repeated under different subtitles to a maximum of nine credits. A particular topic may be offered at most twice under the ME 599 number. Prereq: Variable; given when topic is identified. This course is open only to graduate students or undergraduates with engineering standing. PREREQUISITE FOR GRADUATE WORK: Students desiring to take any of the following courses should have a thorough working knowledge of chemistry, physics and mathematics.

ME 601 INTRODUCTION TO FINITE ELEMENT ANALYSIS. (3)
Theoretical, conceptual, and computational aspects of the finite element method are developed. Development of the element relationships, element calculations, and assembly of the finite element equations are covered. Both one- and two-dimensional finite element problems are considered. One-dimensional problem areas include elastic deformation, heat conduction, fluid flow, electrostatics, groundwater flow, mass transport, beams on elastic foundations, etc. Two-dimensional problem areas include Poisson's equation, viscous incompressible flow, plane elasticity, and bending of elastic plates. Prereq: MA 432G, MA 537 or consent of instructor. (Same as CE 621.)

ME 602 DYNAMICS OF DISTRIBUTED MECHANICAL SYSTEMS. (3)
Applications of small-oscillation shell theory to continuous mechanical systems modeled by shells, plates, rings, arches, membranes, beams, etc. Study of natural frequencies, modeshapes, forced-vibration characteristics, system dampings, dynamic influence function, combination of subsystems, active and passive vibration controls and dampings. Prereq: ME 540 or EM 513, or consent of instructor.

ME 603 MECHANICS OF PLASTIC SOLIDS I. (3)
Permanent changes in shape of solid materials occur as plastic deformations in many engineering applications, such as extrusion, forging and rolling. This course examines the experimental basis and

fundamental theoretical framework for plastic materials. The analysis of plastic deformations in simple bending, torsion, tension and compression, and some two dimensional problems are presented. Connection between mechanics parameters, design variables and metallurgical phenomena are discussed. Limit analysis is studied. Prereq: EM 601/ ME 641, or EM/ME 651 or consent of instructor.

ME 605 MODELING, SIMULATION AND CONTROL FOR MANUFACTURING. (3)
The purpose of this course is to examine methods and systems from the perspectives of modeling, simulation, and control of manufacturing facilities. The emphasis will be primarily on techniques that can be used to model and evaluate performance of systems. Students are encouraged to think critically about available technologies, identify relative strengths and weaknesses, and analyze the technologies toward developing improved solutions to factory control and information management problems. Prereq: Graduate Standing. (Same as EE/MFS 605.)

ME 606 GLOBAL ISSUES IN MANUFACTURING. (3)
The need to increase quality, productivity, efficiency and sustainability in manufacturing operations spanning the product, process and systems (manufacturing systems as well as supply chain) domains is essential for companies to be successful. The increased globalization of markets and manufacturing operations, declining natural resources and negative consequences of some manufacturing practices as well as increased legislation in many regions has led to many new challenges that companies must overcome to be successful in competitive markets. This seminar course will introduce students to a variety of global issues in manufacturing through presentations by leading national and international experts in these domains. The seminars will cover a broad range of manufacturing related topics relevant to many disciplines including manufacturing, mechanical and electrical engineering. The course can also help graduate students identify topical issues that need further investigation and could become potential research topics.

ME 611 BOUNDARY ELEMENT METHODS IN ENGINEERING. (3)
Introduction of boundary element methods for use in solving common engineering equations, such as the Laplace equation, the Poisson equation, the wave equation, and the diffusion equation. Both the theoretical and numerical aspects of the boundary element technique are presented. Application areas include heat conduction, potential flow problems, acoustic wave propagation, general diffusion, and stress analysis. Prereq: EGR 537 or consent of instructor. (Same as EGR 611.)

ME 613 NONLINEAR OSCILLATIONS. (3)
Many physical systems exhibit some nonlinear behavior. This course presents some methods of analyzing discrete, nonlinear, dynamical systems and applies the methods to typical mechanical systems. Various kinds of nonlinear behavior, including resonance phenomena such as harmonics, parametric excitation, and discontinuous jumps in amplitude are considered. Lyapunov stability criteria and Floquet and Routhian procedures for performing stability analyses of systems are introduced, and their physical interpretations for various systems are studied. Prereq: EM/ME 513.

ME 620 ADVANCED ENGINEERING THERMODYNAMICS I. (3)
Critical treatment of the laws of thermodynamics, relations among thermodynamic properties; stability of systems; thermodynamic processes; selected special topics. Prereq: ME 321.

ME 626 ADVANCED HEAT CONVECTION. (3)
Comprehensive study of heat convection; derivation of equations of convection of mass, momentum, and energy; boundary layer equations; classical solutions of laminar convection problems; turbulent convection; analogies between momentum and energy. Prereq: ME 325, MA 432G or concurrent.

ME 627 RADIATION HEAT TRANSFER. (3)
Principles of thermal radiation, the determination of radiation properties, and the analysis of radiation heat transfer. Results of recent radiation researches are included in the discussions. Prereq: ME 325, MA 432G or concurrent.

ME 628 BOILING AND CONDENSATION. (3)
Phase-change heat transfer including boiling and condensation. Phenomenological treatment of boiling using hydrodynamic instability. Theory of two-phase flow and its application to forced flow boiling. Film and dropwise condensation. Prereq: ME 325.

ME 631 FLUID DYNAMICS II. (3)
A continuation of ME 531 with emphasis on viscous flow. Exact and approximate solutions, boundary layer theory. Jets, wakes, rotating systems, compressible boundary layer and hydrodynamic stability. Prereq: ME 531 or consent of instructor.

ME 634 TURBULENT FLOWS. (3)
Physical and analytical description of turbulent flows, isotropic turbulence, boundary layers and shear flows, free turbulence in jets and wakes. Measurement techniques. Prereq: ME 531; prereq or concur: ME 631.

ME 641 FOUNDATIONS OF SOLID MECHANICS. (3)
A brief review of vectors and an in-depth discussion of tensors and tensor calculus. Stress, deformation and strain. Continuum balance principles of mass, momentum and energy, the equations of motion and the energy equation. Entropy, the principles of material frame indifference and material symmetry. Various constitutive models, including elasticity (linear and/or non-linear), plasticity and viscoelasticity. Thermoelasticity, hyperelasticity, hypoelasticity, and electroelasticity may also be addressed. Prereq: EM 531 or ME 532 or consent of instructor.

ME 644 ADVANCED DYNAMICS I. (3)
Many physical systems in engineering involve rigid bodies in translation and rotation. Such motions are studied in this course by the use of Euler's Laws. The kinematical description of the motions utilize the concept of reference frames. The inertia properties of rigid bodies, and the energy functions for rigid bodies are covered. Analytical and numerical solutions of dynamical systems of engineering interest are considered. Prereq: EM 313; prereq, or concur: MA 432G.

ME 645 ADVANCED CONTROL SYSTEM ANALYSIS. (3)
Conceptual development and study of complex systems; their synthesis and design; analysis and optimization of system parameters. Inputoutput relationships; formulation of mathematical models, parameters and constraints on physical systems. Prereq: ME 440 or instructor consent. (Same as EE 645.)

ME 647 SYSTEM OPTIMIZATION I. (3)
Introduction to linear and nonlinear optimization and their use in engineering design. Emphasis on numerical approaches and use of optimization methods for engineering systems (e.g. biological, mechanical, structural). Prereq: CS 221 or equivalent; one mathematics course beyond MA 214 or equivalent. (Same as BAE 647.)

ME 651 MECHANICS OF ELASTIC SOLIDS I. (3)
Many engineering applications involve the use of materials that behave elastically when performing their designed function. This course concerns the general analysis of small deformations, stress, and stress-

deformation relations for elastic bodies. The solution of typical problems frequently encountered in engineering applications, e.g., extension, bending, and torsion of elastic bars, stress concentrations and thermoelastic behavior, are studied. Some modern computational methods currently used in engineering practice are introduced. Prereq: MA 432G or consent of instructor.

ME 652 MECHANICS OF ELASTIC SOLIDS II. (3)
Continuation of EM 651 with more attention to the fundamental structure of and important historical and contemporary contributions to elastic theory. Extensive use of modern computational methods that were introduced in the first course will provide familiarity with the solution of larger scale, industrially important elasticity problems. Application of the boundary integral equation method (BIE) will be emphasized. Some use also will be made of the finite element method, primarily for comparison with BIE. Instruction will include "handson" experience with digital-computer program packages. Prereq: EM 651 or consent of instructor.

ME 672 NONLINEAR SYSTEMS AND CONTROL. (3)
This course presents methods for analyzing and controlling nonlinear dynamic systems. The major topics are: 1) fundamental properties of nonlinear ordinary differential equations such as existence and uniqueness; 2) Lyapunov stability theory; and 3) nonlinear feedback control techniques such as backstepping, feedback linearization, and Lyapunov-based design. (Same as EE 672.)

ME 690 ADVANCED ALGORITHMS FOR COMPUTATIONAL FLUID DYNAMICS. (4)
Theory and implementation of main algorithms widely used for solving multi-dimensional partial differential equations arising in engineering applications such as fluid dynamics, heat and mass transfer, semiconductor simulation, etc. Numerical solution of steady and timedependent linear partial differential equations on rectangular domains via finite difference techniques. Linearization methods for treatment of nonlinear problems. Numerical grid generation for transforming irregular domains into rectangular computational grids. Prereq: MA 537, or consent of instructor, and competence with a high-level programming language.

ME 691 CFD I - INCOMPRESSIBLE FLOWS. (3)
This course will cover a control-volume CFD approach for the conservation of momentum, heat and mass transfer. The emphasis will be on the discretization of the transport equations in general coordinates and its application in both structured and unstructured grid arrangements. Modern numerical schemes and pressure solution algorithms will also be covered. An introduction of turbulence modeling will be provided. At the end of the lecture, the students not only are able to understand the basics of commercial software but also will be able to write a general coordinate code for fluid flow, heat and mass transfer applications. Prereq: ME 531.

ME 692 CFD II - COMPRESSIBLE FLOWS. (3)
This second course shall focus on the solution of the compressible Navier-Stokes equations. The Van-Leer's and Roe's approaches will
be discussed to derive the discretization equations. Modern shock capturing schemes, such as FCT, TVD and ENO will be introduced. The solution techniques such as ADI, DDADI and line-relaxation will be used to solve the system of equations. Multi-grid acceleration techniques will be introduced to speed up the rate of convergence. Finally, the parallelization of CFD codes using shared and distributed computers will be discussed. Prereq: ME 531 and ME 691.

ME 699 TOPICS IN MECHANICAL ENGINEERING (Subtitle required). (3)
A detailed investigation of a topic of current significance in mechanical engineering. May be repeated to a maximum of nine credits under different subtitles. A particular topic may be offered at most twice under

the ME 699 number. Prereq: Variable; given when topic is identified.

ME 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

ME 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

ME 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

ME 768 RESIDENCE CREDIT FOR MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

ME 769 RESIDENCE CREDIT FOR DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

ME 780 SPECIAL PROBLEMS IN MECHANICAL ENGINEERING. (3)
This course consists of individual work in one of the various fields of mechanical engineering. May be repeated three times for a maximum of 12 credits. Prereq: Approval of instructor.

ME 790 RESEARCH IN MECHANICAL ENGINEERING. (1-9)
Work may be taken in any field of mechanical engineering, subject to the approval of the director of graduate studies. May be used to satisfy pre-qualifying examination residency credit. May be repeated to a maximum of 18 hours.

ME 799 MECHANICAL ENGINEERING GRADUATE SEMINAR. (0)
A series of talks presented by national and local speakers that will provide graduate students with an overview of current research activities in the broad field of Mechanical Engineering. Prereq: Engineering Graduate student standing or consent of instructor.

# Mining Engineering

## College of Engineering

The programs leading to the degrees of Master of Science in Mining Engineering, Master of Mining Engineering (* suspension pending) and Doctor of Philosophy are offered through the Department of Mining Engineering. The objectives of these programs are to provide an advanced level of applied science for use in the mining industry and to offer specified topics for research specialization.

The Master of Science in Mining Engineering is a research-oriented degree appropriate for a career in problem solving, research, or technology development.

For the Master of Science in Mining Engineering, 24 credit hours of course work plus an acceptable thesis (Plan A) or 30 credits of course work and a report on one or more research topics (Plan B) are required to fulfill program requirements. Plan B Master of Science degrees will be reserved normally for students who have already demonstrated their ability to conduct and report on independent research.

The Doctor of Philosophy is the terminal degree in the subject and is normally required for a career in teaching and research.

**Admission Requirements**
Enrollment in the Master of Science degree program is open to qualified applicants with an undergraduate degree in mining engineering or other engineering and science fields. A minimum cumulative grade point average of 2.8/4.0 from an accredited undergraduate program is required. Persons with undergraduate degrees in fields other than mining engineering are required to satisfy deficiencies in undergraduate mining engineering courses.

Applicants for admission must have a combined score on the verbal and quantitative portions of the Graduate Record Examination (GRE) in excess of 300. Scores on the analytical portion are also considered. Foreign applicants whose native language is other than English must take the Test of English as a Foreign Language (TOEFL) and achieve a score of at least 80 (internet based test) or 230 (computer based test) or (550 paper based test) is required before they can be admitted. Alternatively candidates should take the International English Language Testing System (IELTS) test and achieve a score of at least 6.5.

In addition to satisfying general Graduate School and College of Engineering admissions requirements, applicants for admission to the Master of Science and Ph.D. degree programs in Mining Engineering must have been awarded the Bachelor of Science degree prior to admission to the graduate degree status. Normally, it is expected that applicants will have graduated from an engineering program accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET). For applicants from non-U.S. universities, from related but non-engineering disciplines, and from institutions that do not have accredited engineering programs, an assessment will be made of the comparability of educational background to that prescribed and appropriate remedial course work established as a provision for admission.

The Ph.D. degree has no formal course requirements. Students need to complete a minimum of 36 credits of graduate level courses while preparing for the written and oral qualifying examinations. Students who hold a Master of Science degree are typically given credit for up to 18 credit hours of the 36 hour requirement.

Current research areas include the following: rock mechanics and ground control, operations research, mine ventilation, underground construction, surface mining and reclamation, explosive and blasting, mine environmental engineering, mine power systems, mineral and coal processing, extractive metallurgy, data management and mineral economics. In addition to the graduate courses in mining engineering, graduate courses in civil engineering and other disciplines may be used to satisfy degree requirements providing they are appropriate to the student's program of study.

Additional information about the graduate program in mining engineering can be obtained by writing the Director of Graduate Studies, Department of Mining Engineering.

**Course Descriptions**

MNG 511 MINE POWER SYSTEM DESIGN. (3)
A study of mine power distribution systems, major power system components, and techniques of power system analysis. Topics include per-unit analysis; symmetrical component analysis; grounding, including ground-bed design, ground-resistor sizing, and ground wire monitoring; cable and transformer sizing; and load-flow analysis. Course may not be used to satisfy degree requirements in electrical engineering if credit is earned in EE 538. Prereq: EE 305 or equivalent and engineering standing.

MNG 520 INDUSTRIAL AUTOMATION AND CONTROL. (3)
Automation techniques for controlling equipment and processes, including applications of sensors, transducers, motor starters, variable- frequency motor drives, linear actuators, and proportional hydraulic valves. Ladder logic programming of programmable automation controllers (PACs) and programming human-machine interface (HMI) touch-screen panels. Prereq: Engineering standing or permission of the instructor. (Same as MFS 520.)

MNG 531 ADVANCED BLAST DESIGN AND TECHNOLOGY. (3)
Advanced theory and application of explosives in excavation; detailed underground blast design; specialized blasting including blast casting, construction and pre-splitting. Bulk systems for blasting, electronic detonators, and introduction to demolition blasting. Introduction to blasting research. Examination of field applications. Prereq: MNG 331, engineering standing.

MNG 535 ENVIRONMENTAL CONTROL SYSTEM DESIGN AND RECLAMATION. (3)
Introduction to the principles of sustainable mine planning with a focus on environmental control system design, reclamation and restoration design, and environmental monitoring systems. Topics will include culvert and diversion design, hydrologic inputs, catchment delineation and routing, sedimentologic inputs, erosion control and best management practice selection, sediment pond design, design of silt fences, grass filters, and sediment ditches, weep berm and vegetated filter strip design, reforestation, grassland/wildlife establishment, stream restoration, wetlands/vernal ponds, environmental monitoring system design, and community integration. Prereq: MNG 291, MNG 463, and engineering standing or consent of instructor. (Same as BAE 535.)

MNG 541 COMPUTER DESIGN OF MINE VENTILATION SYSTEMS. (3)
Computer methods applied to the design and analysis of mine ventilation networks; flow distribution, location and size of regulators and fans; evaluation of existing ventilation systems and application of correction methods to improve effectiveness of ventilation system. Prereq: MNG 341 with a C or higher.

MNG 551 ROCK MECHANICS. (4)
Determination of the physical properties of rocks, rock mass classification, stress around mine openings, strain and displacement of the rock mass, rock reinforcement and support, stress interaction and subsidence, strata control. Lecture, three hours; laboratory, three hours per week. Prereq: EM 302, MNG 303, GLY 220, and engineering standing.

MNG 552 GROUND CONTROL SOFTWARE AND ANALYSIS. (3)
Evaluation and design of ground control plans for various mining conditions through the use of several computer programs with an emphasis placed on sedimentary tabular deposits. Variables including pillar stress, pillar

strength, convergence, and others are investigated. Prereq: MNG 551 – Rock Mechanics or consent of instructor.

MNG 555 ADVANCED GEOMECHANICS I. (3)
3D state of stress and strain, stress redistribution around mine openings, tunnels, wellbores, intact rock and rock mass properties, rock mass failure criteria, role of discontinuities and failure along discontinuities, rock reinforcement and support. Prereq: MNG 551 and engineering standing.

MNG 561 MINE CONSTRUCTION ENGINEERING I. (3)
Development of underground capital openings (shafts, chambers, tunnels, and drifts) in mines. Design and construction under normal conditions. Organization and management of construction operations. Prereq: MNG 551.

MNG 575 COAL PREPARATION DESIGN. (3)
Design a coal preparation plant by integrating unit operations preceded by certain back-up laboratory experiments. Cost sensitivity analysis of competing design schemes will be determined on a selected coal. Lecture: two hours; laboratory: three hours per week. Prereq: MNG 301 or equivalent, engineering standing.

# COLLEGE OF FINE ARTS

# Art Education

## College of Fine Arts

The School of Art and Visual Studies offers graduate course work in three areas: Art Education, Art History and Visual Studies, and Art Studio. The Art Education area and the Art History and Visual Studies area confer the Master of Arts degree in an area of specialization. Studio degree recipients are awarded the Master of Fine Arts.

## Master of Arts - Art Education

The Master of Arts in Art Education seeks to credential teachers for the following routes to Rank II and Rank I:

1. Candidates who hold a bachelor's degree and initial certification in Art Education can pursue the Masters of Arts in Art Education (Plan A, thesis option), which leads to Rank II advancement.
2. Candidates who hold a bachelor's degree and initial certification in Art Education can pursue the Masters of Arts in Art Education (Plan B, non-thesis option), which leads to Rank II advancement.
3. Candidates who hold a bachelor's degree and initial certification in Art Education can pursue the non-degree, fifth-year program that leads to Rank II advancement.
4. Candidates who hold Rank II may advance in rank to Rank I with completion of 30 credits beyond the Rank II.
5. Candidates who hold either a Rank II or a Rank I in Art Education may pursue a program leading directly to the Teacher Leader Endorsement.

**Admission Requirements**

Candidates admitted to the graduate program in Art Education are expected to have completed course work equivalent to an undergraduate major in Art Education (in no case less than 18 hours in Art Education and Education, 12 hours in Art History, and 18 hours in Art Studio). Prospective candidates who do not meet these requirements should seek the counsel of the Program Faculty Committee to make up deficits prior to acceptance into the program. In addition, candidates must submit for review by the Program Faculty Committee, a portfolio of recent artworks and professional writing and other evidence of professional attainment (or a 300-500 word statement of interest in advance studies in Art Education).

**Application Procedure and Deadline**

Because the Graduate School is the administrative unit for all graduate students and because the Art Education program is responsible for ensuring compliance with Kentucky Educational Professional Standard Board requirements and the execution of the academic curriculum, different application materials are required.

Application for admission to the Graduate School requires:

- Completed application form for the Graduate School (on-line application form available at http://gradschool.uky.edu.
- One official transcript sent by each institution of study previously attended.
- Official GRE scores.
- Application fee.

Application materials for the Art Education graduate program should be sent to the Graduate Advisor for Art Education (Art Department, 207 Fine Arts Building, University of Kentucky, Lexington, Kentucky 40506-0022) and be uploaded to our Otis-online-Electronic Portfolio which will be provided for you.

The application for a Masters in Art Education requires additional specific application materials to be included in the online application. They are as follows:

- An electronic portfolio of 10 recent artworks sent as a .pdf with an image key with title, date, size, and medium for each submitted work as part of that document. (maximum resolution 8" x 10" x 72 dpi – NO PowerPoint presentations). This may be uploaded as one document under "Writing Sample". If your files are too large, please resize them. If resizing them distorts them in any way, please mail a CD or DVD of your portfolio to Graduate Advisor (207 Fine Arts, School of Art & Visual Studies, University of Kentucky, Lexington, KY 40506-0022) by January 6.
- Time-based materials on DVD (QuickTime or DVD with menus – 10 minutes max) are too large to be uploaded and should be sent to the Graduate Advisor (207 Fine Arts, School of Art & Visual Studies, University of Kentucky, Lexington, KY 40506-0022) by January 6. Web address with the same materials, as a back up if the CD/DVD fails, will be considered. This may be uploaded as one document under "Writing Sample".
- A brief letter stating your goals for graduate study and your interest in being considered for an assistantship, fellowship, and or internship.
- Two letters of recommendation.
- Brief resume.

Application materials must be received no later than January 1st for fall semester and November 1st for spring semester admittance. Candidates wishing to be considered for a teaching assistantship should provide the Graduate Advisor for Art Education with an additional letter to indicate their interest and credentials for an assistantship by January 1.

**Degree Requirements**
Thesis Option: Successful candidates for the Master of Arts in Art Education must satisfactorily complete: (1) a thesis, an oral/written examination, the mid-point and exit portfolio reviews; (2) 30 credit hours of graduate course work to be divided as follows: (a) 12 -15 graduate credit hours in Art Education; (b) 9 – 12 graduate credit hours in Leadership; (c) 6 – 9 graduate credit hours in the Individual Program Support which may be taken as related course work in the College of Fine Arts, the College of Education or elsewhere in the University, as well as in the Department of Art. Students must have an approved proposal to proceed with their thesis work.

Non-Thesis Option: Successful candidates for the Masters of Arts in Art Education must satisfactorily complete the mid-point and exit portfolio reviews and 36 credit hours of graduate course work. At least 24 of the credit hours should be taken in the Department of Art and are to be divided as follows: (1) 12 – 15 graduate credit hours in Art Education, (2) 9 – 12 graduate credit hours in Leadership, and (3) 6 – 9 graduate credit hours in Individual Program Support which may be taken in related course work in the College of Fine Arts, the College of Education, or elsewhere in the University, as well as in the Department of Art. During the final semester, students must design and complete an independent scholarly project registering for A-E 695 under the supervision of their major professor with final approval from their master's committee.

In accordance with the Graduate Faculty rules, a final comprehension examination is required in both Plan A and Plan B.

# Course Descriptions

A-E 515 INTRODUCTION TO ART THERAPY. (3)
An examination of various historical and contemporary conceptions of the therapeutic function and value of art from an art education perspective. The impact of art experience on emotional, intellectual and behavioral development and/or rehabilitation will be explored through readings, discussions, guest lectures, and lab experiences. Lecture, two hours per week; laboratory, two hours per week. Prereq: PSY 331 and major or consent of instructor.

A-E 538 ADVANCED ARTS AND CRAFTS IN THE ELEMENTARY SCHOOL. (3)
Planned to give the elementary teacher an understanding of teaching methods involved in, and construction of, art activities which would enrich the classroom program.

A-E 545 TOPICAL STUDIES IN ART EDUCATION (Subtitle required). (3)
Intensive study and analysis of a designated topic, issue or development in the philosophy, history, or methodology of art education in community and public school settings. May be repeated to a maximum of six credits. Prereq: Art education major or consent of the instructor.

A-E 550 COMMUNITY ART EDUCATION. (3)
An examination of community arts organizations and the role they play in identifying and interpreting the diverse

A-E 560 MUSEUM EDUCATION. (3)
An examination of educational techniques and practices of learning in a museum setting. The course will focus on educational theories, learning styles and techniques, audiences, educational materials and outreach strategies that will prepare students for successful professional careers in museum education.

A-E 576 ART IN MIDDLE SCHOOLS. (3)
Centering on the study of perceptual and aesthetic development of middle school adolescents, this course provides field and practicum experiences that utilize methods and materials appropriate to the teaching of art in the middle school. Topics include: curriculum design, lesson planning, teaching skills, classroom safety and assessment. Lecture, demonstrations, micro-teaching, laboratory and studio experiences are integrated into the class design. Prereq: Major in art education, admission to the Teacher Education Program (TEP), or consent of instructor.

A-E 577 ART IN SECONDARY SCHOOLS. (3)
This course provides students with an overview of the secondary school in American education and explores the history, theory, techniques and contemporary issues of teaching art in the secondary schools. Skills in the planning of multicultural activities and the teaching and evaluation of secondary art experiences are stressed. Full class instruction, video, micro-teaching, laboratory and studio experiences are incorporated into class design. Prereq: Major in art education, admission to the Teacher Education Program (TEP).

A-E 578 ART IN ELEMENTARY SCHOOLS. (3)
Focusing on the study of perceptual and aesthetic development of elementary age children, this course provides field and practicum experiences that utilize methods and materials appropriate to the teaching of art in the elementary school. Topics include: curriculum design, lesson planning, teaching skills, classroom safety and assessment. Lecture, demonstrations, micro-teaching, laboratory and studio experiences are integrated into the class design. Prereq: Major in art education, admission to the Teacher Education Program (TEP).

A-E 579 ARTS AND HUMANITIES IN ART EDUCATION. (3)
Inquiry into the relationship of current philosophies of art education and aesthetics; a consolidation of art education ideas with a formation of criteria for making value judgments; the development of a personal viewpoint consistent with education and art as humanistic endeavors. Prereq: Major in art education, admission to the Teacher Education Program (TEP).

A-E 645 TOPICAL RESEARCH IN ART EDUCATION (Subtitle required). (3)
Advanced study and research of a designated topic, issue, or development in the philosophy, history, or methodology of art education in community and public school settings. May be repeated for a maximum of nine credits. Prereq: Graduate standing in department.

A-E 665 ISSUES IN ART EDUCATION. (3)
This course is built within the context of the Advanced Preparation Programs in Teacher Leader Programs in Art Education. Each week one or two topics representing issues facing the arts in K - 12 education will be assigned to candidates. Selected candidates are expected to research these topics and post their thoughts on them on blackboard. Fellow candidates are expected to research the topics as well and provide cogent responses to the postings of the selected candidates. The class meets once per week through adobe connect for examination and analysis of the assigned topics. Prereq: Candidates must be enrolled in one of the Advanced Teacher Leader Programs in Art Education to take this course or by instructor permission.

A-E 670 SCHOOL AND COMMUNITY ART. (3)
Analysis of the social function of art; organization of school and community related programs in art; case studies of existing programs. Field experience, educational involvement. Lectures and demonstrations. Prereq: Major in Art Education or consent of instructor.

A-E 675 AESTHETICS AND DESIGN. (3)
Aesthetics and Design focuses on advancing aesthetic awareness, developing an understanding of the principles of visual design, and the application of aesthetic design to human-computer interaction in order to integrate an artistic approach to the examination oftechnological innovation.

A-E 680 HISTORY OF ART EDUCATION. (3)
A-E 680 is a survey of general education practices from classical times to the present. The class will examine the teaching of art in European schools and its influence on American art education. The course will analyze the birth of American art education and significant events related to art in the schools from the 19th to the 21st century.

A-E 685 ACTION RESEARCH IN ART EDUCATION. (3)
This course is built within the context of the Advance Teacher Leader program. All students in this course are expected to integrate the design elements of their curriculum contract into their activities, field experiences, research, and action research projects. Prereq: Students must be enrolled in one of the Advanced Teacher Leader Programs in Art Education to take this course or by instructor permission.

A-E 686 TEACHER LEADERSHIP IN ART EDUCATION. (3)
This course is built within the context of the Advanced Preparation Programs in Teacher Leader Programs in Art Education. All candidates in this course are expected to integrate the design elements of their curriculum contract into their activities, field experiences, research, and action research projects. This course must be repeated for a minimum of two times for a total of six hours but can be repeated for no more than three times for a total of nine credits. Prereq: Candidates must be enrolled in one of the Advanced Preparation Teacher Leader Programs in Art Education to take this course. Candidates must also have completed A-E 685 Action Research in Art Educationas a prerequisite.

A-E 695 INDEPENDENT WORK: ART EDUCATION. (1-3)
Supervised individual research, experimental practicum, and the initiation of field programs leading to the discovery and development of new knowledge in art education theory and method. A formal learning contract between student and supervising faculty member is required. May be repeated to a maximum of six credit hours. Prereq: Graduate standing in the department and consent of instructor.

A-E 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed

# Art History & Visual Studies

## College of Fine Arts

**Master of Fine Arts**

The Master of Arts in Art History & Visual Sudies prepares students with the course work, language skills, and research experience needed for further graduate study or work in arts organizations or educational settings. The curriculum is structured to provide both breadth and depth of inquiry through a variety of approaches to art history and, more broadly, visual studies. We recommend that courses be selected in consultation with the graduate advisor to take full advantage of the multiple approaches, expertise, and insights of the faculty.

**Admission Requirements**

Applicants from a wide variety of educational backgrounds may earn a M.A. degree in Art History & Visual Studies. However, those without an undergraduate art history major should consult with the art history & visual studies graduate advisor before applying. Depending on one's prior preparation, some students may be advised to enroll as a postbaccalaureate to take selected preparatory courses that may count toward the graduate degree requirements if the student is later admitted to the M.A. program (as described in Graduate Bulletin Part 1). Requirements otherwise conform to UK general requirements for Graduate School admission.

**Application Procedures**

The Graduate School, which is the administrative unit for all graduate students, and the Art

History & Visual Studies graduate program, which is responsible for the academic curriculum, require different application materials. All application materials must be submitted through the online application, which is accessible from the Graduate School web page or https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin. asp?id=ukgrad.

Application materials for admission to the Graduate School include:

* Application form
* Copies of transcripts from all higher education institutions previously attended, which should be uploaded on the appropriate location of the online application. Domestic students are to self-report GPAs for each institution attended. (Tip: Convert transcripts on colored paper to white with black ink so as not to exceed the megabyte limitation on the online form.)
* GRE scores that you self-report in the appropriate location on the online application. (At the point of acceptance into the program, official GRE scores must be requested and sent directly from the Educational Testing Service (ETS) to the University of Kentucky; the Institution Code for the GRE for UK Graduate School is R1837).
* TOEFL scores and/or IELTS scores if an international student.
* Application fee.

Application materials for the Art History & Visual Studies graduate program are also to be submitted online on the graduate admissions application and include:

* Brief résumé.
* Personal statement that explains your interest in art history graduate study, experience, and plans.

* Sample of research writing, such as an undergraduate research paper
* Contact information in the form of email addresses for two recommenders who will be notified to submit their recommendations electronically to the online system.

**Application Deadlines**
January 1 - for all applicants, including those requesting a teaching assistantship. Students who want an assistanship should send a separate letter that indicates their interest in being considered either by e-mail attachment or in hardcopy form to the Graduate Advisor in Art History & Visual Studies, School of Art & Visual Studies, 236 Bolivar Street, University of Kentucky, Lexington, KY 40506-0090

**Degree Requirements**
In addition to the provisions below, either option also conforms to general degree requirements for all Master of Arts Programs (Graduate Bulletin part 1)

*Plan A - Thesis Option*
Candidates who plan to continue study at the doctoral level should select Plan A. This option emphasizes art historical research, problem solving, and communication skills. Specific requirements include:

1. Minimum of 30 credit hours of graduate course work.*
2. Foreign language reading competency in one foreign language (German usually recommended).**
3. Satisfactory completion and oral defense of a thesis.

*Plan B - Non-Thesis Option*
Plan B emphasizes course work to broaden the candidate's foundation in art historical knowledge, theory, and methods. Candidates who plan careers in visual arts fields that do not require a Ph.D. - professional placements in galleries, museums, art organizations, arts administration, etc. - may want to select this option. Specific requirements include:

1. Minimum of 36 credit hours of graduate course work.*

2. Foreign language reading competency in one foreign language (German often recommended).**

3. Satisfactory completion of final comprehensive exam.

* Six of the minimum 30 or 36 required credit hours may be taken in related areas such as anthropology, film studies, historic preservation, history, literature, philosophy, studio art, or women's studies, as determined by consultation with the graduate advisor.

**The foreign language competency requirement may be satisfied by any of the means established by the Graduate School.

## Graduate Courses

| | | |
|---|---|---|
| A-E 515 | Introduction To Art Therapy. | (3) |
| A-E 525 | The Elderly and the Arts | (3) |
| A-E 538 | Advanced Arts And Crafts In The Elementary School | (3) |
| A-E 545 | Topical Studies In Art Education (Subtitle Required). | (3) |
| A-E 576 | Art In Middle Schools | (3) |
| A-E 577 | Art In Secondary Schools | (3) |
| A-E 578 | Art In Elementary Schools | (3) |
| A-E 579 | Arts And Humanities In Art Education | (3) |

| | | |
|---|---|---|
| A-E 645 | Topical Research In Art Education (Subtitle Required) | (3) |
| A-E 665 | Issues In Art Education | (3) |
| A-E 670 | School And Community Art | (3) |
| A-E 675 | Aesthetics And Design | (3) |
| A-E 680 | History Of Art Education | (3) |
| A-E 685 | Action Research In Art Education | (3) |
| A-E 695 | Independent Work: Art Education | (1-3) |
| A-E 748 | Master's Thesis Research | (0) |
| A-H 501 | Museum Studies I: Introduction | (3) |
| A-H 502 | Museum Studies Ii: Internship | (3) |
| A-H 504 | Practical Issues In Art History (Subtitle Required) | (3) |
| A-H 524 | Theory And Methods (Subtitle Required) | (3) |
| A-H 525 | Studies In Genres And Media (Subtitle Required) | (3) |
| A-H 526 | Art And The Artist In Society (Subtitle Required) | (3) |
| A-H 527 | Interdisciplinary Approaches (Subtitle Required) | (3) |
| A-H 528 | Topical Seminar In Art History And Visual Studies (Subtitle Required) | (3) |
| A-H 529 | Topical Seminar In Architectural Or Design History (Subtitle Required) | (3) |
| A-H 555 | Methods In Art History And Visual Studies | (3) |
| A-H 592 | Aesthetics (Same As Phi 592) | (3) |
| A-H 598 | Coordinate Study In Art History And Visual Studies | (3) |
| A-H 604 | Practical Problems In Art History (Subtitle Required) | (3) |
| A-H 624 | Theory And Methods: (Subtitle Required) | (3) |
| A-H 625 | Problems In Genres And Media (Subtitle Required) | (3) |
| A-H 626 | The Artist In Society (Subtitle Required) | (3) |
| A-H 627 | Interdisciplinary Problems (Subtitle Required) | (3) |
| A-H 628 | Art History And Visual Studies Topical Seminar (Subtitle Required) | (3) |
| A-H 629 | Art History Topical Seminar In Architectural Or Design History (Subtitle Required) | (3) |
| A-H 738 | Master's Portfolio Preparation | (1-3) |
| A-H 748 | Master's Thesis Research | (0) |
| A-H 768 | Thesis Formulation And Preparation In Art History | (3) |
| A-H 780 | Independent Work: Art History | (1-3) |
| A-S 510 | Painting III | (3) |
| A-S 511 | Painting IV | (3) |
| A-S 520 | Printmedia: Topics (Subtitle Required) | (3) |
| A-S 521 | Printmedia: Contemporary Practices | (3) |
| A-S 530 | Advanced Drawing | (3) |
| A-S 540 | Graphic Design: Publication Design | (3) |
| A-S 541 | Graphic Design: Advanced Design | (3) |
| A-S 546 | Intermedia Studio: (Subtitle Required) | (3) |
| A-S 550 | Fiber III | (3) |
| A-S 551 | Fiber IV | (3) |
| A-S 560 | Advanced Hot Metals: Fabrication | (3) |
| A-S 561 | Advanced Hot Metals: Casting | (3) |
| A-S 570 | Ceramics III | (3) |
| A-S 571 | Ceramics IV | (3) |
| A-S 580 | Photography Projects I | (3) |
| A-S 581 | Photography Projects II | (3) |
| A-S 584 | Color Photography II | (3) |
| A-S 586 | Nonsilver Photography II | (3) |
| A-S 596 | Workshop | (1-6) |

| | | |
|---|---|---|
| A-S 610 | Painting V | (3) |
| A-S 611 | Painting VI | (3) |
| A-S 620 | Printmaking V | (3) |
| A-S 621 | Printmaking VI | (3) |
| A-S 630 | Graduate Drawing | (3) |
| A-S 650 | Fiber V | (3) |
| A-S 651 | Fiber VI | (3) |
| A-S 660 | Sculpture V | (3) |
| A-S 661 | Sculpture VI | (3) |
| A-S 670 | Ceramics V | (3) |
| A-S 671 | Ceramics VI | (3) |
| A-S 680 | Photography V | (3) |
| A-S 681 | Photography VI | (3) |
| A-S 710 | Problems In Painting | (3) |
| A-S 720 | Problems In Printmaking | (3) |
| A-S 730 | Problems In Drawing | (3) |
| A-S 740 | Problems In Fiber | (3) |
| A-S 750 | Problems In Sculpture | (3) |
| A-S 767 | M.F.A. Studio Thesis Project | (1-6) |
| A-S 770 | Problems In Ceramics | (3) |
| A-S 777 | Problems In Intermedia | (3) |
| A-S 779 | Problems In Photography | (3) |
| A-S 780 | Problems In Design | (3) |
| A-S 793 | Graduate Studio Seminar | (3) |
| A-S 795 | Independent Research | (1-3) |
| Art 748 | Master's Thesis Research | (0) |
| Art 768 | Residence Credit For Master's Degree | (1-6) |

# Art Studio

College of Fine Arts

## Master of Fine Arts

The Master of Fine Arts (M.F.A.) degree in Art Studio is the terminal academic degree for studio artists and the required faculty credential for most institutions of higher learning. In addition to being fully qualified to teach at the college-level, M.F.A. graduates will possess the skills to pursue careers in commercial venues or as full-time practicing fine artists. Students enrolled in the M.F.A. program are encouraged to explore inter-disciplinary and cross-disciplinary mediums or concentrate upon a single media dependent upon the direction of their research.

Applications are reviewed only once per year for fall semester admittance. The deadline for all materials is January 6th. Artwork submitted must be substantial in quality, scope, and conceptual rigor.

**Admission Requirements**

While a B.A. or B.F.A. in studio art is the preferred preparatory degree for the M.F.A. program, students from a variety of educational backgrounds may apply. The determinate factor inadmittance to the program will be the quality of the submitted artwork.

**Application Procedures**

The Graduate School, which is the administrative unit for all graduate students, and the Art Studio graduate program, which is responsible for the academic curriculum, require different application materials.

Application for admission to the Graduate School requires:

- A completed application form for the Graduate School (on-line application form available at http://gradschool.uky.edu.
- One official transcript from all institutions previously attended.
- TOEFL scores and/or IELTS scores if an international student.
- Application fee.
- An electronic portfolio of 20 recent artworks sent as a .pdf with an image key with title, date, size, and medium for each submitted work as part of that document. (maximum resolution 8" x 10" x 72 dpi – NO PowerPoint presentations). This portfolio is to be uploaded as one document under the "Portfolio"; submission button. If your files are too large, please resize them. If sending timebased materials (such as video), pleaseinclude a link to your work on a website such as vimeo, personal site, or YouTube.
- A brief letter stating your goals for graduate study and your interest in being considered for an assistantship, fellowship, and or internship and can be uploaded using the "Personal Statement" submission button. A writing sample is not required ignore the prompt.
- A brief résumé uploaded via the CV submission prompt
- Three letters of recommendation uploaded via ApplyYourself

**Degree Requirements**

The M.F.A. degree will be awarded on the completion of 60 hours of graduate course work. Of these, 30 hours must be at or above the 600 level and 40 hours must be in graduate level courses:

Requirements:

- Art Studio - Students must take a minimum of 33 credit hours of Art Studio courses including A-S 793, Graduate Studio Seminar, required of M.F.A. candidates every fall semester of their residency.

- Art History - Students must take a minimum of 9 credit hours of Art History including three hours of A-H 650 Contemporary Art.
- Gallery Practicum - Students must take A-H 502 Museum Studies II: Internship.
- MFA Thesis - A total of 6 credits of A-S 799 (Studio Thesis Project) are required for the preparation and successful completion of a final one-person M.F.A. exhibition of studio work.

Other Requirements
- Up to 9 credit hours in related graduate courses may be taken outside the School of Art and Visual Studies or elsewhere in the University.
- A foreign language is not required, and the M.F.A. degree is offered only according to Plan B.

## Course Descriptions

A-S 510 PAINTING III. (3)
Supervised individual development in painting. Nine studio hours per week. Prereq: A-S 311 or consent of instructor.

A-S 511 PAINTING IV. (3)
Continuation of A-S 510; emphasis on professional awareness and development. May be repeated to a maximum of six credits. Nine studio hours per week. Prereq: A-S 510 or consent of instructor.

A-S 520 PRINTMEDIA: TOPICS (Subtitle required). (3)
This course will explore and discuss contemporary and future directions in print media. Students will combine traditional, digital, and postdigital matrices to create works that merge print with installation, design, animation, book-arts, or other mixed-media methods. Prereq: AS 320 or A-S 321 or consent of instructor.

A-S 521 PRINTMEDIA: CONTEMPORARY PRACTICES. (3)
Students will utilize knowledge from previous print courses to develop specific projects

A-S 547 DIGITAL MEDIA PROJECTS CAPSTONE. (3)
A culminating course that allows digital media students to propose and create large-scale, in depth projects such as short films, video installations, a complete animation, a photographic series, a 3D printing installation, a web-based research project, etc. that require time and focus to produce. 3 credit hours, may be repeated up to 9 hours. Prereq: Senior Standing, B.S. Digital Media and Design Majors.

A-S 550 FIBER III. (3)
Supervised individual development in fiber. Nine studio hours per week. Prereq: A-S 351 or consent of instructor.

A-S 551 FIBER IV. (3)
Continuation of A-S 550; emphasis on professional awareness and development. May be repeated to a maximum of six credits. Nine studio hours per week. Prereq: A-S 550 or consent of instructor.

A-S 560 ADVANCED HOT METALS: FABRICATION. (3)
Art Studio 560 is an advanced level course, continuing metal working skills, techniques and processes for producing sculptural forms based on traditional and contemporary ideas. Primary emphasis is placed on metal shop orientation: fabrication, forging and non-traditional
materials and surfaces. Sculptural concepts are explored through individual research, critical discussions and art production. Prereq: AS 360 or consent of instructor.

A-S 561 ADVANCE HOT METALS: CASTING. (3)
Art Studio 561 is an advance course in metal working skills, techniques and processes for production sculpture forms based on traditional and contemporary ideas. Primary emphasis is placed on metal shop orientation: casting and non-traditional materials and surfaces. Sculptural concepts are explored through individual research, critical discussions and art production. Prereq: A-S 361 or consent of instructor.

A-S 564 DIGITAL FABRICATION PROJECTS (Subtitle required). (3)
This is an advanced course in which students will utilize knowledge from previous hybrid fabrication courses to create personal projects and research to develop a professional body of work and studio practice. Six studio hours per week. May be repeated to a maximum of six credit hours. Prereq: A-S 365 or A-S 366 or consent of the instructor.

A-S 567 ADVANCED TOPICS IN DIGITAL FABRICATION (Subtitle required). (3)
This is an advanced course that allows students to explore a variety of digital fabrication processes used in CAD/CAM based artistic topics. This class builds on students' previous experiences with hybrid fabrication media. Readings and discussion of contemporary and future directions in digital fabrication supplement the class. The use of current technology combined with traditional processes in an artistic context will be emphasized. Students will develop a professional body of work stemming from personal research. Six studio hours per week. May be repeated to a maximum of nine credit hours when identified under a different subtitle. Prereq: A-S 365 or A-S 366 or consent of the instructor.

A-S 570 CERAMICS III. (3)
Supervised individual development in ceramics. Nine studio hours per week. Prereq: A-S 371 or consent of instructor.

A-S 571 CERAMICS IV. (3)
Continuation of A-S 570; emphasis on professional awareness and development. May be repeated to a maximum of six credits. Nine studio hours per week. Prereq: A-S 570 or consent of instructor.

A-S 580 PHOTOGRAPHY PROJECTS I. (3)
A-S 580 is a photography based project course. The emphasis of this course is on the expansion of photographic techniques, self-expression, and long-term project development. Prereq: Any of the following: A-S 381, A-S 384, A-S 385, A-S 386, A-S 305 or consent of instructor.

A-S 581 PHOTOGRAPHY PROJECTS II. (3)
A-S 581 is a continuation of A-S 580. The emphasis of this course is advanced exploration and experimentation of photographic techniques, self-expression, and long-term project development in preparation for student's future success in independent research. May be repeated to a maximum of six credits. Prereq: A-S 580 or consent of instructor.

A-S 584 COLOR PHOTOGRAPHY II. (3)
A-S 584 is a continuation of A-S 384. The emphasis is upon advanced color photographic processes and continued acquisition of skills for self-expression through the medium. May be repeated to a maximum of six credits. Studio, nine hours per week. Prereq: A-S 384 or consent of instructor.

*A-S 585 INDUSTRY PATHWAYS AND PRACTICE. (3)
A-S 585 is a seminar/studio style class that looks at professional practices in the creative industry and helps prepare students for their postcollege careers. Students will work through exercises ranging from goal

setting to portfolio design as well as work in teams to create
material for real world application. This class is broad enough for students to feel prepared to enter numerous creative fields after graduation. This course provides full GCCR credit for the BS in Digital Media and Design Degree. Prereq: Junior standing in the Digital Media and Design major or consent of instructor.

A-S 586 NONSILVER PHOTOGRAPHY II. (3)
A-S 586 is a continuation of A-S 386. The emphasis is upon advanced nonsilver photographic processes and continued acquisition of skills for self-expression through the various media. May be repeated to a maximum of six credits. Studio, nine hours per week. Prereq: A-S 386 or consent of instructor.

A-S 587 ADVANCED TOPICS IN PHOTOGRAPHY (Subtitle required). (3)
An advanced course focusing on a specific area or topic of lens based or photographic arts emphasizing personal development of theoretical, conceptual and technical skills. Six studio hours per week. May be repeated to a maximum of nine credit hours when identified under a different subtitle. Prereq: Will be designated with subtitle or consent of instructor.

A-S 596 WORKSHOP. (1-6)
Workshops in a variety of media dealing with supervised investigation of advanced art studio problems. Prereq: Consent of instructor.

A-S 610 PAINTING V. (3)
Advanced studio investigation of current ideas in painting. Exploration of contemporary and traditional procedures, materials, and issues in a context of a group discussion and review. May be repeated to a maximum of nine credits. Prereq: Graduate standing in the department and approval of the instructor.

A-S 611 PAINTING VI. (3)
Continued studio investigation of current ideas in painting, with increased concentration on critical group discussions of student work and readings in contemporary art. May be repeated to a maximum of nine credits. Studio, nine hours. Prereq: A-S 610 and consent of instructor.

A-S 620 PRINTMAKING V. (3)
Advanced studio investigation of current ideas in printmaking. Exploration of contemporary and traditional procedures, materials, and issues. May be repeated to a maximum of nine credits. Studio, nine hours. Prereq: Graduate standing in the department and consent of the instructor.

A-S 621 PRINTMAKING VI. (3)
Continued advanced studio investigation of current ideas in printmaking. Increased concentration of technical and aesthetic development in preparation for entry into the professional environment. May be repeated to a maximum of nine credits. Studio, nine hours. Prereq: AS 620.

A-S 630 GRADUATE DRAWING. (3)
Supervised studio course in graduate-level drawing and mixed media works on paper or other two-dimensional surfaces. Emphasis will be placed on personal style, its identification, definition and further development in the context of contemporary drawing. May be repeated to a maximum of nine credits. Studio, nine hours per week. Prereq: Twelve credits in upper division studio work and consent of instructor.

A-S 646 ADVANCED INTERMEDIA STUDIO (Subtitle required). (3)
A studio course specially designed for graduate students emphasizing sustained individual, technical and theoretical work in the area of Intermedia. May be repeated to a maximum of nine credits when identified by the same subtitle. Nine studio hours. Prereq: A-S 200 and either A-S 346 or A-S 347 or consent of

instructor, or graduate enrollment.

A-S 650 FIBER V. (3)
In this supervised graduate studio course in fiber, emphasis will be placed on personal style, its identification, definition, and further development in the context of major directions in the fiber arts. May be repeated to a maximum of nine credits. Studio, nine hours per week. Prereq: 12 credits in upper division studio work and consent of instructor.

A-S 651 FIBER VI. (3)
Continued advanced studio investigation of current ideas in the fiber arts. Increased concentration on technical and aesthetic development, professional readings, and group discussion. May be repeated to a maximum of nine credits. Studio, nine hours per week. Prereq: A-S 650.

A-S 660 SCULPTURE V. (3)
In this supervised studio course in graduate sculpture, emphasis will be placed on personal style, its identification, definition, and further development in the context of modern sculpture. May be repeated to a maximum of nine credits. Studio, nine hours per week. Prereq: 12 credits in upper division studio work and consent of instructor.

A-S 661 SCULPTURE VI. (3)
Continued advanced studio investigation of current ideas in sculpture. Increased concentration on technical and aesthetic development, professional readings, and group discussion. May be repeated to a maximum of nine credits. Studio, nine hours per week. Prereq: A-S 660.

A-S 670 CERAMICS V. (3)
In this supervised studio course in graduate ceramics, emphasis will be placed on personal style, its identification, definition, and further development in the context of direction in modern ceramics. Studio, nine hours per week. May be repeated to a maximum of nine credits. Prereq: 12 credits in upper division studio work and consent of instructor.

A-S 671 CERAMICS VI. (3)
Continued advanced studio investigation of current ideas in ceramics, increased concentration on technical and aesthetic development, professional readings, and group discussions. Studio, nine hours per week. May be repeated to a maximum of nine credits. Prereq: A-S 670.

A-S 680 PHOTOGRAPHY V. (3)
A-S 680 is a continuation of A-S 581. In this supervised studio course in graduate photography, emphasis will be placed on personal style, its identification, definition, and further development in the context of major directions in photography. May be repeated to a maximum of nine credits. Studio, nine hours per week. Prereq: A-S 581 and consent of instructor.

A-S 681 PHOTOGRAPHY VI. (3)
A-S 681 is a continuation of A-S 680. The emphasis will be upon continued advanced studio investigation of current ideas in photography with increased concentration on technical and aesthetic development, professional readings, and group discussion. May be repeated to a maximum of nine credits. Studio, nine hours per week. Prereq: A-S 680 and consent of instructor.

A-S 687 GRADUATE TOPICS IN PHOTOGRAPHY (Subtitle Required). (3)
A studio course specially designed for graduate students emphasizing sustained individual, technical and theoretical work in a specified topical area of lens based or photographic arts. May be repeated to a maximum of nine credits when identified under a different subtitle. Six studio hours. Prereq: Graduate

standing.

A-S 710 PROBLEMS IN PAINTING. (3)
Sustained individual projects focusing on problems and experimental work in the technical and theoretical aspects of painting. May be repeated to a maximum of nine credits. Studio, nine hours per week. Prereq: Twelve credits in upper division studio work and consent of instructor.

A-S 720 PROBLEMS IN PRINTMAKING. (3)
Sustained individual projects focusing on problems and experimental work in the technical and theoretical aspects of printmaking. May be repeated to a maximum of nine credits. Studio, nine hours per week. Prereq: Twelve credits in upper division studio work and consent of instructor.

A-S 730 PROBLEMS IN DRAWING. (3)
Sustained individual projects focusing on problems and experimental work in the technical and theoretical aspects of drawing. May be repeated to a maximum of nine credits. Studio, nine hours per week. Prereq: Twelve credits in upper division studio work and consent of instructor.

A-S 740 PROBLEMS IN FIBER. (3)
Sustained individual problems and experimental work in the technical and theoretical problems of fiber. May be repeated two times to a maximum of nine credits. Nine studio hours per week. Prereq: Twelve credits in upper division studio work and consent of instructor.

A-S 750 PROBLEMS IN SCULPTURE. (3)
Sustained individual problems and experimental work in the technical and theoretical problems of sculpture. May be repeated to a maximum of nine credits. Nine studio hours per week. Prereq: 12 credits in upper division studio work and consent of instructor.

A-S 770 PROBLEMS IN CERAMICS. (3)
Sustained individual problems and experimental work in the technical and theoretical problems of ceramics. May be repeated two times for a maximum of nine credits. Nine studio hours per week. Prereq: 12 credits in upper division studio work and consent of instructor.

A-S 777 PROBLEMS IN INTERMEDIA. (3)
A studio course specially designed for independent graduate research emphasizing individual, technical and theoretical work in the area of Intermedia. May be repeated to a maximum of nine credits. Studio, nine hours per week. Prereq: Twelve credits in upper division studio work and consent of instructor.

A-S 779 PROBLEMS IN PHOTOGRAPHY. (3)
A-S 779 emphasizes sustained individual problems and experimental work in the technical and theoretical problems of photography. May be repeated to a maximum of nine credits. Studio, nine hours per week. Prereq: Twelve credits in upper division studio work and consent of instructor.

A-S 780 PROBLEMS IN DESIGN. (3)
Sustained individual problems and experimental work in the technical and theoretical problems of design. May be repeated two times for a maximum of nine credits. Nine studio hours per week. Prereq: 12 credits in upper division studio work and consent of instructor.

A-S 793 GRADUATE STUDIO SEMINAR. (3)
A studio seminar for graduate students in the studio area, in all areas of concentration. Lectures, discussion and criticism will focus on current formal and theoretical problems in the arts. Emphasis will be placed on the integration of concepts and practices arising in the different fields in the visual arts with critical

discourse through monthly group critiques. Required of M.F.A. candidates every Fall semester of their residency. May be repeated to a total of 12 credits. Prereq: Graduate standing in the department.

A-S 795 INDEPENDENT RESEARCH. (1-3)
Advanced studio investigation of art forms, processes, and topics not specially treated in the regular curriculum. May be repeated to a maximum of nine credits. Studio, three hours per week per credit. Prereq: Twelve credits in upper division studio work and consent of instructor.

A-S 799 M.F.A. STUDIO THESIS PROJECT. (6)
Independent research and preparation for the M.F.A. thesis exhibition. For the student working in a highly technical medium or process, the preparation of a correlated written thesis under close guidance will be the outcome. The student will be expected to know the standard forms for photographic records and the preparation of a professional portfolio. Prereq: Normally taken during final semester for graduate study.

# Arts Administration

College of Fine Arts

## Master of Arts

The University of Kentucky prepares the next generation of arts leaders through its innovative online MA in Arts Administration. This degree is designed to serve a vibrant nonprofit arts and cultural industry that attracts more than 78 million Americans each year and generates $135 billion in economic activity annually that support 4.1 million jobs.

Ideal candidates for the M.A. include individuals who have experience in the arts or arts management and have the desire to supplement this experience with more in-depth training in the form of an advanced business and nonprofit arts-focused degree. These include persons who have graduated with a bachelor's degree in Arts Administration, the arts, or a related field and professionals with experience in the arts or arts management.

UK offers its M.A. in Arts Administration as a completely online program. This provides several benefits to UK graduate students:

- Flexibility - For working professionals, an online program is ideal to provide the flexibility needed to balance work, school and personal obligations.
- Time and location - There is no residency requirement. The program is designed for students to have equal access no matter where they are located
- Affordability - All students accepted into the Arts Administration M.A. program pay the in-state tuition rate regardless of residential location. Additionally, there are a number of financial aid options available to students who meet the requirements.
- Quality instruction - Students who attend online classes will receive the same quality instruction as those who would attend class on-campus.

**Admission Requirements**

The MA Program is open to qualified applicants who have earned a bachelor's degree from an accredited college or university in the United States or abroad. All candidates for admission are selected on the basis of undergraduate transcripts, academic and personal references, and related work experience. Applicants are expected to have a demonstrable commitment to the arts in at least one art form. This requirement can be satisfied in several ways including an undergraduate degree in an art form or arts-related field; professional experience in the arts; or extra-curricular activity in the arts.

All applicants whose native language is not English will be required to submit TOEFL or IELTS scores. The minimum acceptable TOEFL score is 550 (paper-based) 213 (computer-based), or 79 (internet-based). The minimum IELTS score is 6.5. Submitted scores must be no more than two years old.

**Application Procedures**

To apply ofr admission to the MA in Arts Administration, applications must be submitted online to the UK Gradute School. New graduate students are accepted in the fall and spring semester.

# Curatorial Studies

## College of Fine Arts

**Master of Fine Arts**

The MFA in Curatorial Studies at the School of Art & Visual Studies (SA/VS) prepares students for careers in the expanding field of curatorial practice. As the first three-year hybrid (online and residency) MFA in Curatorial Studies in the United States, this practice-based terminal degree uniquely equips graduates for careers in a variety of arts organizations, as well as teaching positions at the college level. Through internships, online courses, and residential seminars, students gain a solid foundation in the history and theory of curatorial practice, as well as practical experience in exhibition development, design, and implementation. With courses in art history, art studio, art education, and arts administration, among others, it offers a dynamic interdisciplinary degree that prepares graduates to be highly competitive in a diverse job market. Courses will be selected in consultation with the Graduate Advisor to take full advantage of the multiple approaches, expertise, and insights of the faculty.

**Admission Requirements**

Applicants from a range of educational backgrounds may earn a MFA in Curatorial Studies. However, those without an undergraduate degree in Art History, Studio Art, Art Education, or Arts Administration should consult with the curatorial studies Graduate Advisor before applying. The program attracts a highly competitive pool of national and international applicants—many of whom already have some curatorial experience. All admissions will be reviewed by the program's Graduate Advisor along with a multidisciplinary committee comprised of faculty from art education, art history, and art studio. The requirements otherwise conform to UK general requirements for Graduate School admission.

**Application Procedures**

The Graduate School, which is the administrative unit for all graduate students, and the Curatorial Studies graduate program, which is responsible for the academic curriculum, require different application materials. All application materials must be submitted through the online application, which is accessible from the Graduate School web page or https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin. asp?id=ukgrad.

Application materials for admission to the Graduate School include:
* Application form
* Copies of transcripts from all higher education institutions previously attended, which should be uploaded on the appropriate location of the online application. Domestic students are to self-report GPAs for each institution attended. (Tip: Convert transcripts on colored paper to white with black ink so as not to exceed the megabyte limitation on the online form.)
* GRE scores that you self-report in the appropriate location on the online application. (At the point of acceptance into the program, official GRE scores must be requested and sent directly from theEducational Testing Service (ETS) to the University of Kentucky; the Institution Code for the GRE for UK Graduate School is R1837).
* TOEFL scores and/or IELTS scores if an international student.
* Application fee.

Application materials for the Curatorial Studies graduate program are also to be submitted online on the graduate admissions application and include:

* Brief résumé.

* A statement of purpose
* Sample of research writing (such as an undergraduate research paper or exhibition catalogue essay) or a digital portfolio (if the candidate holds a BA, BFA, or MFA degree in art studio or art education). If an applicant has prior work experience in the field, they may also include documentation of curatorial work along with their writing sample (installation shots, press releases, etc.). Be careful not to exceed the megabyte limitation on the online form.
* Contact information in the form of email addresses for three recommenders who will be notified to submit their recommendations electronically to the online system.

**Application Deadlines**
January 1 - for all applicants, including those requesting a teaching assistantship. Students who want an assistantship should send a separate letter that indicates their interest in being considered either by e-mail attachment or in hardcopy form to the Graduate Advisor in Art History & Visual Studies, School of Art & Visual Studies, 236 Bolivar Street, University of Kentucky, Lexington, KY 40506-0090.

**Degree Requirements**
The MFA degree will be awarded on the completion of 60 credit hours of graduate course work. Of these, 42 credit hours are "program core" required courses (18 hours of which are guided internships). The remaining 18 credit hours are electives (9 hours of "guided electives" in Arts Administration, and 9 "free electives" that relate to the student's specific area of interest within curatorial studies).

**Requirements**
Program Core – Students are required to take the following courses (at number of credit hours specified):

- ART 504 Curatorial Practice: History, Theory, Practice (3 hours)
- ART 604 Curatorial Practice: Curatorial Projects (3 hours)
- ART 768 Thesis Preparation and Presentation (6 hours)
- ART 794 Internship: Bolivar Gallery (3 hours)
- ART 795 Internship: UK Art Museum (3 hours)
- ART 796 Internship: Community Partners (6 hours)
- ART 797 Internship: Arts Organization (6 hours)
- A-H 504/604 Practical Issues in Art History (Subtitle Required) (3 hours)
- A-H 650 Contemporary Art (Subtitle Required) (3 hours)
- A-E 550/560 Community Art Education / Museum Education (3 hours)
- A-S 793 Graduate Seminar (3 hours)

* Guided Electives – Students are required to 9 credit hours of electives in the Department of Arts Administration, choosing from the following:

- AAD 660 Social & Cultural Entreprenurship (3 hours)
- AAD 650 The Arts & the Law (3 hours)
- AAD 640 Principles of Fundraising (3 hours)
- AAD 630 Marketing Research and Planning for Arts Organization (3 hours)
- AAD 620 Management & Leadership in the Art (3 hours)
- AAD 610 Financial Management for Arts Organizations (3 hours)
- AAD 600 Arts Administration Technologies (3 hours)
- AAD 565 Community Engagement (3 hours)
- AAD 550 Grant Writing (3 hours)
- AAD 520 The Arts & Artists in Society (3 hours)

* Free Electives – Students are required to take 9 credit hours in electives in related areas such as Anthropology, Arts Administration, Art Education, Art History, Art Studio, Film Studies, Historic Preservation, History, Literature, Philosophy, Women's Studies, etc. as determined by consultation with the Graduate Advisor.

Other Requirements

* MFA Thesis – The degree requires the successful completion of a final exhibition accompanied by a written document. Students will take 6 hours ART 768 in preparation for curating their thesis exhibition (see "program core"). Additional hours of thesis research may be taken if necessary (ART 748 Thesis Research at 0 hours).

# Music

## College of Fine Arts

The School of Music offers the Master of Arts (M.A.) with specialty areas or emphases in musicology or theory; Master of Music (M.M.) with specialty areas in performance (including choral or instrumental conducting), composition, sacred music, music therapy, or music education; Doctor of Musical Arts (D.M.A.) with specialty areas in performance (including choral or instrumental conducting), or composition; and the Doctor of Philosophy (Ph.D.) with specialty areas in musicology, music education or theory. The applicant for the master's degree is expected to have earned an appropriate undergraduate degree, and the applicant for the doctoral degree is expected to have earned an appropriate master's degree or equivalent.

Graduate work is also provided for persons seeking Rank I and Rank II state certification in music education. Requirements for Rank II coincide with those for the M.M. in Music Education; requirements for Rank I may be completed by a planned and approved 30 semester hour program in addition to Rank II requirements or 60 semester hours of planned and approved graduate credit, including the master's degree. The URL for the School of Music Home Page is http://finearts.uky.edu/music.

**Entrance Requirements**
Applicants must meet the entrance requirements of The Graduate School as well as those of the School of Music. Applicants to all graduate programs in music are required to take entrance exams in the areas of music theory (aural and written) and music history and literature. (Note: Music therapy students will take a discipline-specific music theory and music history exam, due to the specific requirements designated by music therapy professional/accrediting bodies.) Applicants to programs in music education, music therapy, and voice, as well as doctoral study in musicology, are also required to take an additional exam in the proposed area. Those seeking a degree in performance must audition as well. Applicants can send a video/DVD of a recent concert for preliminary audition. Live auditions should be scheduled by contacting the faculty member in charge of the student's performing area, or filling out an audition request form on the School of Music web page. The purpose of these exams and the audition is to discern the applicant's readiness to pursue graduate work in music. Students who have graduated from or are currently enrolled as undergraduate students at the University of Kentucky are not exempt from these entrance requirements. Applicants must demonstrate a minimum level of skills and knowledge on the entrance exams in order to be accepted into the program. For students who are accepted, the exams indicate whether they need review classes in specific areas before entering into graduate-level course work, but a willingness to take review classes is not a substitute for satisfactory performance on the exams. All applicants should take the exams seriously and attempt to do their best work. Admission of students who need review classes will be admitted conditionally until these requirements have been completed, which should be before the student has completed 12 graduate credit hours, or registration for additional classes may be blocked. Entrance examinations are usually scheduled on 4 dates per year at the School of Music: in November, in January/February, in February/March, and in June. The applicant should notify the Music Graduate Office of his/her intention to take the entrance exams and confirm the date at least four weeks prior to the exam. There is no charge to take the exams on the scheduled dates. Students who cannot arrange to take the exams on one of these dates may hire a private proctor to give them the exams at a mutually convenient time.

Note: Persons not applying for financial assistance may choose any of the above dates. Persons who meet the GPA and GRE score requirements for Non-Service Fellowships and wish to be considered for these awards must take the examinations (and the audition if applicable) no later than the first Saturday in

February. Those applying for teaching assistantships may choose to take the examinations in November or February for application for the subsequent fall semester. Those wishing to begin studies during a summer session must take the examinations no later than the first Saturday of March. Applicants should first complete the online application at the Graduate School homepage, then complete the online application at the School of Music website, prior to doing the audition and entrance exams.

**General Requirements for Master's Degree**

Foreign Language Requirement: The Master of Arts degree requires a reading knowledge of one foreign language, preferably French or German. Voice Performance majors in the Masters of Music are expected to have taken at least one year each of undergraduate level German, French, and Italian (or the equivalent by petition to the Director of Graduate Studies in the School of Music) as a prerequisite for degree study. If deficient, a student must enroll in language courses each semester of study until the deficiency is removed. Language classes must be passed with a letter grade of B or above.

Thesis Requirement: The Master of Arts degree requires a thesis (Plan A: see general requirements). For the Master of Music degree in Performance, a public recital acceptable to the faculty is required in lieu of a thesis. For the Master of Music degree in Composition, a composition of major proportions, acceptable to the composition-theory faculty and publicly performed, must be submitted in lieu of a written thesis. For the Master of Music in Music Education, students may choose the thesis option (Plan A), or the non- thesis option which requires taking six hours of additional course work instead (Plan B).

A final comprehensive examination is required for each program. At least fifty percent of all course credits must be at the 600 level or above.

## Master of Arts

Prerequisites: A suitable background in music literature and music theory, and a reading knowledge of one foreign language, normally French or German.

**Master of Arts (Musicology Emphasis)**

| | |
|---|---|
| Music History and Literature | (9-12) |
| Theory (including a minimum of one course from MUS 670, 671, 672, or 676) | (6-9) |
| Research Methods (MUS 618) | (3) |
| Directed Electives | (0-6) |
| Thesis | (6) |
| Total | (30) |

**Master of Arts (Theory Emphasis)**

| | |
|---|---|
| Theory (including a minimum of one course from MUS 670, 671, 672, or 676) | (9-12) |
| Music History and Literature | (6-9) |
| Research Methods (MUS 618) | (3) |
| Directed Electives | (0-6) |
| Thesis | (6) |
| Total | (30) |

**Master of Music (Composition)**

Prerequisites: Submission of three original compositions.

| | |
|---|---|
| Advanced Composition (MUS 673) | (4) |
| Orchestration (MUS 570 and 571) | (4) |
| Music History and Literature | (6) |
| Theory (including a minimum of one course from: MUS 670, 671, 672, or 676) | (9) |
| Directed Electives | (1) |

| | |
|---|---|
| Thesis Composition | (6) |
| Total | (30) |

The thesis composition must be publicly performed. The student is responsible for the preparation of legible score and parts.

**Master of Music (Performance)**

Prerequisites: Acceptance by the appropriate faculty of applied music.

| | |
|---|---|
| Music Performance (including recital) | (9) |
| Music History and Literature | (6) |
| Theory (including a minimum of one course from MUS 670, 671, 672, or 676) | (6) |
| Directed Electives | (9) |
| Recital | (0) |
| Total | (30) |

A minimum of three full semesters, excluding summer sessions, is necessary for an M.M. in Performance.

This MM degree program is offered in the following specialty areas: piano, piano with emphasis in instrumental or vocal accompanying (see below), voice (see below), organ, violin, viola, cello, bass, guitar, flute, oboe, clarinet, saxophone, bassoon, trumpet, horn, trombone, euphonium, tuba, percussion and conducting (choral or instrumental). Wind, string, percussion, and conducting majors must participate in at least one University-sponsored performing organization for two semesters.

**Master of Music (Piano Performance: Instrumental Accompanying)**

| | |
|---|---|
| Piano Performance (MUP 601, including recital) | (9) |
| Music History and Literature (at 600 level, including MUS 624) | (9) |
| Theory (including a minimum of one course from MUS 670, 671, 672, or 676) | (6) |
| Advanced Chamber Ensemble (MUC 570) | (4) |
| Electives (MUP 503 or MUP 520 recommended) | (2) |
| Total | (30) |

**MASTER OF MUSIC (Piano Performance: Vocal Accompanying)**

| | |
|---|---|
| Piano Performance (MUP 601, including recital) | (9) |
| Music History and Literature (at 600 level, including MUS 520) | (9) |
| Theory (including a minimum of one course from MUS 670, 671, 672, or 676) | (6) |
| Vocal Coaching for Singers (MUP 530 and MUP 630) | (4) |
| Electives (MUP 503 or MUP 520 recommended) | (2) |
| Total | (30) |

MASTER OF MUSIC (Voice Performance)

| | |
|---|---|
| Voice Performance (including recital) | (9) |
| Music History and Literature (must include MUS 623 or 627) | (6) |
| Theory (including a minimum of one course from MUS 670, 671, 672, or 676) | (6) |
| Physiology and Functioning of the Singing Voice (MUS 665) | (3) |
| Materials, Techniques, and Literature of Voice Teaching (MUS 667) | (3) |
| Advanced Vocal Repertory (MUS 620) | (3) |
| Total | (30) |

A minimum of three full semesters, excluding summer sessions, is necessary for an M.M. in Performance.

**Master of Music (Sacred Music)**

| | |
|---|---|
| UK Requirements: | (27) |

| | |
|---|---|
| MUS 660 Choral Methods | (3) |
| Music History and Literature | (3) |
| Music Theory (including a minimum of one course from MUS 670, 671, 672, or 676) | (3) |
| Ensemble | (2) |
| Music Education (Choose from MUS 560, MUS 561, MUS 650 or other graduate music education course in consultation with advisor) | (3) |
| Internship | (3) |
| Specialized area of study | (10) |
| Course work at an accredited seminary or other institution specializing in religious studies (Choose from topics such as Music in Worship, Designing Worship, Congregation, Worship and Spirituality, Worship and Music in the Liturgical Year, or other courses. Credits must be completed with a grade "B" or above and must be transferred to UK officially prior to graduation) | (6-9) |
| Total | (33) |

Specialized areas of study:

| | |
|---|---|
| VOICE or KEYBOARD (organ or piano) | |
| MUP 558 Choral Conducting | (4) |
| Music Performance (Voice or Keyboard) | (6 +*) |
| CHORAL CONDUCTING | |
| MUP 558 & 658 Choral Conducting | (8) |
| Keyboard, MUP 501 or 503 | (2) |

+ An audition in the performing area (voice, organ, or piano) is required.
* A 15-minute jury before either the voice faculty (for vocal emphasis) or the keyboard faculty (for piano or organ emphasis) is required at the end of the applied study.

**Master of Music (Music Education - Plan A)**

| | |
|---|---|
| Core Requirements: | (12) |
| MUS 600 Research I | (3) |
| MUS 601 Foundations of Music Education | (3) |
| Music History and Literature | (3) |
| Music Theory (including MUS 578,MUS 670, MUS 671, or MUS 672) | (3) |
| Thesis | (6) |
| Music Education Electives | (6) |
| The student can select any Music Education courses 500 level or above. | |
| Music Electives The student can select any Music course 500 level or above in Performance, Music History, Music Theory, or Composition. | (6) |
| Total | (30) |

Students planning to earn a doctorate in Music Education should elect Plan A.
(Students planning to obtain a Rank II certification should contact the Chair of Music Teacher Education Program (TEP) to get informed about the latest Rank II requirements.)

**Master of Music (Music Education - Plan B)**

| | |
|---|---|
| Core Requirements: | (12) |
| MUS 600 Research I | (3) |
| MUS 601 Foundations of Music Education | (3) |
| Music History and Literature | (3) |
| Music Theory (including MUS 578, 670, 671, 672, or 676) | (3) |
| Specialized Area of Study | (12) |

(The student will select 12 hours from the five areas described below, Instrumental Teaching, Choral Teaching, General Music, Orff Methods, and Choral or Instrumental Conducting. The student and advisor will determine the general area of emphasis and plan a set of courses which best fulfills the student's needs
Music or Education Electives (The student can select any music or education courses 500 level or above.) (6)
Total (30)

(Students planning to obtain a Rank II certification should contact the Chair of Music Teacher Education Program (TEP) to get informed about the latest Rank II requirements.)

Specialized areas of study for Plan B
INSTRUMENTAL TEACHING EMPHASIS - Band or Orchestra (Student and Advisor choose twelve hours from courses below which would best fulfill the student's needs.)

| | |
|---|---|
| MUP Applied Performance (maximum of 4 hours) | (1-4) |
| MUP Secondary Applied | (1-2) |
| MUS 680 Band History and Literature | (3) |
| MUS 622 Symphonic Literature | (3) |
| MUS 660 Adv. Methods: Elementary General Music | (3) |
| MUP 558 Conducting or MUP 658 Conducting | (1-4) |
| MUS 684 Advanced String Methods and Materials | (3) |
| MUS 570 Orchestration | (2) |
| MUS 706 Music Learning and Behavior | (3) |

CHORAL TEACHING EMPHASIS (Student and Advisor choose twelve hours from courses below which would best fulfill the student's needs.)

| | |
|---|---|
| MUP Applied Performance (Maximum of 4 hours) | (1-4) |
| MUS 660 Adv. Methods: Elementary General Music | (3) |
| MUS 650 Music Education Workshop | (1-3) |
| MUS 660 Adv. Methods: Choral Techniques | (3) |
| MUP 558 Conducting or MUP 658 Conducting | (1-4) |
| MUS 706 Music Learning and Behavior | (3) |

GENERAL MUSIC TEACHING EMPHASIS - Elementary Music, Jr. High, Middle School General Music (Student and Advisor choose twelve hours from courses below which would best fulfill the student's needs.)

| | |
|---|---|
| MUP Applied Performance (maximum of 4 hours) | (1-4) |
| MUS 660 Adv. Methods: Elementary General Music | (3) |
| MUS 560 Orff Schulwerk Workshop | (1-3) |
| MUS 561 Orff Schulwerk Certification | (2-6) |
| MUS 650 Music Education Workshop | (1-3) |
| MUS 766 Seminar in Music Education | (3) |
| MUS 664 Music and Special Learners | (3) |
| MUS 706 Music Learning and Behavior | (3) |

**General Music Teaching Emphasis – Orff Schulwerk Concentration**
This program follows all current requirements leading to the Master of Music Degree specializing in General Music with an Orff Schulwerk emphasis. Students must complete at least nine hours of coursework including MUS 560 Orff Schulwerk and MUS 561 Orff Schulwerk Certification Levels One and Two within the 12-hour general music specialization. These courses are normally offered only in the summer as part

of the Orff Teacher Training Courses. Students desiring to write a master's thesis may do so by choosing a topic related to Orff Schulwerk for the thesis and completing six hours of Orff Schulwerk and achieving Level Two Orff Certification.

This MM degree with Concentration in Orff Schulwerk is part of the Academic Common Market program recognized in the state of West Virginia. Residents of West Virginia can pay Kentucky in-state tuition by submitting an application to their State Academic Common Market Coordinator for approval.

**Conducting Emphasis** - Instrumental or Choral (Student and advisor choose twelve hours from courses below which would best fulfill the student's needs).

| | |
|---|---|
| MUP Applied Performance (maximum of 4 hours) | (1-4) |
| MUP Secondary Applied Performance | (1-2) |
| MUS 680 Band History and Literature | (3) |
| MUS 622 Symphonic Literature | (3) |
| MUS 681 Advanced Rehearsal Techniques - Band | (3) |
| MUP 558 Conducting or MUP 658 Conducting (4 hours required) | (1-4) |
| MUS 660 Adv. Methods: Choral Techniques | (3) |
| MUS 570 Orchestration or MUS 571 Orchestration | (2) |
| MUS 684 Adv. String Methods & Materials | (3) |
| MUS 706 Music Learning and Behavior | (3) |

**Master of Music (Music Therapy)**

Equivalency Requirements: Combined equivalency/master's students must have met all AMTA Professional Competencies before finalizing the Master of Music in Music Therapy degree. The number of credits required to complete the equivalency option will vary based on previous courses taken.

All students (both traditional and combined equivalency/master's degree students) must complete the following coursework to finalize the master's degree. Please note: any graduate coursework taken to remediate professional competencies will not count toward the master's degree.

| | |
|---|---|
| MUS 600 Research I | (3) |
| MUS 648 Thesis | (6) |
| MUS 633 Graduate Clinical Placement | (1) |
| Music Therapy (The student will select 11 hours from the following courses: MUS 630; MUS 631; MUS 632; MUS 664; MUS 706; MUS 730; MUS 770) | (11) |
| Electives (The student will select 9 hours of electives based on consultation with his or her Academic advisor.) | (9) |
| Total | (30) |

## Doctor of Musical Arts

The Doctor of Musical Arts program offers opportunity for fullest development as a performer, composer, or teacher of music performance or composition. Technical excellence is a prerequisite for admission into the program; doctoral study emphasizes work in adjunct areas of music, related fields, and research as they enhance and support the major area.

Language requirement differs among performance areas. If required and if deficient, a student must enroll in language courses each semester of study until the deficiency is removed. Language classes must be passed with a grade of B or higher.

Recital requirement differs among performance areas. At least three weeks prior to each recital, the student must do a pre-recital hearing for three members of the applied faculty who must sign and submit a Pre-Recital Hearing Form to be placed in the student's file. The program content of the recitals will be

established in cooperation with the student's Advisory Committee. Immediately after each successful recital, a Recital Approval form must be signed by three members of the Advisory Committee and placed in the student's file. The student should complete at least one recital prior to taking the Qualifying Exam.

If the Major Professor of a student in a performance program is an Associate Member of the Graduate Faculty, he/she can serve as co-chair and another member of the Advisory Committee, who is a Full Member of the Graduate Faculty, shall serve as chair. If the major professor of a student in a performance program is not a member of the Graduate Faculty, a Full Member of the Graduate Faculty shall serve as chair and major academic professor; the performance teacher shall serve as an additional, non-voting member of the committee.

DMA students are required to pass a Qualifying Exam (QE) upon completion of all coursework. Part I of the QE (History and Theory, 3 hours each) will be given as a common exam early every semester. Students should pass Part I prior to taking Part II of the QE which is the Specialty Area portion (six hours) of the QE. Part III of the QE is the oral exam (2 hours maximum) and should be taken last, after completing Parts I and II successfully.

Requirements for doctoral projects differ among the performance areas. The Project for the D.M.A. specializing in Composition will consist of two parts. Part 1 is a large-scale original composition. The candidate is responsible for arranging a public performance of the work. Part 2 is an in-depth analysis and discussion of the composition. The composition and in-depth written analysis and discussion are to be approved by the Advisory Committee in the same manner as a Ph.D. dissertation. For specific requirements in each performance area, please consult the Graduate Music Handbook posted at http://finearts.uky.edu/sites/default/files/Uploads/Documents/GRADUATE%20HANDBOOK.pdf.

**Doctor of Musical Arts**
The minimum course requirements for all DMA students beyond the master's degree are as follows:

| | |
|---|---|
| MUS 618 Research Methods* | (3) |
| Music History and Literature# | (9) |
| Advanced Music Theory** | (6) |
| Performance Major | (12) |
| Minor (optional)*** | (9) |
| Total | (30-39) |

#Must include two regular courses offered by the Division of Musicology (one 700-level course recommended) and those required by the specific performance major area. One course may be from the Division of Musicology, Theory, Music Education, or Performance.

**Doctor of Musical Arts (Voice Performance)**

| | |
|---|---|
| Research Methods (MUS 618)* | (3) |
| Music History and Literature (must include MUS 623 or 627*) | (6) |
| Advanced Music Theory** | (6) |
| Voice Performance | (12) |
| Performance Related Study (must include MUS 665*, 667*, and 620*) | (6-15) |
| Directed Research in Vocal Literature (MUS 780) | (6) |
| Minor (Optional)*** | (9) |
| Total | (33-51) |

**Doctor of Musical Arts (Choral Conducting)**

| | |
|---|---|
| Research Methods (MUS 618)* | (3) |

| | |
|---|---|
| Music History and Literature (must include MUS 625) | (9) |
| Advanced Music Theory** | (6) |
| Advanced Choral Methods (MUS 660) | (3) |
| Performance Major**** | (12) |
| Minor (Optional)*** | (9) |
| Total | (33-42 |

**Doctoral of Musical Arts (Instrumental Conducting)**

| | |
|---|---|
| Research Methods (MUS 618)* | (3) |
| Music History and Literature (must include MUS 622 or MUS 680) | (9) |
| Advanced Music Theory** | (6) |
| Advanced Rehearsal Techniques (MUS 681) | (3) |
| Performance Major (6 hours of MUP 658 and 6 hours of MUP 758) | (12) |
| Minor (Optional)*** | |
| Total | (33-42 |

*If not completed at the master's level.
**MUS 578 cannot be used to fulfill this requirement.
***The minor may be taken within or outside the School of Music, and is subject to the approval of the Advisory Committee and the chairman of the department concerned.
****Must include a minimum of 4 credits of MUP 758

## Doctor of Philosophy

The School of Music offers courses and research opportunities leading to the Ph.D. Applicants must meet the entrance requirements of The Graduate School as well as those of the School of Music. Applicants must submit a master's thesis or a research paper of sufficient scope and quality to demonstrate competence in research and clarity of expression. The basic core requirements beyond the master's degree are as follows:

| | |
|---|---|
| Research Methods: MUS 618 (if not taken at the master's level) | (3) |
| Music History and Literature beyond the master's | (9) |
| Advanced Music Theory beyond the master's* | (6) |
| Three seminars (minimum) beyond the master's | |
| Total | (27) |

(24 hours if competency in Research Methods is accepted by the Musicology faculty.)
*MUS 578 cannot be used to fulfill this requirement.

There is no specific requirement in a minor area, but such work may be required by a student's Advisory Committee if it is essential to the major research or field of concentration.

Satisfaction of language requirements will conform to The Graduate School policy; however, specific languages required will vary with individual options. The foreign language requirement(s), if applicable, must be met by the end of the first full year of study in the Ph.D. program. The student's Advisory Committee must be formed and appointed by the Dean of the Graduate School prior to advance registration for the student's third semester. The dissertation topic and prospectus must be approved by the Advisory Committee; the dissertation itself must be the result of original research which adds to or modifies what has previously been known on the subject. Qualifying examinations should be taken no later than one semester after the completion of course work. A student is admitted to candidacy for the Ph.D. degree only after meeting the language requirement(s) and passing the qualifying examinations.

The Ph.D. in music may be pursued in one of three areas: music education, music theory, or musicology. The program outline for each area beyond the core requirements is given below; the student's Advisory Committee advises on and plans the actual program of study.

**Music Education**
Music in Higher Education (MUS 762)
Psychology of Music (MUS 770)
At least one graduate level course in statistics
Knowledge of acoustics (PHY 140 or equivalent); Knowledge of specialized research in music education (MUS 600 or equivalent). These requirements must be met by the end of the first year of doctoral study.
A foreign language is not required but student must show competency in computer use and statistical understanding for research purposes.
Additional courses in music education or adjunct subjects as recommended by the Advisory Committee.

**Music Theory**
Pedagogy of Theory (MUS 674)
Advanced Analytical Techniques (MUS 676)
History of Music Theory (MUS 678)
Additional courses in music theory or adjunct subjects as recommended by the Advisory Committee
A reading knowledge of French, German, or a language appropriate to the research interest

**Musicology**
Medieval and Renaissance Notation (MUS 700)
Proseminar in Musicological Methods (MUS 703)
Additional courses in musicology or adjunct subjects as recommended by the Advisory Committee
A reading knowledge of at least two foreign languages, normally German and either French or Italian

**Comnined M.A./Ph.D. Program in Musicology & Ethnomusicology**
*The First Two Years*
The first two years of study provide training in the practice and methodology of musicology and ethnomusicology. A minimum of 30 hours of graduate credit is required during the first two years of graduate study.

*Second-Year Review; Examinations and Research Paper*
During the second year of graduate study the student will be expected to:

- Take an examination designed to test the student's knowledge of European and American music and of music theory. This will include a four-hour written examination in general music history, and a four-hour written examination in music theory.
- Write a paper on a topic of the student's choice, and with approval of the student's advisor. This third-term paper should explain and review a selected topic in musicology or ethnomusicology, survey and evaluate the available literature on the topic, and identify lines of inquiry which remain to be pursued. The recommended length for this paper is 25-30 pages of prose, in addition to the bibliography, with appendices and musical examples as needed. Three copies of the paper are to be submitted to the Division of Musicology, which may require revisions before final acceptance.

The departmental evaluation of all students in the second year is based on course work completed to date, the paper, the results of the preliminary exam, and the student's prospects for continued success in the field. The department's judgment is a collective one. If the evaluation is favorable, the student may continue in the Ph.D. program. A student who fails the common exams may receive a terminal M.A.

through the following steps: a) completing 36 hours of course work, b) submitting an acceptable 2nd-year paper, in lieu of thesis, and c) establishing a Masters' committee and passing an oral exam.

A student who successfully completes the 2nd-year review, which includes the common exams and the 2nd-year paper, but fails the special area Qualifying Examination, is eligible to receive a terminal M.A. without further academic work, as long as performance on the oral portion of the qualifying exam is considered to have been satisfactory as an M.A. final examination. The advisor and two other members of the doctoral committee will be named as the M.A. committee to complete the necessary paperwork."

"A student who passes the qualifying exams but does not successfully complete the dissertation and/or defense will be eligible to receive the M.A. without further work of any kind, except for applying for the degree. The advisor and two other members of the doctoral committee will be named as the M.A. committee to complete the necessary paperwork, certifying the 2nd-year paper in lieu of the thesis and the doctoral qualifying examination in lieu of the M.A. final exam.

Students entering the program with M.A. degrees in Musicology from the University of Kentucky or other institutions may make a written petition to the departmental faculty to participate in the Second-Year Review during their first year of residency. Note: In order for the petition to be considered, the student must have been admitted without the requirement of any remedial work, and must have taken an appropriate research method class as part of the master's program.

*The Third Year*
During the third year of study, the student will take additional courses in musicology, ethnomusicology, theory, and any appropriate cognate areas within or outside the music program; a limited number of these courses may be independent study in the area of specialization.

The student will take the qualifying examinations, which will consist of a special field examination in musicology or ethnomusicology, the general sense and limits of which have been discussed in advance with the prospective dissertation advisor and the student's advisory committee. If necessary, the committee may also retest areas in which the second-year exams demonstrated deficiencies.

*The Dissertation*
As soon as possible after the successful completion of Qualifying Examinations, the student should submit a dissertation proposal to his/her Advisory Committee. The student will defend this proposal at a meeting of the committee, and is expected to submit any required revisions within two months.
The dissertation itself will meet all the requirements of the University of Kentucky Graduate School, and will be defended following the usual Final Examination procedures.

**Course Requirements**

| | |
|---|---|
| MUS 618 - Research Methods | (3) |
| MUS 703 - Proseminar in Musicological Methods | (3) |
| MUS 700 - Medieval and Renaissance Notation | (3) |
| MUS 702 - Seminar in Musicology (variable topics) | (12-18) |
| MUS 710 - Introduction to Ethnomusicology | (3) |
| MUS 711 - Seminar in Ethnomusicology (variable topics) | (3-6) |
| Advanced Music Theory (not including MUS 578) | (9) |
| Directed electives (including independent study) | (9-18) |
| Total | 54 |

Note: Students entering the program with a Master's degree, whose petition to enter in the second year has

been approved, will be required to take 36 hours, with specific courses to be determined by the Advisory Committee based on the evaluation of coursework taken in the previous degree.

*Foreign Language*
All students in the combined M.A./Ph.D. program must demonstrate reading knowledge of two foreign languages. One of these is usually French or German, but they may also be other languages appropriate to the students' research interests. The Graduate School offers reading knowledge courses in French, German, and Spanish.

*Advising*
Students in the M.A./Ph.D. program will work initially with an individual advisor, and then with an Advisory Committee. For further details on the program see the program webpage: http://finearts.uky.edu/music/musicology .

**Graduate Certificate in Music Theory Pedagogy**
The School of Music offers course work leading to the Certificate in Music Theory Pedagogy. The Certificate requires a total of 15 hours consisting of the following courses:

| | | |
|---|---|---|
| MUS 674 | Theory Pedagogy | (3) |
| MUS 675 | Internship | (3) |
| MUS 676 | Advanced Analytic Techniques | (3) |
| and two elective theory courses selected from the following: | | |
| MUS 572 | Counterpoint | (3) |
| MUS 573 | Counterpoint | (3) |
| MUS 670 | Analytical Techniques for Tonal Music | (3) |
| MUS 671 | Introduction to Schenkerian Analysis | (3) |
| MUS 672 | Analytical Techniques for Music Since 1900 | (3) |
| MUS 676: | Analytical Techniques for Atonal Music | (3) |
| MUS 677 | Contemporary Music Idioms | (3) |
| MUS 678 | History of Theory | (3) |
| MUS 772 | Seminar in Theory | (3) |
| MUS 799 | Independent Work in Music Theory | (1-3) |

The Certificate will be awarded upon completion of the requirements. Students working on the Certificate are expected to earn a grade of B or higher in each certificate requirement.

**Graduate Certificate in Orff Schulwerk**
The School of Music offers course work leading to the Certificate in Orff Schulwerk. The Certificate requires a total of 12 hours consisting of the following courses:

| | | |
|---|---|---|
| MUS 561 | Orff Schulwerk Certification I | (2-4) |
| MUS 561 | Orff Schulwerk Certification II | (2-4) |
| MUS 561 | Orff Schulwerk Certification III | (2-4) |
| OR | | |
| MUS 560 | Orff Schulwerk | (1-3) |
| MUS 666 | Independent Project | (1-3) |

The content for MUS 666 and MUS 560 must be pre-approved by the UK Director of Orff Schulwerk. The Certificate will be awarded upon completion of the requirements. Students working on the Certificate are expected to earn a grade of B or higher in each certificate requirement.

**Graduate Certificate in Vocal Pedagogy**
The School of Music offers course work leading to the Certificate in Vocal Pedagogy. The Certificate requires a total of 15 hours consisting of the following courses:

| | | |
|---|---|---|
| MUP 502/602 | Voice | (3) |
| MUS 665 | Physiology & Functioning of the Singing Voice | (3) |
| MUS 667 | Materials, Techniques & Literature of Voice Teaching | (3) |
| MUS 668/695 | Internship in Vocal Pedagogy | (2) |
| CSD 670 | Voice Disorders | (3) |
| CSD 789 | Independent Study in Communication Disorders | (1) |

Optional and recommended for students interested in doing scientific research:
MUS 600 Research I (3)

The content for Internship and Independent Study must be pre-approved by the course instructor and the Director of the Vocal Pedagogy. The Certificate will be awarded upon completion of the requirements. Students working on the Certificate are expected to earn a grade of B or higher in each certificate requirement.

**Dismassal Policy**
After admission into a music graduate program, a student will be dismissed for any one of the following conditions:
- Review courses not completed (with passing grade at B or higher) by the end of first year of study
- Two "C's" or lower in grade report for courses in the degree program
- Failure to pass full faculty-jury twice

**Music Courses**
All music performance courses (MUP) may be repeated for credit as needed. Music ensemble courses (MUC) may be repeated indefinitely.

All music performance courses carry from one to four credits, though three credits is the norm for performance majors, during the fall and spring semesters. (Applied music offerings during the summer are limited. Two credits is the maximum allowed, and one credit is the norm.)

**Course Descriptions**

MUS 500 MUSIC OF THE MIDDLE AGES. (3)
The development of Western music through the 14th century. Prereq: MUS 203 or consent of instructor.

MUS 501 MUSIC OF THE RENAISSANCE.
A survey of vocal and instrumental music of the 15th and 16th centuries. Prereq: MUS 203 or consent of instructor.

MUS 502 MUSIC OF THE BAROQUE ERA. (3)
The history of vocal and instrumental music in the Baroque style from 1600 to 1750. Prereq: MUS 302 or consent of instructor.

MUS 503 MUSIC OF THE CLASSIC PERIOD. (3)
The development of music in the Classic style from the early 18th century to 1800. Prereq: MUS 302 or consent of instructor.

MUS 504 MUSIC OF THE 19th CENTURY. (3)
A study of master works of music composed in the 19th century. Prereq: MUS 303 or consent of instructor.

MUS 505 MUSIC OF THE 20th CENTURY. (3)
A stylistic study of representative compositions of the 20th century. Prereq: MUS 303 or consent of instructor.

MUS 506 HISTORY OF AMERICAN MUSIC. (3)
A survey of cultivated and vernacular musical styles in America from Colonial times to the present. Prereq: MUS 302 and 303 or consent of instructor.

MUS 507 TOPICS IN MUSIC HISTORY AND LITERATURE (Subtitle required). (3)
A focused study of a single composer, genre, or musical topic. May be repeated, with different subtitles, for up to 9 credits. Prereq: Junior or graduate standing in music. MUS 203, 302, and 303, or permission of instructor.

MUS 520 VOCAL SOLO LITERATURE. (3)
A stylistic study of solo vocal music from the Baroque to the present. Prereq: MUS 302 and 303 or consent of instructor.

MUS 521 ORGAN LITERATURE. (3)
A course of study designed to give the organ student a practical knowledge of the development of the organ, its construction, the standard literature, and teaching materials. Prereq: MUS 302 and 303 or consent of instructor.

MUS 522 PIANO LITERATURE TO 1830. (3)
An historical and analytical study of music for piano to 1830, including discussion of the development of the instrument and the emergence of the idiomatic piano writing. Prereq: MUS 302 or consent of instructor.

MUS 523 PIANO LITERATURE SINCE 1830. (3)
A historical and analytical study of music written for the piano from the inception of the Romantic period to the present, from the parallel perspectives of changes in the approach to the instrument and stylistic developments as they are reflected in piano writing. Prereq: MUS 303 or permission of instructor.

#MUS 524 COLLABORATIVE PIANO LITERATURE 1. (3)
A survey of significant repertoire for wind and brass instruments with piano. The focus is on music for collaborative duo (instrument and piano) and will include sonata repertoire, important concerti, music of the Paris Conservatoire, and character pieces. This course will provide a practical approach to the repertoire by discussing rehearsal techniques, collaborative considerations, as well as having in-class performances. Topics will include orchestral reductions of standard concerti, preferred editions, misprints and errata in published scores, as well as performance tradition. Prereq: Permission of instructor.

#MUS 525 COLLABORATIVE PIANO LITERATURE 2. (3)
A survey of significant repertoire for stringed instruments with piano. The focus is on music for collaborative duo (instrument and piano) and will include sonata repertoire, important concerti, and character pieces. This course will provide a practical approach to the repertoire by discussing rehearsal techniques, collaborative considerations, as well as having in-class performances. Topics will include orchestral reductions of standard concerti, preferred editions, misprints and errata in published scores, as well as performance tradition. Prereq: Permission of instructor.

MUS 540 APPLICATIONS OF MUSIC TECHNOLOGY.
Applications of music technology hardware and software, including but not limited to MIDI systems, sequencing, notation software, and MIDI code. Emphasis will be on use of technology as tools for creativity and productivity. Content will be continually updated. No prior computer or MIDI experience assumed; space preference given to music majors. Prereq: Nonmusic majors must obtain permission of instructor; ability to read music required.

MUS 550 TOPICS IN MUSIC EDUCATION (Subtitle required). (1-3)
In-depth study of a designated topic, special issue, philosophy, or methodology of music education. May be repeated to a maximum of nine credits when identified by different course subtitles. Prereq: Junior standing in music.

MUS 555 SOUNDS OF MUSIC: PSYCHOLOGY AND PERCEPTION. (3)
This course focuses on the roles of music in human life. Issues and research findings regarding what makes music and how human beings perceive and respond to musical sounds are examined. Critical thinking and reflection on topics such as music preferences, musical performance, and listening to music are meant to encourage the student to identify the relationship between music and human behavior. This course is suitable for students who are curious to learn about the influence of music on people. It is open to all students with or without musical training.

MUS 560 ORFF SCHULWERK. (1-3)
The study of the philosophy and the pedagogy of the Orff Schulwerk method through movement, discussion, performance, improvisation, composition, and demonstration. Number of credits awarded will depend on total number of hours of participation and the amount of work in musical arrangement, orchestration, and composition. May be repeated to a maximum of six credits. Prereq: Junior standing in music or approval of instructor.

MUS 561 ORFF CERTIFICATION: LEVEL I, II, OR III. (2)
An intensive and systematic study of the philosophy and the pedagogy of the Orff Schulwerk method based on the curriculum recommended by the American Orff Schulwerk Association. The three main components are ensemble, recorder, and movement. Participants must demonstrate competency in orchestration, recorder, and pedagogy in order to obtain certification. Lecture, two hours; laboratory, two hours per week. May be repeated in sequence to a maximum of six credits. Prereq: Junior standing in music or approval of instructor.

MUS 566 PIANO PEDAGOGY. (3)
Investigation of techniques and materials for teaching piano in groups and to individual students, both children and adults. Prereq: Consent of instructor.

MUS 570 ORCHESTRATION. (2)
This course includes a study of the individual instruments of the orchestra and band with practice in scoring for these instruments. Prereq: MUS 371.

MUS 571 ORCHESTRATION. (2)
A continuation of MUS 570. Prereq: MUS 570.

MUS 572 COUNTERPOINT. (3)
A study of 16th century contrapuntal techniques and of contrapuntal influences in common-practice music. Prereq: MUS 273 or equivalent.

MUS 573 COUNTERPOINT. (3)
A study of 18th century contrapuntal techniques and of contrapuntal influences in Romantic and 20th century music. Prereq: MUS 273 or equivalent.

MUS 578 ANALYSIS AND STYLE SURVEY.
Studies in analytical terminology and methodology; survey of major stylistic practices of Western music. Prereq: MUS 372 or equivalent.

MUS 600 RESEARCH I. (3)
A course designed to acquaint students with basic techniques and tools used in music education research.

MUS 601 FOUNDATIONS IN MUSIC EDUCATION. (3)
An historical survey of thought concerning the place and significance of music in the education of the individual and the group.

MUS 618 RESEARCH METHODS. (3)
A survey of basic research techniques and materials in musicology and theory. Prereq: A reading knowledge of French or German.

MUS 620 ADVANCED VOCAL REPERTORY (Subtitle required). (3)
An intensive study of the stylistic and interpretive characteristics of solo vocal literature of a specified repertory. May be repeated as desired with different subtitles. Prereq: Graduate standing or consent of instructor.

MUS 622 SYMPHONIC LITERATURE. (3)
An intensive study of orchestral literature from the classical period to the present. Prereq: Graduate standing in music or consent of instructor.

MUS 623 OPERA LITERATURE I. (3)
An intensive study of the history and literature of opera from its origins around 1600 through the early Romantic period. Prereq: Graduate standing in music or consent of instructor.

MUS 624 CHAMBER MUSIC LITERATURE. (3)
An intensive study of the development of instrumental chamber music. Prereq: Graduate standing in music or consent of instructor.

MUS 625 CHORAL LITERATURE. (3)
An intensive study of choral literature from the Renaissance period to the present. Prereq: Graduate standing or consent of instructor.

MUS 627 OPERA LITERATURE II. (3)
An intensive study of the history and literature of opera from the early Romantic period through the present. Prereq: Graduate standing in music or consent of instructor.

MUS 630 MEDICAL MUSIC THERAPY. (3)
This course is directed toward developing advanced competencies in medical music therapy objectives. Current research related to medical music therapy, current laws and regulations governing medical practice, and current music therapy theory related to the practice of music therapy in a medical setting will be addressed. Prereq: Permission of the instructor.

MUS 631 MUSIC IN COUNSELING. (3)
This course is directed toward developing advanced competencies in music therapy theory and clinical skills. Specifically, the use of music in counseling and the development of counseling techniques appropriate in music therapy will be addressed. Prereq: Permission of the instructor.

MUS 633 GRADUATE CLINICAL PLACEMENT IN MUSIC THERAPY. (1-3)
This course is directed toward the development of advanced clinical skills in music therapy in an area chosen by the student in consultation with program faculty. Prereq: Permission of instructor and satisfactory completion of MUS 433G.

MUS 648 MUSIC SOFTWARE TECHNOLOGY. (3)
This course is directed toward developing advanced competencies in music technology common to the fields of music education and music therapy. Supervised projects will be a large component of this course and projects will be individualized based on students' educational track and career goals. All course instructional materials are conducted online but there are three face-to-face meetings during the second half of the course. Two of these meetings are individual conferences with the instructor, and one is for presentation of the project on Saturday morning of the last week of class schedule. Prereq: Permission of instructor.

MUS 650 MUSIC EDUCATION WORKSHOP. (1-4)
Intensive study of advanced methods and materials in one of the following areas of music education: elementary and general music, the school orchestra, the school band, choral music. May be repeated once for a total of two, three or four credits.

MUS 660 ADVANCED MUSIC EDUCATION METHODS AND MATERIALS (Subtitle required). (3)
An in-depth study and analysis of the methodology and materials and their development in music education. May be repeated to a maximum of 12 credits when identified by different course subtitles. Prereq: Graduate standing or consent of instructor.

MUS 662 DALCROZE APPROACH I. (3)
This course is especially designed for music teachers who wish to acquire knowledge and skills in Dalcroze pedagogy and musicianship. There are two parts of this course: on-site participation and a Blackboard component. Students will be immersed in the principal subjects of the Dalcroze approach: eurhythmics, solfège, and improvisation. The on-site session provides creative experiences of hands-on activities and the Blackboard component covers assignments related to the philosophy, history, composition, lesson designs, and discussion of the Dalcroze approach in music education.

MUS 663 DALCROZE APPROACH II. (3)
This course is especially designed for music teachers who wish to acquire knowledge and skills in Dalcroze pedagogy and musicianship. There are two parts of this course: on-site participation and a Blackboard component. Students will be immersed in the principal subjects of the Dalcroze approach: eurhythmics, solfège, and improvisation. The on-site session provides creative experiences of hands-on activities and the Blackboard component covers assignments related to the philosophy, history, composition, lesson designs, and discussion of the Dalcroze approach in music education. Prereq: Successful completion of MUS 662 or equivalence and permission by instructor.

MUS 664 MUSIC AND SPECIAL LEARNERS. (3)
This course provides an overview of the characteristics and instructional needs of special learners. Students will be introduced to administrative issues and laws governing special educational practices in the public school setting. Educational strategies and adaptations/ modifications will be addressed with

emphasis on applications in the music setting. Teaching adult learners and gifted students will be included, as will therapeutic uses of music appropriate for music therapists working in special education settings. A field experience is required. Prereq: Consent of instructor.

MUS 665 PHYSIOLOGY AND FUNCTIONING OF THE SINGING VOICE. (3)
Detailed study of vocal physiology and acoustics of the singing voice. Major historical sources and recent scientific research form the basis of the course. Designed for professional voice teachers and music educators who work with singers. Prior study of acoustics recommended.

MUS 666 ADVANCED ORFF SCHULWERK. (1-3)
For experienced music teachers who already had basic Orff Schulwerk training. This course enables students to advance their musicianship, refine pedagogic techniques, and/or do research in Orff Schulwerk. Prereq: MUS 561 – equivalent to Level Two OrffSchulwerk Teacher Training or permission of the instructor.

MUS 667 MATERIALS, TECHNIQUES AND LITERATURE OF VOICE TRAINING. (3)
Survey of currently published books, anthologies, and other materials for voice teaching. Various approaches to teaching vocal technique will be examined; other pertinent literature explored. Prereq: MUS 665.

MUS 668 DALCROZE APPROACH III. (3)
This course is especially designed for music teachers who wish to acquire knowledge and skills in Dalcroze pedagogy and musicianship. There are two parts of this course: on-site participation and a Blackboard component. Students will be immersed in the principal subjects of the Dalcroze approach: eurhythmics, solfège, and improvisation. The on-site session provides creative experiences of hands-on activities and the Blackboard component covers assignments related to the philosophy, history, composition, lesson designs, and discussion of the Dalcroze approach in music education. Prereq: Successful completion of MUS 663 or equivalence and permission by instructor.

MUS 669 INDIVIDUAL DALCROZE PROJECT.
This course is especially designed for music teachers who have acquired adequate knowledge and skills in Dalcroze pedagogy and musicianship and are ready to demonstrate independence in designing and completing an instructional or research project that exemplifies the Dalcroze approach. The student is guided at a distance by the instructor at all phases of the project and carry out the study at his or her own school or location. Prereq: a) Successful completion of MUS 663 (or equivalent) and permission by instructor, or b) successful completion of MUS 668.

MUS 670 ANALYSIS OF TONAL MUSIC I. (3)
An introduction to and exploration of analytical techniques and issues relevant to music before 1900, addressing as well the performance implications of analytical decisions insofar as possible. Various musical dimensions will be studied including motivic structure, meter/ rhythm, harmonic syntax, formal processes and text/music relationships. Prereq: MUS 578 or equivalent.

MUS 671 ANALYSIS OF TONAL MUSIC II. (3)
Introduction to the theories of Heinrich Schenker, their application to the analysis of tonal music and to performance. Intensive analytical work and selected readings. Prereq: MUS 578 or equivalent.

MUS 672 ANALYSIS OF MUSIC SINCE 1900 I. (3)
An introduction to and exploration of analytical techniques and issues relevant to the literature since 1900, addressing as well the performance implications of analytical decisions insofar as possible. Various musical

dimensions will be studied including motivic structure, meter/rhythm, harmonic syntax, formal processes and text/music relationships. Prereq: MUS 578 or equivalent.

MUS 673 ADVANCED COMPOSITION. (2)
May be repeated to a maximum of six credits. Prereq: MUS 575.

MUS 674 PEDAGOGY OF THEORY. (3)
Examination of the resources and techniques of teaching undergraduate music theory (aural and written components). Extensive review of the textbook literature, study of the application of contrasting theoretical approaches, and the examination of relevant Computer Assisted Instruction materials. Requirements to include practice teaching and observation of undergraduate music theory classes (MUS 171-173; 271-273; 170-172; 270-272). Prereq: MUS 578 or equivalent.

MUS 675 INTERNSHIP IN THEORY PEDAGOGY. (1)
An internship providing pedagogical experience in undergraduate music theory (written and aural). Internship is conducted under the supervision of a faculty member who is teaching an undergraduate music theory course (MUS 170, 171, 172, 173, 270, 271, 272, or 273). May be repeated to a maximum of four credits.

MUS 676 ADVANCED ANALYTICAL TECHNIQUES. (3)
Study of the most significant approaches to music analysis of the 20th century, including Schenkerian analysis, Forte set theory, and others. Prereq: MUS 578 or equivalent.

MUS 678 HISTORY OF THEORY. (3)
A survey of theoretical ideas from the Greeks through 19th century English and German theorists. Prereq: MUS 578 or equivalent.

MUS 680 BAND HISTORY AND LITERATURE. (3)
A study of the heritage of the wind band through its leaders and literature, from its earliest roots to the present, with emphasis on the period from 1950 to the present. Prereq: Consent of instructor.

MUS 681 ADVANCED REHEARSAL TECHNIQUES – BAND. (3)
The development of effective rehearsal skills in the secondary school and university band settings, with emphasis on performance orientation, the development of aural concepts and advanced rehearsal analysis and techniques. Prereq: MUS 365, teaching experience or permission of instructor.

MUS 684 ADVANCED STRING METHODS AND MATERIALS. (3)
The study of string pedagogy through historical perspectives as it relates to the individual instruments as well as to class instruction. Prereq: Graduate standing in music or approval of instructor.

MUS 690 TOPICS IN MUSICOLOGY (Subtitle required). (3)
Investigation of critical and historical problems in musicology; intensive study of a specific composer, genre, or school of composers. May be repeated to a maximum of six credits when identified by different course subtitles. Prereq: Graduate standing and consent of instructor.

MUS 693 WORLD MUSIC FOR TEACHERS. (3)
This course provides a comprehensive survey of world music for teachers, an introduction to theories and methodologies of ethnomusicology and preparation for developing a more in-depth knowledge of a given musical region. Prereq: Graduate standing or consent of instructor.

MUS 694 INTERNSHIP IN SACRED MUSIC. (1)
An internship to provide students in the Master of Music in Sacred Music program with a practical field experience in a sacred setting. The internship is identified and conducted under the supervision of a UK School of Music faculty supervisor and on-site coordinator. Students must file a Learning Contract with the School of Music DGS. May be repeated to a maximum of three credits. Prereq: Completion of 12 hours in the M.M. in Sacred Music program or by consent of instructor.

MUS 695 INDEPENDENT WORK IN MUSIC. (1-3)
Study of an individually selected topic relevant to a student's academic development. For work in musicology, theory, music education, or vocal literature, students should enroll in the designated independent work courses listed separately. May be repeated to a maximum of six credits. Prereq: Graduate standing in music and consent of instructor.

MUS 700 MEDIEVAL AND RENAISSANCE NOTATION. (3)
The study and transcription of the notation of medieval and Renaissance polyphony, and of the various keyboard and lute tablatures of the 16th and 17th centuries. Prereq: Consent of instructor.

MUS 702 SEMINAR IN MUSICOLOGY. (3)
Study and research in specific musicological problems. May be repeated to a maximum of eighteen hours. Prereq: Consent of instructor.

MUS 703 PROSEMINAR IN MUSICOLOGICAL METHODS. (3)
An introductory exploration into the methodologies currently utilized in the field of musicology. Prereq: Consent of instructor.

MUS 705 RESEARCH II. (3)
A course designed to lead the student in music education to do experimental research in the area of music education. Prereq: MUS 600.

MUS 706 MUSIC LEARNING AND BEHAVIOR. (3)
This course is intended for graduate students in music education with the major focus of the class involved in learning behavioral principles, learning observational categories pertaining to classroom reinforcement and role playing and practicing techniques to be employed later in the classroom. Prereq: Graduate standing in music.

MUS 707 TESTS AND MEASUREMENTS IN MUSIC. (3)
This course is designed to provide students with knowledge in measurements and evaluation in the field of music education and research. Topics include principles of measurement, administration and evaluation of published standardized and teacher-made tests, interpretation of test results, and test construction. Prereq: MUS 600.

MUS 710 INTRODUCTION TO ETHNOMUSICOLOGY. (3)
An introduction to the materials and methodologies of the field of ethnomusicology. Prereq: Graduate standing in music.

MUS 711 SEMINAR IN ETHNOMUSICOLOGY (Subtitle required). (3)
Intensive research-based study of specific problems and topics in ethnomusicology. May be repeated under a different subtitle to a maximum of twelve credits. Prereq: Graduate standing in music.

MUS 719 INDEPENDENT WORK IN MUSICOLOGY. (1-3)
May be repeated to a maximum of six hours. Prereq: Four to six hours of graduate credit in the area of specialization and consent of instructor.

MUS 730 INDEPENDENT WORK IN MUSIC THERAPY. (1-3)
This course is directed toward developing individualized advanced competencies in music therapy in one of the following areas: Music Therapy Theory, Research, Musical Development and Personal Growth, and Clinical Administration. Prereq: Permission of instructor.

MUS 731 MUSIC PERCEPTION AND COGNITION. (3)
This course is designed for doctoral students with a concentration in music education and will cover the physiological, sensory, and organizational processes involved in music perception and cognition. It is also directed toward developing advanced competencies in understanding how music can be used to treat neurological disorders and stroke. Prereq: Permission of instructor.

MUS 732 SEMINAR: TOPICS IN MUSIC THERAPY. (3)
This course is directed toward developing advanced competencies in various topics in and related to music therapy. Topics will include supervision, leadership skills, research, current theories of practice and clinical administration. Prereq: Permission of instructor.

MUS 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

MUS 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

MUS 750 INDEPENDENT WORK IN MUSIC EDUCATION. (1-3)
May be repeated to a maximum of six hours. Prereq: Four to six hours of graduate credit in area of specialization and consent of instructor.

MUS 760 MUSIC RESEARCH III. (3)
This course is directed toward developing advanced competencies in research methods common to the fields of music education and music therapy. MUS 760 will build upon and expand the foundations established in MUS 600 and MUS 705, covering topics such as mixed methods research, integrative or advanced statistical analyses, and social/behavioral science designs and medical research designs. Supervised research projects will be a large component of this course and projects will be individualized based on students' educational track and career goals. Prereq: MUS 600 Research I and MUS 705 Research II and permission of instructor.

MUS 762 MUSIC IN HIGHER EDUCATION. (3)
Historical and comparative studies in the teaching and administration of music in colleges and universities. Includes case studies in administration, music in European higher education and the relationship of music to all other elements of the academic program. Prereq: MUS 751.

MUS 766 SEMINAR IN MUSIC EDUCATION. (3)
Advanced professional study in the theory and practice of music education. May be repeated to a maximum of six credits. Prereq: Consent of instructor.

MUS 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

MUS 780 DIRECTED RESEARCH IN VOCAL LITERATURE. (1-3)
Individual directed research. Elective course for master's degree students. Required for doctoral voice majors; topics assigned at discretion of instructor in proportion to credits undertaken. May be repeated to a maximum of 12 credits. Prereq: MUS 618 and MUS 620 or permission of instructor.

MUS 799 INDEPENDENT WORK IN MUSIC THEORY. (1-3) May be repeated to a maximum of six hours. Prereq: Four to six hours of credit in area of specialization and consent

# COLLEGE OF HEALTH SCIENCES

# Athletic Training

College of Health Sciences

## Master of Science

The master's degree in athletic training is designed to accommodate both NATA certified athletic trainers and NATA "certification eligible" athletic trainers. Course work and clinical experiences are designed to develop skills necessary to conduct research and increase proficiency in injury prevention, treatment, and rehabilitation. Graduates are prepared to become critical consumers of research and accepted clinical practices, advanced health care providers, and leaders in the clinical educational, and research endeavors of the profession.

**Admission Requirements**

Students interested in applying to the program can find additional information at the following site: https://www.uky.edu/chs/at. Applicants must meet the minimum requirements of The Graduate School, as well as the following requirements of the athletic training program: satisfactory scores on the Graduate Record Examination (GRE), a minimum undergraduate grade point average of 2.70 on a 4.00 grading scale, a baccalaureate degree in athletic training from a school accredited by a nationally recognized organization, two references, and an interview. Final admission recommendations are made on a competitive basis. Students must be elibible for current license to practice in Kentucky. Admission to the post-professional athletic training program is competitive and is based on availability of space and adequate faculty support. For additional information, contact:

Dr. Phillip Gibble, Director, Division of Athletic Training
phillip.gribble@uky.edu

## Course Descriptions

AT 500 INTEGRATIVE CARE FOR HEALTH SCIENCES. (1-3)
Integrative care involves using the best possible treatments from both complementary/alternative and allopathic medicine, based on the patient's individual needs and condition. The selection of health care providers should be based on goodscience and this course will introduce students to complementary and alternative health care providers and the practices and beliefs of these practices as well as the scientific evidence in support of these practices. The course integrates successes from both worlds and describe the safest, least invasive, most cost-effective approach while incorporating a holistic understanding of the individual. May be repeated to a maximum of 3 credits (1 credit didactic and up to two credits experiential/research). (Same as HS 500, CLS 500, CNU 500, CD 500, PAS 500.)

AT 510 LIFE-THREATENING AND EMERGENCY CONDITIONS DURING PHYSICAL ACTIVITY. (3)
This is a course designed for students pursuing licensure as an Athletic Trainer or a similar professional license in a health care profession that requires the ability to understand, recognize and manage life-threatening and emergency conditions. This is part of a sequence of courses that focus on sports injury assessment and recognition. The overall objectives are for the students to provide foundational and conceptual information for the body systems most commonly involved in emergency conditions during physical activity. Students will learnto recognize life-threatening emergency conditions, identify the body systems in crisis, and the associated threats to those body systems. The student will be required to demonstrate competencies in written and practical examinations. Prereq: Formal acceptance into the Master of Science degree program in Athletic Training at The University of Kentucky.

AT 520 MANAGEMENT AND ADMINISTRATION IN ATHLETIC TRAINING. (3)
This is a course designed to students pursuing a certification in Athletic Training or similar professional

license in health care professions that focuses on the concepts related to the administration of athletic training programs including legal aspects and regulation of clinical practice, department and personnel management, budgeting, medical records management, risk management planning, facility design, development of referral programs and basic program outcome assessment methods. Prereq: Formal acceptance into the Master of Science

AT 592 FOUNDATIONS AND PATHOPHYSIOLOGY OF THE MUSCULOSKELETAL SYSTEM FOR ATHLETIC TRAINERS: ARTICULAR / BONE / CARTILAGE. (3)
This is a course designed for students pursuing a certification in Athletic Training or similar professional license in health care professions that require the assessment and management of injuries to the musculoskeletal system. This is part of a series of courses whose content is organized according to anatomical and physiological human body systems. The objective of this class is to understand normal and pathological conditions of the musculoskeletal system specifically focusing on bone, ligament and cartilage structures and systems common to sports injuries. The student will be required to demonstrate competencies via written examinations. Prereq: Formal acceptance into the Master of Science degree program in Athletic Training at The University of Kentucky.

AT 593 FOUNDATIONS AND PATHOPHYSIOLOGY OF THE MUSCULOSKELETAL SYSTEM FOR ATHLETIC TRAINERS: INTEGUMENTARY AND IMMUNE SYSTEMS. (2)
This is a course designed for students pursuing a certification in Athletic Training or similar professional license in health care professions that requires the ability to perform musculoskeletal assessment and management of the entire human body. This is part of a sequence of anatomical and physiological of human body systems courses that focus on normal and disrupted structures involved in sports injuries. The overall objective is for the students to provide foundation information of integumentary and inflammatory body systems. The student will be required to demonstrate competencies in written examinations. Prereq: Formal acceptance into the Master of Science in Athletic Training program at The University of Kentucky.

AT 610 ASSESSMENT AND MANAGEMENT OF LIFE-THREATENING AND EMERGENCY CONDITIONS DURING PHYSICAL ACTIVITY. (4)
This is a course designed for students pursuing a certification in Athletic Training or similar health care professions that require patient assessment and the management of life threatening, emergency conditions. A combination of lectures and laboratory experiences will be provided in order for the student to learn and demonstrate appropriate assessment and care for patients of all ages with a variety of medical conditions and traumatic injuries. The overall objective is for the students to be able to survey, deliver and manage emergency conditions that are likely to occur during athletic competition or physical activity. The student will be required to demonstrate competencies in assessment and management with both written and practical examinations. Prereq: Formal acceptance into the Master of Science degree program in Athletic Training at The University of Kentucky. AT 510 Foundational Systems for Athletic Trainers: Life-Threatening and Emergency Conditions.

AT 620 GENERAL MEDICAL CONDITIONS IN THE PHYSICALLY ACTIVE. (3)
This is a course designed for students pursuing a certification in Athletic Training or similar professional license in health care professions that requires the study of the pathology, etiology and presentation of common general medical conditions in active populations. Systems will include cardiovascular, respiratory, gastrointestinal, genitourinary, reproductive, and neurologic conditions most common to the physically active. In addition, concepts of pharmacology including pharmacokinetics, basic drug classifications and legal aspects of use will be covered. Specific focus will be placed on common therapeutic drugs used in sports medicine. Prereq: Formal acceptance into the Master of Science degree program in Athletic Training at The University of Kentucky.

AT 640 PRACTICUM IN ATHLETIC TRAINING. (2-6)
This is a course designed for students pursuing a certification in Athletic Training. This course may be repeated up to 6 times as part of a sequence of practicum courses that combines supervised field experience with review of clinical skills from the classroom. The overall objective of this course sequence is to integrate clinical skills into clinical experiences, while emphasizing clinical decision making. Students will complete a range of preceptor supervised clinical hours (100-300) and credit hours (2-6 credit hours) that will vary per semester. Additionally, students will be required to demonstrate proficiency in competencies specific to the semester content. Prereq: Formal acceptance into the Master of Science degree program in Athletic Training at The University of Kentucky.

AT 641 CLINICAL INTEGRATION I: LOWER EXTREMITY ASSESSMENT AND MANAGEMENT. (1)
This is a course designed for students pursuing a certification in Athletic Training. This is part of a sequence of courses that provides a review of clinical skills in the classroom. The overall objective of this course sequence is to integrate clinical skills into clinical experiences, while emphasizing clinical decision making. The student will be required to demonstrate proficiency in competencies specific to the semester content, as well as evaluated on practical examinations. Prereq: Formal acceptance into the Master of Science degree program in Athletic Training at The University of Kentucky.

AT 642 CLINICAL INTEGRATION II: UPPER EXTREMITY ASSESSMENT AND MANAGEMENT. (1)
This is a course designed for students pursuing a certification in Athletic Training. This is part of a sequence of courses that provides a review of clinical skills in the classroom. The overall objective of this course sequence is to integrate clinical skills into clinical experiences, while emphasizing clinical decision making. The student will be required to demonstrate proficiency in competencies specific to the semester content, as well as evaluated on practical examinations. Prereq: Formal acceptance into the Master of Science degree program in Athletic Training at The University of Kentucky.

AT 643 CLINICAL INTEGRATION III: ASSESSMENT AND MANAGEMENT
OF LIFE-THREATENING AND EMERGENCY CONDITIONS DURING PHYSICAL ACTIVITY. (1)
This is a course designed for students pursuing a certification in Athletic Training. This is part of a sequence of courses that provides a review of clinical skills in the classroom. The overall objective of this course sequence is to integrate clinical skills into clinical experiences, while emphasizing clinical decision making. The student will be required to demonstrate proficiency in competencies specific to the semester content, as well as evaluated on practical examinations. Prereq: Formal acceptance into the Master of Science degree program in Athletic Training at The University of Kentucky.

AT 644 CLINICAL INTEGRATION IV: THERAPEUTIC MODALITIES AND ADVANCED
THERAPEUTIC REHABILITATION. (1)
This is a course designed for students pursuing a certification in Athletic Training. This is part of a sequence of courses that provides a review of clinical skills in the classroom. The overall objective of this course sequence is to integrate clinical skills into clinical experiences, while emphasizing clinical decision making. The student will be required to demonstrate proficiency in competencies specific to the semester content, as well as evaluated on practical examinations. Prereq: Formal acceptance into the Master of Science degree programin Athletic Training at The University of Kentucky. AT 690. AT 691. AT 695.

AT 660 DIRECTED STUDY IN ATHLETIC TRAINING. (1-3)
A specific topic in Athletic Training related to the student's interests is selected for intensive study. Work to be supervised by a graduate faculty member proficient in the area under investigation. May be repeated to a maximum of six credits. Prereq: Graduate standing and consent of instructor.

AT 670 SCIENTIFIC INQUIRY IN ATHLETIC TRAINING I. (2)
An introduction to the research process in athletic training. The importance of pursuing quality research in athletic training will be stressed and the procedures necessary to complete this process will be presented. May be repeated to a maximum of 8 credits. Prereq: Graduate standing and consent of the instructor.

AT 671 SCIENTIFIC INQUIRY IN ATHLETIC TRAINING II. (2)
The second course of a four part series that will develop skills and a knowledge base that will aid the student while conducting and critically reviewing research in athletic training. Course work will address the methodological procedures of designing and pursuing research in athletic training. The importance of pursuing quality research will be stressed and the procedures necessary to complete this process will be presented. Prereq: Graduate standing and consent of instructor.

AT 672 SCIENTIFIC INQUIRY IN ATHLETIC TRAINING III. (2)
The third course of a four part series that will develop skills and a knowledge base that will aid the student while conducting and critically reviewing research in athletic training. Course work will address the design of research and synthesis of data in athletic training. The importance of pursuing quality research will be stressed and the procedures necessary to complete this process will be presented. Prereq: Graduate standing and consent of instructor.

AT 673 SCIENTIFIC INQUIRY IN ATHLETIC TRAINING IV. (2)
The final course of a four part series that will develop skills and a knowledge base that will aid the student while conducting and critically reviewing research in athletic training. Course work will focus on developing the skills needed to critically synthesize material with accepted practice, and prepare professional presentations using acquired data and an appropriate statistical analysis. The importance of pursuing quality research will be stressed and the procedures necessary to complete this process will be presented. Prereq: Graduate standing, and consent of instructor.

AT 680 SPECIAL TOPICS IN ATHLETIC TRAINING: (Subtitle required). (1-3)
Study of emerging topics of current high interest in athletic training. May be repeated to a maximum of 9 credits. Prereq: Graduate standing and consent of instructor.

AT 682 CLINICAL SEMINAR IN ATHLETIC TRAINING. (1)
This is an advanced athletic training course encompassing a wide range of topics related to all domains of the athletic training profession. The primary focus of this course will be on the presentation of case studies for group discussion and contribution. This course will utilize a combination of discussion, review, and student presentation.

AT 685 PRINCIPLES AND APPLICATION OF KINESIOLOGICAL EMG. (3)
To introduce the student to the principles and application of kinesiologic electromyography (EMG). Kinesiological EMG research incorporates the study of human movement with direct assessment of the muscles involved with human motion. The primary aim for this course is to provide the student with background and practical knowledge of kinesiological EMG in order to be able to perform and critically analyze kinesiological EMG studies. Students will enhance their understanding of neuromuscular properties of skeletal musculature. Students will be exposed to the common procedures used to collect, analyze, and interpret both surface and indwelling kinesiological EMG research. Prereq: KHP 615 or comparable graduate level biomechanics course, the course can be taken concurrently. Approval of instructor.

AT 690 ORTHOPAEDIC EVALUATION AND REHABILITATION OF THE UPPER EXTREMITY. (4)
Current evaluation and rehabilitation of upper extremity and upper spine injuries that commonly occur

in athletic, recreational or occupational activities. A combination of lecture, laboratory techniques will be used to review current practice and interventions. Prereq: Graduate standing and consent of instructor.

AT 691 THERAPEUTIC MODALITIES FOR ATHLETIC TRAINERS. (3)
This is a course designed to students pursuing a certification in Athletic Training or similar professional license in health care professions that requires the ability to treat and manage symptoms of musculoskeletal conditions using therapeutic modalities. A combination of lectures and laboratory experiences will be provided in this class in order for the student to gain theoretical knowledge and practical application of the use of these physical agents. The overall objective is for the students to develop the skills necessary to select appropriate modalities that can be used when providing care for musculoskeletal injuries sustained by physically active individuals. The student will be required to demonstrate competencies in therapeutic modality applications with both written and practical examinations. Prereq: Formal acceptance into the Master of Science degree program in Athletic Training at The University of Kentucky. AT 591 Foundational Systems, Disorders and Disruptions in Athletic Injury: Muscle/Tendon/Nerve. AT 592 Foundational Systems, Disorders and Disruptions in Athletic Injury: Articular/Bone/Cartilage. AT 590 Anatomical Musculoskeletal Dissection.

AT 692 ORTHOPAEDIC EVALUATION AND REHABILITATION OF THE SPINE. (4)
This is an advanced athletic training course encompassing a regional study of orthopedic evaluation and management of the cervical, thoracic, and lumbar spine. A combination of lecture, applied evaluation and rehabilitation techniques, critical reviews of the literature, discussion, and student presentations will be employed. Prereq: Graduate standing and consent of instructor.
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AT 695 ORTHOPAEDIC EVALUATION AND REHABILITATION OF THE LOWER EXTREMITY. (4)
Current evaluation and rehabilitation of lower extremity and lumbar spine injuries that commonly occur in athletic, recreational or occupational activities. A combination of lecture, laboratory and student presentation and written reviews of current practice and interventions will be employed. Prereq: Graduate standing and consent of instructor.

AT 700 MUSCLE MECHANICS. (3)
This is an advanced athletic training course encompassing a wide range of topics related to all aspects of skeletal muscle form and function. The primary focus of this course will be on the mechanical properties of skeletal muscle, and translational aspects of basic science research and clinical care.
AT 720 SPORTS MEDICINE. (3)
A study of the basic areas covered in sports medicine with readings and discussions of current international trends in the research and practice in this field. Prereq: Twelve semester hours; credit in the field of biological sciences; consent of instructor. (Same as KHP 720.)

AT 740 MUSCULOSKELETAL ANATOMICAL DISSECTION. (3)
This course is a 3-credit cadaver anatomy laboratory course, which will include examination and dissection of the human cadaver. Lectures and laboratory experience will emphasize the musculoskeletal, articular, nervous, and vascular systems particularly as they relate to athletic injury mechanism and evaluation.

AT 768 RES CR MASTERS DEGREE. (1-3)
Residency credit for master’s thesis

# Communication Sciences & Disorders

## College of Health Sciences

The Division of Communication Sciences & Disorders at the University of Kentucky offers a two-year master's degree program in speech-language pathology. The program is accredited by the Council on Academic Accreditation of the American Speech-Language-Hearing Association. Students who complete the program will typically meet the academic and clinical training requirements for the American Speech-Language-Hearing Association's (ASHA) Certificate of Clinical Competence in Speech-Language Pathology and for licensure in Kentucky and in most states with licensure requirements.

The length of a student's program depends upon the certification options selected, the student's educational background, and the number of credits completed each semester. Students with an undergraduate major in communication sciences & disorders will typically complete the program in six semesters of full-time study. Students entering without an undergraduate major in communication sciences & disorders will need eight semesters of course work including prerequisite courses to complete the program. Additional information regarding prerequisite coursework is available from the Director of Graduate Studies.

During the first full year of the graduate program, students typically complete course work and clinical practicum at the UK Communications Disorders Clinic. During the second year, students are assigned to clinical rotations in a variety of settings, including medical or rehab facilities, agencies providing services to children (e.g., public schools, preschools, clinics), and agencies in one of Kentucky's Area Health Education Center (AHECs) regions. Successful completion of a comprehensive examination or thesis is required for all degree candidates.

**Admission Requirements**
Students who are admitted to the program typically have at least a 3.0 undergraduate GPA. To be considered for admission, students must also submit Graduate Record Examination scores (verbal, quantitative, and writing). Students with a bachelor's degree in communication disorders begin the program in the second summer semester. Students with bachelor's degree in another field of study begin the program in the fall semester. Admission deadline is January 15 for domestic applicants for concurrent summer or fall start. Deadline for international applicants is March 15 for following year start.

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|---|---|---|
| CSD 621 | Alternative & Augmentative Communication | (3) |
| CSD 647 | Lang. Disorders in Dev. Young Individuals | (3) |
| CSD 648 | Lang. Disorders in School-Age Populations | (3) |
| CSD 661 | Phonological Development & Disorders | (3) |
| CSD 670 | Voice Disorders | (3) |
| CSD 674 | Disorders of Fluency | (3) |
| CSD 675 | Low Incidence Disorders | (1-3) |
| CSD 677 | Aphasia & Related Disorders | (3) |
| CSD 701 | Research Methods in Communication Sciences & Disorders | (3) |
| CSD 710 | Cognitive Communication Disorders | (3) |
| CSD 744 | Adult Swallowing and Motor Speech Disorders | (3) |
| CSD 745 | Pediatric Swallowing and Motor Speech Disorders | (3) |
| CSD 748 | Master's Thesis Research (Optional) | (0) |
| CSD 768 | Residence Credit for the Master's Degree (Optional) | (6) |

To receive the M.S. degree and also fulfill the American-Speech-Language-Hearing Association certification requirements, the student will be required to successfully complete:

- 33 semester hours of didactic coursework in Communication Sciences & Disorders
- 3 semester hours of clinical orientation (CSD 654)
- 2 semester hours of clinical practicum supervised by UK CSD Faculty (CSD 657)
- 1 semester hour of a graduate level elective
- 21-30 semester hours of clinical rotations (CSD 659)
- A thesis option or pass comprehensive examinations

## Course Descriptions

CSD 500 INTEGRATIVE CARE FOR HEALTH SCIENCES. (1-3)
Integrative care involves using the best possible treatments from both complementary/alternative and allopathic medicine, based on the patient's individual needs and condition. The selection of health care providers should be based on good science and this course will introduce students to complementary and alternative health care providers and the practices and beliefs of these practices as well as the scientific evidence in support of these practices. The course integrates successes from both worlds and describe the safest, least invasive, most cost-effective approach while incorporating a holistic understanding of the individual. May be repeated to a maximum of 3 credits (1 credit didactic and up to two credits experiential/ research). (Same as AT 500, HS 500, CLS 500, CNU 500, PAS 500.)

CSD 520 INTRODUCTION TO MANUAL COMMUNICATION. (2)
An introduction to manual communication systems, including American Sign Language and other commonly-used manual sign systems. Includes study of the characteristics and use of existing manual communication systems. Students will learn to code and decode sentences using a combination of signs and fingerspelling. Lecture: one hour; laboratory: two hours per week.

CSD 571 NEURAL BASES OF SPEECH, LANGUAGE, AND HEARING. (3)
Detailed investigation of the neuroanatomy and neurophysiology of speech, language, and hearing from a communication sciences perspective. Emphasis on anatomy and physiology of the central nervous system, neurodevelopment, and normal neural substrates involved in speech, language, and hearing. Prereq: CSD 378 or permission of the instructor.

CSD 588 VARIABLE TOPICS IN COMMUNICATION DISORDERS (Subtitle required). (1-3)
In-depth study of a current problem or issue related to the communication disorders profession. May be repeated for a maximum of 6 credits. A title is assigned each time the course is offered. Prereq: Undergraduate or master's level CODI majors only and consent of the instructor.

CSD 589 INDEPENDENT STUDY IN COMMUNICATION DISORDERS. (1-6)
Independent study for undergraduate or master's level graduate students with an interest in a specific problem or issue in communication disorders. May be repeated for a maximum of six credits. Prereq: Undergraduate or master's level graduate CODI majors only and consent of the instructor.

CSD 591 AURAL REHABILITATION. (3)
Management strategies for people with hearing loss. Topics include: variables affecting hearing handicap; characteristics, selection, counseling, and orientation in regard to amplification systems; acoustic, perceptual and visual aspects of speech; assessment and management of problems resulting from hearing loss across the lifespan. Prereq: CSD 420 or consent of instructor; undergraduate and graduate CODI majors only. This course is a Graduation Composition and Communication Requirement (GCCR) course in certain programs, and hence is not likely to be eligible for automatic transfer credit to UK.

CSD 621 ALTERNATIVE AND AUGMENTATIVE COMMUNICATION. (3)
A detailed investigation of the use of augmentative and alternative communication systems with individuals with moderate to severe communication disorders. Participants will examine the full range of augmentative/alternative communication systems and the related assessment and intervention considerations. Prereq: EDS 375 or equivalent or graduate status in CODI or RHB, or consent of instructor.

CSD 647 LANGUAGE DISORDERS IN DEVELOPMENTALLY YOUNG INDIVIDUALS. (3)
A detailed investigation of language disorders and language intervention in developmentally young populations. Includes an in-depth discussion of prevention strategies, service delivery models, assessment tools and paradigms, and intervention strategies. Provides practice in self-directed inquiry. Prereq: Graduate status in CODI or RHB or consent of instructor.

CSD 648 LANGUAGE DISORDERS IN SCHOOL-AGE POPULATIONS. (3)
A detailed investigation of language disorders and language intervention in school-age populations. Includes an in-depth discussion of prevention strategies, service delivery models, related cultural diversity issues, and assessment and intervention principles and
strategies. Prereq: Graduate status in CODI or RHB or consent of instructor.

CSD 649 COMMUNICATION, AAC, AND TECHNOLOGY FOR INDIVIDUALS WITH AUTISM SPECTRUM DISORDERS. (3)
This course prepares persons who will be serving individuals with ASD. The focus of the course is on developing communication in this population, exploring augmentative and alternative communication devices, and using technology to teach individuals with ASD. The course will provide information on (a) typical language development, (b) characteristics of persons with autism and their unique communication needs, (c) assessment of communication needs, (d) development of communication goals, (e) development and delivery of effective strategies for teaching communication, and (f) use of technology to teach individuals with ASD. The objectives of this course are designed to provide students with a comprehensive knowledge of the communication characteristics of persons with autism, the state-of-the-art techniques in providing communication services for this population, and research-based strategies utilizing technology in teaching individuals with ASD. This course will be taught jointly by the Department of Special Education & Rehabilitation Counseling and the Department of Communication Sciences and Disorders. Prereq: EDS 601, EDS 661, EDS 662. (Same as EDS 662.)

CSD 654 CLINICAL ORIENTATION IN COMMUNICATION DISORDERS. (3)
A lecture-laboratory experience designed to orient the student to the professional activities in speech-language pathology. Lecture, one hour; laboratory, four hours per week. Prereq: Graduate status in CODI or consent of instructor.

CSD 657 CLINICAL PRACTICUM IN SPEECH-LANGUAGE PATHOLOGY. (1-3)
Experience with children and adults in the assessment and management of communication and swallowing disorders. Lecture, one hour; practicum, four hours per week. May be repeated to a maximum of 12 credits. Prereq: Graduate status in CODI, CSD 481 or equivalent, and CSD 654.

CSD 659 CLINICAL ROTATION IN SPEECH-LANGUAGE PATHOLOGY. (1-12)
Supervised clinical experience in the evaluation and management of children and adults. Up to 40 laboratory hours per week (at site all day). May be repeated up to 36 hours. Prereq: Graduate status in CODI, successful completion of 6 hours of graduate clinical practicum and consent of instructor.

CSD 661 PHONOLOGICAL DEVELOPMENT AND DISORDERS. (3)

A comprehensive course in phonological theory, assessment, and treatment. Advanced principles of diagnosis and remediation for patients across the age span and from culturally and linguistically diverse backgrounds. Prereq: Graduate status in CODI or RHB or consent of instructor.

CSD 670 VOICE DISORDERS. (3)
Assessment and management of adults and children with disorders of voice and resonance. Includes laryngectomy. Prereq: Graduate status in CODI or RHB or consent of instructor.

CSD 674 DISORDERS OF FLUENCY. (3)
Analysis, identification and management of fluency disorders. Prereq: Permission of instructor.

CSD 675 LOW INCIDENCE COMMUNICATION DISORDERS (Subtitle required). (1)
Assessment and management of adults and children with low incidence communication disorders including disorders of fluency, craniofacial anomalies and tracheostomy. Topics may vary depending on current trends in the discipline. Prereq: Graduate status in CODI or consent of instructor.

CSD 677 APHASIA AND RELATED DISORDERS. (3)
Identification, appraisal, diagnosis, and clinical management of persons with aphasia and related disorders. Primary emphasis is given to aphasia and apraxia of speech in adults. Prereq: Graduate status in RHB or CODI or consent of instructor.

CSD 701 RESEARCH METHODS IN COMMUNICATION DISORDERS. (3)
Principles and methods for designing research in communication sciences and disorders. Topics include: introduction to the scientific method, research designs, measurement techniques, formulating research questions, writing and evaluating research reports, and ethics of research. Prereq: Graduate standing in Communication Disorders.

CSD 710 COGNITIVE COMMUNICATION DISORDERS. (3)
The class will focus on the neuroanatomy and pathology of traumatic brain injury, right hemisphere disorders, and dementia. Students will learn current theory regarding differential diagnosis and treatment of these disorders. Prereq: CSD 571 or permission of instructor.

CSD 744 ADULT SWALLOWING AND MOTOR SPEECH DISORDERS. (3)
Analysis, identification and management of adult neurogenic disorders of speech and swallowing. Emphasis will be placed on clinical management of adult dysarthria and the concomitant communication and swallowing disorders. Prereq: CSD 571 or permission of instructor.

CSD 745 PEDIATRIC FEEDING AND MOTOR SPEECH DISORDERS. (3)
Analysis, identification and management of pediatric disorders of speech, feeding and swallowing. Emphasis will be placed on clinical management of dysarthria and the concomitant communication, feeding and swallowing disorders. Prereq: CSD 571 or permission of instructor.

CSD 747 SEMINAR IN LANGUAGE DEVELOPMENT IN CHILDREN. (3)
A contemporary overview of processes governing language acquisition and their role in atypical language development. Topics include: theories of language acquisition; roles of perception, cognition, social interaction, and genetics on language acquisition; and influence of atypical situations on language. Prereq: Admission to the Communication Disorders graduate program or the Rehabilitation Sciences Ph.D. program or consent of the instructor.

CSD 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

CSD 761 APPLIED PHONOLOGY: DEVELOPMENT AND DISORDERS. (3)
Critical review and discussion of clinical and developmental phonology research and phonological theories. Study of the bases for normal and disordered phonological development from birth through age twelve. Study of procedures for assessment and treatment of children with phonological disorders including the development of individualized remediation plans for expediting intelligibility gains. Course will include information regarding second language acquisition and oral and written language as these relate to phonological systems. Prereq: Admission to the Communication Disorders graduate program or the Rehabilitation Sciences Ph.D. program or consent of the instructor.

CSD 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

CSD 771 DYSPHAGIA. (3)
This course includes a review of the anatomy and physiology of normal deglutition; the nature and characteristics of swallowing disorders; methods of evaluation and management of dysphagia in adults and children; and consideration of medical conditions such as aspiration pneumonia, tracheostomy, and other complicating factors associated with dysphagia. Also included is a brief review of professional issues relating to efficacy of treatment; third party reimbursement; and roles and responsibilities of other health care professionals in feeding and swallowing. Prereq: Admission to the Communication Disorders graduate program or the Rehabilitation Sciences Ph.D. program or consent of the instructor.

CSD 775 SEMINAR IN LITERATE LANGUAGE. (3)
A review and discussion of the literature concerning literate language. Topics include: 1) characteristics of literate language; 2) differences between literate and oral language; 3) emergent literacy; 4) theories of the reading and writing processes; 5) components, development, strategies, and factors involved in typical reading and writing; 6) literate language and speaking; and 7) issues pertaining to atypical readers and writers. Prereq: Admission to the Communication Disorders graduate program or the Rehabilitation Sciences Ph.D. program or consent of the instructor.

CSD 788 VARIABLE TOPICS IN COMMUNICATION DISORDERS (Subtitle required). (1-3)
In-depth study of a current problem or issue related to the communication disorders profession. May be repeated for a maximum of nine credits. A title is assigned each time the course is offered. Prereq: Graduate status in RHB or CODI or consent of instructor.

CSD 789 INDEPENDENT STUDY IN COMMUNICATION DISORDERS. (1-6)
Independent study for graduate students with an interest in a specific problem in communication disorders. May be repeated to a maximum of 12 credits. Lecture, 1-6 hours; laboratory, 2-12 hours per week. Prereq: Graduate status and consent of instructor.

# Physician Assistant Studies

## College of Health Sciences

The University of Kentucky, Division of Physician Assistant Studies (PAS) offers a Plan B, non-thesis, physician assistant master's degree program that is accredited by the Accreditation Review Commission on Education for the Physician Assistant (ARC-PA). The Master of Science in Physician Assistant Studies (M.S.P.A.S.) program is designed for students who wish to become PAs and hold a baccalaureate or will have earned a baccalaureate degree by the time they enter the program. The M.S.P.A.S. program is offered at two distinct locations in either Lexington or Morehead, KY.

The mission of the UK M.S.P.A.S. program is to improve the health and well-being of the people in the Commonwealth of Kentucky. Accordingly, we seek applicants who have a strong interest in practicing medicine in Kentucky, especially its most underserved areas. We employ a holistic approach to choose those students who will best fulfill our mission. Graduates of the program are eligible to take the Physician Assistant National Certifying Examination. After successful completion of the NCCPA Exam, graduates are eligible for state certification/licensure to practice as certified physician assistants.

**Admission Requirements**
Admission to the M.S.P.A.S. program occurs annually, with a new class beginning each January. Qualified applicants for the Lexington or Morehead campuses must simultaneously apply to the Centralized Application Service for Physician Assistants (CASPA) and the UK Graduate School. Students must satisfy admissions requirements for both the Graduate School and the Physician Assistant Studies Program.

*Bachelor's Degree*
Completion of a bachelor's degree from a regionally accredited college or university is required. The UKPAS program does not require a specific degree and the program does not favor one degree over another. All applicants must meet the minimum academic standards for the Graduate School. The Bachelor's Degree must be completed prior to entry into the program. In addition, applicants may have only two outstanding prerequisite requirements at the time of application submission. The program only allows up to one retake per prerequisite course. Applicants must complete all prerequisite courses by the time of scheduled interviews.

*Prerequisite Courses**
A "C" grade or better must be earned in the following prerequisite courses:

| | |
|---|---|
| General Chemistry 1 with laboratory | 1 semester |
| General Chemistry 2 with laboratory | 1 semester |
| Organic Chemistry with laboratory | 1 semester |
| Psychology | 1 semester |
| Developmental Psychology | 1 semester |
| Microbiology with laboratory | 1 semester |
| General Biology with laboratory | 1 semester |
| Human Physiology | 1 semester |
| Human Anatomy | 1 semester |
| Sociology or Anthropology | 1 semester |
| Medical Terminology | 1 semester |
| Statistics | 1 semester |

*For more detailed information on prerequisites and course equivalencies, please visit the program website. http://www.mc.uky.edu/PA/admissions.html

*Graduate Record Exam (GRE)*
All GRE scores must come from exams taken within the last 5 years. A minimum score is not set by the program or UK's Graduate School. The UKPAS Program accepts ONLY the GRE for our program. We do not accept any substitutes (e.g. the MCAT).

*TOEFL Requirements (if applicable)*
International applicants or domestic students who attended a high school in which English was not the primary language are required to submit TOEFL iBT scores in addition to the GRE. A minimum combined TOEFL iBT socre of 120 is required with a minimum score of 26 in each category: Reading, Listening, Speaking, & Writing.

*Patient Care Experience*
The UKPAS Program requires patient contact, however a minimum amount of hours is not set. Contact hours may be completed utilizing the following (but not limited to) medical disciplines: CNA, EMT, CMA, Medical Tech., Professional Hospice Volunteer, etc. Medical Scribe is not considered a hands-on clinical patient care experience.

*Shadowing*
A minimum 50 hours of shadowing a clinical Physician Assistant is required. The UKPAS program prefers applicants shadow PAs in a variety of medical specialities as well as a foundation in a Primary Care/Family Medicine setting.

*Letters of Recommendation*
Three (3) letters of recommendation are required from people acquainted with the applicant for at least one year and familiar with his/her professional goals. They must be submitted with the CASPA application packet. Letters should come from the following sources:

- Letter 1 - PA or Physician
- Letter 2 - Academic Professor or Advisor
- Letter 3 - Medical (i.e. PA, Physician, supervisor) or Academic

*Admissions Essay*
The admission essay must be of graduate quality and reflect the applicant's commitment to the mission of the UKPAS Program as well as their interest in being a PA. It should contain approximately 625 words.

*Basic Life Support Certification*
Applicants must be certified in Basic Life Support for Health Providers through the American Heart Association. Red Cross certifications will not be accepted. The BLS card is expected to be presented at the time of interview.

*Technical Standards, Background Checks & Drug Screening*
All students matriculating into the UKPA Program are required to meet certain technical standards of the program and College of Health Sciences. Additionally, applicants must pass a background check and drug screen.

Due to the competitive nature and large number of students applying to the program, not all applicants who meet minimum requirements will be invited for an interview.

THE DEADLINE FOR APPLICATIONS--JULY 15 of the application year.

For more information and dates of General Information Sessions please visit our website at www.mc.uky.edu/pa/. If you have questions after visiting our website and attending an information session you may contact:

Julia Berry, Student Affairs Officer
Office of Admissions and Student Affairs College of Health Sciences
900 S. Limestone, Room 205 Charles T. Wethington Building Lexington, KY 40356-0200
859.257.5001
julia.berry@uky.edu

**M.S.P.A.S. Program Curriculum Requirements**

All students enrolled in the program will take the following courses

*Spring*

| | | |
|---|---|---|
| ANA 611 | Human Gross Anatomy | (5) |
| PAS 651 | Introduction to PA Profession | (2) |
| HSM 601 | Overview of the Health Care Delivery System | (3) |
| PGY 412G | Human Physiology | (4) |

*4-Week Intersession*

| | | |
|---|---|---|
| PAS 610 | Research Methods and Epidemiology | (3) |

*8-Week Intersession*

| | | |
|---|---|---|
| PAS 678 | Seminar in PA Studies I | (2) |
| PAS 653 | Introduction to Human Disease | (3) |

*Fall*

| | | |
|---|---|---|
| PAS 654 | Clinical Lecture Series | (4) |
| PAS 672 | Pharmacology I | (3) |
| PAS 657 | Clinical Laboratory Procedures | (3) |
| PAS 850 | Clinical Methods | (3) |
| PAS 645 | Master's Project I | (1) |

*Spring*

| | | |
|---|---|---|
| PAS 658 | Clinical Lecture Series II | (4) |
| PAS 673 | Pharmacology II | (3) |
| PAS 655 | Psychosocial Factors in Primary Care | (3) |
| PAS 656 | Patient Evaluation and Management | (4) |
| PAS 646 | Master's Project II | (2) |

*4-Week Intersession*

| | | |
|---|---|---|
| PAS 640 | Survey of Geriatric Medicine | (3) |
| CNU 503 | Applied Nutrition | (1) |

*8-Week Intersession, Begin Clinical Year Program Clerkship Requirements*

All students will complete the following clerkship requirements:

| | | |
|---|---|---|
| PAS 660 | Family Medicine Clerkship | (6) |
| PAS 661 | Pediatrics Clerkship | (6) |
| PAS 662 | Obstetrics and Gynecology Clerkship | (3) |

| | | |
|---|---|---|
| PAS 663 | Surgery Clerkship | (6) |
| PAS 664 | Geriatrics Clerkship | (3) |
| PAS 665 | Elective Clerkship | (3) |
| PAS 665 | Selective Clerkship | (3) |
| PAS 669 | Internal Medicine Clerkship | (6) |
| PAS 670 | Emergency Medicine Clerkship | (3) |
| PAS 671 | Psychiatry Clerkship | (3) |
| PAS 680 | Seminar in PA Studies II | (2) |

Please note that any course offered in the PA program curriculum must be taken while in the program. The program does not offer advanced placement. No courses will be allowed to transfer into the program (PGY 412G, HSM 601, etc.)

After completing the course work and clerkship requirements with a minimum 3.0 GPA, students who receive passing scores on written and practical final examination will be awarded a Master of Science in Physician Assistant Studies (M.S.P.A.S.) degree. Graduates of the program are eligible to take the Physician Assistant National Certifying Examination. After successful completion of the exam, they are also eligible for state certification/licensure to practice as certified physician assistants.

M.S.P.A.S. for Graduates of Programs in Physician Assistant Studies
PAs applying to the M.S.P.A.S. program and who already hold a baccalaureate degree in Physician Assistant Studies from an accredited Physician Assistant program, must have maintained a 3.0 GPA in their prior PA program coursework and achieved a combined score of 900 on the verbal and quantitative portions of the GRE taken within the last five years of the application to the program. To satisfy the M.S.P.A.S. curriculum, these students are required to complete a 24 credit hour core of M.S.P.A.S. courses and a minimum of 9 credit hours in an academic concentration of their choosing for a total of 33 credit hours.

*M.S.P.A.S. Program Core Courses*

| | | |
|---|---|---|
| STA 570 | Basic Statistical Analysis | (4) |
| PAS 610 | Research Methods and Epidemiology | (3) |
| HSM 601 | Overview of the Health Care Delivery System | (3) |
| PAS 673 | Pharmacology II | (3) |
| PAS 640 | Survey of Geriatric Medicine | (3) |
| PAS 680 | Seminar in PA Studies II | (2) |
| PAS 646 | Master's Project II | (2-6) |
| PAS 690 | Physician Assistant Clerkship | (3-6) |

A minimum of nine credit hours of elective courses will be completed with a concentration in gerontology, health care administration, or clinical nutrition.

*Elective Courses in Areas of Concentration*

**Gerontology Concentration**

| | | |
|---|---|---|
| GRN 643 | Biomedical Aspects of Aging | (3) |
| BIO/GRN 612 | Biology of Aging | (3) |
| BSC 770 | Psychosocial Issues of Aging and Health | (3) |
| BSC 772 | Women, Health and Aging | (3) |
| NUR 510 | Older Women and Their Health | (3) |
| BSC 779 | Behavioral Factors in Death and Dying | (3) |
| HSM 510 | Organization of Long Term Care Sector | (3) |
| NFS 680 | Nutrition and Aging | (3) |

| | | |
|---|---|---|
| GRN 513 | Geriatric Pharmacy | (3) |

For more information contact the M.S.P.A.S. Program: www.mc.uky.edu/pa/

## Graduate Courses

| | | |
|---|---|---|
| PAS 610 | Research Methods and Epidemiology | (3) |
| PAS 640 | Survey of Geriatric Medicine | (3) |
| PAS 645 | Master's Project I | (1) |
| PAS 646 | Master's Project II | (2-6) |
| PAS 654 | Clinical Lecture Series | (4) |
| PAS 655 | Psychosocial Factors in Primary Care | (3) |
| PAS 658 | Clinical Lecture Series II | (4) |
| PAS 660 | Family Medicine Clerkship | (6) |
| PAS 661 | Pediatrics Clerkship | (6) |
| PAS 663 | Surgery Clerkship | (6) |
| PAS 669 | Internal Medicine Clerkship | (6) |
| PAS 672 | Pharmacology I | (3) |
| PAS 673 | Pharmacology II | (3) |
| PAS 680 | Seminar in PA Studies II | (2) |
| PAS 690 | Physician Assistant Clerkship | (3-6) |

### Course Descriptions

PAS 500 INTEGRATIVE CARE FOR HEALTH SCIENCES. (1-3)
Integrative care involves using the best possible treatments from both complementary/alternative and allopathic medicine, based on the patient's individual needs and condition. The selection of health care providers should be based on good science and this course will introduce students to complementary and alternative health care providers and the practices and beliefs of these practices as well as the scientific evidence in support of these practices. The course integrates successes from both worlds and describe the safest, least invasive, most cost-effective approach while incorporating a holistic understanding of the individual. May be repeated to a maximum of 3 credits (1 credit didactic and up to two credits experiential/research). (Same as AT 500, HS 500, CLS 500, CNU 500, CD 500.)

PAS 610 RESEARCH METHODS AND EPIDEMIOLOGY IN PA STUDIES. (3)
An introductory course designed to introduce students to research applicable to the health care sciences and the field of epidemiology. The course will include a description of the scientific method, research design, measurement techniques, and statistical analysis. Emphasis will be placed on both clinical research and population-based studies. Students will learn how to critically review literature and how to design a research protocol. Prereq: Completion of STA 570, admission to the Physician Assistant Program, or consent of instructor.

PAS 620 HEALTH CARE DELIVERY IN THE 21ST CENTURY. (3)
The PAS 620 course will be an introduction to healthcare delivery of the 21st century. This course will emphasize characteristics of the United States care delivery system, its relationship to the physician assistant profession, and will include instruction on the care system's historical organization, composition and function. Students will gain perspective on models of care, payment, health care quality, patient safety, health information technology, population and global health care as well as team-based care. Prereq: Acceptance into the PAS Program.

PAS 640 SURVEY OF GERIATRIC MEDICINE. (3)
Overview of physician assistant practice with geriatric patients. Emphasis is placed on the practice of geri-

atric medicine including the anatomy and physiology of normal aging; pathology of aging; health care aspects of geriatric management; the diagnosis, treatment and prevention of geriatric problems; and research aspects of geriatric practice. Prereq: Admission to the Physician Assistant graduate program or consent of the instructor.

PAS 645 MASTER'S PROJECT. (1)
A 4-week course designed to introduce students to methods of identifying and analyzing a health care delivery issue that can be studied through a scientific literature search. The analysis of the topic and writing of a research paper will occur during the student's clinical clerkships. Prereq: STA 570, PAS 610, completion of the first year of the Physician Assistant graduate program.

PAS 646 MASTER'S PROJECT 2. (2-6)
This variable credit hour course is designed to allow PA students to complete a Master's Project while under the guidance of a faculty advisor. Students will identify a health care issue topic, conduct appropriate library research on the topic, develop a research paper on the topic, and make an oral presentation of their project at the conclusion of the Master of Science in Physician Assistant Studies Program. Students will be responsible for developing appropriate audiovisuals, handouts, etc. for the oral presentation. Prereq: Admission to the Physician Assistant Program.

PAS 650 CLINICAL METHODS. (4)
The PAS 650 course is designed to deliver content specific to the principles of obtaining medical histories as well as performing physical examinations. Further, students will be introduced to health care communication in both a lecture as well as laboratory format.

PAS 651 INTRODUCTION TO THE PA PROFESSION. (2)
This course provides an overview of selected health care delivery issues affecting primary care physician assistants. The first half of the semester is devoted to examination of the history and evolution of the PA profession, current PA practice demographics and regulations, principles of quality assurance, risk management, and medical literature evaluation. The second half of the semester is devoted to the study of the ethical dimensions of PA practice. Topics include moral principles and ethical theories, as well as a series of seminar discussions on contemporary ethical issues confronting primary care providers in the 20th and 21st centuries. Prereq: Enrollment in the Physician Assistant Program.

PAS 653 INTRODUCTION TO HEALTH AND DISEASE. (3)
An overview of the etiology, distribution, and prevention of basic disease processes. Prereq: Enrollment in Physician Assistant Program.

PAS 654 CLINICAL LECTURE SERIES I. (4)
A study of diseases and disorders seen in primary care physician assistant practice. Emphasis is placed on identifying the etiology, clinical presentation, laboratory and x-ray abnormalities, management, and prevention of diseases/disorders of the cardiovascular, pulmonary, renal, gastrointestinal, hematological, endocrine, and neurological systems. Research aspects of selected diseases is also presented. Prereq: Enrollment in the Physician Assistant Studies Program.

PAS 655 PSYCHOSOCIAL FACTORS IN PRIMARY HEALTH CARE. (3)
This course provides a broad overview of the role of psychosocial factors (behavioral, cultural, and environmental) in the nature, cause, course distribution, prevention, and treatment of illness. It develops the student's communication skills for clinical practice and presents psychosocial theories and research, and is organized into fours areas: general behavioral concepts, communications skills, developmental issues, and psychopathology. Prereq: Enrollment in the Physician Assistant Program.

PAS 656 PATIENT EVALUATION AND MANAGEMENT. (4)
The PAS 656 course is combination of lecture, formal presentations, laboratory practice sessions, and supervised patient care experiences involving patient evaluation and management skills. Prereq: Enrollment in Physician Assistant Program or consent of instructor.

PAS 657 CLINICAL LABORATORY PROCEDURES. (3)
This is a survey laboratory course covering common laboratory procedures performed in the primary care clinical setting. Emphasis will be placed on performing and interpreting basic clinical tests. Lecture, two hours; laboratory, two hours per week. Prereq: Enrollment in the Physician Assistant Studies Program.

PAS 658 CLINICAL LECTURE SERIES II. (4)
A seminar in diseases and disorders seen by primary care physician assistants. Emphasis is placed on student research and presentation of selected diseases/disorders associated with orthopedics, dermatology, emergency medicine, pediatrics, and obstetrics and gynecology. Prereq: Enrollment in the Physician Assistant Program.

PAS 660 FAMILY MEDICINE CLERKSHIP. (3)
This is an eight-week clinical course designed to provide physician assistant students with experience in evaluation and treating common problems encountered in Family medicine. Experience is provided at the level of a primary care physician assistant, and emphasis is placed on performing a history and physical exam, selecting and interpreting laboratory exams, establishing a logical differential diagnosis, conducting research on clinical problems, performing selected studies, and establishing a tentative treatment plan. Prereq: Enrollment in the Physician Assistant program and successful completion of the didactic portion of the curriculum.

PAS 661 PEDIATRIC CLERKSHIP. (3)
This is a four-week clinical course designed to provide physician assistant students with experience in evaluation and treating common problems encountered in pediatrics. Experience is provided at the level of a primary care physician assistant, and emphasis is placed on performing a pediatric history and physical exam, selecting and interpreting laboratory exams, establishing a logical differential diagnosis, conducting research on pediatric problems, performing selected procedures, and establishing a tentative treatment plan. Prereq: Enrollment in the Physician Assistant program and successful completion of the didactic portion of the PA curriculum.

PAS 662 OBSTETRICS AND GYNECOLOGY CLERKSHIP. (3)
This is a four-week course designed to provide physician assistant students with experience in evaluating and treating common problems encountered in obstetrics and gynecology. Experience is provided at the level of a primary care physician assistant, and emphasis is placed on performing a prenatal history and physical exam, assisting in surgery, selecting and interpreting laboratory exams, establishing a logical differential diagnosis, conducting research on clinical problems, performing selected studies, and establishing a tentative treatment plan. Prereq: Enrollment in the Physician Assistant program and successful completion of the didactic portion of the PA curriculum.

PAS 663 SURGERY CLERKSHIP. (3)
This is a four-week clinical course designed to provide physician assistant students with experience in evaluating and treating surgical problems. Experience is provided at the level of a primary care physician assistant, and emphasis is placed on performing a surgical history and physical exam, assisting in surgery, selecting and interpreting laboratory exams, establishing a logical differential diagnosis, conducting research on surgical problems, and performing selected surgical procedures. Prereq: Enrollment in the Physician Assistant program and successful completion of the didactic portion of the PA curriculum.

PAS 664 GERIATRIC CLERKSHIP. (3)
A 4-week physician assistant clinical clerkship in geriatric medicine. Objectives involve the development of knowledge and skills in the evaluation, management, and prevention of common geriatric disorders and diseases. Principles of business management, evidence-based medicine, research, and use of ancillary medical services are also covered. Prereq: Admission to the Physician Assistant graduate program, or consent of instructor.

PAS 665 CLINICAL PRACTICUM IN PHYSICIAN ASSISTANT STUDIES. (1-6)
This field assignment offers supervised clinical experience appropriate to the PA student's chosen area of practice. May be repeated to a maximum of 12 credits; 40 hours per week. Prereq: Enrollment in Physician Assistant Program.

PAS 669 INTERNAL MEDICINE CLERKSHIP. (6)
This is an eight-week clinical course designed to provide physician assistant students with experience in evaluating and treating common problems encountered in Internal Medicine. Experience is provided at the level of a primary care physician assistant, and emphasis is placed on performing a history and physical exam, selecting and interpreting laboratory exams, establishing a logical differential diagnosis, conducting research on clinical programs, performing selected studies, and establishing a tentative treatment plan. Prereq: Enrollment in the Physician Assistant program and successful completion of the didactic portion of the PA curriculum.

PAS 670 EMERGENCY MEDICINE CLERKSHIP. (3)
This is a four-week clinical course designed to provide physician assistant students with experience in evaluating and treating problems encountered in emergency medicine. Experience is provided at the level of a primary care physician assistant, and emphasis is placed on performing a history and physical exam, selecting and interpreting laboratory exams, establishing a logical differential diagnosis, performing selected studies, and establishing a tentative treatment plan. Prereq: Enrollment in the Physician Assistant program and successful completion of the didactic portion of the curriculum.

PAS 671 PSYCHIATRIC CLERKSHIP. (3)
This is a four-week clinical course designed to provide physician assistant students with experience evaluating and treating common problems encountered in psychiatry. Experience is provided at the level of a primary care physician assistant, and emphasis is placed on performing a history and physical exam, mental status exam, selecting and interpreting laboratory exams, establishing a logical differential diagnosis, and establishing a tentative treatment plan. Prereq: Enrollment in the Physician Assistant program and successful completion of the didactic portion of the PA curriculum.

PAS 672 PHARMACOLOGY I. (3)
This course is designed to prepare students for the pharmacological requirements of practice as a primary care physician assistant. Emphasis is placed on a description of drug categories, prescription writing, drug abbreviations and equivalents, principles of drug research, and the laws on ethics of drug use in primary care medicine. Prereq: Enrollment in the Physician Assistant Program.

PAS 673 PHARMACOLOGY II. (3)
This course is designed to prepare students for the pharmacological requirements of practice as a primary care physician assistant. Emphasis is placed on utilizing specific drugs and drug combinations for specific diseases, and performing literature reviews on current pharmacological problems. A research paper and presentation is required addressing a specific pharmacological problem that occurs in primary care physician assistant practice. Prereq: Enrollment in the Physician Assistant Program.

PAS 678 HEALTH PROMOTION AND DISEASE PREVENTION. (2)
This course is designed to focus on health promotion and disease prevention in primary care medical practice. The course reflects concerns expressed in Healthy People 2010 which call for an increased emphasis on preventive medicine and reflects the need for additional disease education for physician assistant students. The course will address topics such as immunizations, genetic counseling, complementary and alternative medicine, and health and wellness. Prereq: Enrollment in the Physician Assistant Program.

PAS 680 SEMINAR IN PHYSICIAN ASSISTANT STUDIES. (2)
A study of selected topics and contemporary issues regarding physician assistant practice. Emphasis will be placed on review of selected clinical medicine topics, research in primary care, principles of managed care, job searches and interviewing skill. Prereq: Enrollment in the Physician Assistant program and successful completion of the didactic portion of the PA curriculum.

PAS 690 PA CLERKSHIP. (3-6)
This variable credit, 1 to 2 month course is intended to allow MPAS students with a prior baccalaureate degree in PA studies to engage in clinical work relevant to their chosen area of concentration. Course objectives will be developed to include acquiring knowledge in clinical knowledge and library research. It is expected that students will use this course to develop and implement their final Master's Project. Students will be responsible for developing appropriate audiovisuals, handouts, and other presentation materials. Prereq: Completion of PAS 645, admission to the Physician Assistant Program, or consent of instructor.

# Rehabilitation Sciences

## College of Health Sciences

The Divisions of Athletic Training, Communication Sciences and Disorders, and Physical Therapy at UK, in cooperation with Occupational Therapy program at Eastern Kentucky University, and Communication Sciences and Disorders programs at Murray State University and Western Kentucky University, offer a Doctor of Philosophy Degree in Rehabilitation Sciences. This program has a unique interdisciplinary, inter-institutional emphasis for rehabilitation professionals in the disciplines of athletic training, communication disorders, occupational therapy, and physical therapy.

The focus of the program is to prepare academic leaders in Rehabilitation Sciences through interdisciplinary academic, clinical, and research experiences. The program prepares scholars and scientists in rehabilitation science to teach at the university level, direct discipline specific educational programs, work in rehabilitation services field and collaborate with other professionals on issues related to rehabilitation and health.

**Admission Requirements**
Individuals applying for admission must be eligible for state licensure or national certification in Athletic Training, Communication Disorders, Occupational Therapy, or Physical Therapy. They must also have a professional or post-professional master's degree and submit GRE scores, transcripts from all universities attended, a comprehensive resume, and three letters of recommendation.Those with basic science graduate degrees and interests are also welcomed to apply and will be considered equally for admission. International students must submit an official TOEFL score. Program application materials can be obtained from www.mc.uky.edu/rehabsciences. An interview is strongly encouraged and may be scheduled after your application has been reviewed by RHB faculty.

**Areas of Specialization**
Students in the Program have the unique opportunity to study with professionals from all four disciplines and take courses from faculty from all four institutions. Distance technologies are used to deliver some portions of the program, thus making it more widely accessible.

Physical therapists, occupational therapists, speech-language pathologists and audiologists, and athletic trainers who have a master's degree and are eligible for certification or licensure in one of the disciplines may apply for admission to the program. Students can choose from several areas of concentration to focus their research interests.  Individuals not eligible for licensure will be considered on an exceptional basis.

**Degree Requirements**
Each candidate for the Ph.D. must pass a written and oral Qualifying Examination, submit and defend a dissertation based on original and significant research and satisfy the Graduate School requirements. The courses expected of all students in the doctoral degree curriculum include the following:

**Core Courses**
RHB 701 Rehabilitation Theories and Application through the Life Span (3)
RHB 712 Critical Appraisal of Research in Rehabilitation Sciences (3)
RHB 720 Research in Rehabilitation Sciences (3)
RHB 770 Professional Seminar in Rehabilitation Sciences (6)

**Research Methodologies**
(minimum 6-9 Credits) Examples below:

STA 671 Regression and Correlation (2)
STA 672 Design and Analysis of Experiments (2)
CPH630 Biostatistics II(3)
CPH 664Design and Analysis of Clinical Trials(3)
EDS 633Single Subject Research Design(3)

Professional Discipline Specific Coursework**(min of 12 credits)
RHB 787 Teaching Apprenticeship in Rehabilitation Sciences (2) (minimum)

**Research Apprenticeship**
At least two research apprenticeships are required for students (6-9c redits) - individually designed based on student's past research experience.

RHB 789 Research Apprenticeship In Rehabilitation Sciences (1-4)
RHB 767 Residence Credit for the Doctoral Degree (4)
(2 Credits per semester for a maximum of 5 years)

For Additional Information, contact:
Esther Dupont-Versteegden, Ph.D.
eedupo2@uky.edu
Rehabilitation Sciences Doctoral Program
859.218.0592

Occupational Therapy courses are available through our partnership with the Department of Occupational Therapy at Eastern Kentucky University.

**Course Descriptions**

RHB 625 MUSCLE FORUM. (1)
Muscle Forum is a course that will allow students to develop critical evaluatory skills for seminars and grant writing in the field of Muscle Biology. Prereq: Students need to be enrolled in the Rehabilitation Sciences doctoral program, one of the graduate programs of the
Integrative Biomedical Sciences, or with permission of the course director. (Same as PGY 625.)

#RHB 680 LABORATORY TECHNIQUES IN REHABILITATION SCIENCE. (3)
The purpose the course "Laboratory Techniques in Rehabilitation Science" is to introduce students to the processes and methodology behind data acquisition and processing of commonly used systems in the fields of musculoskeletal health and rehabilitation science, with an emphasis on equipment and procedures used in the Sports Medicine Research Institute. The study of rehabilitation science involves the use and understanding of many different methodologies and data sources. The main aim of this course is to provide students with background and practical knowledge on how data, such as analog signals (i.e. force transducers, accelerometers, movement data), neuromuscular characteristics, and clinical measures are acquired, the processes used to process and refine such data, and how to interpret the results in a rehabilitation science application. Students will be exposed to common methods used to collect data in rehabilitation science through classroom and laboratory experiences. Prereq: Admittance to RHB PhD program or graduate student status with consent from instructor.

RHB 701 REHABILITATION THEORIES AND APPLICATION THROUGH THE LIFE SPAN. (3)

Explores the theories common to all the rehabilitation therapies (PT, CD, OT) and that form a foundation for the rehabilitation sciences. Included are theories specific to rehabilitation, attachment, adaptation and resilience, cognition, motor learning, empowerment, loss and grief, psycho-immunology, and the societal responses to stigmatized groups. Theories are applied to rehabilitation practice and research design across the life span. Prereq: Admission to the Rehabilitation Sciences Ph.D. program or consent of the instructor.

RHB 710 NEUROPLASTICITY IN REHABILITATION. (3)
This course will examine the neurological principles utilized by each of the rehabilitation disciplines (PT, OT, SLP) in the context of current research data and determine whether these principles hold up to scientific examination. The format of this course will utilize formal lectures on current theories of neuroplasticity and class discussion on current literature in each of these areas. Case studies will be utilized to apply current theories to practical application within each of the listed disciplines. Prereq: Course in Neuroanatomy, Admission to the Rehabilitation Sciences Doctoral Program or by consent of the instructor.

RHB 712 PHARMACOLOGY IN REHABILITATION. (2-3)
This course will provide the basic science background necessary to understand the effects of medications on patients treated in the rehabilitation setting and the their influence on treatment. Topics will include mechanisms of drug action, side effects, and how age and disease alter those mechanisms. The course will also address newly developing drug treatment strategies, including those in clinical trials. Students may either take the course for two credits or complete an additional advanced project for 3 credits, as outlined in the syllabus. The advanced project will enable the more interested student to pursue a topic in greater depth. Prereq: Admission to the Rehabilitation Sciences Doctoral Program or consent of instructor.

RHB 714 CRITICAL APPRAISAL OF RESEARCH IN REHABILITATION SCIENCES. (3)
This course will introduce the student to critical appraisal of all forms of research in the Rehabilitation Sciences. The purpose of this course is to further develop the student's competence in carrying out and evaluating research. The student will develop the skills necessary to find, critically evaluate, and synthesize the available research.

RHB 720 RESEARCH IN THE REHABILITATION SCIENCES.(3)
The purpose of this course is to provide a critical review of the current practices in research methodologies in rehabilitation and investigate the consequences of selecting various research methodologies and analytic strategies.

RHB 744 ADVANCED TOPICS IN MOTOR DEVELOPMENT. (3)
Investigation of motor development, control, and learning and teaching strategies in pediatrics. In depth analysis of movement for specific function tasks and motor dysfunction with identification of both primary and secondary designated problem areas in children with neuro-developmental concerns. Prereq: Admission to the Rehabilitation Sciences Ph.D. program or consent of the instructor.

RHB 749 DISSERTATION RESEARCH IN REHABILITATION SCIENCES. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Admission to the Rehabilitation Sciences Ph.D. program.

RHB 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

RHB 769 RESIDENCE CREDIT FOR THE DOCTORAL DEGREE. (0-9)

May be repeated to a maximum of 18 credits. Prereq: Admission to the Rehabilitation Sciences Ph.D. program.

RHB 770 PROFESSIONAL SEMINAR IN REHABILITATION SCIENCES. (0-3)
A study of selected topics related to leadership issues in the Rehabilitation Sciences with emphasis on recent research and theory related to higher education and to the communication disorders, occupational therapy, physical therapy, and athletic training disciplines. Sample topics include research methods and current topics, interdisciplinary issues, health systems, grant writing, teaching and learning in higher education, and the culture of colleges and universities. Prereq: Admission to the Rehabilitation Sciences Ph.D. program or consent of the instructor.

RHB 787 TEACHING APPRENTICESHIP IN REHABILITATION SCIENCES. (1-4)
Study of instructional methods in higher education including development of syllabi, class presentations, and examinations. Emphasis on classroom dynamics and innovative techniques for instruction. May be repeated to a maximum of four credits. Prereq: Admission to the Rehabilitation Sciences Ph.D. program in communication disorders or physical therapy or consent of the instructor.

RHB 788 INDEPENDENT STUDY IN REHABILITATION SCIENCES. (1-3)
Independent study for graduate students interested in specific interdisciplinary topics in Rehabilitation Sciences. May be repeated to a maximum of six credits. Prereq: Admission to the Rehabilitation Sciences Ph.D. program or consent of the instructor.

RHB 789 RESEARCH APPRENTICESHIP IN REHABILITATION SCIENCES. (1-9)
In-depth study of a discipline specific topic under the direction of a member of the graduate faculty. Emphasis on scientific method including development of a research question, methodology, data collection and analysis. Students will complete a supervised research project during the course. Variable credit hours repeatable to a maximum of 21 credit hours. Prereq: Admission to the Rehabilitation Sciences Ph.D. program or consent of the instructor.

# COLLEGE OF MEDICINE

# Clinical & Translational Science

## College of Medicine

The Department of Behavioral Science in the College of Medicine, in affiliation with the University of Kentucky Center for Clinical and Translational Science, offers a Ph.D. program in Clinical and Translational Science (CTS). The academic discipline focuses on acceleration of the translation of basic science advances to tangible improvements in public health. This interdisciplinary program is designed to expand research career opportunities for exceptional professionals with terminal professional health care degrees (e.g., physicians, nurses, dentists, pharmacists, public health professionals). Students enrolled in the MD/PhD Program are also eligible for admission.

The primary emphasis of the program is mentored research training to permit scholars to create well-reasoned original research contributions to the discovery of clinical health knowledge and its application. An interdisciplinary PhD Advisory Committee will play a prominent role in coordinating the individualized curriculum, research training and career development of the scholars in the program, based on scholar interest and background. A major professor (i.e., primary mentor), with the support of the Advisory Committee, will oversee research training and career development. A minimum of one faculty member in the Department of Behavioral Science who is a full member of the graduate faculty will serve as a primary or co-mentor. Other members of the Advisory Committee will be selected based on their abilities to support elements of the interdisciplinary research interests and career trajectories of the scholar, regardless of departmental affiliation.

**Admission Requirements**

Admission to the program is generally limited to 1) applicants with terminal health professional degrees with appropriate domestic licensure to practice and 2) students in the MD/PhD Program. Other students may apply to the program with consent of the Director of Graduate Studies.

Admission to the PhD in CTS program is through the Department of Behavioral Science. Inquiries about the Ph.D. program should be directed to the Director of Graduate Studies, Department of Behavioral Science. Additional information may also be obtained from the Web sites of the Department of Behavioral Science (http://behavioralscience.med.uky.edu) and Center for Clinical and Translational Science (http://ccts.uky.edu/ccts/phd-translational-science).

**Curriculum**

Scholars with a terminal health professional degree (or enrolled in the MD/PhD Program) are required to complete 18 credit hours of coursework to establish pre-qualifying residency status. This coursework typically consists of core competency-based courses in clinical and translational science (typically 13 credit hours) and tailored coursework developed in consultation with the major professor and advisory committee (minimum of 5 credit hours). The tailored portion of the curriculum will be designed to provide training needed for the scholar to lead interdisciplinary CTS research teams and/or sustain independent research programs that promote innovation and new discovery.

### Core Curriculum

| | | |
|---|---|---|
| BSC 731 | Methods and Technologies in CTS | (3) |
| BSC 732 | Interdisciplinary Protocol Development | (3) |
| BSC 733 | Seminar in CTS | (1-3) |
| BSC 534 | Ethics and Responsibility in Clinical Research | (3) |
| BSC 772 | Fundamentals of Biostatistics for Clinical and Translational Research | (3) |
| BSC 790 | Research in Medical Behavioral Science | (1-6) |

**Additional credit hours selected from graduate courses offered by health sciences colleges or related disciplines.**

# Medical Sciences

## College of Medicine

**Admission Requirements**
The Master's of Science in Medical Sciences (MSMS) is a broad interdisciplinary degree program housed in the College of Medicine. Participating Departments and Centers include Behavioral Sciences; Pharmacology and Nutritional Sciences; Toxicology and Cancer Biology; Microbiology, Immunology and Molecular Genetics; Molecular and Cellular Biochemistry; Neuroscience; and Physiology. The MSMS may be used as a stand-alone degree by students seeking career enhancement in fields such as basic biomedical research, the pharmaceutical industry, or the health science professions; by students seeking academic credentials in the biomedical sciences prior to applying for medical school or other health related professional degree programs; or by students seeking to enhance their knowledge base prior to choosing a career direction.

The MSMS degree may also provide supplemental or joint training for practitioners in the health professions (e.g., physicians, dentists, pharmacists), or students in professional health science programs based on individual career goals and research training needs. Finally, the MSMS program provides students with the opportunity to opt out of a Ph.D. program and receive a master's degree.

Admission to the graduate program is competitive and is based upon academic background, professional recommendations, performance on either the Graduate Record Examination (GRE), Medical College Admission Test (MCAT), or Dental Admission Test (DAT), and experience. Students should have completed an undergraduate degree in chemistry, biology, biochemistry, engineering, mathematics, neurosciences, physics, pharmacy or psychology. Although there are no formal course requirements, it is recommended that students have completed undergraduate courses in organic chemistry, calculus, physics, biochemistry (optional but likely helpful) and the biological sciences.

**Degree Requirements**
The Medical Sciences program encompasses the disciplines of behavioral science; nutritional sciences; toxicology; microbiology, immunology and molecular genetics; molecular and biomedical pharmacology; nolecular and cellular biochemistry; neuroscience and physiology. The student, in cooperation with the major professor/thesis advisor and the student's Advisory Committee, will determine the elective course work in the area of specialization and in related basic sciences.

Each student will take the required eight (8) hour core curriculum hours and will choose from the list of recommended courses and departmental course work to develop a disciplinary specialization. The degree requirements will vary with the thesis (Plan A) and the non-thesis (Plan B) option selected by the student. The thesis option requires a minimum of 30 hours (6 of which are research), and half of the 30 hours must be at the 600+ level, as well as an approved thesis based on the student's research. The non-thesis option requires a minimum of 30 graduate credit hours, half of which must be at the 600+ level.

Financial support is not provided for students in the M.S. in Medical Sciences program. Inquiries regarding the program should be directed to the Director of Graduate Studies, M.S. in Medical Sciences Program (Dr. Melinda Wilson at Melinda.wilson@uky.edu) or Bridget Szczapinski at bridget.szczapinski@uky.edu.

## Core Curriculum

The plan of study for the MSMS program consists of an eight (8) credit hour curriculum and a

recommended course of study based on career tracks. The eight credit hour core curriculum consists of the following courses:

| | | |
|---|---|---|
| IBS 602 | Molecular Biology and Genetics | (3) |
| IBS 606 | Physiological Communications | (3) |
| TOX 600 | Ethics in Scientific Research | (1) |
| MI 772 | Seminar in Microbiology | (1) |

## Recommended Courses (representative list)

| | |
|---|---|
| ANA 417G | Functional Human Neuroanatomy |
| ANA 611 | Regional Human Anatomy |
| ANA/PGY 605 | Neurobiology of CNS Injury and Repair |
| BCH 401G | Fundamentals of Biochemistry |
| BCH 419G | Molecular Basis of Human Disease |
| BSC 731 | Methods and Technologies in Clinical and Translational Science |
| IBS 601/BCH 607 | Biomolecules and Metabolism |
| IBS 603 | Cell Biology and Signaling |
| MI 494G | Immunobiology |
| MI 598 | Clinical Microbiology |
| MI 685 | Immunology, Infection, and Inflammation |
| NS 601/2/3 | Integrated Nutritional Sciences I/II/III |
| NS 605 | Wellness and Sports Nutrition |
| PGY 412G | Principles of Human Physiology |
| PHA 621 | Principles of Drug Action |
| PHA 622 | Molecular Drug Targets and Therapeutics |
| TOX 663 | Drug Metabolism and Disposition |
| TOX 680 | Molecular Mechanisms in Toxicology |

Coursework: The minimum requirements are as follows:

1. Plan A: Twenty-four hours of graduate level courses (50% must be at 600+ level; 2/3 in organized courses). Research required for the master's thesis cannot be included in the required 24 credit hours of course work.
2. Plan B: Thirty hours of graduate courses (50% must be 600+ level; 2/3 in organized courses).
3. Eight hours of core curriculum (see above).
4. The Advisor will work with the student to identify the remainder of hours in the area of the student's specialization.

# Microbiology

## College of Medicine

The Ph.D. program in Microbiology is designed to prepare candidates for research careers in academics, industry, and government laboratories, as well as teaching careers at major universities and colleges. The program has at its heart a close student-mentor relationship that allows for the maximum flexibility in the development of independent and creative scientists and teachers.

**Admission Requirements**
Admission to the graduate program is competitive and is based upon academic background, professional recommendations, performance on either the Graduate Record Examination (GRE), experience, and when possible, personal interviews. Students should have completed an undergraduate degree in chemistry, biology, biochemistry, engineering, mathematics, neurosciences, physics, pharmacy or psychology. It is recommended that students have completed undergraduate courses in organic chemistry, physical chemistry, calculus, physics, and the biological sciences.

Students will have the opportunity to join faculty research programs across a spectrum of topics including: pathogenic microbiology, virology, cancer cell and molecular biology and cellular and molecular immunology. Specific research areas include microbial physiology, microbial pathogenesis, cellular and molecular immununology, mucosal immunology, host immune responses to infection, tumor immunology, lymphocyte differentiation, membrane biology, molecular virology, molecular genetics and gene regulation. Students will utilize the techniques of molecular biology, genetic engineering, genomics, proteomics, array technology, transgenic technology, hybridoma technology and fluorescence-activated cell sorting. The program of study is tailored to the individual background and career goals of the student and stresses an interdepartmental approach both in the selection of courses and in the pursuit of research. The most important aspect of the doctoral program is an independent research thesis under the direction of the student's mentor. Students have the opportunity to participate in graduate seminars, journal clubs, research seminars; to interact with visiting scholars; and to present the results of their research at national and international meetings. Financial aid is available for qualified students.

All students pursuing degrees in the biomedical sciences at the University of Kentucky, College of Medicine are admitted through the Integrated Biomedical Sciences (IBS) Curriculum. This first-year core curriculum provides broad-based exposure to biochemistry, cell biology, molecular biology, genetics, cell signaling and integrated physiology, as well as flexibility in selecting a research emphasis among 125 faculty in the Biomedical Sciences. Students select their doctoral degree program at the completion of the first year core curriculum from among the departments of Anatomy and Neurobiology; Microbiology, Immunology and Molecular Genetics; Molecular and Biomedical Pharmacology; Molecular and Cellular Biochemistry; Physiology, Toxicology, and the Nutritional Sciences. Inquiries regarding admission should be directed to the Director, Integrated Biomedical Sciences Curriculum, University of Kentucky College of Medicine, Lexington, KY 40536-0298. Information regarding the IBS program and admission forms are available on their web site: http://www.mc.uky.edu/ibs/. Information regarding the Microbiology program may be obtained from the Director of Graduate Studies, Department of Microbiology, Immunology and Molecular Genetics, University of Kentucky College of Medicine, Lexington, KY 40536-0298, (800.462.5257) or the Microbiology, Immunology and Molecular Genetics web site: http://www.mc.uky.edu/microbiology/.

## Course Descriptions

MI 494G IMMUNOBIOLOGY. (3)
A survey of theories and mechanisms of immunity, including: nature of antigens and antibodies, antigen-antibody reactions, immunocompetent cells, immunogenetics, allergic reactions, tumor immunology and transplantation immunology. Prereq: BCH 401G (may be taken concurrently) and BIO 208 or BIO 308 or consent of instructor. (Same as BIO 494G.)

MI 495G BACTERIAL PATHOGENESIS. (3)
This course will examine the pathogenic mechanisms used by bacteria to cause human disease. Bacterial virulence factors and host susceptibility factors will be discussed, with an emphasis on understanding the techniques that can be used to identify these traits in newly emerging pathogens. Prereq: BIO 308, BIO 315, BCH 401 recommended. Or permission of instructor. (Same as BIO 495G.) MI 582 VIROLOGY. (3)
Physical, chemical and biological properties of viruses. Modes of replication and control of gene product formation displayed by representative plant, animal, and bacterial viruses. Prereq: BIO 304 and biochemistry or equivalent strongly recommended, or consent of instructor. (Same as BIO 582.)

MI 595 IMMUNOBIOLOGY LABORATORY. (2)
Laboratory in immunology and serology. Preparation, standardization, and uses of biological products; serology. Laboratory; four hours. Prereq: BIO/MI 494G or concurrently; or consent of instructor. (Same as BIO 595.)

MI 598 CLINICAL MICROBIOLOGY. (3)
An introduction to the concepts of clinical microbiology through a survey of the microbial diseases of man using an organ system approach. Prereq: BIO 208 and 209, BIO 476G recommended, CHE 230 or 236, or consent of instructor. (Same as PAT 598.)

MI 601 SPECIAL TOPICS IN MOLECULAR AND CELLULAR GENETICS. (1)Each semester five distinguished scientists visit the UK campus to deliver a series of three formal lectures each and participate in numerous informal contacts with graduate students. The emphasis is on the presentation of the most current advances (often unpublished) in selectedtopics in molecular and cellular genetics. May be repeated to a maximum of six credits. (Same as BCH/BIO/PLS/PPA 601.)

MI 615 MOLECULAR BIOLOGY. (3)
This course will develop the student's ability to critically read and evaluate the primary literature in selected areas of molecular biology; various experimental systems and techniques are discussed. While there is some lecture, the time will be predominately spent in class discussions of the primary literature. Prereq: An advanced course in molecular biology and genetics (e.g. IBS 602) or consent of instructor. (Same as BCH/BIO 615.)

MI 616 BIOLOGY AND THERAPY OF CANCER. (3)
Biology of cancer will be discussed at the molecular, cellular and organismic level. Emphasis will be placed on cellular signaling, apostosis and cell cycle unique to cancer cells, which affects tumor cell behavior and its interactions with the host immune system. The biology of hematopoitic cells will also be included. Clinicians active in treatment and research of various types of cancer will be invited to participate in the lectures. Prereq: BCH 502, 502, BIO 685. (Same as MED/PHA 616.)

MI 685 IMMUNOBIOLOGY, INFECTION AND INFLAMMATION. (3)
An introductory level graduate course surveying current trends in immunology including the organization of the immune system, cells important for immunity and inflammation; types of immune responses, cellular immunology, molecular immunology, self-nonself discrimination, vaccines and immune mediated

diseases. Prereq: BCH 401G, or BCH 501 or 502, IBS 501 or equivalent or consent of the course director. (Same as BIO 685.)

MI 707 CONTEMPORARY TOPICS IN IMMUNOLOGY. (3)
This course will deal with controversial and evolving areas of immunology. Lectures in a given topic will be accompanied by student discussion of contemporary literature. Prereq: MI 685 or equivalent or consent of instructor. (Same as BIO 707.)

MI 710 SPECIAL TOPICS IN MICROBIOLOGY. (2)
A variety of topics relating to modern molecular and cell biology. Prereq: Consent of instructor.

MI 720 MICROBIAL STRUCTURE AND FUNCTION. (3)
Molecular basis of structure and function in unicellular microbes. Molecular genetic and structural approaches to the analysis of bacterial architecture growth, division, and differentiation. Prereq: (to reflect appropriate IBS course). (Same as BIO 720 and OBI 720).

MI 725 MECHANICS OF MICROBIAL PATHOGENESIS. (3)
Mechanisms of Microbial Pathogenesis is designed to cover major pathogenic mechanisms of bacteria, protozoa, fungi and viruses. Since it is impossible to include every possible pathogen, we instead focus on selected pathogens that illustrate particular lifestyles and pathogenic strategies. Emphasis is given to covering host mechanisms that combat the different weapons and lifestyles of the disease causing microbes. Students will gain an understanding of the interplay between pathogen and host and appreciate the myriad ways in which microbes have learned to subvert host pathways and evade the immune system. The course starts with an introduction to pathogenic concepts and immune responses, and then proceeds to the selected pathogens, including Listeria, Chlamydia, Mycobacterium, Toxoplasma, Ebola, Influenza, and HIV. The course is a mixture of lecture and discussion. Students will read current literature, assigned by their instructors, and participate in classroom discussions of the papers. Prereq: MI 720 or MI 495G

MI 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

MI 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams. (Same as MB 749.)

MI 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

MI 768 RESIDENCE CREDIT FOR MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours. (Same as MB 768.)

MI 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (1-12)
May be repeated indefinitely. (Same as MB 769.)

MI 772 SEMINAR IN MICROBIOLOGY. (0-1)
Review of current literature in microbiology; presentation of papers on work in progress in the department

or on assigned topics; reports on meetings of national and international scientific and professional societies and symposia. Required of all graduate students. Two hours per week. May be repeated nine times for a maximum of 10 credits. (Same as BIO 772.)

MI 798 RESEARCH IN MICROBIOLOGY. (1-9)
May be repeated to a maximum of 24 credits. Prereq: Consent of instructor. (Same as BIO 798.)

MI 815 FIRST-YEAR ELECTIVE, MEDICAL MICROBIOLOGY AND IMMUNOLOGY. (1-3)
With the advice and approval of his or her faculty adviser, the first-year student may choose approved electives offered by the Department of Medical Microbiology and Immunology. The intent is to provide the student an opportunity for exploration and study in an area which supplements and/or complements required course work in the first-year curriculum. Pass-fail only. Prereq: Admission to first year, College of Medicine.

MI 816 CELLULAR STRUCTURE AND FUNCTION/GENETICS. (4)
The course combines small group meetings, lecture, clinical correlations, problem-based learning, and problem-solving sessions in providing an understanding of the relationship of human genetics to human health and disease. Close integration with biochemistry topics provides a better picture of how biochemistry, genetics and molecular biology contribute to normal human development and medicine. Lecture, 20 hours per week. Prereq: Admission to Medical School (first year).

MI 822 IMMUNITY, INFECTION, AND DISEASE. (9)
The course provides basic concepts of immunology and of bacterial, viral, fungal and protozoal biology. It focuses on mechanisms of human immunity, immunologically mediated disease, and pathogenesis in infectious disease. The material covered includes relevant pathology associated with both immunologic and infectious diseases, and a brief summary of infectious diseases from an organ system perspective. Lecture, 20 hours per week. Prereq: Admission to second year of medical curriculum.

MI 825 SECOND-YEAR ELECTIVE, MEDICAL MICROBIOLOGY AND IMMUNOLOGY. (1-4)
With the advice and approval of his or her faculty adviser, the second-year student may choose approved electives offered by the Department of Medical Microbiology and Immunology. The intent is to provide the student an opportunity for exploration and study in an area which supplements and/or complements required course work in the second-year curriculum. Pass-fail only. Prereq: Admission to second-year medical curriculum and approval of adviser.

MI 850-899 FOURTH-YEAR ELECTIVE FOR MEDICAL STUDENTS. (1-6)
With the advice and approval of the faculty adviser and the Student Progress and Promotions Committee, the fourth-year student may choose approved electives offered by the various departments in the College of Medicine. The intent is to provide the student an opportunity to develop his fund of knowledge and clinical competence. Prereq: Admission to the fourth year, College of Medicine and/ or permission of the Student Progress and Promotions Committee.

# Molecular & Cellular Biochemistry

## College of Medicine

Graduate study in biochemistry is designed to prepare candidates for research careers in academics, industry, and government laboratories. Admission to the graduate program is competitive and is based upon academic background, professional recommendations, performance on the Graduate Record Examination (GRE), experience and, when possible, personal interviews. Students should have completed an undergraduate degree in chemistry, biology, biochemistry, engineering, mathematics, physics, or pharmacy. It is recommended that students have completed undergraduate courses in organic chemistry, physical chemistry, calculus, physics and biological sciences.

Students will have the opportunity to join faculty research programs studying a spectrum of topics including: signal transduction, protein structure and function, transcriptional regulation, the cytoskeleton, secretion and vesicular fusion, disease mechanisms (atherosclerosis, cancer, infectious disease, diabetes, Alzheimer's), drug design, computational biology, development, nucleic acid dynamics, and membrane biogenesis & function. The program of study stresses an interdepartmental approach both in the selection of courses and in the pursuit of research. Students are expected to participate in graduate seminars, journal clubs, and research seminars; to interact with visiting scholars; and to present the results of their research at local and national meetings. Financial aid is available to all students in the program.

**Admission Requirements**
Admission to the Ph.D. program in Molecular and Cellular Biochemistry is through the Integrated Biomedical Sciences (IBS) Curriculum.

Inquiries regarding admission should be directed to the Director of Graduate Studies, Department of Biochemistry, University of Kentucky College of Medicine. Information regarding the Ph.D. program in Biochemistry may also be obtained at http://biochemistry.med.uky.edu/.

**Course Descriptions**

BCH 395 INDEPENDENT WORK IN BIOCHEMISTRY. (3-12)
Students will carry out a laboratory research project and related reference reading. Laboratory: 9-36 hours per week. May be repeated to a maximum of 12 credits. Prereq: Permission of instructor.

BCH 401G FUNDAMENTALS OF BIOCHEMISTRY. (3)
Descriptive chemistry of amino acids and proteins, carbohydrates, lipids, and nucleic acids. Discussion of structure and function; metabolism and bioenergetics; and biological information flow. At the undergraduate level, understanding is demonstrated through hour examinations;at the graduate level, understanding is demonstrated through hour examinations and a brief paper. Lecture, three hours; one optional conference. Prereq: CHE 107, CHE 236 and BIO 152 or equivalent.

BCH 419G MOLECULAR BASIS OF HUMAN DISEASE. (3)
The goal of this course is to provide students with an understanding of the defining characteristics of the major human diseases, the molecular mechanisms responsible for causing these diseases, and some of the molecular technologies used to diagnose and treat them. Prereq: BCH 401G.

BCH 517 EXPERIMENTAL METHODS IN BIOCHEMISTRY. (4)
A laboratory course dealing with the instrumentation and procedures of biochemical research. Because many of the materials used are labile, the course is given in a block during a four-week period at the end of the spring semester. Five days per week during four-week intersession, or summer session. Prereq: BCH 401G, 502 or 811 and consent of instructor.

BCH 556 PRINCIPLES OF DRUG DESIGN. (3)
Introduction to medicinal chemistry will be explored through rational biochemical and physical organic chemical approaches to drug design, action and development. Structural features, physical properties, mechanism of action and metabolism of drug like molecules, forces that govern interaction of drug-like molecules with their targets, enzyme mechanisms and inhibition and xenobiotic metabolism will be illustrated with specific examples showing how drugs function at the molecular level. Prereq: CHE 230, CHE 232, BIO 148, BIO 152. (Same as PHS 556.)

BCH 601 SPECIAL TOPICS IN MOLECULAR AND CELLULAR GENETICS. (1)
Each semester five distinguished scientists visit the UK campus to deliver a series of three formal lectures each and participate in numerous informal contacts with graduate students. The emphasis is on the presentation of the most current advances (often unpublished) in selected topics in molecular and cellular genetics. May be repeated to a maximum of six credits. (Same as BIO/MI/PLS/PPA 601.)

BCH 604 STRUCTURAL BIOLOGY. (3)
An advanced course on the structure and function of proteins and nucleic acids. Topics include: the physical determinants of protein structure, classification of protein architecture, protein-nucleic acid and protein-protein interactions, sequence dependence of nucleic acid structure, ribozymes, dynamics and evolutionary relationships. Prereq: IBS 601-602/BCH 607-608 or equivalent.

BCH 607 BIOMOLECULES AND METABOLISM. (3)
An introductory graduate-level biochemistry course designed to provide a basic knowledge of molecular and biochemical principles necessary for advanced graduate study. Protein structure and function, enzyme catalysis, the generation and storage of metabolic energy, amino acid, nucleotide, and lipid metabolism and biological membranes and transport will be covered. Prereq: CHE 105, 107, 230 and 232; BIO 150 and 152; or equivalents. (Same as IBS 601.)

BCH 608 BIOMOLECULES AND MOLECULAR BIOLOGY. (3)
An introductory graduate-level biochemistry course focused on the cellular mechanisms that underlie the regulated expression of genes, including transcription and translation, as well as basic mechanisms of DNA replication/repair and recombination. Genetic engineering and other experimental approaches critical to molecular biology research will be reviewed. Prereq: CHE 105, 107, 230 and 232; BIO 150 and 152; or equivalents.

BCH 609 PLANT BIOCHEMISTRY. (3)
The course will consider the chemical constituents of plants (with emphasis on biologically or nutritionally significant compounds unique to plants), their biosynthesis, contribution to key metabolic and defense processes and the regulation of their synthesis. Included will be discussions of photosynthesis, carbohydrates, lipids, isoprenoids and phenylpropanoids, nitrogen fixation, nitrogen and sulfur reduction and assimilation, alkaloids and additional secondary compounds, frontiers in plant biochemistry. Prereq: BCH 607 or equivalent or consent of instructor. (Same as PLS/PPA 609.)

BCH 610 STRUCTURE AND FUNCTION OF BIOMEMBRANES. (3)
A lecture and seminar course that discusses primary literature focused on the structures, assembly, and functions of biologically important membranes. Prereq: CHE 232; CHE 442G; BCH 401G, 811, or IBS 601.

BCH 611 BIOCHEMISTRY AND CELL BIOLOGY OF NUCLEIC ACIDS. (3)
A lecture and seminar course devoted to a study of the principles of nucleic acid chemistry and to the role of nucleic acids in cellular function. Prereq: BCH 401G, 502 or 811.

BCH 612 STRUCTURE AND FUNCTION OF PROTEINS AND ENZYMES. (3)
Primarily a lecture course devoted to the relationship of the structure of protein molecules to their biological roles. Proteins will be discussed in terms of their size, shape, conformation, primary structure, catalytic mechanism and regulatory properties. Prereq: BCH 401G, 502 or 811; CHE 444G or consent of instructor. May be taken concurrently with BCH 502.

BCH 615 MOLECULAR BIOLOGY. (3)
This course will develop the student's ability to critically read and evaluate the primary literature in selected areas of molecular biology; various experimental systems and techniques are discussed. While there is some lecture, the time will be predominately spent in class discussions of the primary literature. Prereq: An advanced course in molecular biology and genetics (e.g. IBS 602) or consent of instructor. (Same as BIO/MI 615.)

BCH 618 SEMINAR IN BIOCHEMISTRY. (1)
A weekly seminar, required of all students majoring in biochemistry, devoted to discussions of areas not covered in other courses and to recent developments in the field. May be repeated to a maximum of five credits.

BCH 619 SEMINAR IN BIOCHEMISTRY. (1)
A weekly seminar, required of all students majoring in biochemistry, devoted to discussions of areas not covered in other courses and to recent developments in the field. May be repeated to a maximum of five credits.

BCH 620 BIOSYNTHESIS OF NATURAL PRODUCTS. (3)
An overview of the biochemical pathways leading to compounds called natural products/secondary metabolites. Prereq: Two semesters of organic chemistry. (Same as PHR 620/PLS 642.)

BCH 625 SCIENTIFIC COMMUNICATIONS. (2)
To be useful, scientific research needs to be explained clearly to others – to colleagues, to administrators, to foundations and governmental bodies, and to the public. This course will give students the tools to effectively present their data, their ideas, and themselves to the scientific community. Through a series of directed exercises the students will learn how to write an abstract, a scientific paper, and a grant, and to prepare a poster and to give an oral presentation. The class will draw examples, topics, and exercises from current literature. Prereq: Good standing in a graduate program in the physical, chemical or biomedical sciences.

BCH 640 RESEARCH IN BIOCHEMISTRY. (1-9)
Prereq: Consent of instructor.

BCH 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

BCH 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

BCH 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

BCH 768 RESIDENCE CREDIT FOR MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

BCH 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

BCH 779 MEMBRANE SCIENCES COLLOQUIUM. (1)
Outstanding membrane scientists present their current research on biological and/or synthetic membranes. Students read a pertinent paper by the speaker prior to his/her talk and write a short paper on the talk; especially important is relevance of the main points of the talk to membrane science in general and the student's own research in particular. May be repeated to a maximum of six credits. (Same as CHE/ CME/

PHA/PHR 779.)

BCH 780 TOPICS IN BIOCHEMISTRY. (1-3)
A lecture and seminar course offered on topics of special interest to graduate students. May be repeated to a maximum of six credits.

*BCH 812 DENTAL BIOCHEMISTRY. (6)
This is a comprehensive course in biochemistry designed to fulfill the specific needs of student dentists. Course content is generally as outlined in the American Association of Dental Schools suggested curriculum guidelines for biochemistry. Part I acquaints students with the chemical constituents of prokaryotic and eukaryotic cells; topics include the chemistry of lipids, carbohydrates, proteins, vitamins and coenzymes, and the nature of enzyme action. Part II integrates the chemical principles learned from Part I with concepts of cell dynamics, structure, function, subcellular organization, and metabolism. Topics include intermediary metabolism, bioenergetics, DNA replication, protein synthesis, and cellular regulatory and control mechanisms. Course content, where possible, is related to current concepts concerning the etiology of oral diseases, their treatment, and prevention to assist student dentists in attaining institutional goals and objectives for clinical competency. Prereq: Admission into the College of Dentistry and/or consent of course director. (Same as OBI 812.)

BCH 815 FIRST-YEAR ELECTIVE, BIOCHEMISTRY. (1-3)
With the advice and approval of his or her faculty adviser, the first-year student may choose approved electives offered by the Department of Biochemistry. The intent is to provide the student an opportunity for exploration and study in an area which supplements and/or complements required course work in the first-year curriculum. Pass-fail only. Prereq: Admission to first year, College of Medicine.

BCH 819 CELLULAR STRUCTURE AND FUNCTION/BIOCHEMISTRY. (7)
The course combines lecture, small group activities, clinical correlations, problem-based learning, and problem-solving sessions in providing an understanding of the relationship of biochemical principles to human health and disease. Close integration with genetics topics provides a better picture of how biochemistry, molecular biology and genetics contribute to normal human development and medicine. Lecture, 20 hours per week. Prereq: Admission to Medical School (first year).

BCH 825 SECOND-YEAR ELECTIVE, BIOCHEMISTRY. (1-4)
With the advice and approval of his or her faculty advisor, the second-year student may choose approved electives offered by the Department of Biochemistry. The intent is to provide the student with an opportunity for exploration and study in an area which supplements and/or complements required course work in the second-year curriculum. Pass/Fail only. Prereq: Admission to second year medical curriculum and approval of advisor.

BCH 850-899 FOURTH-YEAR ELECTIVE FOR MEDICAL STUDENTS. (1-6)
With the advice and approval of the faculty adviser and the Student Progress and Promotions Committee, the fourth-year student may choose approved electives offered by the various departments in the College of Medicine. The intent is to provide the student an opportunity to develop his fund of knowledge and clinical competence. Prereq: Admission to the fourth year, College of Medicine and/ or permission of the Student Progress and Promotions Committee.

<u>Approved elective:</u>
*BCH 850 ELECTIVE: RESEARCH IN BIOCHEMISTRY

# Neuroscience

## College of Medicine

The Department of Neuroscience offers a graduate program leading to the Doctor of Philosophy degree in Anatomy and Neurobiology. Graduate study in anatomy and neurobiology is designed to prepare candidates for research careers in academics, industry, and government laboratories. Admission to the graduate program is competitive and is based upon academic background, professional recommendations, performance on the Graduate Record Examination (GRE), experience, and when possible, personal interviews. Students should have completed an undergraduate degree in biology, biochemistry, chemistry, engineering, mathematics, neurosciences, physics, pharmacy or psychology. Some students who have already completed an M.D. or D.M.D. degree may be interested in obtaining specific training in anatomy and neurobiology in order to complete their professional education. For traditional students with only an undergraduate degree, undergraduate courses in organic chemistry, physical chemistry, calculus, physics, and the biological sciences are highly recommended.

Students will have the opportunity to join faculty research programs across a spectrum of topics including: cellular and molecular neurobiology, neurodegenerative diseases and aging, brain and spinal cord injury, neuroendocrinology, and behavioral, cognitive and integrated neuroscience. The program of study is tailored to the individual background and career goals of the student and stresses an interdepartmental approach both in the selection of courses and in the pursuit of research. Students are expected to participate in graduate seminars, journal clubs, research seminars; to interact with visiting scholars; and to present the results of their research at local and national meetings. Teaching opportunities leading to a graduate certificate in Anatomical Sciences Instruction are also available. Financial aid is available to students accepted into the program.

**Admission Requirements**
Admission to the Ph.D. program in Neuroscience is through the Integrated Biomedical Sciences (IBS) Curriculum. Inquiries regarding admission should be directed to the Director, Integrated Biomedical Sciences Curriculum, University of Kentucky College of Medicine at http://www.mc.uky.edu/ibs/. For information about the Ph.D. program in Anatomy and Neurobiology, contact the Director of Graduate Studies, Department of Neuroscience. Information may also be obtained from the department website.

**Course Descriptions**

ANA 503 INDEPENDENT WORK IN ANATOMY. (3)
Reading and laboratory work in a defined area of anatomy are carried out under the direct supervision of one staff member. Hours of discussion and laboratory work by individual arrangement. May be repeated to a maximum of 12 credits. Prereq: An introductory course in biology, zoology, or botany and consent of instructor.

ANA 511 INTRODUCTION TO HUMAN ANATOMY. (5)
The principles of organization of the human body are presented. Gross anatomy lectures initially follow a systemic plan. This is succeeded by a regional presentation. Several methods of studying anatomy are utilized. These include radiology, palpation of living structures, and the demonstration of prosected fresh and fixed materials. Prereq: Some background in biology, including one or more such courses as biology, zoology, botany, comparative anatomy or embryology, and enrollment in the College of Medicine or a graduate program in the biomedical sciences. In addition, students from graduate programs outside of anatomy must obtain the consent of the course director before registration.

ANA 512 MICROSCOPY AND ULTRASTRUCTURE. (4)
The organization of cells, tissues and organs are presented through lectures and in the laboratory, through the microscopic study of histological sections and illustrations. Prereq: Some background in biology, including one or more such courses as biology, zoology, botany, histological techniques, comparative anatomy or embryology and enrollment in the College of Medicine or a graduate program in the biomedical sciences. In addition, students from graduate programs outside of anatomy must obtain the consent of the course director before registration.

ANA 516 SELECTED TOPICS IN ADVANCED NEUROSCIENCE. (3)
ANA 516 will cover advanced topics in neuroscience. Topics include: neural pathways, development, neuroanatomy, neurobiochemistry, neuropharmacology, neural imaging and molecular neuroscience. Laboratory experiences will be used to complement lectures. Prereq: ANA 511, 512, 513; PGY 511; and enrollment in the College of Medicine or a graduate program in the bio-medical sciences. In addition, students from graduate programs outside of anatomy must obtain the consent of the course director before registration.

ANA 530 COMBINED HISTOLOGY AND SPECIAL ORAL MICROANATOMY. (5)
An analysis of the histological structure and organization of the human body, including an especially detailed treatment of the tissues and organs related to the oral cavity. Prereq: Admission to the College of Dentistry or some background in biology and consent of instructor.

ANA 534 DENTAL GROSS ANATOMY AND EMBRYOLOGY. (6)
Study of human gross and developmental anatomy with particular emphasis on functional anatomy of the head and neck. Lecture/ laboratory course, with dissection being an essential component of the laboratory portion. 140 hours. Prereq: Admission to the College of Dentistry. (Same as OBI 815.)

ANA 536 HUMAN EMBRYOLOGY, AN ABBREVIATED COURSE. (2)
A concise presentation of developmental mechanisms, early development of the embryo, and subsequent development of selected systems and regions of the body. Lecture, one hour. Prereq: Admission to the College of Dentistry.

ANA 538 DENTAL NEUROANATOMY. (2)
Study of human dental neuroanatomy with emphasis on functional neuroanatomy of central nervous system, especially related to cranial nerves 5, 7, 9, and 10, pain, and long tracts. Prereq: Admission to the College of Dentistry.

ANA 600 SEMINAR IN ANATOMY. (1)
A weekly seminar devoted to presentation and discussion of classic and new research in the field. May be repeated to a maximum of four credits. Prereq: Admission to the anatomy graduate program or permission of the course director.

ANA 605 NEUROBIOLOGY OF CNS INJURY AND REPAIR.
The objective of the course will be to provide a general overview of the current state of knowledge concerning the pathophysiology and therapeutic approaches to central nervous system injury. The course will provide a strong working background concerning the issues, techniques and frontiers of neurotrauma therapeutic discovery research aimed at reducing acute post-traumatic neurodegeneration in the injured brain or spinal cord or enabling regeneration and repair. This course is a graduate level course intended for students who are in their second or subsequent years of graduate study and who are pursuing focused research training in neurotrauma research. No special prerequisites, other than graduate standing, are necessary. However, a background in neuroanatomy and neurophysiology is highly recommended. Prereq:

Permission of instructor. (Same as PGY 605.)

ANA 609 EDUCATIONAL STRATEGIES IN THE ANATOMICAL SCIENCES. (3)
This course informs on and examines multiple aspects of teaching the Anatomical Sciences. Classroom and laboratory issues, teaching theory, portfolio development and presentation strategies are among the topics covered. Prereq: Admission to the graduate certificate program in the Anatomical Sciences or the permission of the course director.

ANA 611 REGIONAL HUMAN ANATOMY. (5)
Functional human anatomy covering all regions of the body utilizing dissection techniques with an emphasis on cross-sectional anatomy and normal morphology. Lecture, four hours; laboratory, four hours per week. Prereq: Enrollment in the PAS Program of the College of Allied Health or a graduate program in the biomedical sciences (by consent of course director only).

ANA 612 BIOLOGY OF AGING. (3)
A multidisciplinary discussion of how the process of aging affects biological systems. Coverage will be quite broad and includes topics such as subcellular and cellular aging, genetics, immunology, anatomy and physiology, animal model of aging, etc. Prereq: Enrollment in the doctoral program in Gerontology or a biomedical science department or consent of instructor. (Same as BIO/GRN/PGY 612.)

ANA 625 INTRODUCTION TO FUNCTIONAL MRI. (1)
Hands-on course for practitioners interested in acquiring functional MRI technique(s) as a research tool. Prereq: (1) Introductory statistics (e.g. PSY 610, STA 503, STA 570). (2) Permission of instructor.

ANA 631 ADVANCED HUMAN ANATOMY. (3-5)
The objective of this course is to meet individual student needs for increased knowledge in particular areas of gross human morphology. Investigations of problems involving gross morphology will be carried out. One or several defined areas of the body will be studied in considerable detail by dissection, by intensive use of the pertinent literature, by the use of visual aids, prosected materials and other appropriate learning aids. Prereq: A background in gross human anatomy equivalent to a medical school course in regional anatomy and consent of course director and/or Director of Graduate Studies in Anatomy and Neurobiology.

ANA 636 ADVANCED NEUROSCIENCE. (3-5)
This course will consist of a comprehensive examination of the nervous system. Emphasis will be placed on structure-function relationships, neurotransmitters, chemical constituents of the nervous system, neuronal as well as non-neuronal cells, plasticity of the nervous system and developmental biology. The detailed content and emphasis will depend on both the background and goals of the students. Depending on the number of credits a student registers for, and the topic and course orientation, laboratory work, library work, written and/or oral presentations may be a course requirement. Prereq: Enrollment in a graduate program in the biomedical sciences, or consent of the instructor.

ANA 638 DEVELOPMENTAL NEUROBIOLOGY. (3)
An explanation of the processes which contribute to the development of the nervous system. Neurophysiological, cell biological and molecular approaches to cell differentiation, neuronal pathfinding and synapse formation and stabilization will be explored and discussed. Examples will be drawn from both vertebrate and invertebrate preparations. Prereq: BIO 535 or consent of instructor. (Same as BIO/ PGY/ PSY 638.)

ANA 655 INTRODUCTION TO MAGNETIC RESONANCE IMAGING. (3)
Survey of basic concepts and applications in magnetic resonance imaging: physics and chemistry, basic

mathematical foundations, workings of a modern MRI scanner, image reconstruction, biology with emphasis on neurobiology, medical applications in the brain and heart. Covers basic functional imaging and spectroscopy. Prereq: Undergraduate major in a science or engineering discipline.

ANA 660 BIOLOGY OF REPRODUCTION.
Advanced study of current topics in reproductive biology. The course is comprised equally of student-led discussions and lectures given by faculty with research expertise in selected topics. Readings will be taken from current and classic literature. Topics covered include (but are not limited to) molecular and cellular endocrinology, hormone receptors and mechanism of action, reproductive neuroendocrinology, reproductive behavior, gametogenesis, fertilization, sexual differentiation, puberty, menopause and environmental effects on reproduction. Emphasis will be placed on the analysis and understanding of the experimental basis for current concepts in reproductive biology. Prereq: ASC/PGY 601 and ASC 364 or BIO/PGY 502 or consent of instructor. (Same as ASC 660 and PGY 660).

ANA 662 ULTRASTRUCTURAL ANATOMY. (2-5)
The objectives of this course are to advance the students' knowledge of the submicroscopic structure of cells and tissues. Correlation of intra- and extracellular morphology and function will be emphasized. Students will do detailed laboratory work in the techniques of electron microscopy. Depending on the number of credits a student registers for, and the topic and course orientation, laboratory work, library work, written and/or oral presentations may be a course requirement. Prereq: ANA 512, previous work in microscopy including histology or cytology, or equivalents, and consent of instructor.

ANA 710 AGING OF THE NERVOUS SYSTEM. (3)
This course will examine the alterations in the brain that occur with aging and in neurodegenerative disorders such as Alzheimer's disease. The emphasis will be on human aging although the relevance of animal models to studies of human aging will be a recurrent theme. The course will examine aging at several levels, including molecular, cellular, organismic, and behavioral. A strong background in the basic sciences in encouraged. (Same as GRN/PGY/PHA 710.)

ANA 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

ANA 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

ANA 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

ANA 790 RESEARCH IN ANATOMY. (1-12)
Individualized laboratory and research experience under the supervision of a faculty member. May be repeated to a maximum of 12 credits. Prereq: Consent of the instructor.

ANA 801 HISTOLOGY FOR PHYSICAL THERAPY STUDENTS. (1)
A survey of selected basic and specialized mammalian tissues most commonly involved in diseases treated by physical therapists. The course provides information required for understanding the cellular

mechanisms behind the various diseases and the rationale for subsequent treatment. Prereq: Admission to the College of Allied Health.

# Nutritional Sciences

## College of Medicine

The impact of nutrition on health and disease has produced major clinical and public policy challenges that are shaping research and career opportunities for highly trained nutritional scientists in academia, industry and government. Disease prevention efforts, increased health consciousness and an aging population are further fueling the demand for nutritional scientists. The interdisciplinary Division of Nutritional Sciences enables students in its Ph.D. and Master's of Science programs to explore the interrelationship between environmental factors and nutrients and their effect on biochemistry, physiology and disease development. More than 50 faculty members provide teaching and individualized research guidance across over 20 departments and divisions in the University's Colleges of Medicine, Health Sciences and Agriculture, as well as the Colleges of Pharmacy, Nursing, and Education.

One of the Center's primary areas of research and training targets nutrition and chronic diseases, with a focus on obesity and associated disorders of cardiovascular disease, diabetes and cancer. Other specialty areas include nutrition and oxidative stress, nutrition and aging, clinical nutrition, animal nutrition and food science.

Further information may be obtained by writing to the Director of Graduate Studies, Division of Nutritional Sciences, 521 CTW Building, 900 South Limestone, University of Kentucky, Lexington, KY 40536-0200.

Applicants for the Ph.D. and Master's of Science programs must meet admissions requirements for the both the University of Kentucky Graduate School and for the Division of Nutritional Sciences.

## Master of Science

**Admission Requirements**

1. A baccalaureate degree from a fully accredited institution of higher learning.
2. A minimum undergraduate grade point average of 2.9 on undergraduate coursework and a 3.0 on all graduate work.
3. An average Graduate Record Examination (GRE) score on the verbal, quantitative and analytical sections greater than the 30th percentile.
4. For international applicants, a minimum score of 550 on the paper-based Test of English as a Foreign Language (TOEFL), which has a maximum score of 667; score of 213 on the computer-based TOEFL (maximum 300), or 79 on the internet-based TOEFL. The minimum International English Language Testing Service (IELTS) score is a 6.5. All applicants must demonstrate proficiency in verbal and written English.
5. Admission for the M.S. in Nutritional Sciences with Clinical Nutrition Emphasis is limited to those with a B.S. in Dietetics, having an RD, or being RD eligible.
6. Course Prerequisites: you would need to have taken an undergraduate physiology course (PGY 206 at UK) and it is highly recommended that you have taken 1 year of general chemistry (CHE 105 and 107 at UK) and 1 semester of organic chemistry (CHE 236 at UK). Biochemistry is also a prerequisite course but it can be taken your first semester for graduate credit (BCH 401G). It has prerequisites of CHE 107 and CHE 236.

**Admissions Process**

All those interested in graduate study at the University of Kentucky Graduate School must apply online

via Hobson's ApplyYourself Application Network. There is a $65 application fee for domestic applicants and a $75 application fee for international applicants. Please note that the application cannot be submitted without paying this fee.

The following information must be submitted online to the Graduate School via ApplyYourself:

1. Transcripts from all higher education institutions attended. The Graduate School requires an overall grade point average of 2.9 on all undergraduate work, and a 3.00 on all graduate work
2. GRE scores are required for admission. GRE scores should be sent directly from Educational Testing Service (ETS); the Institutional Code for the GRE for the UK Graduate School is R1837.
3. TOEFL or IELTS scores are required for all applicants whose native language is not English. TOEFL scores should be sent directly from Educational Testing Service (ETS); the Institutional Code for the TOEFL for the UK Graduate School is R1837. IELTS scores should be sent directly from the International English Language Testing Service, specifying the University of Kentucky Graduate School, Lexington KY as the recipient institution.
4. Curriculum vitae.
5. A brief essay, no longer than two single-spaced pages, describing long-term career goals and how the M.S. Program in Nutritional Sciences would advance these goals.
6. Three letters of recommendation.
7. Research Assistantship Application Form (optional): http://pharmns.med.uky.edu/pharmns-research-assistant-application-form.

**Research Assistantships**
Applicants who have been accepted into the M.S. program and can also apply for a Research Assistantship with individual faculty. Interested applicants should submit a completed Research Assistantship Application Form with their application materials to the Center's Director of Graduate Studies by the application deadline listed below.

**Degree Requirements**
Prerequisites-200 level or equivalent physiology course. Recommended a 400 level biochemistry course

Core Courses Total credits required for degree (30)

| | | |
|---|---|---|
| NS/CNU 601 | Integrated Nutritional Sciences Part I | 3 credits |
| NS/ASC/CNU 602 | Integrated Nutritional Sciences Part II | 3 credits |
| NS/CNU/FCS 603 | Integrated Nutritional Sciences Part III | 2 credits |
| NS/CNU/NFS704 | Current Topics | 1 credit |
| STA 570 | Basic Statistical Analysis | 4 credits OR |
| IBS 611 | Practical Statistics | 1 credit |
| NS 771 | Seminar in Nutritional Sciences | 0-1** credits |
| NS/CNU/NFS 782 | Special Problems | 1-6* credits |
| NS/CNU 609 | Ethics | 1 credits |

Core Credits = 15 *Plan B Only **Plan A Only

Courses for Emphasis in Clinical Nutrition Prerequisite- B.S. in Dietetics and/or meeting ADA Dietetics requirements for internship

| | | |
|---|---|---|
| CNU 501 | Nutraceuticals and Functional Foods | 2 credits OR |
| CNU 502 | Obesity: Cell to Community | 2 credits |
| NS/CNU 702 | Clinical Nutrition Problem Based Case Studies | 1-3 credits |

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|---|---|---|
| CNU 611 | Advanced Medical Nutrition Therapy | 2 credits |
| CNU 612 | Examination Skills for the Clinical Nutritionist | 2 credits |

Emphasis Credits = 8-10 Electives to equal a minimum of 30 credit hours

Courses for Emphasis in Wellness and Sports Nutrition

| | | |
|---|---|---|
| NS/CNU 605 | Wellness and Sports Nutrition | 3 credits |
| KHP 600 | Exercise Stress Testing and Prescription | 3 credits |
| KHP 620 | Advanced Exercise Physiology | 3 credits |
| CNU 501 | Nutraceuticals and Functional Foods | 2 credits |

Emphasis credits = 14 Electives to equal a minimum of 30 credit hours

Courses for Emphasis in Community Nutrition

| | | |
|---|---|---|
| CPH 605 | Epidemiology | 3 credits |
| DHN 603 | Advanced Community Program Development | 3 credits |
| DHN 607 | Food Related Behaviors | 3 credits |

Emphasis credits= 15 Electives to equal a minimum of 30 credit hours

Courses for Emphasis in Molecular and Biochemical Nutrition

| | | |
|---|---|---|
| BCH 607 (IBS 601) | Biomolecules & Metabolism | 3 credits |
| BCH 608 | Biomolecules and Molecular Biology | 3 credits OR |
| IBS 602 | Molecular Biology & Genetics | 3 credits |
| NS/CNU 606 | Molecular Biology Applications in Nutrition | 2 credits |

Emphasis Credits= 8 Electives to equal a minimum of 30 credit hours

Approved Electives

The student must successfully complete a minimum of 6 credit hours in electives. Elective courses are recommended by the DGS and/or the Advisor.

Suggested elective courses include:

| | | |
|---|---|---|
| IBS 604 | Cell Signaling | 3 credits |
| IBS 605 | Experimental Genetics | 2 credits |
| IBS 607 | Seminar in Integrated Biomedical Sciences | 0 credit |
| IBS 609 | Research in Integrated Biomedical Sciences | 1 credit |
| NS/CNU 606 | Molecular Biology Applications in Nutrition | 2 credits |
| CNU 501 | Nutraceuticals and Functional Foods | 2 credits |
| CNU 502 | Obesity: Cell to Community | 2 credits |
| CNU 611 | Advanced Medical Nutrition Therapy | 2 credits |
| CNU 612 | Examination Skills for the Clinical Nutritionist | 2 credits |
| CNU/NS 604 | Lipid Metabolism | 3 credits |
| CNU/NS 605 | Wellness and Sports Nutrition | 3 credits |
| CNU/NS 702 | Problem-Based Case Studies | 1-5 credits |
| ASC 681 | Energy Metabolism | 3 credits |
| ASC 683 | Protein metabolism | 3 credits |
| ASC 689 | Physiology of Nutrient Digestion/Absorption | 3 credits |
| ASC 684 | Advanced Ruminent Nutrition | 3 credits |
| ASC 686 | Advanced Non-ruminant Nutrition | 3 credits |
| FSC 638 | Food Proteins | 3 credits |
| FSC 640 | Food Lipids | 3 credits |
| FSC 434G | Food Chemistry | 4 credits |

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|---|---|---|
| BCH 610 | Biochemistry of Lipids and Membranes | 3 credits |
| BCH/BIO/MI 615 | Molecular Biology | 3 credits |
| CPH 605/PM 620 | Epidemiology | 3 credits |
| CPH 645 | Food Systems, Malnutrition and Public Health | 3 credits |
| EDP 661 | Counseling Techniques II | 3 credits |
| GS 610 | College Teaching | 3 credits |
| KHP 420G | Physiology of Exercise | 3 credits |
| KHP 621 | Advanced Exercise Physiology | 3 credits |
| KHP 621 | Exercise and Coronary Heart Disease | 3 credits |
| KHP 720 | Sport Medicine | 3 credits |
| KHP 781 | Theory and Methodology of Body Composition | 3 credits |
| MI 685 | Advanced Immunology | 3 credits |
| MI 710 | Molecular Cell Biology | 3 credits |
| PGY 604 | Advanced Cardiovascular Physiology | 3 credits |
| PGY 607 | Hormonal Control Mechanisms | 3 credits |
| BCH 609 | Plant Biochemistry | 3 credits |

## Doctor of Philosophy

**Admission Requirements**

There are two ways to be admitted into the PhD program:

- Direct Admission http://pharmns.med.uky.edu/pharmns-phd-application or
- IBS Program http://www.mc.uky.edu/ibs/default.asp

*Direct Admission Requirements for the Ph.D. Program*

Applicants must meet the following requirements for admission to the University of Kentucky Graduate School and the Graduate Center for Nutritional Sciences:

1. A baccalaureate degree from a fully accredited institution of higher learning.
2. An M.S. degree with a Grade Point Average (GPA) of 3.2 or above on a 4.0 scale, or a B.S. degree with a GPA of 3.0 or above on a 4.0 scale.
3. An average Graduate Record Examination (GRE) score on the verbal, quantitative and analytical sections that is greater than the 50th percentile.
4. For international applicants, a minimum score of 550 out 667 maximum possible is required on the paper-based Test of English as a Foreign Language (TOEFL), a minimum 213 score on the computer-based TOEFL (maximum 300), or 79 on the internet-based TOEFL. The minimum International English Language Testing Service (IELTS) score is 6.5. All applicants must demonstrate proficiency in verbal and written English.
5. Course Prerequisites: an undergraduate physiology course (PGY 206 at UK), 1 year of general chemistry (CHE 105 and 107 at UK), and 1 semester of organic chemistry (CHE 236 at UK).

**Application Process**

All those interested in graduate study at the University of Kentucky Graduate School must apply online via Hobson's ApplyYourself Application Network. There is a $65 application fee for domestic applicants and a $75 application fee for international applicants. Please note that the application cannot be submitted without paying this fee.

The following information must be submitted online to the Graduate School via ApplyYourself:

1. Transcripts from all higher education institutions attended. The Graduate School requires an average of 2.9 on all undergraduate work, and a 3.00 on all graduate work. Please note: the Graduate Center for Nutritional Sciences requirements are higher. GRE scores are required for admission. GRE scores should be sent directly from Educational Testing Service (ETS); the Institutional Code for the GRE for

the UK Graduate School is R1837.
2. TOEFL or IELTS scores are required for all applications whose native language is not English. TOEFL scores should be sent directly from ETS; the Institutional Code for the TOEFL for the UK Graduate School is R1837. IELTS scores should be sent directly from the IELTS, specifying the University of Kentucky Graduate School, Lexington, KY as the recipient institution.
3. Curriculum vitae
4. A brief essay, no longer than two single-spaced pages, describing long-term career goals and how the Ph.D. Program in Nutritional Sciences would advance these goals.
5. Three letters of recommendation
6. Completed Research Assistant Application Form (http://pharmns.med.uky.edu/pharmns-research-assistant-application-form).

**Research Assistantships and Laboratory Rotations**
Ph.D. applicants are required to apply for a Research Assistantship, which represents an integral part of the Ph.D. program. Applicants accepted into the Ph.D. program also may apply to participate in a Laboratory Rotation Program. This program enables students to work four to nine months in as many as three laboratories before selecting an advisor.

**Degree Requirements**
Doctoral Degree Requirements
Students are required to complete the core curriculum. Elective courses to be taken will be recommended by the advisory committee.

Academic Course Prerequisites to Program:
Biology (2 semesters)
General Chemistry (2 semesters)
Organic Chemistry (1 semester)
Undergraduate Biochemistry and Physiology

Some courses are cross-listed with other units and departments, but for clarity only the "NS" prefixes are listed below.

Core Curriculum

| | | |
|---|---|---|
| NS 601 | Integrated Nutritional Sciences I | 3 credits |
| NS 602 | Integrated Nutritional Sciences II | 3 credits |
| NS 603 | Integrated Nutritional Sciences III | 2 credits |
| NS 704 | Current Topics in Nutrition | 1 credit |
| NS 771 | Graduate Seminar in Nutritional Sciences | 1 credit** |
| NS 609 | Ethics in Clinical Research | 1 credit OR |
| TOX 600 | Ethics in Scientific Research | 1 credits |
| STA 570 | Basic Statistical Analysis | 4 credits OR |
| IBS 611 | Practical Statistics | 1 credit |
| IBS 601 | Biomolecules & Metabolism | 3 credits OR |
| IBS 602 | Molecular Biology & Genetics | 3 credits |
| IBS 603 | Cell Biology | 3 credits |
| IBS 606 | Integrated Medical Sciences | 3 credits OR |
| PGY 502 | Principles of Systems, Cellular and Molecular Physiology OR | 5 credits |
| PGY 412G | Principles of Human Physiology | 4 credits |
| Electives | Electives | 7-12 credits |
| Total | | 36 credits |

**All Ph.D. students must register for 0 credit (except for the one semester registered for 1 credit) and attend all GCNS seminars during their residency at the University of Kentucky. Minimum of 1 credit is required before qualifying examination. In addition, all GCNS doctoral candidates will present a seminar once/year post-qualifying exam.

Electives The student must successfully complete a minimum of 7 credit hours in electives. Elective courses are recommended by the Advisor and approved by the Advisory Committee.

Suggested courses are listed below:

| | | |
|---|---|---|
| IBS 607 | Seminar in Integrated Biomedical Sciences | 0 credit |
| IBS 608 | Special Topics in Integrated Biomedical Sci. | 2 credits |
| IBS 609 | Research in Integrated Biomedical Sciences | 1 credit |
| IBS 610 | Critical Readings/Small Groups | 2 credits |
| NS/CNU 606 | Molecular Biology Applications in Nutrition | 2 credits |
| NS 790 | Research in Nutritional Sciences (before qualifying exam) | 1-6 credits |
| CNU 501 | Nutraceuticals and Functional Foods | 2 credits |
| CNU 502 | Obesity: Cell to Community | 2 credits |
| CNU 611 | Advanced Medical Nutrition Therapy | 2 credits |
| CNU 612 | Examination Skills for the Clinical Nutritionist | 2 credits |
| CNU/NS 604 | Lipid Metabolism | 3 credits |
| CNU/NS 605 | Wellness and Sports Nutrition | 3 credits |
| CNU/NS 702 | Problem-Based Case Studies | 1-5 credits |
| ASC 681 | Energy Metabolism | 3 credits |
| ASC 683 | Protein metabolism | 3 credits |
| ASC 689 | Physiology of Nutrient Digestion/Absorption | 3 credits |
| ASC 684 | Advanced Ruminant Nutrition | 3 credits |
| ASC 686 | Advanced Non-ruminant Nutrition | 3 credits |
| FSC 638 | Food Proteins | 3 credits |
| FSC 640 | Food Lipids | 3 credits |
| FSC 434G | Food Chemistry | 4 credits |
| BCH 610 | Biochemistry of Lipids and Membranes | 3 credits |
| BCH/BIO/MI 615 | Molecular Biology | 3 credits |
| CPH 605/PM 620 | Epidemiology | 3 credits |
| CPH 645 | Food Systems, Malnutrition and Public Health | 3 credits |
| EDP 605 | Counseling Techniques | 3 credits |
| GS 610 | College Teaching | 3 credits |
| KHP 420G | Physiology of Exercise | 3 credits |
| KHP 620 | Advanced Exercise Physiology | 3 credits |
| KHP 621 | Exercise and Coronary Heart Disease | 3 credits |
| KHP 720 | Sport Medicine | 3 credits |
| KHP 781 | Theory and Methodology of Body Composition | 3 credits |
| MI 685 | Advanced Immunology | 3 credits |
| MI 710 | Molecular Cell Biology | 3 credits |
| PGY 604 | Advanced Cardiovascular Physiology | 3 credits |
| PGY 607 | Hormonal Control Mechanisms | 3 credits |
| BCH 609 | Plant Biochemistry | 3 credits |

Residency Requirement

| | | | |
|---|---|---|---|
| NS | 767 | Residency Credit in Nutritional Sciences (post-qualifying exam) | 2 hr/semester |

## Course Descriptions

NS 601 INTEGRATED NUTRITIONAL SCIENCES I. (3)
The material covered in CNU/NS 601 consists of three major emphasis areas: (1) review of carbohydrate, lipid, and protein structure, synthesis, absorption, and metabolism, (2) the impact of nutritional influences on macronutrient metabolism to health and disease, (3) the influence of macronutrient metabolism on the regulation of energy balance. Prereq: IBS 601, PGY 206. (Same as CNU 601.)

NS 602 INTEGRATED NUTRITIONAL SCIENCES II. (3)
Integrated study of the properties, metabolism, biochemical and physiological functions and interactions of vitamins and minerals, and their relationships to chronic diseases, deficiency symptoms and toxicity. Prereq: IBS 601, PGY 206. (Same as ASC/CNU 602.)

NS 603 INTEGRATED NUTRITIONAL SCIENCES III. (2)
This course is aimed at providing medical and health professional students with a working knowledge of dietary requirements and guidelines, nutritional assessment and nutritional requirements, food safety issues and nutritional needs throughout the lifecycle. Prereq: Health Professional Graduate Status. (Same as CNU/FSC 603.)

NS 605 WELLNESS AND SPORTS NUTRITION. (3)
Emphasis is directed toward nutrition as applied to prevention of disease through lifestyle management and the application of nutrition in exercise and sport. Targeted focus areas are: body composition and energy expenditure, the metabolic basis of weight management, nutrient needs throughout the lifecycle, the metabolic changes associated with obesity, behavioral management of obesity, nutrient metabolism and exercise, water and electrolyte balance during exercise, nutritional ergogenic aids, nutrition-strength and performance enhancement. Prereq: PGY 412G, and BCH 401G or equivalent or consent of instructor. (Same as CNU/PT 605.)

NS 606 MOLECULAR BIOLOGY APPLICATIONS IN NUTRITION. (2)
Focus will be on the use of the most recently developed techniques and model systems in molecular biology for studying nutrient regulation of gene expression. Examples include current problems in nutrition such as models for engineering plants containing more desirable nutrient sources (fats); for studying effects of various nutrients in transgenic mice on tumor suppressor genes and oncogene expression, that are important in cancer prevention; and for studying nutrient effects on genes that modulate obesity. Prereq: BCH 501 and 502 or equivalent; or BCH 401G and consent of instructor. (Same as CNU 606.)

NS 608 NUTRITIONAL IMMUNOLOGY. (3)
Theories and mechanisms of immunity will be introduced. The effects of nutrition on immunity will be discussed from experimental and clinical perspectives. A lecture and problem-based learning approach with incorporation of student presentations, three hours per week. Prereq: PGY 412G and CNU 601, or consent of instructor. (Same as CNU 608.)

NS 609 ETHICS IN CLINICAL SCIENCES RESEARCH. (1)
Students will examine ethical issues in biomedical research using a case-study approach. Representative issues addressed may include data selection and retention, plagiarism, scientific review of grants and manuscripts, scientific misconduct, and informed consent. Prereq:
Graduate student status. (Same as CNU 609.)

NS 623 PROFESSIONAL DEVELOPMENT FOR SCIENTISTS IN TRAINING. (3)
The purpose of this course is to introduce graduate students to useful topics in their quest to attain and retain a tenure track researcher position (or equivalent) at some point in their scientific future. These

subjects are not always taught by mentors or through a traditional curriculum, but they are of utmost importance in a successful career. A breadth of issues will be presented that many principal investigators would say they wished they learned in graduate school and should give students the resources to become competitive scientific professionals. (Same as PHA 623.)

NS 640 HUMAN NUTRITION: ASSESSMENT. (3)
Assessment of dietary, anthropometric and biochemical parameters of nutritional status in health and disease. Lecture, two hours; laboratory, three hours per week. Prereq: NFS 510, NFS 511 or equivalent. (Same as NFS 640.)

NS 701 NUTRITION AND CHRONIC DISEASES. (4)
Selected topics in nutritional sciences as related to health and chronic diseases, e.g., gastrointestinal disease, cancer, AIDS, diabetes, cardiovascular disease, obesity, including drug-nutrient interactions. Prereq or concur: NS/CNU 601, NS/ASC 602. (Same as CNU 701.)

NS 702 CLINICAL/WELLNESS NUTRITION PROBLEM-BASED CASE STUDIES. (1-3)
A problem-based learning approach to case studies is integrated with a traditional didactic approach to offer options in therapeutic nutrition, and/or health promotion. Efforts are directed toward patient, worksite and laboratory data interpretation as well as patient education. Students are directed to develop independent critical thinking related to class presentations including case studies regarding rotations through various medical or health services e.g. surgery, pediatrics, nutrition support and health promotion. Prereq: NS/CNU 601, NS/ASC 602, NS/CNU 701, NS/NFS 610 and graduate status or consent of instructor. (Same as CNU 702.)

NS 704 CURRENT TOPICS IN NUTRITIONAL SCIENCES. (1)
This course is designed to develop the student's independent thinking and critical analysis related to various nutritional sciences issues. These skills will be developed through reading assignments and group discussion related to current topics in nutrition. Prereq: Consent of instructor. (Same as CNU/NFS 704.)

NS 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed. (Same as NFS 748.)

NS 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams

NS 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

NS 782 SPECIAL PROBLEMS. (1-6)
Independent advanced work on a special problem in nutritional sciences. Prereq: Consent of graduate advisor. (Same as CNU/NFS 782.)

NS 790 RESEARCH IN NUTRITIONAL SCIENCES. (0-6)
Research work involving original investigation. May be repeated to a maximum of 18 credits. Prereq: Consent of graduate advisor. (Same as CNU/NFS 790.)

# Pharmacology

## College of Medicine

Graduate study in Pharmacology is designed to prepare candidates for research careers in academics, industry or government laboratories and agencies. The Ph.D. program in Pharmacology trains students in the fundamental principles of basic molecular and biochemical science, while also providing training in the principles of drug-receptor interactions, of experimental therapeutics and of drug discovery. Modern pharmacology also emphasizes new directions in gene therapy and pharmacogenetics. Students learn the conceptual and technical basis of research while performing mentored and, subsequently, independent research projects in laboratories equipped with state of the art technology and instrumentation.

Students will have the opportunity to join nationally recognized faculty research programs in investigating topics such as: Cardiovascular Disease and Obesity; Molecular Biology of Carcinogenesis and Metastasis; and Neurobiology of Aging and Neurodegenerative Disease, with emphases on memory, hormones, stress, and Type II Diabetes.

**Admission Requirements**
Admission to the graduate program is competitive and is based upon academic background, professional recommendations, performance on the Graduate Record Examination (GRE), experience, and when possible, personal interviews. It is recommended that students have completed undergraduate courses in organic chemistry, calculus, physics, and biological sciences. The program of study is tailored to the individual background and career goals of the student and can often include interdepartmental study and research. Students are expected to participate in journal clubs and research seminars; to interact with visiting scholars; and to present the results of their research at local and national meetings. Financial aid is available for qualified students.

Admission to the Ph.D. program in Pharmacology is through the Integrated Biomedical Sciences (IBS) program. Information about the admissions process is available at http://www.mc.uky.edu/ibs .For information about the Ph.D. program in Pharmacology, please contact the Director of Graduate Studies, Department of Molecular and Biomedical Pharmacology, University of Kentucky College of Medicine, Lexington, KY 40536-0298. Information may also be obtained from www.mc.uky.edu/pharmacology/.

**Course Descriptions**

PHA 200 PHARMACOLOGY: DRUGS AND HUMAN HEALTH. (3)
This course will give students the needed background to understand how drugs impact human health and guide their appropriate use. Lectures will focus on how drugs function, how they impact our lives, and how new targets for drugs are discovered. This course will provide a history of drug development, design, and drug discovery, and examine the uses and actions of commonly prescribed and overthe-counter drugs. This course will also cover drugs of abuse and those used in sports and performance enhancement. Students will learn about when drugs should be used, conditions under which their use is prudent, and how to obtain accurate information regarding use, benefits and risks of new drugs. This class will give students valuable scientific insights into drug actions and provide a basis for lifelong learning to better protect and inform health care choices. Prereq: One semester of College Biology.

#PHA 421G PHARMACOLOGY: PRINCIPLES OF DRUG ACTION. (3)
PHA 421G is a 3 credit course designed to first introduce students to the basic principles of modern pharmacology, and then have them apply those principles to current issues of both drug therapy of human

disease and drug abuse. The goal of this course is to prepare students with the knowledge base to explore career options in medicine, pharmacy, dentistry, or graduate school. Prereq: 3 credits are required from either BIO 148 or BIO 152, 4 credits from either PGY 206+207 or BIO 350 and PHA 200 or consent of the Course Director.

PHA 422G PHARMACOLOGY OF TREATING HUMAN DISEASE. (3)
This course will provide students with a fundamental understanding of the actions of drugs most commonly used in the treatment of the major human diseases, drugs of abuse, and those used in sports to enhance performance. This course is geared toward the pre-professional and others interested in a career in health care and research. Prereq: BIO 350 and BIO 315.

#PHA 423G EXPLORING THE DARK SIDE OF MEDICINE. (3)
This course will provide students with a fundamental understanding of the adverse effects of drugs and other substances that may be harmful to human health as well as the approaches that are used to ensure drug safety. This course is geared toward the pre-professional student and others interested in a career in health care and research. Prereq: PHA 421G or consent of the Course Director.

#PHA 424G PHARMACOLOGY OF HUMAN ENDOCRINOLOGY AND REPRODUCTION. (3)
PHA 424G is a 3-credit course designed to give students a fundamental understanding of the drugs that control the human endocrine system and reproduction and the mechanism by which they exert their actions. The goal of this course is to prepare students with the knowledge base that will allow them to explore career options in medicine, pharmacy, dentistry, graduate school and pharmaceutical sciences.
#PHA 425G NEUROPHARMACOLOGY: TREATING DISORDERS OF THE BRAIN. (3)
PHA 425G is a 3-credit course designed to give students a fundamental understanding of the drugs that exert neuronal control in the human and the mechanism by which they exert their actions. The goal of this course is to prepare students with the knowledge base that will allow them to explore career options in medicine, pharmacy, dentistry, graduate school and pharmaceutical sciences. Prereq: PHA 421G or consent of instructor.

PHA 612 QUANTITATIVE PHARMACODYNAMICS: PHARMACOKINETICS. (3)
Quantitative treatment of dynamics of drug absorption, distribution, metabolism and excretion, including development of both mathematical models and model-independent approaches for describing these processes. Prereq: MA 114 and consent of instructor. (Same as PHS 612.)

PHA 616 BIOLOGY AND THERAPY OF CANCER. (3)
Biology of cancer will be discussed at the molecular, cellular and organismic level. Emphasis will be placed on cellular signaling, apostosis and cell cycle unique to cancer cells, which affects tumor cell behavior and its interactions with the host immune system. The biology of hematopoitic cells will also be included. Clinicians active in treatment and research of various types of cancer will be invited to participate in the lectures. Prereq: BCH 501, 502, BIO 685. (Same as MED/MI 616.)

PHA 617 PHYSIOLOGICAL GENOMICS. (2)
RNA-seq, ChIP-seq and microarray techniques are powerful tools for global analyses of transcriptomes and gene expression. They are widely used in biological and medical research. Lectures on fundamental concepts, experimental design, and the impact of understanding gene expression patterns are combined with computer labs where students analyze RNA-seq, ChIP-seq and microarray data. Prereq:
IBS 603 or an equivalent course in Cell Biology or Molecular Biology. (Same as PGY 617.)

PHA 621 PRINCIPLES OF DRUG ACTION. (3)
The objective of this course is to familiarize graduate students with the principles and mechanisms of

drug action in biochemical and physiological systems. Students will discuss the quantitative approaches to assessing drug responses, metabolism and toxicity. Prereq: Consent of instructor.

PHA 622 MOLECULAR DRUG TARGETS AND THERAPEUTICS. (1-4)
PHA 622 is an advanced course designed to provide graduate students with state of the art information regarding drugs, drug action and targets for drug action. Emphasis will be placed on drugs that interact with the cardiovascular system (section 001), the central nervous system (section 002), chemotherapeutic agents (section 003), and other important drug classes such as nonsteroidal anti-inflammatory agents, steroid hormones, antidiabetic agents and toxicology (section 004). Each section is designed to be a separate one hour course. Students may take any combination of sections from one to all four sections. For each agent, emphasis will be placed on the cellular mechanisms of action, the receptors or cellular targets at which they act, therapeutic issues and potential toxicities. This information is intended to be integrated with other disciplines, including anatomy, biochemistry, physiology, psychology and molecular biology. Prereq: IBS 601-609 and PHA 621.

PHA 623 PROFESSIONAL DEVELOPMENT FOR SCIENTISTS IN TRAINING. (3)
The purpose of this course is to introduce graduate students to useful topics in their quest to attain and retain a tenure track researcher position (or equivalent) at some point in their scientific future. These subjects are not always taught by mentors or through a traditional curriculum, but they are of utmost importance in a successful career. A breadth of issues will be presented that many principal investigators would say they wished they learned in graduate school and should give students the resources to become competitive scientific professionals. (Same as NS 623.)

PHA 630 SPECIAL TOPICS IN PHARMACOLOGY. (1-3)
Detailed examination of current, significant topics in pharmacology such as: contemporary neuroscience methodology, molecular and cellular pharmacodynamics, transmembrane signaling. Course is designed to offer flexibility to students in different tracks, different emphasis in a given year and to utilize the special research interests in resident and visiting investigators. May be repeated to a maximum of six credits. Prereq: Consent of course director.

PHA 658 ADVANCED NEUROPHARMACOLOGY. (2)
A study of the general theories of the mode of action of drugs upon nervous tissue and a review of the effects of analgesics, sedatives, hypnotics, anesthetics, tranquilizers, psychotomimetics, analeptics, antidepressants, anti-convulsants and drugs affecting motor dyskinesias upon neurones, synapses and functional components of the central nervous system. Prereq: PHA 522, IBS 601-606, or consent of instructor.

PHA 670 CHEMICAL CARCINOGENESIS. (3)
Lectures and discussion of the chemical and biochemical reactions of chemical carcinogens and their metabolites. Prereq: CHE 232; PHR 400; or BCH 501, 502. (Same as TOX 670.)

PHA 710 AGING OF THE NERVOUS SYSTEM. (3)
This course will examine the alterations in the brain that occur with aging and in neurodegenerative disorders such as Alzheimer's disease. The emphasis will be on human aging although the relevance of animal models to studies of human aging will be a recurrent theme. The course will examine aging at several levels, including molecular, cellular, organismic, and behavioral. A strong background in the basic sciences in encouraged. (Same as ANA/GRN/PGY 710.)

PHA 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

PHA 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

PHA 815 FIRST-YEAR ELECTIVE, PHARMACOLOGY. (1-3)
With the advice and approval of his or her faculty adviser, the first-year student may choose approved electives offered by the Department of Pharmacology. The intent is to provide the student an opportunity for exploration and study in an area which supplements and/or complements required course work in the first-year curriculum. Pass-fail only. Prereq: Admission to first year, College of Medicine.

PHA 822 DENTAL PHARMACOLOGY AND THERAPEUTICS. (4)
This course will provide students with a fundamental understanding of the pharmacology and therapeutic uses of drugs commonly used by their patients and in their practice. Prereq: OBI 812 and OBI 814. (Same as OBI 826.)

PHA 824 MECHANISMS OF DISEASE AND TREATMENT/PHARMACOLOGY. (7)
This course introduces the principal actions of substances which are used as drugs for treatment of diseases and suffering in humans. It will cover the general principles of drug action, how drugs alter the function of normal and pathologic tissues and organisms and how they influence the disease process. Drugs used in the treatment of disease processes will be integrated with discussion of those diseases in PAT 823. Lecture, 20 hours per week. Prereq: Admission to second year of medical curriculum.

PHA 825 SECOND-YEAR ELECTIVE, PHARMACOLOGY. (1-4)
With the advice and approval of his or her faculty adviser, the second-year student may choose approved electives offered by the Department of Pharmacology. The intent is to provide the student an opportunity for exploration and study in an area which supplements and/or complements required course work in the second-year curriculum. Pass-fail only. Prereq: Admission to secondyear medical curriculum and approval of adviser.

PHA 850-899 FOURTH-YEAR ELECTIVE FOR MEDICAL STUDENTS. (1-6)
With the advice and approval of the faculty adviser and the Student Progress and Promotions Committee, the fourth-year student may choose approved electives offered by the various departments in the College of Medicine. The intent is to provide the student an opportunity to develop his fund of knowledge and clinical competence. Prereq: Admission to the fourth year, College of Medicine and/ or permission of the Student Progress and Promotions Committee.

# Physiology

## College of Medicine

Graduate study in physiology is designed to prepare candidates for careers as independent scientists in academics, industry, and government positions. Admission to the graduate program is competitive and is based upon academic background, professional recommendations, performance on the Graduate Record Examination (GRE), experience, and when possible, personal interviews. Applicants should complete an undergraduate degree in biological sciences, chemical sciences, physical sciences, mathematics, psychology, or engineering. It is recommended that applicants complete courses in organic chemistry, physical chemistry, calculus, physics, and the biological sciences, as well as have some research experience.

Students will have the opportunity to join faculty research programs across a spectrum of topics such as neural, endocrine, cardiovascular, renal, respiratory, sensory, and muscle physiology. Research activities employ systems, cellular, and molecular approaches. The program of study is tailored to the individual background and career goals of the student and stresses an interdepartmental approach both in the selection of courses and in the pursuit of research. Students are expected to participate in graduate seminars, journal clubs, research seminars; to interact with visiting scholars; and to present the results of their research at local and national meetings. Teaching opportunities leading to a graduate certificate in teaching is also available. Financial aid is available to the students accepted to the program.

**Admission Requirements**
Admission to the Ph.D. program in Physiology is through the Integrated Biomedical Sciences (IBS) Curriculum. Inquiries regarding admission should be directed to Director, Integrated Biomedical Sciences Curriculum, University of Kentucky, College of Medicine http://graduate.med.uky.edu/integrated-biomedical-sciences . For information about the Ph.D. program in Physiology, please contact the Director of Graduate Studies, Department of Physiology. Information may also be obtained from the department Web site: http://physiology.med.uky.edu/.

**Course Descriptions**

*PGY 502 SYSTEMS, CELLULAR AND MOLECULAR PHYSIOLOGY. (5)
PGY/BIO 502 is a team-taught, lecture-based course that provides an integrated in-depth understanding of the physiology and pathophysiology of the human cardiovascular, digestive, endocrine, neural, renal and respiratory organ systems. Lectures are supplemented with assigned readings, hands-on demonstrations, and problem-oriented study sessions. Prereq: An introductory physiology course (for example PGY 206), and an understanding of fundamental undergraduate-level chemical and physical concepts is recommended but not required. (Same as BIO 502.)

PGY 504 INDEPENDENT WORK IN PHYSIOLOGY. (2-4)
A study of some advanced problems in physiology under the direct supervision of the instructor. Discussion period, one hour; laboratory, four hours. May be repeated to a maximum of eight credits. Prereq: Consent of instructor.

PGY 512 EVOLUTIONARY MEDICINE. (3)
This online course surveys the consequences of evolution on human function and disease. Lecture materials, online discussions, and reading and writing assignments will expand on examples of the repercussions of evolutionary processes on health. Prereq: BIO 150-153 or equivalent introductory biology sequence, BIO 315 or equivalent, and an introductory physiology course (PGY 206, BIO 350, or PGY 412G).

PGY 535 COMPARATIVE NEUROBIOLOGY AND BEHAVIOR. (3)
The course consists of an introduction to neurophysiology and study of the neural basis of sensory processing and motor patterns. A comparative analysis of the neurobiological basis of behavioral responses will be made, utilizing a broad range of vertebrates and invertebrates. Prereq: BIO 350 or consent of instructor. (Same as BIO 535.)

PGY 560 PATHOPHYSIOLOGY: INTEGRATIVE STUDY IN PHYSIOLOGY AND MEDICINE. (1)
This course aims at the development of an integrative conception of the human organism, and involves the study of medical case histories. The complex network of physiologic interactions which underlie disease states is investigated. The physiologic bases of health, illness, dying, and death are explored. May be repeated to a maximum of three credits. Prereq: PGY 412G, PGY 502 or consent of instructor.

PGY 601 MAMMALIAN ENDOCRINOLOGY. (3)
An introduction to the basic anatomy, physiology and biochemistry of endocrine systems with emphasis on mechanisms of hormone synthesis, secretion and action. Lectures and reading assignments will focus on endocrine function in mammalian species, including laboratory animals, humans and livestock. Prereq: BCH 401G and BIO 350 or equivalents. (Same as ASC 601.)

PGY 602 READINGS IN SYSTEMS, CELLULAR AND MOLECULAR PHYSIOLOGY. (3)
A critical evaluation at the advanced level of the literature of the major mammalian physiological systems at the organ, cellular and molecular level. The course is intended to be taken with and to complement PGY 502. It includes a critical reading of the primary literature. Prereq: One year each of physics, general chemistry; PGY 206 or equivalent.

PGY 603 DESIGN AND ANALYSIS. (3)
This is a course for students in the biomedical sciences interested in understanding the principles and pitfalls of experimental design and data analysis. The course focuses on why specific experimental design and analysis strategies are applied. Prereq: Consent of instructor. An introductory statistics course is recommended, e.g., STA 570 or STA 580.

PGY 604 ADVANCED CARDIOVASCULAR PHYSIOLOGY. (3)
The objective of this course is to examine in-depth the various functions of the cardiovascular system and their proposed mechanisms. Prereq: PGY 502 or consent of instructor.

PGY 605 NEUROBIOLOGY OF CNS INJURY AND REPAIR.
The objective of the course will be to provide a general overview of the current state of knowledge concerning the pathophysiology and therapeutic approaches to central nervous system injury. The course will provide a strong working background concerning the issues, techniques and frontiers of neurotrauma therapeutic discovery research aimed at reducing acute post-traumatic neurodegeneration in the injured brain or spinal cord or enabling regeneration and repair. This course is a graduate level course intended for students who are in their second or subsequent years of graduate study and who are pursuing focused research training in neurotrauma research. No special prerequisites, other than graduate standing, are necessary. However, a background in neuroanatomy and neurophysiology is highly recommended. Prereq: Permission of instructor. (Same as ANA 605.)

PGY 608 ADVANCED RENAL PHYSIOLOGY. (3)
This course will examine in-depth the physiology and pathophysiology of the renal system, as well as provide an understanding of advanced renal physiological techniques. Prereq: PGY 412G, PGY 502 or consent of instructor.

PGY 609 ADVANCED RESPIRATORY PHYSIOLOGY. (3)
This course will examine in-depth the physiology and pathophysiology of the respiratory system. Prereq: PGY 412G, PGY 502 or consent of instructor.

PGY 612 BIOLOGY OF AGING. (3)
A multidisciplinary discussion of how the process of aging affects biological systems. Coverage will be quite broad and includes topics such as subcellular and cellular aging, genetics, immunology, anatomy and physiology, animal model of aging, etc. Prereq: Enrollment in the doctoral program in Gerontology or a biomedical science department or consent of instructor. (Same as ANA/BIO/GRN 612.)

PGY 615 SEMINAR IN TEACHING MEDICAL SCIENCE (MED SCIENCE TEACHING I). (2)
A two (2) credit seminar course in which issues related to the theory and practice of life science education are discussed in a Socratic manner. May be repeated to a maximum of three credits. Prereq: Current enrollment in a life science graduate program. (Same as GRN 615.)

PGY 616 PRACTICUM IN TEACHING MEDICAL SCIENCE (MED SCIENCE TEACHING II). (2)
A two (2) credit experimental course in which students will directly participate in the teaching of Physiology under supervised conditions. May be repeated to a maximum of six credits. Prereq: PGY 615 may be taken concurrently.

PGY 617 PHYSIOLOGICAL GENOMICS. (2)
RNA-seq, ChIP-seq and microarray techniques are powerful tools for global analyses of transcriptomes and gene expression. They are widely used in biological and medical research. Lectures on fundamental concepts, experimental design, and the impact of understanding gene expression patterns are combined with computer labs where students analyze RNA-seq, ChIP-seq and microarray data. Prereq: IBS 603 or an equivalent course in Cell Biology or Molecular Biology. (Same as PHA 617.)

PGY 625 MUSCLE FORUM.(1)
Muscle Forum is a course that will allow students to develop critical evaluatory skills for seminars and grant writing in the field of Muscle Biology. Prereq: Students need to be enrolled in the Rehabilitation Sciences doctoral program, one of the graduate programs of the Integrative Biomedical Sciences, or with permission of the course director. (Same as RHB 625.)

PGY 627 PROSEMINAR IN PHYSIOLOGICAL PSYCHOLOGY. (3)
An intensive examination of theories, methods of investigation, and current developments in the field of physiological psychology. Prereq: Graduate standing or consent of instructor. (Same as PSY 627.)

PGY 630 ADVANCED TOPICS IN PHYSIOLOGY. (1-3)
Contemporary topics in physiology. Course designed to utilize the special research interests of resident and visiting faculty. May be repeated to a maximum of six credits. Prereq: PGY 502 or consent of instructor.

PGY 638 DEVELOPMENTAL NEUROBIOLOGY. (3)
An explanation of the processes which contribute to the development of the nervous system. Neurophysiological, cell biological and molecular approaches to cell differentiation, neuronal pathfinding and synapse formation and stabilization will be explored and discussed. Examples will be drawn from both vertebrate and invertebrate preparations. Prereq: BIO 535 or consent of instructor. (Same as ANA/ BIO/ PSY 638.)

PGY 650 ANIMAL PHYSIOLOGY LABORATORY.
Hands-on laboratory exercises in animal physiology. Prereq: Previous or concurrent enrollment in BIO 550. (Same as BIO 650.)

PGY 660 BIOLOGY OF REPRODUCTION. (3)
Advanced study of current topics in reproductive biology. The course is comprised equally of student-led discussions and lectures given by faculty with research expertise in selected topics. Readings will be taken from current and classic literature. Topics covered include (but are not limited to) molecular and cellular endocrinology, hormone receptors and mechanism of action, reproductive neuroendocrinology, reproductive behavior, gametogenesis, fertilization, sexual differentiation, puberty, menopause and environmental effects on reproduction. Emphasis will be placed on the analysis and understanding of the experimental basis for current concepts in reproductive biology. Prereq: ASC/PGY 601 and ASC 364 or BIO/PGY 502 or consent of instructor. (Same as ANA 660 and ASC 660).

PGY 710 AGING OF THE NERVOUS SYSTEM. (3)
This course will examine the alterations in the brain that occur with aging and in neurodegenerative disorders such as Alzheimer's disease. The emphasis will be on human aging although the relevance of animal models to studies of human aging will be a recurrent theme. The course will examine aging at several levels, including molecular, cellular, organismic, and behavioral. A strong background in the basic sciences in encouraged. (Same as ANA/GRN/PHA 710.)

PGY 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

PGY 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

PGY 766 TOPICAL SEMINAR BEHAVIORAL NEUROSCIENCE. (3)
A study of selected topics in behavioral neuroscience with emphasis on recent research and theory. May be repeated to a maximum of nine credits. Prereq: Consent of instructor. This course may be elected to fulfill requirements in the Psychology and Physiology graduate programs. (Same as PSY 766.)

PGY 767 TOPICAL SEMINAR IN BEHAVIORAL NEUROSCIENCE. (3)
A study of selected topics in behavioral neuroscience with emphasis on recent research and theory. May be repeated to a maximum of nine credits. Prereq: Consent of instructor. This course may be elected to fulfill requirements in the psychology and physiology graduate programs. (Same as PSY 767.)

PGY 774 GRADUATE SEMINAR IN PHYSIOLOGY. (1)
A discussion-based course for physiology graduate students and other advanced students interested in physiology. The students learn how to understand and critique research papers and how to review a research manuscript. The full potential of the course is realized in conjunction with the Physiology Seminar Series, because the material of the course prepares the students for these Seminars. Students are encouraged to participate until they are heavily involved in their research project.

PGY 791 RESEARCH IN PHYSIOLOGY. (1-15)
May be repeated to a maximum of 15 credits. Prereq: Consent of instructor.

PGY 813 NEUROPHYSIOLOGY. (1)
The brain uses electrical signals to process all information it receives and analyzes. Individual neurons encode complex information into simple electrical signals; the meaning behind these signals is derived from the specific interconnections of neurons. The purpose of neurophysiology is to describe how the neuron produces electrical and chemical signals and illustrate how these signals are involved in the functional organization of neural circuits. This course also describes how the central nervous system analyzes and integrates the various inputs, elicits command decisions that determine the motor and/or endocrine responses. Lecture: three hours per week for five weeks. Prereq: Admission to the College of Dentistry, or consent of the Course Director. (Same as OBI 813.)

PGY 814 PRINCIPLES OF HUMAN PHYSIOLOGY FOR DENTAL STUDENTS. (4)
This course enables student dentists to understand the basic principles of human physiology, especially as it relates to the practice of dentistry. The introduction of the course presents the basic physiology of cells, conducting and contracting tissues, lining and secretory tissues, and other special tissues. The course focuses on the major physiological systems and presents them at the system, cellular, and molecular levels; and emphasizes those aspects particularly relevant to dentistry - dentin sensitivity, dental and pulpal pain, muscle dysfunction, ischemic and, hypertensive heart disease, oral manifestations of endocrine abnormalities, temperature regulation, calciumphosphate homeostasis, and the dental mineralized tissues. Upon successful completion of the course, student dentists will be able to rationally and scientifically apply basic cell, tissue, organ, and organ system function to clinical decision-making. Lectures with assigned reading: 68 hours. Prereq: OBI 812 or consent of the course director. (Same as OBI 814.)

PGY 815 FIRST-YEAR ELECTIVE, PHYSIOLOGY. (1-3)
With the advice and approval of his or her faculty adviser, the first-year student may choose approved electives offered by the Department of Physiology and Biophysics. The intent is to provide the student an opportunity for exploration and study in an area which supplements and/or complements required course work in the first-year curriculum. Pass-fail only. Prereq: Admission to first year, College of Medicine.

PGY 818 HUMAN FUNCTION. (8)
This course provides in-depth instruction on the physiological mechanisms of body function from the single cell to the organism level. The course is team taught by medical scientists and clinicians. Teaching methodologies include didactic and Socratic lectures, small group discussions, demonstrations and live model and computer simulated laboratories. Lecture, 20 hours per week. Prereq: Admission to medical school (first year). (Same as OBI 814.)

PGY 825 SECOND-YEAR ELECTIVE, PHYSIOLOGY. (1-4)
With the advice and approval of his or her faculty adviser, the second-year student may choose approved electives offered by the Department of Physiology and Biophysics. The intent is to provide the student an opportunity for exploration and study in an area which supplements and/or complements required course work in the second-year curriculum. Pass-fail only. Prereq: Admission to second-year medical curriculum and approval of adviser.

PGY 850-899 FOURTH-YEAR ELECTIVE FOR MEDICAL STUDENTS. (1-6)
With the advice and approval of the faculty adviser and the Student Progress and Promotions Committee, the fourth-year student may choose approved electives offered by the various departments in the College of Medicine. The intent is to provide the student an opportunity to develop his fund of knowledge and clinical competence. Prereq: Admission to the fourth year, College of Medicine and/ or permission of the Student Progress and Promotions Committee.

Approved elective: PGY 850 RESEARCH IN PHYSIOLOGY

# Radiation Sciences

## College of Medicine

## Master of Science (MS) in Radiological Medical Physics

### Admission Requirements

In addition to the general requirements of the Graduate School, the Radiological Medical Physics Program requires the following for MS candidates. At a minimum, candidates must show the equivalence of a minor in physics (as defined by CAMPEP). To meet this requirement, candidates must have completed the following: 1) Calculus through Ordinary Differential Equations; 2) The Calculus-based introductory General Physics sequence with labs (2 semesters); and 3) Three upper division Physics electives ( junior level or above). Courses in Human Anatomy, Human Physiology, Computer Science, and Scientific Statistics are preferred but, if missing, may be incorporated into the graduate program at the discretion of the Director of Graduate Studies.

### Application Information

Application to the Radiation Sciences program is online through the Graduate School using the link https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=ukgrad . The applicant will be required to submit GRE General Test scores, transcripts for all undergraduate work, a personal statement, and contact information for three persons willing to provide letters of recommendation. Only self-reported, unofficial General GRE scores and transcripts are required at the time of application. Official versions must be submitted upon entry into the program. A CV may be included but is not required. A personal interview, typically on-campus, is required. However, on-line interviews may be allowed in cases of severe travel restrictions. Fluent spoken English skills are required and are assessed during the interview.

Admission to the program occurs once annually with new classes beginning in the Fall semester. The deadline for applications is April 30th, however, offers for admission are usually made early in the preceding spring semester with completion of the class roster by April 1st. There are a limited number accepted into our program (typically 8), therefore it is recommended that applications be completed by January 31st to assure full consideration. Applications received after the class roster is filled will not be reviewed.

### Degree Requirements

The Master of Science in Radiological Medical Physics is interdisciplinary. Plan B (non-thesis) guidelines are utilized for the graduate work, incorporating specific courses in several departments. There is no language requirement. A coursework outline is given as follows.

### Required Program Coursework

- PHY/RM 472G Interactions of Radiation with Matter (3)
- RAS/RM/PHY 545 Radiation Hazards and Protection (3)
- RAS/RM/PHY 546 General Medical Radiological Physics (3)
- RAS/RM 601 Advanced Radiation Dosimetry (2)
- RAS/RM 647 Physics of Diagnostic Imaging I (3)
- RAS/RM 648 Physics of Diagnostic Imaging II (3)
- RAS/RM 649 Physics of Radiation Therapy (3)
- RAS 651 Advanced Laboratory in Diagnostic Imaging Physics (2)
- RAS/RM 695 Research in the Health-Related Radiation Sciences (2)
- RAS 710 Radiation Science Seminar (1)
- RM/BIO 740 Mammalian Radiation Biology (2)
- Elective(s) (3)

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**TOTAL CREDIT HOURS: 30**

### Available Electives (Partial Listing)

- RM 660 Graduate Practicum in Radiation Medicine (1-6)
- RAS/RM 650 Brachytherapy Physics (2)
- RM 842 Radiation Oncology (1)
- RM 848 Practicum in Brachytherapy Physics (1-3)
- RM 849 Practicum in External Beam Therapy Physics (1-6)
- EE 630 Digital Signal Processing (3)
- EE 635 Image Processing (3)

## Doctor of Philosophy (PhD) in Radiation and Radiological Sciences

Medical Physics is a profession that includes clinical, industrial and academic practices. The Radiation and Radiological Sciences PhD program is designed primarily for students who desire to enter a clinical career, but who want to acquire the additional skills and credentials that accompany a PhD.

This educational program is provided by the Departments of Radiation Medicine and Radiology, both of which are clinical departments within the UK Healthcare enterprise, thus providing a unique culture and context to the training. Research areas involve collaborative efforts between students, clinical physicists and physicians, and often possess direct clinical applicability. The collaborative nature of the program structure allows for didactic, clinical and research training in therapeutic and diagnostic medical physics.

The didactic coursework consists of 34 core credit hours plus an additional 18 hours of guided electives. Research will be conducted primarily under the mentorship of faculty in the Radiation

Medicine or Radiology Departments. Research projects can be conducted using clinical equipment, combined with other available technical resources, including computer programming and simulations, and interdisciplinary collaborations.

## Admission Requirements

In addition to the general requirements of the Graduate School, the Radiation and Radiological Sciences Program requires the following. At a minimum, candidates must show the equivalence of a minor in physics. To meet this requirement, candidates must have completed the following: 1) Calculus through Ordinary Differential Equations; 2) The Calculus-based introductory General Physics sequence with labs (2 semesters); and 3) Three upper division Physics electives (300 level or above). Courses in Human Anatomy, Physiology, Computer Science, and Scientific Statistics are preferred but, if missing, may be incorporated into the graduate program at the discretion of the Director of Graduate Studies.

Most of our entering students possess undergraduate physics degrees, although students possessing related physical science backgrounds are eligible and qualified. These students are counseled prior to their arrival of the need to comply with the entrance requirements. Most students have some missing prerequisites that are remediated in their first year. These most typically include anatomy, physiology, and sometimes include an upper level physics course. The deficiencies described above are remediated via formal coursework. These courses are almost exclusively taken here at the University, although may be completed via coursework at another accredited college.

## Application Information

Application to the program is online through the Graduate School at http://www.gradschool.uky.edu/ProspectiveStudents/prospective.html . The applicant will be required to submit GRE General Test scores, transcripts for all undergraduate work, and three letters of recommendation. Only self-reported, unofficial General GRE scores and transcripts are required at the time of application. Official versions must be submitted upon entry into the program. A personal statement and/or a CV may be included but are not required. A personal interview, typically on-campus, is required. However, on-line interviews may be allowed in cases of severe travel restrictions. Fluent spoken English skills are required and are assessed during the interview.

Admission to the program occurs once annually with new classes beginning in the Fall semester. The deadline for applications is April 30th, however, offers for admission are usually made early in the preceding Spring semester with completion of the class roster by May. Therefore, it is recommended that applications be completed by January 31 to assure full consideration.

## Degree Requirements

A minimum of 52 credit hours are required for the PhD degree consisting of 34 core credit hours and 18 elective credit hours. The elective credit hours (18) must include at least 6 hours of graduate level (i.e., 4xxG, 5xx, 6xx or 7xx) didactic coursework covering related topics in science, engineering, or medicine. The intent of this requirement is to encourage interdisciplinary collaboration and to develop rigorous scientific skills. The selection of the specific courses is variable. The remaining 12 elective credit hours may be fulfilled by any combination obtained from the list of “Available PhD Electives”

below. These credits must be approved by the student's dissertation advisor. In addition, completion of 36 hours is required for pre-qualifying residency. Post-qualifying residency must be a minimum or 4 credit hours of RAS 767. Students must maintain at least a 3.0 GPA for retention in the program. A student's progress will be reviewed annually by their graduate committee and any deficiencies or concerns identified will be followed up with the student.

The qualifying exam will consist of two major components, one written and one oral. Students must pass both to be allowed to progress in the PhD program. The written component will be a problem-based exam consisting of 4 subject areas. These are:

1. General Radiological Physics and Dosimetry
2. General Physics of Medical Imaging
3. General Physics of Radiation Therapy
4. Elective Subject (select one from the following list)
    a. Advanced Radiation Therapy Physics
    b. Advanced Medical Imaging Physics
    c. Other topic approved by the Advisory Committee

The written exam is given over a two non-sequential day period. Day one will cover subject areas 1, 2, and 3 while day two will cover section 4. The written exam will typically be taken in the second year of the program and a score of 50% or greater will be required in order to pass. Students who do not pass on the first attempt will be allowed a second attempt. If the second attempt is unsuccessful then the student will not be allowed to proceed in the PhD program. Such students will, however, be allowed to attempt to complete the degree requirements for an en passant MS degree in Radiation Sciences and be awarded that degree upon successful completion.

The qualifying oral exam will be taken after successful completion of the written exam, but typically not to exceed 3 years from the initial date of enrollment. The student must orally defend a proposal for the selected dissertation topic. The proposal defense will be delivered to the student's dissertation advisory committee.

### PhD Core Coursework Requirements

- PHY/RM 472G Interactions of Radiation with Matter (3)
- RAS/RM/PHY 545 Radiation Hazards and Protection (3)
- RAS/RM/PHY 546 General Medical Radiological Physics (3)
- RAS/RM 601 Advanced Radiation Dosimetry (2)
- RAS/RM 647 Physics of Diagnostic Imaging I (3)
- RAS/RM 648 Physics of Diagnostic Imaging II (3)
- RAS/RM 649 Physics of Radiation Therapy (3)
- RAS 651 Advanced Laboratory in Diagnostic Imaging Physics (2)
- RAS/RM 695 Research in the Health-Related Radiation Sciences (4)
- RAS 710 Radiation Science Seminar (1)
- RAS 711 Research Methods in Medical Physics (1)

- RM/BIO 740 Mammalian Radiation Biology (2)
- RAS 767 Post Qualifying Residency (4)

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**TOTAL CORE CREDIT HOURS REQUIRED: 34**

**Available PhD Electives (Partial Listing)**

- RM 660 Graduate Practicum in Radiation Medicine (1-6)
- RAS 650 Brachytherapy Physics (2)
- RM 842 Radiation Oncology (1)
- RM 848 Practicum in Brachytherapy Physics (1-3)
- RM 849 Practicum in External Beam Therapy Physics (1-6)
- EE 630 Digital Signal Processing (3)
- EE 635 Image Processing (3)
- BME 530 Biomedical Instrumentation (3)
- BMI 730 Principles of Clinical Informatics (3)

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**TOTAL ELECTIVE CREDIT HOURS REQUIRED: 18**

Other Electives can be used with approval of the Dissertation Advisor

# Course Descriptions

**BME 530 BIOMEDICAL INSTRUMENTATION. (3)** A comprehensive introduction to major aspects of biomedical instrumentation. Topics include basic concept of medical instrumentation, biopotentials, physiological pressure/flow/respiratory measurement, optical sensing, and clinical applications of all the above. The fundamental mathematics underlying each instrument will be reviewed and an engineering picture of the hardware and software needed to implement each system will be examined. Prereq: Consent of instructor.

**BMI 730 PRINCIPLES OF CLINICAL INFORMATICS. (3)** This course offers an overview of Clinical informatics, which is the application of informatics principles, methods, and tools to support healthcare practice and research activities as well as business processes.

**EE 630 DIGITAL SIGNAL PROCESSING. (3)** An introductory treatment of the basic concepts of signal processing via time and frequency domain (Z-transform) methods and a survey of procedures for designing, implementing and using digital signal processors. Prereq: EE 512 or consent of instructor.

**EE 635 IMAGE PROCESSING. (3)** The course outlines applications of image processing and addresses basic operations involved. Topics covered include image perception, transforms, compression,

enhancement, restoration, segmentation, and matching. Prereq: Graduate standing and consent of instructor. (Same as CS 635.)

**PHY 472G INTERACTION OF RADIATION WITH MATTER. (3)** Basic aspects of the interaction of ionizing radiation with matter. Bohr atom, atomic spectra, radioactivity, energetics of decay. Sources of radiation, penetration of charged particles, electromagnetic radiation, and neutrons through matter; excitation and ionization processes; selected nuclear reactions; basic radiation detection and dosimetry. Prereq: PHY 213 or 232; MA 114 (may be taken concurrently); or equivalent. (Same as RAS/RM 472G.)

**RAS 545 RADIATION HAZARDS AND PROTECTION. (3)** An analysis of common radiation hazards encountered in medicine, research, industry, and the environment. Regulations and procedures for the safe use of ionizing and nonionizing radiations. Lecture, two hours; laboratory, two and one-half hours. Prereq: PHY/RM 472G or consent of instructor. (Same as PHY/RM 545.)

**RAS 546 GENERAL MEDICAL RADIOLOGICAL PHYSICS. (3)** The uses and dosimetric aspects of radiation in medicine will be analyzed, including many basic applications in the fields of diagnostic radiology physics, therapy physics, and nuclear medical physics. Prereq or concur: RM/PHY 472G or consent of instructor. (Same as PHY/RM 546.)

**RAS 601 ADVANCED RADIATION DOSIMETRY. (2)** Advanced aspects of the interaction of radiation with matter and specialized topics in the dosimetry of ionizing radiations. Modifications of Bragg-Gray theory for application to megavoltage sources. Beta dosimetry. Specialized calibration techniques. Relative response functions of various media. Nontraditional techniques. Dosimetry of radiation fields including complex spectra. Prereq: PHY 472G, RM 546, or equivalent. (Same as RM 601.)

**RAS 647 PHYSICS OF DIAGNOSTIC IMAGING I. (3)** Specialized and advanced topics in diagnostic imaging, including modulation transfer function analysis, image processing algorithms, acceptance testing, CT, NMR, ultrasound, etc. Prereq: PHY/RM/RAS 546 or consent of instructor. (Same as RM 647.)

**RAS 648 PHYSICS OF DIAGNOSTIC IMAGING II. (3)** A continuation of RAS/RM 647. Specialized and advanced topics in nuclear medicine imaging physics, including positron emission tomographic procedures, emerging new modalities, and quality control. Prereq: RM/RAS 647 or consent of instructor. (Same as RM 648.)

**RAS 649 PHYSICS OF RADIATION THERAPY. (3)** Specialized external beam and brachytherapy treatment planning; advanced Bragg-Gray cavity applications, including Ngas and TG-21; calibration, acceptance testing, and quality control of therapy physics equipment. Prereq: RAS/RM/PHY 546 and RAS/RM 601, or consent of instructor. (Same as RM 649.)

**RAS 650 PHYSICS OF RADIATION THERAPY II: BRACHYTHERAPY PHYSICS. (2)** A presentation of the full scope of use of implanted radiation sources for medical purposes. The course includes consideration of all aspects of brachytherapy dosimetry and treatment planning as well as modern and cutting-edge brachytherapy clinical practice. Characteristics of interstitial, intracavitary, and intraluminal implants,

as well as remote afterloaders, are considered. Prereq: RAS/ RM/PHY 546; RM/PHY 472G; RAS/RM 649 (may be co-requisite). (Same as RM 650.)

**RAS 651 ADVANCED LABORATORY IN DIAGNOSTIC IMAGING PHYSICS. (1-3)** Specialized experiments involving the use, calibration, and quality control of x-ray and other diagnostic imaging equipment, and the appropriate use of radiation detectors in diagnostic physics measurements. Laboratory, approximately 30 hours per credit. May be repeated to a maximum of three credits. Prereq: RM/PHY 472G, RAS/RM 546; and concurrent: RAS/RM 647, or equivalent, plus graduate standing in the radiation science program.

**RAS 695 RESEARCH IN THE HEALTH-RELATED RADIATION SCIENCES. (1-4)** Independent directed research on theoretical and practical problems in the health-related radiation sciences. May be repeated to a maximum of eight credits. Prereq: Graduate standing in one of the radiation-related sciences, plus consent of instructor. (Same as RM 695.)

**RAS 710 RADIATION SCIENCE SEMINAR (Subtitle required). (1)** Topics of current interest relating to radiation and its applications in the areas of radiological medical physics and health physics. May be repeated to a maximum of four credit hours with consent of instructor. Prereq: Graduate standing in a radiation-related science.

**RAS 711 RESEARCH METHODS IN MEDICAL PHYSICS. (1)** This course will introduce the student to, and give them practical experience in, writing research proposals, research reports and carrying out research work. The course will be jointly taught by various medical physics faculty and guest lecturers. Students will be asked to present their own work to be critiqued by the class. The goal is to give the student a hands-on experience of what is involved in doing funded clinical research on human subjects and getting it published in an academic journal. Prereq: Approval of instructor.

**RAS 767 DISSERTATION RESIDENCE CREDIT. (2)** Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

**RM 660 GRADUATE PRACTICUM IN RADIATION MEDICINE. (1-6)** Applied field work at the graduate level in the sciences relating to radiation medicine. May be repeated to a maximum of six credits. Prereq: Graduate standing in the bioradiation or medical sciences, plus consent of instructor.

**RM 740 MAMMALIAN RADIATION BIOLOGY. (2)** The physical and biological sequelae of radiation effects will be discussed emphasizing human and mammalian responses and radiation health. Emphasis will be for health and medical workers. Prereq: Consent of instructor; BIO/RM 540 or RM 546 or equivalent background. (Same as BIO 740.)

**RM 842 RADIATION ONCOLOGY. (1)** Use of radiation therapy in clinical treatment of malignancy. Staging, histology, spread, treatment techniques, acute and late effects of radiation therapy. Prereq: RM 740 and an introductory anatomy course, or equivalent, and consent of instructor.

**RM 848 PRACTICUM IN BRACHYTHERAPY PHYSICS. (1-3)** This course offers practicum training in the clinical use of therapy physics and health physics in brachytherapy. May be repeated to a maximum of three credits. Laboratory: 40 hours per week. Prereq: RM/HRS 649, or equivalent, and consent of instructional staff.

**RM 849 PRACTICUM IN EXTERNAL BEAM THERAPY PHYSICS. (1-6)** This course offers practicum training in the professional use of therapy physics in external beam radiation therapy. May be repeated to a maximum of six credits. Laboratory: 40 hours per week. Prereq: RM/HRS 649, or equivalent, and consent of instructor.

# Toxicology and Cancer Biology

## College of Medicine

The Department of Toxicology and Cancer Biology is a multidisciplinary unit for research, graduate education, and professional training in the broad areas of Toxicology and Cancer Biology. The program was founded in 1969 in the Graduate School, as one of nation's first Ph.D. programs in Toxicology and moved to College of Medicine (COM) in 2004. Our education mission is to provide students with an education in Toxicology and Cancer Biology that is based on an understanding of biochemistry, physiology, molecular/cell biology, genetics and metabolism, coupled with in-depth research experience on the mechanisms by which specific agents induce toxicity, and/or the basic cellular processes upon which environmental agents impact to cause disease. In addition, the department provides the only Master of Forensic Toxicology and Analytical Genetics (or degree of comparable nature) in the state and it is only the fifth such professional master's degree in the field of forensics in the nation.

The department is housed in the Health Sciences Research Building in the Medical Center within easy walking distance of all major research units and colleges. Excellent research support facilities are available, including transgenic mouse, macromolecular structure, mass spectrometry, nuclear magnetic resonance, proteomics, genomics, and metabolomics.

## Doctor of Philosophy in Toxicology and Cancer Biology or Master of Science in Toxicology

Our department consists of tenured/tenure track Core Faculty with a primary appointment in Toxicology and Cancer Biology, and is enhanced by faculty who have Joint Appointments in the department, but whose primary appointments are in Departments and Colleges across the University. The Department of Toxicology and Cancer Biology has graduated more than 150 PhDs in Toxicology who have gone on to careers in academia, government, such as the Environmental Protection Agency (EPA) and the Food and Drug Administration (FDA), and in the pharmaceutical and chemical industry. The department maintains a robust extramurally supported training environment, including an NIEHS T32 training grant for doctoral students in toxicology, which has been continuously funded since 1990 and has been renewed for funding until 2021.

The Ph.D. program in Toxicology is ranked in the top quartile in the National Research Council survey of doctoral programs in Toxicology. For more information on the Ph.D. program, please visit http://toxicology.med.uky.edu/graduate-program.

### Admission Requirements

Applicants must meet the following requirements for admission to the University of Kentucky Graduate School and the Toxicology and Cancer Biology program.
An appropriate degree (e.g., Chemistry, Biological Sciences) from an accredited college or university.
A minimum grade point average of 3.0 on a 4.0 scale.

A Graduate Record Examination (GRE) score is not required.
For international applicants, the minimum acceptable TOFEL score is 550 (paper-based), 213 (computer-based), or 79 (internet-based). The minimum IELTS score is 6.5.

More information on how to apply can be found here http://toxicology.med.uky.edu/graduate-program.

## Course Descriptions

**TOX 509 ENVIRONMENTAL AND REGULATORY TOXICOLOGY. (2)** Presentation of basic and advanced concepts to provide an integrated description of toxicology, its scope, the unique application of principles that characterize it as a science, and its professional practice. Emphases will include an extensive treatment of relationships between toxicology and environmental exposures and the influence of federal regulations on the practice of toxicology. Prereq: BCH 501 or BCH 401G or other equivalent or consent of instructor.

**TOX 600 ETHICS IN SCIENTIFIC RESEARCH. (1-2)** The course will commence with an overview of good laboratory practices and present them as the basis of good scientific research, along with an overview of quality assurance and appropriate practices in data analysis and data interpretation. The course will then move to the ethics of human and animal experimentation and discuss the concepts of data and intellectual property, their ownership and access to them. The problems of reviewing other workers' intellectual property such as grant applications, research papers and other intellectual property will be addressed. Prereq: Research experiences; consent of instructor. (Same as VS 600.)

**TOX 680 MOLECULAR TOXICOLOGY AND CARCINOGENESIS. (3)** An intensive examination of 1) the key molecular and cellular mechanisms related to toxicity and carcinogenesis, and 2) the established relationships between exposures to toxicants and development of cancer and other human diseases. Prereq: TOX 509, TOX 663 or consent of Director of Graduate Studies.

**TOX 770 TOXICOLOGY SEMINAR. (0-2)** A specialized seminar focusing on current topics of toxicological significance. Registration each fall and spring semester required of all toxicology majors until residency requirements for the degree have been completed. May be repeated to a maximum of three times during a semester and for a maximum number of two credits during entire graduate course work.

**TOX 780 SPECIAL PROBLEMS IN TOXICOLOGY. (1-3)** Exposure to and actual research experience in an area of toxicology other than that encountered by students in their graduate thesis and dissertation research, or in their professional degree. May be repeated to a maximum of ten credits. Prereq: Consent of graduate advisor or professional degree advisor.

**TOX 790 RESEARCH IN TOXICOLOGY AND CANCER BIOLOGY. (1-6)** Research in Toxicology and Cancer Biology. Research will be conducted in specific areas of toxicology and cancer biology. Learning Outcomes: 1. Conduct independent, hypothesis driven research; 2. Demonstrate the ability to read, understand and apply the scientific literature that is relevant to the research activities; 3. Demonstrate the ability to develop original hypotheses, develop strategies and design experiments to test

hypotheses; 4. Demonstrate competency in the collection, analysis and interpretation of data that is relevant to the research activities. Prereq: Consent of Director of Graduate Studies.

# Master of Forensic Toxicology and Analytical Genetics

As the flagship university in the Commonwealth, the University of Kentucky provides the only Master of Forensic Toxicology and Analytical Genetics (or degree of comparable nature) in the state, and it is only the *fifth* such professional master's degree in the field of forensics in the nation.

This two-year program has two areas of concentration: one concentration is focused on Forensic Toxicology/Chemistry and the second on Forensic/Analytical Genetics. Through the common core curriculum, students in both concentrations will have foundational information and skill set in advanced forensic science, writing, communication, professionalism, ethics, legal perspectives, and workplace-specific laboratory skills. Through a rigorous targeted finishing curriculum in either concentration, including internship experiences and cognate elective courses, the graduates will be competitive for workforce deployment in the areas of private industry drug testing, private DNA analysis, forensic governmental divisions, and hospital clinical labs. For more information on this program, please visit http://toxicology.med.uky.edu/tox-professional-master-forensic-toxicology-and-analytical-genetics.

## Admission Requirements

Applicants must meet the following requirements for admission to the University of Kentucky Graduate School and the Forensic Toxicology and Analytical Genetics program.
An undergraduate bachelor's degree in biology, chemistry, forensic science or a related field of study from an accredited university is preferred. However, students with other bachelor's degrees or the equivalent from an accredited university will be considered if they are judged to be highly competitive and have completed foundational undergraduate courses in chemistry, biology or related fields.
A Graduate Record Examination (GRE) score is not required.

More information on how to apply can be found here http://toxicology.med.uky.edu/tox-admissions-0.

## Course Descriptions (click the link to see full description)

**Core Courses Required for Both Concentrations**
TOX 800: Fundamentals in Forensic Sciences (4)
IBS 611: Practical Statistics (2)
TOX 810: Communication in the Forensic Science Profession (1)
TOX 820: Preparing Professionals in Forensic Science and Analytical Genetics (1)
TOX 840: Forensic Science Standards and Practices (3)
TOX 880: Ethics and Professional Practice in Forensic Science and Analytical DNA (3)
TOX 980: Internship in Forensic Toxicology or Analytical Genetics (6)

**Forensic Toxicology/Chemistry Concentration Required Courses**
TOX 663: Drug Metabolism and Disposition (2)
TOX 860: Forensic and Analytical Toxicology (3)

TOX 920: General Instrumental Techniques in Forensic Chemistry (4)
BCH 401G: Fundamentals of Biochemistry (3)

**Forensic/Analytical Genetics Concentration Required Courses**
TOX 830: Advanced Human Genetics (2)
ABT 461G: Population Genetics (3)
IBS 602: Molecular Biology and Genetics (3)
TOX 910: Forensic and Analytical DNA (4)
BCH 401G: Fundamentals of Biochemistry (3)

**Electives**
TOX 780: Special Problems in Toxicology (1-6)
TOX 790: Research in Toxicology (1-5)
MBA 624: Entrepreneurship and Management Technology Commercialization (3)
PA 651: The Public Policy Process (3)

A suggested curriculum plan can be found here http://toxicology.med.uky.edu/tox-curriculum-overview-0.

## Course Descriptions

**ABT 461G INTRODUCTION TO POPULATION GENETICS. (3)** This survey course examines the population dynamics and equilibria of genes in nuclei, chloroplasts and mitochondria. Emphasis will be on biological relevance (in plants, animals, and micro-organisms), but some theoretical derivations will also be introduced. Prereq: ABT 360 (or equivalent) and one course in probability/statistics. (Same as BIO/ENT/FOR 461G.) [Offered in spring only.]

**BCH 401G FUNDAMENTALS OF BIOCHEMISTRY. (3)** Descriptive chemistry of amino acids and proteins, carbohydrates, lipids, and nucleic acids. Discussion of structure and function; metabolism and bioenergetics; and biological information flow. At the undergraduate level, understanding is demonstrated through hour examinations; at the graduate level, understanding is demonstrated through hour examinations and a brief paper. Lecture, three hours; one optional conference. Prereq: CHE 107, CHE 236 and BIO 152 or equivalent.

**IBS 602 MOLECULAR BIOLOGY AND GENETICS. (3)** In introductory graduate-level course focused on molecular biology and genetics (concepts and techniques) necessary for advanced graduate courses. The course will emphasize basic genetic principles and the molecular mechanisms that underlie the regulated expression of genes, including transcription, mRNA processing and translation, as well as mechanisms of DNA replication/repair and recombination. Genetic engineering and other experimental approaches that are critical to molecular biology research will be covered. Prereq: CHE 105, 107, 230 and 232; BIO 150 and 152; or equivalents.

***IBS 611 PRACTICAL STATISTICS. (2)** Practical Statistics will introduce students to basic statistical concepts and applications that are used in a majority of biomedical and translational research studies.

The emphasis will be on “how” and “why” certain basic statistical applications are used rather than the theory behind various statistical methods. Students will cover materials using didactic lectures, examples of data from the primary literature, and homework problems. Prereq: Some background in molecular biology, cell biology, biochemistry, and/or chemistry (including organic chemistry) at the graduate level is recommended. Courses such as BCH 401G, IBS 601, IBS 602, or IBS 603 would satisfy this recommendation.

**MBA 624 ENTREPRENEURSHIP AND MANAGEMENT TECHNOLOGY COMMERCIALIZATION. (3)** This course is a broad overview of the technology commercialization process with a hands-on opportunity to learn commercialization skills in a real world environment that combines theory and practice. It is designed to cover the three primary phases of the commercialization process. The Assessment Module focuses on customer validation and market research, commercialization pathways, intellectual property, legal entities, strategic partnerships, and the business model canvas. The Business Planning Module provides an overview of accounting principles and pro forma statements, business plan elements, management teams and advisory boards, go-to-market strategies, and licensing and royalties. The Capitalization Module focuses on funding strategies including federal and state programs, angel investors and venture capital, crowd funding, and introduction to term sheets and valuation methods, and investor presentations. This course will meet twice per week for 2.5 hours each session for a total of eight weeks. Prereq: MBA Program Standing.

**PA 651 THE POLICY PROCESS. (3)** Broad-based course in public policy formulation and social planning. Emphasis is on the parameters of policy formulation as well as the social planning and impact variables. Both policy processes and relevant content areas will be stressed. Prereq: MPA program status.

**TOX 663 DRUG METABOLISM AND DISPOSITION (2)** This course covers the science of the interactions between the human body and drugs, or xenobiotics. The focus is on drug absorption, distribution, metabolism, and excretion in the area of pharmacokinetics. Additional topics also include drug-drug and drug-food interactions, pharmacogenetics, and pharmacodynamics of commonly abused drugs. The objective of this course is to provide a strong scientific foundation for the understanding and practice of analytical and forensic toxicology.

**TOX 780 SPECIAL PROBLEMS IN TOXICOLOGY. (1-3)** Exposure to and actual research experience in an area of toxicology other than that encountered by students in their graduate thesis and dissertation research, or in their professional degree. May be repeated to a maximum of ten credits. Prereq: Consent of graduate advisor or professional degree advisor.

**TOX 780 SPECIAL PROBLEMS IN TOXICOLOGY. (1-3)** Exposure to and actual research experience in an area of toxicology other than that encountered by students in their graduate thesis and dissertation research, or in their professional degree. May be repeated to a maximum of ten credits. Prereq: Consent of graduate advisor or professional degree advisor.

**TOX 800 FUNDAMENTALS IN FORENSIC SCIENCE. (4)** This course will broadly survey the disciplines and technology within the field of Forensic Sciences. These disciplines include crime scene investigation techniques, medicolegal death investigation, and patterned evidence examination, and traditional

forensic laboratory (criminalistics) disciplines – specifically forensic drug chemistry, forensic toxicology, trace evidence, fire debris, explosives, and forensic molecular biology. A laboratory component provides hands-on exercise with current instrumentation used in Forensic Sciences. This course can be enrolled in by persons not admitted to the professional program, with approval of the Instructor of Record. Prereq: A Bachelor of Science in Chemistry, Biology, Toxicology, Biochemistry, or related disciplines as approved by the Instructor of Record.

**TOX 810 COMMUNICATING IN THE FORENSIC SCIENCE PROFESSION. (1)** This course will introduce students to the science and art of effective communication with a focus on enhancing communication and presentation skills related to the profession of forensic science. The course will prepare students to communicate (in written and oral format) highly technical and scientific information to lay audiences, which could include government and/or political policymakers, attorneys, juries, judges and the like.

**TOX 820 PREPARING PROFESSIONALS IN FORENSIC SCIENCE AND ANALYTICAL GENETICS. (1)** This course will introduce and develop professional skills required for obtaining workplace employment in the areas of Forensic Chemistry/Toxicology and Forensic/Analytical Genetics. It will prepare students to understand workplace professionalism including proper use of social media, how to search and apply for jobs, and understand goal setting and the importance of work-life balance. Students will learn how to clearly articulate their skill sets, their understanding of their training and how to apply their training as professionals in the workplace environment. Prereq: TOX 810: Communicating in the Forensic Science Profession.

**TOX 830 ADVANCED HUMAN GENETICS. (2)** This course will train students in advanced genetics and the rapidly progressing and influential field of human genetics. Through lectures, the primary literature and review articles, students will gain in-depth knowledge of inheritance, genetic variation, genetic diseases and the impacts of epigenetic alterations and the environment. Students will gain advanced knowledge of contemporary methods used to investigate the human genome and their applications to genetic testing. Students will improve their critical reading skills of relevant primary scientific literature and apply their knowledge in the writing and oral presentation of a term paper. Prereq: IBS 602: Molecular Biology and Genetics, IBS 611: Practical Statistics, TOX 800: Fundamentals in Forensic Science, TOX 810: Communicating in the Forensic Science Profession.

**TOX 840 FORENSIC SCIENCE STANDARDS AND PRACTICES. (3)** This course will examine the day to day considerations of operating a forensic laboratory with emphasis on quality assurance and quality control. Discussions will include considerations of laboratory accreditation and individual certification, employee continuing education, equipment qualification, method validation, rates of error in analytical procedures, proficiency testing, calibration issues, choosing the appropriate sample preparation and analytical technique, and quality control considerations of the actual analysis. Proper documentation with respect to chain of custody, record keeping, and uniform language in reports will also be discussed. Prereq: BCH 401G: Fundamentals of Biochemistry, TOX 810: Communicating in the Forensic Science Profession, TOX 800: Fundamentals in Forensic Science, IBS 611: Practical Statistics.

**TOX 860 FORENSIC AND ANALYTICAL TOXICOLOGY. (3)** Study of the chemistry, biochemical activity,

isolation and identification of drugs of forensic interest in biological materials. Postmortem, human performance and drug testing scenarios commonly encountered in forensic laboratories are appraised. Advanced concepts in sample preparation and analytical methods for presumptive and confirmatory testing are covered. Many factors affecting interpretation of toxicology results are considered. A molecular level approach is taken on many topics. Prereq: BCH 401G: Fundamentals of Biochemistry, TOX 810: Communicating in the Forensic Science Profession, TOX 800: Fundamentals in Forensic Science, IBS 611: Practical Statistics.

**TOX 880 ETHICS AND PROFESSIONAL PRACTICE IN FORENSIC SCIENCE AND ANALYTICAL DNA. (3)** This course will train students in professional practices as they relate to the forensic scientist or the professional working in a modern crime laboratory or DNA testing laboratory (public or private). The course will focus on scientific integrity, ethical behavior, ethics standards and various examples of ethics violations and misconduct in the forensic scientific and DNA analysis fields. A second focus is on education and training in quality assurance programs and practices and the audit and accreditation processes. The third major focus is on the relationships between forensic science or DNA analysis and the legal system and will include courtroom testimony procedures and oral mock court scenarios to train the student as an expert witness in the courtroom setting. Prereq: TOX 800: Fundamentals in Forensic Science, TOX 810: Communicating in the Forensic Science Profession, TOX 780: Preparing Professionals in Forensic Science and Analytical Genetics, TOX 840: Forensic Science Standards and Practice, IBS 611: Practical Statistics, or consent of Program Director.

**TOX 910 FORENSIC AND ANALYTICAL DNA. (4)** This course will train students to become experts in the collection, identification and evaluation of biological evidence in criminal matters and DNA testing using current DNA technologies. Methods routinely used for the isolation of DNA from cells, DNA quantitation, PCR, electrophoretic separation, and DNA sequence determination will be discussed and studied in detail. Students will implement the information obtained from lectures in complementary laboratory sessions. Students will demonstrate an understanding of the theory and practice underlying the use of instrumentation in PCR, Real-Time PCR, capillary electrophoresis, next generation sequencing, the applications of robotics and the use of DNA data bases. The complex range of considerations that need to be considered in data collection, sample storage, data interpretation, analysis and reporting will also be covered in detail. Current uses of single nucleotide polymorphisms, mitochondrial DNA analysis, Y or X chromosome analysis and nonhuman DNA will be described. The legal aspects specific to DNA testing will be incorporated to prepare students for expert witness testimony. Prereq: TOX 820: Preparing Professionals In Forensic Science and Analytical Genetics, TOX 830: Advanced Human Genetics, ABT 461: Population Genetics, TOX 810: Communicating in the Forensic Science Profession, TOX 800: Fundamentals in Forensic Science, IBS 611: Practical Statistics, TOX 840 Forensic Science Standards and Practices; IBS 602: Molecular Biology and Genetics.

**TOX 920 INSTRUMENTAL TECHNIQUES IN FORENSIC CHEMISTRY. (4)** Theory and practice of modern instrumental methods used in forensic chemistry laboratories, including mass spectrometry. The class offers an in-depth description of the processes and techniques involved in detection, identification, and quantification of elemental or molecular ionic species by mass spectrometry techniques, and other sensitive analytical techniques. Topics covered in the course include: theory of mass spectrometry, methods of ionization, instrument design, combined chromatography and mass spectrometry,

quantitative aspects of mass spectrometry, meta-stable ions in mass spectrometry, recent applications of mass spectrometry techniques, analytical chemistry instrumentation and methods used by forensic scientists for analysis of drugs, toxicology, trace evidence, and sample collection and processing. Prereq: Introductory chemistry, organic chemistry, introductory biology, BCH 401G: Fundamentals of Biochemistry, TOX 810: Communicating in the Forensic Science Profession, TOX 780: Special Problems in Toxicology: Preparing Professionals in Forensic Science and Analytical Genetics, TOX 800: Fundamentals in Forensic Science, TOX 840 Forensic Science Standards and Practices, IBS 611: Practical Statistics.

**TOX 980 INTERNSHIP IN FORENSIC TOXICOLOGY AND ANALYTICAL GENETICS. (1-6)** The internship component of the program provides the student with an opportunity for immersed participation in the professional work environment associated with a laboratory practicing methods in forensic toxicology or analytical genetics. Through handson experience in a real work site the student applies the formal classroom knowledge to the real work setting. The work/learning arrangement is supervised by a program faculty member plus the designated representative of the internship site, which will be a private industry, governmental, hospital or other appropriate setting providing real world training in practices and procedures of forensic toxicology or analytical genetics. Prereq: Enrollment in the Master of Forensic Toxicology and Analytical Genetics Program; Approval of Director of Graduate Studies.

# COLLEGE OF NURSING

# MSN – Health Care Systems Leadership

## College of Nursing

## Master of Science in Nursing – Healthcare Systems Leadership

The MSN in Healthcare Systems Leadership program is a Plan B, non-thesis program, based on the MSN Essentials and builds on the student's current knowledge and expertise. Graduates that complete this program will have a fuller understanding of the discipline of nursing in order to engage in higher level practice and leadership in a variety of settings and to commit to lifelong learning. Students will take a series of courses that prepare them to function as change agents in multi-dimensional roles in the organization and community. The curriculum emphasizes leadership effectiveness in micro and meso organizational/systems/settings, evidence-based management, quality/safety, information management expertise, and strategies to make organizational effectiveness strategies. MSN courses are offered on-line. Graduates will be prepared to:

1. Lead change to improve quality outcomes,
2. Advance a culture of excellence through lifelong learning,
3. Build and lead collaborative inter-professional care teams,
4. Navigate and integrate care services across the healthcare system,
5. Design innovative nursing practices, and
6. Translate evidence into practice (AACN, 2011, The Essentials of Master's Education in Nursing)

Full and part time sample plans of study can be found at MSN Healthcare Systems Leadership program.

### Admission Requirements

- Undergraduate grade point average of 3.0 on a 4.0 grading scale
- Baccalaureate degree in nursing from a CCNE or NLN accredited program
- Three references attesting to the applicant's expertise in nursing or health care. Faculty prefer professional references from a former nursing faculty member or advisor if available, one or two from a manager/director/leader from their work setting, and no more than one from a peer.
- Personal interview(s)
- Current, active, unencumbered and unrestricted RN license in each US state where practice or clinical experiences occur. The RN license cannot have any restrictions on licensure which would preclude meeting the requirements of the degree program and required clinical rotations.
- Goal statement:
    - In one to three double-spaced pages, discuss your reasons for seeking graduate study, including your short- and long-term professional goals. Discuss a system or population

you are interested in working with and identify/discuss a system or health problem in that population that you wish to study as a project.

- Scholarly written work:
    - An example of scholarly written work, completed within three years of application, related to nursing that demonstrates excellent writing skills and the ability to communicate clearly and logically. Samples of scholarly work: formal research paper written in your BSN program; published article on a nursing issue; or paper written on a nursing issue of interest to you
- Current vita/resume

Final admission recommendations are made on a competitive basis.

## Application Procedures

ALL applicants are required to complete the Graduate School online application. Process details can be found at UK College of Nursing MSN-Health Care Leadership Admissions.

## Application Deadline

The MSN application opens Sept. 15 and closes February 15th for Fall (August) enrollment. The MSN program does not admit a spring or summer class. All materials are submitted electronically to the UK Graduate School. Process details can be found at UK College of Nursing MSN-Health Care Leadership Admissions.

## Degree Requirements

In addition to successful completion of the required 38 credit hours of course work with a GPA of 3.00 or better and no more than one C grade on transcript and one repeat option; student must successfully complete an oral comprehensive exam consisting of a summary presentation of Capstone project work.

## Curriculum

Program course requirements:

- EPE/EDP 557 - Gathering, Analyzing and Using Educational Data (3 CH)
- NUR 624 - Concepts, Theories, And Models for Advanced Practice Nursing (3 CH)
- NUR 614 - Economic and Financial Aspects of Clinical and Population-Based Health Care Delivery Systems (3 CH)
- NUR 602 - Research Methods in Advanced Practice Nursing (3 CH)
- NUR 730 - Leading Change: Seminar (3 CH)
- NUR 731 - Leading Change: Practicum (3 CH)
- NUR 610 - Nursing Leadership in Health Care (3 CH)
- NUR 619 - Quality and Safety in Nursing and Healthcare (3 CH)
- NUR 615 - Evaluating Evidence for Research and Evidence-Based Practice (3 CH)
- NUR 736 – Relationship-Based Leadership in Healthy Working Environments: Seminar (3 CH)

- NUR 737 – Relationship-Based Leadership in Healthy Working Environments: Practicum (3 CH)
- NUR 660 - MSN Capstone Practicum (3 CH)
- NUR 617 - Technology for Transforming Nursing and Healthcare (2 CH)

## Course Descriptions

**EDP 557 GATHERING, ANALYZING, AND USING EDUCATIONAL DATA. (3)** This course is rooted in the conceptual understanding of statistics and covers applications of statistical and graphical methods for educational and evaluation data. Basic descriptive statistics, correlation, normal distributions and hypothesis testing will be covered. An emphasis is placed on exploratory data analysis and interpretation of results within the broad contexts of education and evaluation. Statistical literacy exercises will be used for comprehension and application of materials. In addition, applications of statistical software will be demonstrated. Prereq: MA 109 or equivalent; undergraduate (with permission) or graduate status in the College of Education; or consent of the instructor. (Same as EPE 557.)

**NUR 602 RESEARCH METHODS IN ADVANCED PRACTICE NURSING. (3)** This course provides the knowledge and skills essential for using research to support clinical and organizational decision-making. The strengths and limitations of various research designs and methods are reviewed for their utility in answering clinical questions, evaluating care delivery and patient outcomes, and making clinical decisions. Prereq: Graduate statistics course and NUR 924, admission to DNP program, graduate programs in nursing, or consent of instructor. (Same as NUR 925.)

**NUR 610 NURSING LEADERSHIP IN HEALTH CARE. (3)** Students use theories of leadership, motivation, power, influence, and relationships to evaluate current practices and initiate future practices within health care, educational, and research organizations. Shared visions, advocacy, relationships and change management are addressed. Students study the change process in health related organizations by critically analyzing demographics, cultural influences, and current trends that affect practice, education, and research. Prereq: Enrollment in graduate nursing program.

**NUR 614 ECONOMIC AND FINANCIAL ASPECTS OF CLINICAL AND POPULATION-BASED HEALTH CARE DELIVERY SYSTEMS. (3)** This course focuses on the application of economic and financial principles and practices to health care. Within this framework, content related to finance and economics, health care reimbursement models, incentive structures, market dynamics, economic evaluations, and quantification of outcomes are examined. The emphasis will be on critically analyzing the actual and potential impact of these dynamics on the structure and functioning of the health care system. Prereq: Admission to the MSN or DNP program

**NUR 615 EVALUATING EVIDENCE FOR RESEARCH AND EVIDENCE-BASED PRACTICE. (3)** This course focuses on critical evaluation and synthesis of the comprehensive evidence base including interventional and noninterventional research and non-research sources of evidence to elucidate the best available evidence and state of the science in a particular focused area to provide a foundation for

the development of practice change based on best evidence, and to illuminate significant gaps in current knowledge to support the development of research studies. This course is designed to provide the tools to evaluate, translate and integrate evidence for scholarly inquiry and/or practice improvement. Prereq: EPE 557 or STA 570 or the equivalents or consent of instructor. In addition, for MSN or Post BSN DNP students, NUR 602/925 is a prerequisite course.

**NUR 617 TECHNOLOGY FOR TRANSFORMING NURSING AND HEALTH CARE. (2)** This course focuses on information systems and technology as applied to nursing and health care. Knowledge and skills necessary for utilizing information systems and technology for the advancement of practice and health services research are emphasized. The use of computer systems and technology will be explored. Prereq: Admission to MSN or DNP program or consent of instructor. (Same as NUR 917.)

**NUR 619 QUALITY AND SAFETY IN NURSING AND HEALTHCARE. (3)** This course provides the foundation to improve health outcomes for patient populations. National strategies, theories and methods to improve health outcomes will be explored. Emphasis will be placed on the systematic analysis of systems of care to promote safe, timely, effective, efficient, equitable, patient-centered care. Students will learn how to optimize the translation of evidence into clinical practice to enhance quality and safety. Students will gain knowledge to lead quality improvement and patient safety initiatives in health care systems. Prereq: NUR 615/NUR 915.

**NUR 624 CONCEPTS, THEORIES, AND MODELS FOR ADVANCED PRACTICE NURSING. (3)** Students will examine the processes underlying the development of models, theories and conceptual framework. Selected models, theories, and conceptual frameworks from nursing and other disciplines will be evaluated for their utility in advanced nursing practice. All are discussed within the context of the nature of nursing knowledge and the expanding scientific basis for advanced practice nursing. This course serves as a foundation for clinical courses in which models, theories, and conceptual frameworks are used to develop and evaluate new approaches to the clinical practice of advanced nursing practice. Prereq: Admission to graduate program in nursing.

This course will focus on the exploration of models for providing preventive, primary health care, acute care, and chronic health care services in rural areas, including nursing care delivery models. Model standards for implementing the national health objectives in rural communities will be the primary focus. Demographic characteristics and organization of the community will be considered in assessing appropriateness and effectiveness of models for improving access to service and reducing disparity among subpopulations. Prereq: Enrollment in graduate program in nursing or consent of instructor.

**NUR 660 MSN CAPSTONE PRACTICUM. (3)** This course provides the opportunity for the student to apply theories, principles, and processes learned during the Master's program of study and to reflect on the competencies acquired during this educational experience. Under the guidance of the student's faculty advisor and practicum preceptor, the student will develop a proposal for a Capstone paper, which includes an outline of the key components of the projected work. The Capstone paper should be focused on a practice problem, evidence-based innovation, or practice program, with the outcome being a paper that describes the work. At the end of this course, students will be required to

successfully complete an oral examination focused on the Capstone work and the MSN essentials. Prereq: MSN Leadership Specialty courses (NUR 730, NUR 731, NUR 736, & NUR 737).

**NUR 730 LEADING CHANGE: SEMINAR. (3)** The course is designed to increase the student's understanding of organizational change theory and leadership strategies and techniques needed to initiate, implement, evaluate, and sustain changes. Leaders in contemporary and complex adaptive health care organizations and systems are constantly faced with the challenges of uncertainty and of change at micro, meso, and macrosystem levels. The management of change is a dynamic process and must be consistent with the mission, vision, values, goals, structure, processes, technology, people, and culture of the organization. This course is taught from the perspective that the student will lead change at all levels of the organization at some time in their professional career and will need to understand change theory, communication, influence, power, and politics. Prereq: Admission to MSN program. Coreq: NUR 731.

**NUR 731 LEADING CHANGE: PRACTICUM. (3)** This practicum course is designed to increase the student's understanding about how organizational change theory and leadership strategies/techniques are applied in the practice environment to guide the initiation, implementation, evaluation, and sustainment of changes. Students will understand why change initiatives should be consistent with the mission, vision, values, goals, structure, processes, technology, people, and culture of the organization and why change is a dynamic process. In this course the student will work with organizational leaders to implement a change initiative and will focus on understanding the importance of change theory, communication, influence, power, and politics. Prereq: Enrollment in the College of Nursing and in NUR 730 is required for enrollment in this course, except with permission of the instructor.

**NUR 736 RELATIONSHIP-BASED LEADERSHIP IN HEALTHY WORKING ENVIRONMENTS: SEMINAR. (3)** This systems level course provides opportunities for leadership development for nurses in varied leadership roles. The course focuses on theories of systems, leadership, motivation, politics, power, influence, justice, ethics, and organizational behavior to lead individuals and groups providing healthcare in organizations and in the community. The course will also focus on organizational, legal, economic, and technical issues concerned with acquiring, motivating, and retaining employees, with emphasis directed to the development, implementation, and assessment of policies and practices consistent with legal, social, human, and environmental dynamics. Emphasis will be placed on analyzing the practice environment using research findings, literature and aggregate data. Students will learn how to integrate evidence-based decision making competencies to maximize attention to diverse challenges in the work environment. Prereq: Enrollment in graduate nursing program.

**NUR 737 RELATIONSHIP-BASED LEADERSHIP IN HEALTHY WORKING ENVIRONMENTS: PRACTICUM. (3)** This systems level course provides students the opportunity to work with a leadership preceptor to obtain experience in a position different than one they have experienced as an employee. During this practicum experience, students will learn about department and organizational requirements for a healthy work environment; they also will focus on the importance of positive professional relationships for success in varied leadership roles. Emphasis will be placed on the application of evidence-based leadership principles to promote a healthy practice environment and to address diverse challenges in

the work environment. This course is to be taken at the same time the student is taking Nursing 972 Seminar. Prereq: Admission to MSN or DNP program. Coreq: NUR 736/972. (Same as NUR 973.)

# Nursing

## College of Nursing

The College of Nursing offers graduate programs leading to the research doctorate, the Doctor of Philosophy in Nursing, and a professional degree program leading to the clinical doctorate, the Doctor of Nursing Practice. The College of Nursing is not admitting new students to the Master of Science in Nursing degree program.

## Doctor of Philosophy

The College of Nursing offers graduate programs leading to the research doctorate, the Doctor of Philosophy in Nursing, and a professional degree program leading to the clinical doctorate, the Doctor of Nursing Practice. The College of Nursing is not admitting new students to the Master of Science in Nursing degree program.

## Doctor of Nursing Practice

The College of Nursing offers a post-Baccalaureate of Science in Nursing (B.S.N.) entry option to the Doctorate of Nursing Practice (DNP) program to prepare nurse practitioners, clinical nurse specialists, public health nurses and nurse managers. This professional, clinical doctoral program builds on the B.S.N. degree and the practice experience of a Registered Nurse (R.N.). A post MSN entry option is also available. Information about the DNP program, admission requirements and sample curriculum plans may be found on the College of Nursing Web page, http://www.uky.edu/nursing/.

**Admission Requirements**

Applicants to the PhD program must meet the minimum requirements of the Graduate School, as well as the following requirements of the nursing program. An applicant for the BSN entry option must possess a bachelor's degree in nursing from a nationally accredited school; a cumulative undergraduate grade point average of 3.3 or higher, on a 4.0 scale; a Kentucky Registered Nurse license; GRE general test scores are optional but highly recommended; GRE scores are used for competitive funding opportunities, particularly those from the Graduate School; three references; personal interview(s); a goal statement, an example of scholarly written work, and description of clinical experience. An applicant for the MS/MSN entry option must have a master's degree in nursing (MS/MSN) from a nationally accredited school and a 3.3 or higher grade point average on a 4.0 scale for all master's level work. Satisfactory scores on the GRE general test are optional, but highly recommended; GRE scores are used for competitive funding opportunities, particularly those from the Graduate School. Personal interviews, a goal statement, a writing sample, and three references are required. Applicants for the DNP entry option must have a DNP degree from a nationally accredited program, and a cumulative GPA of 3.3 or higher on graduate coursework. Applicants must provide a goal statement, a writing sample, participate in interviews, and provide three references. Final admission recommendations are made on a competitive basis.

The Doctor of Philosophy degree in nursing requires a minimum of 45 credit hours of course work beyond the master's degree, participation in at least one research project prior to qualifying examinations, plus a minimum of two semesters of residence credit for dissertation research. Written and oral examinations are required to qualify as a degree candidate. There is a final examination for defense of the dissertation research.

## Graduate Courses

| | | |
|---|---|---|
| Nur 620 | Problems In Clinical Nursing | (2-6) |
| Nur 767 | Dissertation Residency Credit | (2) |
| Nur 769 | Residence Credit For The Doctor's Degree | (0-12) |
| Nur 770 | Philosophical Foundations Of Nursing Practice | (3) |
| Nur 771 | Research Experience | (1) |
| Nur 776 | Special Topics Seminar (Subtitle Required) | (2-4) |
| Nur 778 | Proseminar In Contemporary Health And Nursing Policy Issues | (3) |
| Nur 779 | Doctoral Seminar | (1-3) |
| Nur 781 | Independent Study In Nursing | (1-3) |
| Nur 790 | Knowledge Development In Nursing | (3) |
| Nur 791 | Qualitative Methods In Nursing Research | (3) |
| Nur 792 | Quantitative Methods In Nursing Research | (3) |
| Nur 793 | Measurement Of Nursing Phenomena | (4) |
| Nur 794 | Analysis, Interpretation, And Presentation Of Quantitative Data | (3) |

# COLLEGE OF PHARMACY

# Pharmaceutical Sciences

## College of Pharmacy

The Graduate Program in Pharmaceutical Sciences is a multidisciplinary program designed to prepare motivated individuals for academic, industrial, or government careers in pharmaceutical and biomedical research. It is a graduate training program that encompasses research in areas of pharmaceutical sciences that range from identifying fundamental mechanisms of human disease, to the design, development and formulation of new medicines, to understanding the impact of drug policies on health care systems. Within this broad scientific framework, students develop individually tailored programs of study to meet their particular research interests and career objectives.

Intense, laboratory-based and data and analysis driven research, using state-of-the-art techniques and instruments, forms the basis of a student's PhD dissertation or Master's thesis. Each student develops the skills and judgment to make a unique, scholarly contribution to our understanding of drugs and how these compounds impact human health and disease. These breakthroughs are published in top pharmaceutical journals and presented at national and international meetings. Students receive the training that will enable them to become independent scientists who can conduct front-line research in pharmaceutical sciences in industrial, academic or governmental settings.

The overall goal of the graduate program is to provide the graduate student with a comprehensive, structured, yet flexible educational experience comprised of both coursework and independent, highly creative, research. This goal is supported by additional components, such as research rotations for first-year students and a program-wide seminar series. The intent is to provide both depth and breadth of expertise in the Pharmaceutical Sciences along with developing the creative and critical approach to research that characterizes a PhD-level or Master's level scientist.

All students in the program will carry out hypothesis-driven laboratory investigations as the basis of a written dissertation or thesis for PharmD/MS students. The quality of the dissertation will be judged by the student's advisory committee, in accord with the requirements and regulations set forth by the Graduate School. It is expected that the dissertation or thesis work will be recognized as high quality by also being published in national and international scientific journals and presented in forums at national and international scientific meetings.

**Admission Requirements**
Admission to the graduate program is competitive and is based upon academic background, professional recommendations, performance on the Graduate Record Examination (GRE), experience and interviews. Students should have completed an undergraduate degree in biology, biochemistry, biomedical engineering, chemical engineering, chemistry, neurosciences, or pharmacy with a mastery of mathematics through calculus.

## Training Options

Doctoral degrees in Pharmaceutical Sciences at the College of Pharmacy are obtained through one of five Tracks. The Traditional Pharmaceutical Science Tracks provide training that is based on advanced coursework in contemporary basic pharmaceutical sciences plus independent laboratory or computational research under the direction of a faculty mentor. In the Traditional Pharmaceutical Science Tracks the many research opportunities available are organized into three broad disciplinary areas: Medicinal, Bioorganic and Computational Chemistry, Pharmaceutical Chemistry and Engineering, and Pharmacology

and Experimental Therapeutics. The Clinical and Experimental Therapeutics Track requires a prior degree in an area of professional health care, and focuses on training in translational research at the interface between basic and clinical studies. The Pharmaceutical Outcomes and Policy Track trains scientists to conduct research on the safe, efficient, and effective use of pharmaceuticals to improve the health of individuals and populations.

**Traditional Pharmaceutical Science Tracks**
The goal of the Pharmaceutical Science Tracks is to develop scientists who possess a blend of contemporary basic science skills and an understanding of their role in the development of new drugs. Training begins with advanced coursework that is tailored to give each student a solid foundation across the breadth of pharmaceutical sciences, yet is individualized based on the student's academic background, and the research project that will be the basis for their dissertation. The many research opportunities available are organized into three broad disciplinary areas, built around the three Divisions within the Department of Pharmaceutical Sciences—the Medicinal, Bioorganic, & Computational Chemistry Division, The Pharmaceutical Chemistry and Engineering Division, and the Pharmacology & Experimental Therapeutics Division.

**Medicinal, Bioorganic and Computational Chemistry Track**
The Division of Medicinal, Bioorganic and Computational Chemistry is focused on small molecules as well as new protein and nucleic acid based therapies, and natural product drug discovery platforms and seeks to expand is expertise with interests in synthetic/biosynthetic approaches for drug discovery, development of novel computational tools for drug design, and evolution of biologics for specific therapies or drug delivery.

**Pharmaceutical Chemistry and Engineering Track**
The Division of Pharmaceutical Chemistry and Engineering focuses on drug formulation, development and delivery. Areas of emphasis include the application of physical, physical organic, and analytical chemistry to solve pharmaceutical problems; the design, development, and optimization of dosage forms for small and large molecules; and fundamental research into materials science and nanotechnology to advance drug delivery systems design. Collaborations with faculty in the UK College of Engineering provide additional opportunities for a combined pharmaceutical and engineering research program. In addition, faculty participate in preclinical and/or clinical projects through collaborative relationships within the College of Pharmacy and with investigators across the UK Medical Center Complex.

**Pharmacology and Experimental Therapeutics Track**
The Division of Pharmacology and Experimental Therapeutics draws upon campus-wide strengths in neurobiology, cardiovascular disease, oncology and infectious diseases. Strong collaborations exist with the Sanders-Brown Center on Aging, addiction/abuse consortia, and the Markey Cancer Center, which recently received NCI Cancer Center designation. Division faculty are skilled in pharmacokinetic and pharmacodynamics, systems biology, neurochemistry and neurophysiology. Translational research programs bridging preclinical and/or clinical projects through collaborative relationships within the College of Pharmacy and with investigators across the UK Medical Center Complex also exist.

**Clinical and Experimental Therapeutics Track (CET)**
The completion of a Pharm.D., D.D.S., D.V.M. or other professional health degree is required for admission into this training Track. The focus of the CET Track is translational research, and involves training in how to conduct studies that occur at the interface of basic and clinical research. Since all students admitted to the program will already have a clinical/health profession degree, the emphasis of the program will be training in the basic sciences. This breadth and balance of skills will improve the graduate's ability to successfully compete for extramural funding and job opportunities. There are required clinical components to assure competency in the foundations, principle and processes of clinical research.

The keystone of the training is the conduct of an integrated, combined laboratory-based and clinical dissertation.

**Pharmaceutical Outcomes and Policy Track (POP)**
The goal of the Pharmaceutical Outcomes and Policy Track is to train scientists to conduct research on the safe, efficient, and effective use of pharmaceuticals to improve the health of individuals and populations. The emphasis of the program will be on building a core set of analytical skills and tools to evaluate the impact of clinical interventions and clinical outcomes. Students complete core classes in five areas: pharmacoepidemiology, pharmacoeconomics, statistics, biomedical informatics, and pharmaceutical policy. This breadth and balance of skills will improve the graduate's ability to successfully compete for extramural funding and contribute to the scholarly literature on pharmaceutical outcomes. Most students within the Pharmaceutical Outcomes & Policy Track have a prior professional health related degree (Pharm.D., B.S. Pharm.) Exceptional students without a pharmacy related degree may be admitted with the consent of the admissions committee. Students without appropriate prerequisite training may be required to complete additional course work.

**Doctoral Program Core Coursework**
Each Track has a distinct set of courses. These courses may be offered in the Graduate Program of Pharmaceutical Sciences, or available outside of the Program. The mentor and the Dissertation Ad-visory Committee are empowered to select those courses that fit best into the educational and ca-reer goals of the student and the scientific goals of the dissertation. The Track Coordinator (for first-year students) or mentor and the Dissertation Advisory Committee are empowered to petition the DGS, in writing, to waive courses of the Graduate Program Core if the student has demon-strated sufficient academic mastery of material in courses taken in other programs. The DGS will monitor the coursework of students and keep the Advisory Committee members apprised as to the student's grades and completion of courses. Coursework and grades are reviewed by the Advisory committee at each yearly meeting.

The student's Dissertation Advisory Committee is responsible for coursework recommendations that are in addition to the common coursework of the program and courses recommended by the Track faculty. Full descriptions of available graduate courses are described in the Bulletin of the University of Kentucky Graduate School (http://www.uky.edu/Registrar/Bulletin.htm ).

**Medicinal, Bioorganic, and Computational Chemistry Track**
*Core Courses*
Students should complete these courses over 4-6 semesters

| | | |
|---|---|---|
| IBS/CHE 601/550 | Biomolecules and Metabolism or Biological Chemistry I | (3) |
| IBS/CHE 602/552 | Molecular Biology and Genetics Biological Chemistry II | (3) |
| PHS 760 00x | Introduction to Pharmaceutical Sciences | (1) |
| PHS 760 00x | Drug Discovery, Development, Commercialization, Outcomes | (3) |
| PHS 711 | Fundamentals of Bioethics | (2) |
| PHS 778 | Seminar (attendance required each semester until defense; officially register only until passing the qualifying exam) | (1) |

Additional courses to be taken by an individual student depend on:
1. The lab and dissertation project the student selects
2. The academic preparation of the student (areas that need strengthening)

*Elective courses*

| | | |
|---|---|---|
| PHS 510 | Modern Methods in Pharmaceutical Analysis | (5) |
| PHS 662 | Bioorganic Mechanisms | (3) |

| | | |
|---|---|---|
| PHS 660 | Biosynthesis of Natural Products | (3) |
| BCH 401G | Fundamentals of Biochemistry | (3) |
| CHE 440G | Introductory Physical Chemistry | (4) |
| CHE 538 | Principals of Physical Chemistry | (3) |
| IBS 606 | Physiological Communication | (3) |
| MA 213 | Calculus III | (4) |
| PGY 502 | Principles of Systems, Cellular and Molecular Physiology | (5) |
| STA 570 | Basic Statistical Analysis4 | (4) |

**Pharmaceutical Chemistry and Engineering Track**

*Core Courses*

Students should complete these courses over 4-6 semesters

| | | |
|---|---|---|
| CHE 548 | Principles of Physical Chemistry II | (3) |
| PHS 612 | Quantitative PD/PK (Modules I and II listed under PHS 760) | (2) |
| PHS 630 | Pharmaceutical Rate Process | (3) |
| PHS 631 | Equilibrium Phenomena in Pharmaceutical Systems | (3) |
| PHS 760 | Drug Discovery, Development, Commercialization and Outcomes | (3) |
| PHS 711 | Fundamentals of Bioethics | (2) |
| PHS 778 | Seminar (attendance required each semester until defense; officially register only until passing the qualifying exam) | (1) |

Additional courses to be taken by an individual student depend on:

1. The lab and dissertation project the student selects
2. The academic preparation of the student (areas that need strengthening)

*Highly Recommended Courses*

Students must select 5 courses from this list

| | | |
|---|---|---|
| CHE 538 | Principles of Organic Chemistry | (3) |
| CME 505 | Analysis of Chemical Engineering Problems | (3) |
| CME 630 | Transport I | (3) |
| IBS 601 | Biomolecules and Metabolism (or CHE 550) | (3) |
| PGY 206 or 502 | Elementary Physiology (no graduate credit) or Principles of Systems, Cellular and Molecular Physiology | (3-5) |
| PHS 76x | Drug Delivery Systems | (3) |
| PHS 76x | Solid State Stability and Formulation | (3) |
| PHS 76x | Techniques in Pharmaceutical Analysis | (3) |

*Elective Courses*

These courses may require additional prerequisites

| | | |
|---|---|---|
| CHE 532 | Spectroscopic Identification of Organic Molecules | (2) |
| CHE/IBS 552/602 | Biological Chemistry II or Molecular Biology and Genetics | (3) |
| CHE/ABT 553/495 | Chemistry and Molecular Biotechnology or Experimental Methods in Biotechnology | (3-4) |
| MED 616 | Biology and Therapy of Cancer | (3) |
| STA 673 | Distribution-Free Statistical Inference and Analysis of Categorical Data | (2) |
| STA 677 | Applied Multivariate Methods | (3) |
| STA 679 | Design and Analysis of Experiments II | (3) |

**Pharmacology and Experimental Therapeutics**

*Core Courses*

Students should complete these courses over 4-6 semesters

| | | |
|---|---|---|
| IBS/CHE 601/550 | Biomolecules and Metabolism or Biological Chemistry I | (3) |
| IBS/CHE 602/603/552 | Molecular Biology and Genetics/Cell Biology and Cell Signaling/ Biological Chemistry II | (3) |
| STA/IBS 570/580/611 | Basic Statistical Analysis | (4) |
| | Biostatics | (3) |
| | Practical Statistics | (1-4) |
| PHS 760 00x | Introduction to Pharmaceutical Sciences | (1) |
| PHS 760 00x | Drug Discovery, Development, Commercialization, Out-comes | (3) |
| PHS 711 | Fundamentals of Bioethics | (2) |
| PHS 778 | Seminar (attendance required each semester until de-fense; officially register only until passing the qualifying exam) | (1) |

**Clinical and Experimental Therapeutics**

Core Courses

*Students should complete these courses over 4-6 semesters*

| | | |
|---|---|---|
| IBS 601 | Biomolecules and Metabolism | (3) |
| IBS 602 | Molecular Biology and Genetics | (3) |
| PHS 612 | Quantitative Pharmacodynamics: Pharmacokinetics | (3) |
| PHS 711 | Fundamentals of Bioethics | (2) |
| PHS 750 | Journal Club (choice of journal club topic) | (1) |
| PHS 760 00x | Introduction to Pharmaceutical Sciences | (1) |
| PHS 760 00x | Drug Discovery, Development, Commercialization, Out-comes | (3) |
| PHS 760 00x | CET track lab rotations | Varies |
| PHS 778 | Seminar (attendance required each semester until de-fense; officially register only until passing the qualifying exam) | (1) |
| PPS 764 | Drug Development Regulation & Clinical Research | (3) |

All students must become IRB and HIPPA certified

*Strongly Recommended Courses*

| | | |
|---|---|---|
| STA 671 | Statistics: Regression and Correlation | (2) |
| STA 672 | Statistics: Design and Analysis of Experiments | (2) |

*Possible Electives*

| | | |
|---|---|---|
| PHS 760 00x | Techniques in Pharmaceutical Analysis | (3) |
| BIO 520 | Bioinformatics | (3) |
| BIO 615 | Molecular Biology | (3) |
| IBS 603 | Cell Biology and Signaling | (3) |
| PGY 502 | Principles of Systems, Cellular and Molecular Physiology | (5) |
| PGY 617 | Physiological Genomics | (2) |
| PHA 621 | Principles of Drug Action | (3) |

**Pharmaceutical Outcomes and Policy**

The Doctor of Philosophy track focusing on Pharmaceutical Outcomes & Policy requires a minimum of 50 credit hours: including a 29 credit hour core curriculum, 12 hours in a specialization area de-signed by the Advisory Committee, and 9 hours of dissertation work. Students without appropriate pre-requisite training may be required to complete additional course work. Generally, students without a Master level degree will

be required to complete appropriate level courses designed to meet pre-requisite requirements to begin doctoral coursework. The student Advisory Committee may also require additional coursework to satisfy appropriate depth and breadth of training.

| | | |
|---|---|---|
| PPS 700 | Introduction to Pharmaceutical Outcomes and Policy | (3) |
| PPS 701 | Pharmacoepidemiology | (3) |
| PPS 704 | Pharmacy Informatics | (3) |
| PPS 706 | Intermediate Pharmacoeconomics and Decision Analysis | (3) |
| PPS 710 | Techniques in Secondary Data Research | (3) |
| PPS 750 | Pharmaceutical Outcomes and Policy Journal Club (attendance is required each semester until defense) | (1) |
| PPS 760 | Special Topics in Pharmacy Practice & Science: Behavioral Economics in Pharmaceutical Outcomes & Policy (will be created as new course PPS 703) | (3) |
| PPS 778 | Seminars in Pharmacy Practice & Science (attendance is required each semester until defense) | (1) |
| PHS 760 | Topics in Pharmaceutical Sciences: Introduction to Pharmaceutical Sciences | (1) |
| PHS 760 | Topics in Pharmaceutical Sciences: Drug Discovery, Development & Translation | (3) |
| PHS 711 | Fundamentals of Bioethics | (2) |
| ECO 603* | Research Methods and Procedures in Economics OR (Alt. Statistics) | (3) |
| ECO 703* | Introduction to Econometrics I OR (Alt. Statistics) | (3) |

All students must complete IRB and HIPAA training
* Prerequisites are required, including 6 hours of statistics or biostatistics, and introductory epide-miology and health economics.

In addition to the core courses, the student's Advisory Committee may recommend additional elec-tive courses. A student's completion of these course requirements must be assured by the stu-dent's Mentor(s), Advisory Committee and PPS Track Coordinator. In addition, some students may need to complete prerequisite courses before beginning core class course work. Note at least 75% of the courses must be 600 level or higher and prerequisites for core courses cannot count as specialty electives.

*Partial List of Elective Courses*
These courses may require additional prerequisites.

| | | |
|---|---|---|
| PPS 605 | Pharmacoeconomics and Decision Analysis | (2) |
| PPS 620 | Substance Use Disorders: Health Implication, Policies, & Prevention Strategies | (3) |
| PPS 702 | Pharmaceutical Health Policy | (2-3) |
| PPS 764 | Drug Development Regulation and Clinical Research | (3) |
| BMI 633 | Introduction to Bioinformatics | (3) |
| BMI 730 | Principles of Clinical Informatics | (3) |
| BMI 732 | Biomedical Ontologies and Semantic Web Techniques | (3) |
| BMI 734 | Introduction to Biomedical Image Analysis | (3) |
| BMI 738 | Big Data for Healthcare | (3) |
| BST 682 | Generalized Linear Models | (3) |
| BST 761 | Time to Event Analysis | (3) |
| BST 762 | Longitudinal Data Analysis | (3) |
| CPH 664 | Design and Analysis of Clinical Trials | (3) |
| CPH 711 | Chronic Disease Epidemiology | (3) |
| CPH 712 | Advanced Epidemiology | (3) |

| | | |
|---|---|---|
| CS 405G | Introduction to Database Systems | (3) |
| CS 460G | Machine Learning | (3) |
| CS 515 | Algorithm Design | (3) |
| ECO 751 | Public Economics | (3) |
| PA 751 | Public Policy Formulation & Implementation | (3) |
| PA 752 | The Economics of Policy Analysis | (3) |
| PPA 784 | Next Generation Sequencing and Bioinformatics | |
| STA 671 | Regression and Correlation | (2) |
| STA 672 | Design and Analysis of Experiments | (2) |
| STA 673 | Distribution-Free Statistical Inference and Analysis of Categorical Data | (2) |
| STA 677 | Applied Multivariate Methods | (3) |

**Course Descriptions**

PHS 510 MODERN METHODS IN PHARMACEUTICAL ANALYSIS. (5)
A course which deals with the application of modern analytical methods, primarily instrumental methods, in the determination of the strength, purity, and quality of drugs and pharmaceuticals. Laboratory exercises include analysis of raw materials and finished dosage forms. Lecture, three hours; laboratory, four hours. Prereq: CHE 226.

PHS 530 RADIOPHARMACEUTICS. (3)
Basics of radioactive decay and detection. Labelling of molecules and cells with radionuclides. Imaging systems and clinical aspects of radiopharmaceuticals. Radioanalytical applications in pharmaceutical sciences, including positron tomography and gamma scintigraphy. Development of new radiopharmaceuticals and absorbed dose calculations. The principles of radiation safety and radiobiology. Prereq: Consent of instructor.

PHS 545 STERILE PARENTERALS AND DEVICES. (2-3)
The course will describe the fundamental concepts, principles and techniques involved in the characterization, development, evaluation and preparation of sterile products. Lecture, two credits; lecture with laboratory, three credits. Prereq: Consent of instructor.

PHS 556 PRINCIPLES OF DRUG DESIGN. (3)
Introduction to medicinal chemistry will be explored through rational biochemical and physical organic chemical approaches to drug design, action and development. Structural features, physical properties, mechanism of action and metabolism of drug like molecules, forces that govern interaction of drug-like molecules with their targets, enzyme mechanisms and inhibition and xenobiotic metabolism will be illustrated with specific examples showing how drugs function at the molecular level. Prereq: CHE 230, CHE 232, BIO 148, BIO 152. (Same as BCH 556.)

PHS 612 QUANTITATIVE PHARMACODYNAMICS: PHARMACOKINETICS. (3)
Quantitative treatment of dynamics of drug absorption, distribution, metabolism and excretion, including development of both mathematical models and model-independent approaches for describing these processes. Prereq: MA 114 and consent of instructor. (Same as PHA 612.)

PHS 630 PHARMACEUTICAL RATE PROCESSES. (3)
Kinetics of reactions of pharmaceutical interest; mechanisms of drug decomposition and theoretical approaches to stabilization and preservation; accelerated stability analysis. Prereq: MA 213, CHE 538, CHE 548 and PHR 631.

PHS 631 EQUILIBRIUM PHENOMENA IN PHARMACEUTICAL SYSTEMS. (3)
An advanced study in special topics of a physical chemical nature which are applicable to pharmacy, with special emphasis on physical properties and molecular structure, solubility, complexation and equilibria in solution. Prereq: Physical chemistry.

PHS 632 THE PRACTICE OF DRUG METABOLISM. (3)
The purpose of this course is to teach students about practical aspects of drug metabolism research. This includes addressing the function and purpose of drug metabolism studies, how those studies are carried out, why and how they are done, how metabolites are characterized, and some discussion of the limits and utility of the various approaches used in drug metabolism research.

PHS 649 ADVANCED MOLECULAR PHARMACOLOGY. (2)
This course will provide in-depth coverage of the molecular pharmacology of growth factors, transcription factors, receptors, and ion channels. Emphasis will be placed on both the normal functions of these cell-signaling molecules and perturbations that result in several prevalent human diseases, including cancer, Alzheimer's, diabetes, osteoporosis, and inherited human illnesses. Students will be introduced to experimental approaches to diagnosing and treating these illnesses in the light of our evolving knowledge of molecular pharmacology. Prereq: IBS 601-606 or consent of instructor. (Same as PHA/TOX 649.)

PHS 660 BIOSYNTHESIS OF NATURAL PRODUCTS. (3)
An overview of the biochemical pathways leading to compounds called natural products/secondary metabolites. Prereq: Two semesters of organic chemistry. (Same as BCH 620/PLS 642.)

PHS 662 BIOORGANIC MECHANISMS. (3)
An in-depth discussion on the bioorganic chemistry aspects of the active sites of enzymes and drug receptors, the molecular basis of drug design, and principles of drug metabolism. Within these topics, the mode of action of some of the major coenzymes and drugs will be discussed from a mechanistic chemistry point of view. Prereq: CHE 538, CHE 633, BCH 501 or consent of instructor.

PHS 663 MOLECULAR NEUROBIOLOGY OF ABUSED DRUGS. (3)
This course is designed to review major topics, concepts and issues pertinent to the molecular neurobiology of drug abuse and dependence. The proposed course of study will provide a strong background in neuroscience and students will be informed about current trends in our understanding of the molecular neurobiology of drug abuse research. Prereq: IBS 601 or consent of instructor.

PHS 711 RESPONSIBLE CONDUCT OF RESEARCH. (2)
Research scientists require an understanding of the fundamental principles guiding the ethical and responsible conduct and reporting of their research. Through case studies and reviews of the current literature, students will gain a greater understanding of the ethical and regulatory considerations in research design, conduct, and publication as well as the regulatory landscape governing fiscal compliance, scientific misconduct, research involving vulnerable populations, tissue banking, genetics/genomics, intellectual property, privacy, and data security. The importance of inclusion and diversity of individuals from underrepresented groups, those with disabilities, and individuals from economically disadvantaged backgrounds as investigators is also discussed. Students engage in didactic lectures, small-group breakout discussion sessions, and out of class learning activities to facilitate in-depth training and greater understanding of the relevant issues. Prereq: Consent of instructor.

PHS 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

PHS 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

PHS 750 PHARMACEUTICAL SCIENCES JOURNAL CLUBS. (1)
Discussion and presentations of foundation or current literature and emerging topics in pharmaceutical sciences. Topics vary by section. May be repeated to a maximum of 5 credit hours. Prereq: Consent of instructor.

PHS 760 TOPICS IN PHARMACEUTICAL SCIENCES. (1-4)
Pharmaceutical sciences which are not being covered in other courses. May be repeated to a maximum of 24 hours. Prereq: Consent of instructor.

PHS 767 DISSERTATION RESIDENCY CREDIT.(2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended. Reports and discussion of pertinent research and literature in a disciplinary area of the pharmaceutical sciences. May be repeated to a maximum of eight credits. Prereq: Graduate standing.

PHS 780 SPECIAL PROBLEMS IN PHARMACEUTICAL SCIENCES. (1-6)
Selected problems of laboratory or literature nature in which a student pursues a topic of interest to him under the supervision of a faculty member particularly qualified in that area. May be repeated once. Prereq: Consent of instructor.

PHS 790 RESEARCH IN PHARMACEUTICAL SCIENCES. (1-12)
Research work to be conducted in selected areas of pharmaceutical sciences. May be repeated indefinitely. Prereq: Approval of student's special committee and consent of instructor.

PHS 911 PHYSIOLOGICAL BASIS FOR THERAPEUTICS I. (4)
Integrated concepts of human organ system functions with particular emphasis on the physiology of the central and autonomic nervous system, the cellular and molecular mechanisms of neurotransmission and transduction and the response of target issues. The course includes an introduction to the pathophysiology of each system and the pharmacodynamics of therapeutic agents as a framework for discussion. Variable mixtures of lecture, group discussion and independent study. Prereq: Admission to the first year, College of Pharmacy.

PHS 912 PHYSIOLOGICAL CHEMISTRY AND MOLECULAR BIOLOGY I. (3)
The first of a two course sequence covering integrated concepts of human biochemistry from a physiological viewpoint, functional group chemistry essential to biology, key structural and functional relationships of the biomolecules in living systems, energy metabolism emphasizing inter organ relationships and an in depth discussion of information storage and transfer. The course includes an introduction to common metabolic diseases and the therapeutic agents used in those diseases as a framework for discussion. Variable mixture of lecture, group discussion and independent study. Prereq: Admission to the first year, College of Pharmacy

PHS 914 BASIC PRINCIPLES OF PHARMACEUTICAL SCIENCE: PHARMACEUTICS AND BIOPHARMACEUTICS I. (3)
The first of a two course sequence in basic principles of Pharmaceutical Science concentrating on

absorption, distribution, metabolism, excretion and bioavailability of drugs; and an introduction to dosage forms, oral drug delivery systems, drug solutions and drug solids, bioequivalence determinations and ratings, and official compendia. Variable mixtures of lectures, discussions and independent study. Prereq: Admission to the first year, College of Pharmacy.

PHS 921 PHYSIOLOGICAL BASIS FOR THERAPEUTICS II. (4)
A continuation of PHS 911 covering integrated concepts of human organ system functions with particular emphasis on the physiology of the cardiovascular, renal, pulmonary and endocrine systems. The course includes an introduction to the pathophysiology of each system and the pharmacodynamics of prototype therapeutic agents as a framework for discussion. Variable mixture of lecture, group discussions and independent study. Prereq: PHS 911 and admission to the first year, College of Pharmacy.

PHS 922 PHYSIOLOGICAL CHEMISTRY AND MOLECULAR BIOLOGY II. (3)
A continuation of PHS 912. Variable mixture of lectures, group discussion and independent study. Prereq: Admission to the first year, College of Pharmacy and PHS 912.

PHS 924 BASIC PRINCIPLES OF PHARMACEUTICAL SCIENCE: PHARMACEUTICS AND BIOPHARMACEUTICS II. (3)
The second of a two course sequence in the basic principles of Pharmaceutical Science concentrating on modified release oral dosage forms; modified release parenteral dosage forms; nasal, buccal, rectal, vaginal and ophthalmic delivery systems; aerosols and pulmonary delivery systems, and the drug development process. Variable mixture of lecture, group discussion and independent study. Prereq: Admission to the first year, College of Pharmacy.

PHS 931 PHARMACOLOGICAL BASIS FOR THERAPEUTICS: NERVOUS SYSTEM.(5)
A study of human disease processes and rational pharmacotherapeutics relating to the autonomic, central and peripheral nervous system including a discussion of the factors influencing the development of substance dependence and the strategies for risk reduction. Emphasis is placed on the principles of pathophysiology, pharmacology, toxicology and therapeutics, the incorporation of these principles in the clinical application of modern drug therapy, and how these principles can be utilized in pharmacy practice. Variable mixture of lecture, group discussion and independent study. Prereq: Admission to the second year, College of Pharmacy.

PHS 932 PHARMACOLOGICAL BASIS FOR THERAPEUTICS: IMMUNOLOGY AND BIOTECHNOLOGY. (3)
A study of the immune system, immunopathologies and select autoimmune diseases and their treatment. Includes a discussion of immunizations, immunology of cancer, neoplasias and an introduction to antineoplastic therapy. The course concludes with a discussion of biotechnology and its application to the production and use of pharmaceuticals, diagnostic agents and advanced therapies. Variable mixture of lecture, group discussion and independent study. Prereq: Admission to the second year, College of Pharmacy.

PHS 933 PHARMACOLOGICAL BASIS FOR THERAPEUTICS: ENDOCRINE SYSTEMS. (3)
A study of the pathophysiology of the major disorders affecting the endocrine system concentrating on the pharmacology of the therapeutic agents used to treat those disorders, including discussions of the rational use of endocrine agents and their congeners in the treatment of non-endocrine diseases. Variable mixture of lecture, group discussion and independent study. Prereq: Admission to the second year, College of Pharmacy.

PHS 944 BASIC PRINCIPLES OF MEDICINAL CHEMISTRY. (3)
The rational design of molecules to produce safe and effective therapeutic responses in humans; molecular changes in drug molecules that affect affinity and activity at drug receptors and influence the absorption, distribution, metabolism, excretion and stability of drugs; and the properties of drug molecules which are important in their formulation into drug products. Variable mixture of lecture, group discussion and independent study. Prereq: Admission to the second year, College of Pharmacy.

PHS 947 APPLIED BIOPHARMACEUTICS AND PHARMACOKINETICS. (4)
The theoretical and practical considerations of the processes of drug absorption (including dosage formulation), distribution, metabolism and excretion and the mathematical models that describe these events including the calculation of dosage regimens for patients with problems ranging from simple to complex. A variable mixture of computer-assisted learning, formal lecture, interactive lecture and problem-based learning laboratory experiences. Prereq: Admission to the second year, College of Pharmacy.

PHS 951 PHARMACOLOGICAL BASIS FOR THERAPEUTICS: CARDIOPULMONARY AND RENAL SYSTEMS. (5)
A study of the pathophysiology of the major disorders affecting the cardiovascular, renal and respiratory system concentrating on the pharmacology of the therapeutic agents used to treat those disorders. Variable mixture of lecture, group discussion and independent study. Prereq: Admission to the third year, College of Pharmacy.

COLLEGE OF PUBLIC HEALTH

# Epidemiology & Biostatistics

## College of Public Health

The Ph.D. program in Epidemiology and Biostatistics at the University of Kentucky is intended to prepare professionals for a career in conducting population-based research and clinical trials. This is a unique program which strongly emphasizes the acquisition of applied skills in the complementary fields of epidemiology and biostatistics, as well as the theoretical foundations of these disciplines. Graduates of this program will be prepared to address the practical challenges of conducting population-based and clinical, translational research in the multidisciplinary work environments of academia, government, and industry. The essentially strong cross-training and mentoring nature of the program is intended to develop independent researchers who will be skilled in designing and conducting studies as well as analyzing, and interpreting the results from an increasing variety of designs and databases in the public health and medical research domains.

The target audience for this program will include students with an appropriate prior bachelor's or master's degree (in biostatistics, epidemiology, statistics, health services research, mathematical sciences, or a related field) with prior mathematical training to include two semesters of calculus (univariate, differential and integral) and statistical methods. Practicing health care professionals (MDs, DMDs, PharmDs, etc.) who are interested in pursuing independent, doctoral level, research careers will be targeted for the program. Master's graduates from psychology, computer science, engineering, business, biology, or chemistry may also find this degree program attractive.

**Program Overview**
Students will complete a minimum of 57 credit hours of study plus dissertation research and the corresponding residency credits. The core curriculum consists of 33 credit hours comprising eleven courses, including nine courses in epidemiology and biostatistics, a 1-credit-hour doctoral seminar, and a three-credit-hour course that will serve as a broad introduction to public health. Students will also complete a minimum of 24 credit hours of electives, including at least three DGS-approved epidemiology courses and two 700 level biostatistics courses. Electives must be approved by the student's dissertation committee and the DGS. If the student does not yet have a dissertation committee at the time approval is sought for an elective, then approval will rest with the DGS, who will serve as the student's academic advisor until such time as the student has a dissertation advisor.

After passing a written comprehensive examination over selected core courses (between the Fall and Spring semesters of the second year for a full-time student), the student will select a dissertation advisor and form a dissertation committee. The dissertation research will be an original scientific project which is integrative in the sense that either advanced biostatistical methods are applied to a population-based epidemiologic study of sufficient size and appropriate design, or original theoretical research is undertaken in biostatistics with applied research problems. Ordinarily a dissertation document will produce at least three manuscripts of publishable quality, as well as an integrative literature review. The scope of the project will demonstrate independence, mastery of research skills, thoughtful reflection of the results, and contribute to new knowledge in the field of investigation. The student must pass both an oral qualifying examination in the early stages of dissertation research and a final oral defense once the dissertation research has been completed.

**Admission Requirements**
Please follow the instructions at http://gradschool.uky.edu/welcome-university-kentucky.
The Ph.D. program in Epidemiology and Biostatistics has its own earlier deadline of 01 February

preceding the fall semester in which the applicant hopes to begin graduate work. This Ph.D. program does not admit students for the spring or summer semesters. See the handbook (p.6) at http://www.uky.edu/publichealth/sites/www.uky.edu.publichealth/files/Academics/PhD_epi-bio/2017-2018%20PhD%20in%20Epidemiology%20%26%20Biostatistics%20Handbook.pdf for additional application requirements, including the submission of some material through SOPHAS.

Financial aid may be available to qualified applicants. For further information about financial aid, academic policies, courses, and other program requirements, please refer to the handbook.

**Course Descriptions**

EPI 714 EPIDEMIOLOGIC STUDY DESIGN. (3)
This course provides students with advanced course material relevant to the planning and execution of epidemiologic studies of various designs. The course will consider study designs which employ routinely collected data on disease occurrence, such as would be undertaken in government agencies and health departments, and the classic etiologic study designs including the case-control, prospective cohort, retrospective cohort, nested case control, case-cohort and case-crossover designs. The course will focus considerable attention on measurement methods and measurement error, borrowing examples from the subfields of epidemiology including occupational, cardiovascular, and social epidemiology. Given current interest on multilevel methods of analysis, the class will discuss approaches to the incorporation of designing multilevel studies. Finally, we will consider recent advances in experimental epidemiology with consideration of controlled community trials. Prereq: CPH 605 or consent of instructor.

EPI 715 RESEARCH METHODS IN EPIDEMIOLOGY AND BIOSTATISTICS. (3)
This course builds a broad array of skills that are useful for the design and development of research protocols and funding applications for peer review, and for the analysis of resultant scientific data. Prereq: BST 760, EPI 714, and BST 639.

EPI 716 INFECTIOUS DISEASE EPIDEMIOLOGY. (3)
This course provides instruction about the epidemiological and microbiological characteristics of bacteria, fungi, prions, rickettsia and viruses causing emerging and infectious diseases. Prereq: Graduate student or consent of instructor.

# Gerontology

## College of Public Health

The Ph.D. program in Gerontology is an interdisciplinary research-oriented degree specifically focused on developing critically holistic and integrative perspectives of aging and health. The program, based in the Graduate Center for Gerontology and the College of Public Health, is organized in a way that combines topical expertise, methodologies and facilities from more than 20 departments ranging from the biomedical sciences, through the social and behavioral sciences, to the humanities.

**Admission Requirements**
The Ph.D. Program in Gerontology encourages applications from individuals having expressed interests in advanced theoretical and research-based studies of aging processes or aged individuals and populations. Complete applications that will be considered for admission to the Gerontology Program must include:

- Application Form and fee payment,
- Official transcripts of all colleges and universities attended,
- Official report of the Graduate Record Examination (GRE).
- (International Students) Official TOEFL report
- At least three (3) letters of reference,
- Personal statement of interests, doctoral study plans, and career goals.

Students are encouraged to submit samples of scholarly writing, and are strongly encouraged to visit the program before admission decisions are made. All complete applications will be evaluated not only for evidence of strong academic accomplishment and high professional standards, but for evidence of a strong potential for success in advanced graduate studies and careers in gerontology-related fields.

**Degree Requirements**
The goal of the Ph.D. program is to provide advanced scholarly development in gerontology. Students will develop critical thinking and methodological skills through the study of topics that concern both the process of aging and the health and well-being of both individuals and populations. In addition, students will develop advanced expertise in related disciplines or areas of specialization. The course of study is flexible, stressing an integrative approach to the selection of course work and research activities. Emphasis is placed on tailoring each student's program to meet the specific needs of the individual's background and career goals. To fulfill these objectives, the program integrates formal course work in gerontology, specialized training in a related domain, opportunities for research, experiential learning modules and a problem focused research seminar. Graduates of the program will be able to conduct aging-related research, teach gerontology at the university level, direct gerontology educational programs, work in the aging services field, and consult with other professionals on various issues pertaining to aging and health.

Approximately 35 faculty from departments throughout the University are involved in the program's instruction and research activities. Departments represented include: Anatomy and Neurobiology, Anthropology, Behavioral Science, Civil Engineering, Communications, Dentistry, Epidemiology, Family Studies, Geography, Health Administration, Internal Medicine and Geriatrics, Management, Neurology, Nursing, Pharmacy, Physiology and Biophysics, Preventive Medicine, Psychology, Rehabilitation Sciences, Social Work, and Sociology. The diversity of the faculty facilitates the comprehensive study of aging and the aged. At the same time it allows for concentration in several areas of particular expertise and program specialization, including: rural aging, long-term care, cognitive and sensory change, public policy, ethical

issues, and the etiology and treatment of Alzheimer's disease, strokes, and other diseases prevalent among the elderly.

The Ph.D. program maintains close linkages with the Sanders-Brown Center on Aging, a Commonwealth Center of Excellence, which offers a broad base of programmatic support for the program as well as serving as the home of the Alzheimer's Disease Research Center and the Stroke Center. Numerous sites for clinical/experiential training are available at various clinics, agencies and organizations, including but not limited to: The Kentucky Division of Aging Services, the University of Kentucky Hospital, Christian Health Center (a University-affiliated nursing home), Best Friends Alzheimer's Day Care Program, University of Kentucky Geriatric Support Services, University of Kentucky Memory Disorders Clinic, University of Kentucky Center for Rural Health, the Center for Creative Living, Cardinal Hill Hospital, St. Claire Medical Center, Northeast Area Health Education Center and the Veterans Affairs Medical Center.
Further information may be obtained by writing to:

John Watkins, Ph.D., Director of Graduate Studies
Graduate Center for Gerontology
401 Multidisciplinary Sciences Building
University of Kentucky
Lexington, KY 40536-0082
http://www.uky.edu/publichealth/departments/gerontology

## Ph.D. Requirements

Students are required to complete the core curriculum in gerontology and 12 hours in an area of specialization. Elective courses to be taken will be recommended by each student's Advisory Committee.

**Core Requirements**

CPH 605 Epidemiology (3 hr)
CPH 663 Issues in Public Health (3hr)
GRN 600 A Study of the Older Person (3 hrs)
GRN 612 Biology of Aging (3 hrs)
GRN 620 Human Aging and Adjustment (3 hrs)
GRN 650 Research Design in Gerontology (4 hrs)
GRN 656 Integrative Studies in Gerontology (3 hrs)

STA 570 (4) or 580 (3) Basic Statistical Analysis / Biostatistics
Elective Methods (6 hrs minimum)
Approved courses in area of specialization (minimum of 12 hrs)

Elective courses should be selected by the student with the guidance of the student's advisor and/or Advisory Committee. No more than 9 hours of independent readings or research may be used to fulfill this requirement.

It is assumed that students entering with M.S. or M.A. degrees will have taken some of the required courses or their equivalent. The student's Advisory Committee, in conjunction with the DGS, will determine the amount of prior course work to be credited toward specific requirements.

**Committee Composition Requirements**
Doctoral advisory committees conform to Graduate School requirements. Selection of committee members is done by the student with consultation and approval of the student's chair, co-chair (if applicable) and the

DGS. Final determinations of whether membership requirements are met are made by the DGS.

Possible elective courses from within or outside the Gerontology Program that may be selected by the student or required by the student's Advisory Committee include but are not limited to those listed below:

## Course Descriptions

GRN 513 GERIATRIC PHARMACY. (3)
A course designed to educate students in the basic knowledge of attitudes and skills required to meet the pharmaceutical needs of the elderly. Topics include discussions of the aging process, physiological and psychological changes in the elderly, how these changes influence patient compliance and the responses to drug and nondrug treatments, monitoring drug use in long-term care facilities, and special community services available to the elderly. Prereq: PHR 849, 852, 853, 854 and 856 or permission of instructor. (Same as PPS 813.)

GRN 585 AGING AND ENVIRONMENT. (3)
Explores the elderly person's changing experience of environment. Physiological, psychological and social changes are related to adjustment within urban and rural community environments, special housing for the elderly, and long-term care environments. Prereq: Graduate or advanced undergraduate standing and consent of instructor. (Same as FAM/GEO 585.)

GRN 600 A STUDY OF THE OLDER PERSON. (3)
This didactic/experiential course is designed to give the student an overview of the experience of growing old by focusing on the individual older person. Framed from a cell to society perspective, didactic lectures will focus on historical, demographic, biological, psychological, social, environmental, life course and humanistic dimensions of growing old. Emphasis is placed on the relationship between individual experience and societal context. The experiential component will consist of having each student interact with a healthy elder mentor who will provide insight from the perspective of lived experience. Prereq: Admission to the Ph.D. Program in Gerontology.

GRN 602 CERTIFICATE PRACTICUM IN GERONTOLOGY. (3)
The course is a field experience of approximately 220 hours focused on aging. Content, site, and supervisor may vary; but the student must have an objective-based proposal approved prior to beginning the practicum. Prereq: Acceptance into the Graduate Certificate in Gerontology.

GRN 610 PSYCHOLOGY OF AGING. (3)
This is a graduate level seminar on the psychology of aging. The course will focus on many of the major topics and theories relevant to understanding the aging process. It focuses on health behaviors, sensation and perception, cognitive abilities, personality, social interactions, motivation and emotion, psychological disorders, end of life issues, and successful aging. The course examines the topics above from a normal aging perspective, atypical aging, successful aging, and demonstrates the interrelationships between the topics to address the aging individual. The course will also focus on the methods used to conduct psychological research with an aging population.

GRN 612 BIOLOGY OF AGING. (3)
A multidisciplinary discussion of how the process of aging affects biological systems. Coverage will be quite broad and includes topics such as subcellular and cellular aging, genetics, immunology, anatomy and physiology, animal model of aging, etc. Prereq: Enrollment in the doctoral program in Gerontology or a biomedical science department or consent of instructor. (Same as ANA/BIO/PGY 612.)

GRN 615 SEMINAR IN TEACHING MEDICAL SCIENCE (MED SCIENCE TEACHING I). (2)
A two (2) credit seminar course in which issues related to the theory and practice of life science education are discussed in a Socratic manner. May be repeated to a maximum of three credits. Prereq: Current enrollment in a life science graduate program. (Same as PGY 615.)

GRN 616 TEACHING SEMINAR IN GERONTOLOGY. (2)
The purpose of this seminar is to prepare doctoral students as classroom instructors, and to enhance instructional skills of those students with teaching experience. Emphasis is placed on developing the fundamental knowledge and skills needed to survive and excel in the classroom. Topics covered include: course development strategies; lecture preparation and delivery; interactive and group learning; writing for learning; student evaluation; student advising; and instructional ethics and responsibilities. Seminar activities include development of instructional materials, thematic discussion, and demonstrations/simulations of classroom experiences. Prereq: GRN 600 and GRN 620, or consent of instructor.

GRN 617 TEACHING PRACTICUM IN GERONTOLOGY. (3)
This practicum provides a forum for continued development of teaching skills by concurrently combining classroom instruction experience with formal instructor debriefing sessions. Problematic and successful experiences will be discussed, and specific instructional concepts and issues will be addressed in depth. Prereq: GRN 616 and concurrent classroom teaching.

GRN 618 EPIDEMIOLOGY OF AGING. (3)
This course introduces the application of epidemiologic methods to the study of older persons. Prereq: Enrollment in a Public Health degree and SPH 605/PM 620 Intro to Epidemiology and GRN 650, or consent of instructor. (Same as SPH 618.)

GRN 620 HUMAN AGING AND ADJUSTMENT. (3)
The intent of GRN 620 is to provide continued development (from GRN 600) of critical interdisciplinary skills in studies of the aging process. Students will, as a group, identify a single central issue associated with aging and conduct comprehensive literature reviews and appropriate research to thoroughly address that issue. Prereq: GRN 600 and admission to the Ph.D. program in gerontology.

GRN 644 DEMOGRAPHY AND AGING. (3)
This course examines the dynamics of human population distributions, densities, and growth patterns as they relate to population aging. The essential demographic processes of fertility, mortality, and mobility are addressed from multiple disciplinary perspectives, and topical coverage includes the environmental, social, political, economic, and cultural impacts on personal demographic behavior and population change. Emphasis is placed on historic and contemporary meanings and influences of population diversity, and how this diversity affects the patterns and consequences of aging across space and time.

GRN 650 RESEARCH DESIGN IN GERONTOLOGY. (4)
This course will provide training in research design appropriate for the study of aging and the aged and will critically assess special considerations involved in studying this population. Topics to be covered will include: philosophy of science; data sources for research on aging (including medical informatics and clinical epidemiology sources); the use of animal models in aging research; special design considerations for the study of aging [reconciling age, period, and cohort effects]: longitudinal research; measurement tools for assessing the elderly [functional assessment, ADLs, life satisfaction scales, etc.] issues in interviewing older people; qualitative methods in aging research; the ethics of research on aging and the aged. Prereq: Admission to Gerontology Ph.D. Program.

GRN 651 QUALITATIVE GERONTOLOGY. (3)
This course (1) critically evaluates different qualitative epistemologies including biography, phenomenology, grounded theory, ethnography and the case study; (2) assesses the value of alternative qualitative methodologies for gaining deeper understanding of the experience of elders; (3) explores practical issues in employing such methodologies; and (4) provides opportunities for participants to engage in different styles of qualitative research. Prereq: Graduate standing.

GRN 653 LABORATORY RESEARCH IN GERONTOLOGY. (3)
Students will be exposed to current biomedical techniques by conducting supervised research in a laboratory setting. Prereq: Permission of instructor.

GRN 656 INTEGRATIVE STUDIES IN GERONTOLOGY. (3)
This seminar is designed to provide gerontology doctoral students the opportunity to place individual dissertation topics within the broader field of gerontology, and to broaden the authority with which the students engage in their dissertation work. Although work
will largely be independently driven, frequent class meetings provide ongoing feedback from the group on progress and allow all participants to learn from each others work. Prereq: Completion of gerontology core requirements.

GRN 660 AGING ISSUES AND FAMILY RELATIONS. (3)
The study of dynamics of family interactions and issues when some family members are elderly. Emphasis is placed on perspectives from multiple generations and across various kin categories. (Same as FAM 660.)

GRN 704 MENTAL HEALTH AND AGING. (3)
The aim of this class is to provide some breadth and selected depth in the area of Mental Health and Aging, aimed at research perspectives. Various psychiatric syndromes will be evaluated in lectures and throughout the readings in relation to prevalence, assessment, etiology, and treatment in reference to research in older adults. Prereq: Graduate student status.

GRN 705 COGNITIVE AGING. (3)
This is a graduate level seminar on cognitive aging. Topics to be addressed include theories of aging, memory, sensation, and perception, attention, language, social cognition, intelligence, decision-making, and dementia.

GRN 706 HEALTH PROMOTION AND AGING. (3)
In this class health promotion in old age will be examined. The theory behind health promotion programs and the status of existing health promotion program for older adults will be reviewed and discussed. Finally, the knowledge acquired in class will be used to develop and demonstrate an innovative health promotion program for older adults. Prereq: Graduate student standing.

GRN 710 AGING OF THE NERVOUS SYSTEM. (3)
This course will examine the alterations in the brain that occur with aging and in neurodegenerative disorders such as Alzheimer's disease. The emphasis will be on human aging although the relevance of animal models to studies of human aging will be a recurrent theme. The course will examine aging at several levels, including molecular, cellular, organismic, and behavioral. A strong background in the basic sciences in encouraged. (Same as ANA/PGY/PHA 710.)

GRN 720 GERONTOLOGY/GERIATRIC DENTISTRY. (1)
This course is designed to help students gain an appreciation for the significant opportunities as well as challenges the aging population will bring to their oral health practice. This course will provide students

basic knowledge and information in gerontology/geriatric dentistry. Lecture, 17 hours. May be repeated to a maximum of two credits. Prereq: Permission of course director.

GRN 731 ELDER MISTREATMENT. (3)
This course reviews major issues and trends related to elder mistreatment. The course emphasizes individual and systemic issues related to elder abuse, neglect, exploitation, and self-neglect on individual, local, state, and federal levels. Special consideration is given to dynamics that shape past, current, and future issues related to elder mistreatment. Prereq: Graduate student status and/or permission of instructor.

GRN 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-timesemesters of 769 residence credit following the successful completion of the qualifying exams.

GRN 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

GRN 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

GRN 770 SPECIAL TOPICS IN GERONTOLOGY. (1-3)
This course is designed to present contemporary topics in gerontology in either a lecture or seminar format. It is intended to provide students with opportunities to be informed of current issues in gerontology as well as to explore in-depth studies of particular gerontological topics. May be repeated to a maximum of twelve credits.

GRN 771 AGING IN RURAL ENVIRONMENTS. (3)
In the context of a changing rural environment, this seminar explores the life circumstances and life experience of rural elders in relation to the health and well-being of this population.

GRN 772 AGING AND THE LIFE COURSE. (3)
This seminar will establish a common foundation of knowledge through examinations of traditional "life courses" influencing individuals as they age through time, including household and family, education and work, and housing. This foundation will be built upon using critical examinations of such themes as gender roles, spatial experience, cognitive change and memory, and structural effects on life trajectories. Emphasis will be placed on surveys of existing literature and on integrating various life course elements within social and behavioral theory.

GRN 773 ETHICS AND AGING. (3)
The focus of this class is on applied ethics and aging. We will address the following topics: mid/late life reproduction; research with older adults; spirituality/selfhood; legal issues; cultural issues; vulnerable older people; caregiving and community-based care; specific issues related to Alzheimer's Disease; issues at the end of life, and other timely ethical issues that may arise during the course. The course will make use of provocative readings, case studies, supplementary professional articles, a presentation and paper, lively class discussion, and outside speakers who will share their expertise with you on a variety of ethical issues related to aging.

GRN 774 PUBLIC POLICY AND AGING. (3)
This course reviews major issues and trends in the economics of aging and social policy and aging. The course emphasizes health, economic, and welfare policies and considers their implications on federal, state, and local levels. Special consideration is given to dynamics that shape past, current, and future policy in the area of aging. Prereq: Graduate standing.

GRN 775 CLINICAL GERIATRICS. (3)
This course provides a perspective of clinical geriatrics. Basic concepts of geriatric care are presented, along with concepts of gerontology as it applies to geriatric medicine. This course is designed for both clinicians and non-clinicians.

GRN 778 CURRENT TOPICS IN BRAIN AGING. (3)
Students will learn cellular and molecular changes that occur in the brain through AD progression in addition to the impact of these changes on individual lifestyle and on society.

GRN 780 APPLIED GERONTOLOGY PRACTICUM. (1-3)
This course is designed to provide students the opportunity to experience the practical application of gerontology in such domains as government, administration and clinical environments. In addition, the student will gain in-depth experience with the organization and an introduction to problems in applied research. Students will work under the supervision of a gerontology faculty member to coordinate efforts, establish timelines for completion, and determine grading criteria. May be repeated to a maximum of six credits. Approval of the Director of Graduate Studies required.

GRN 781 STUDENT DEVELOPMENT PRACTICUM. (1)
This practicum provides an opportunity for students to present and discuss their research findings in a venue that promotes skill development in the areas of preparation and delivery of research presentations. Students are required to enroll in GRN 781 during each of the first five semesters in residence. Prereq: Admission to Gerontology Ph.D. program.

GRN 782 WOMEN'S HEALTH AND AGING. (3)
This class explores the issues related to health and well-being among older women. Using a multidisciplinary approach that blends humanities, social and medical science and public policy, the course examines social, economic and cultural contexts of chronic physical and mental health. Prereq: Upper level/graduate class in social science. (Same as BSC 782.)

GRN 783 PUBLIC HEALTH AND AGING. (3)
Public Health and Aging is an elective course in the Graduate Center for Gerontology and Department of Health Behavior and is offered to students on the graduate level. The focus of the course is to help students identify a public health framework and a paradigm for addressing the issues of social, emotional, physical, and mental health in older adults, as well as a keen understanding and awareness of chronic disease prevention, mortality, and quality of life issues that are germane to aging in the United States. Prereq: Graduate standing.

GRN 785 INDEPENDENT RESEARCH IN GERONTOLOGY. (1-6)
Open to doctoral students who have the necessary training and ability to conduct research at an advanced level. Students will work under the supervision of a gerontology faculty member to coordinate research efforts, establish timelines for completion, and determine grading criteria. May be repeated to a maximum of 9 credits. Approval of the Director of Graduate Studies required.

GRN 786 INDEPENDENT READINGS IN GERONTOLOGY. (1-6)

Open to doctoral students who have the necessary training and ability to work independently at an advanced level. Students will work under the supervision of a gerontology faculty member to identify readings appropriate for the student's chosen topic, establish timelines for completion, and determine grading criteria. May be repeated to a maximum of nine credits. Approval of the Director of Graduate Studies required.

GRN 790 PROFESSIONAL DEVELOPMENT IN GERONTOLOGY. (1)
This seminar will cover elements of professional development in the areas of research, teaching and service as students are prepared for obtaining positions and developing careers in gerontology. Emphasis will be placed on means of documenting progress and accomplishment (e.g., CV building, teaching portfolio development, evaluation), effective strategies for searching for and securing jobs (e.g., interview skills), and strategies for promoting quality performance and professional success in gerontology-related professions. Prereq: Admission to the Gerontology Ph.D. program.

# Health Administration

## College of Public Health

The Master of Health Administration (MHA) program is offered in the College of Public Health. Its mission is to provide students with critical competencies required to succeed in leadership positions in health systems, hospitals and other complex health-related organizations, and to build a solid foundation for their future career development. The MHA program focuses on preparing students early in their careers for positions that require management and strategic abilities, and places special emphasis on needs and opportunities in healthcare organizations within Kentucky and the region. MHA courses draw on the expertise of faculty from several UK colleges, UK HealthCare, and other healthcare organizations in Kentucky and beyond.

**Admission Requirements**

- A 3.0 or higher undergraduate grade point average is recommended.
- Official scores on the Graduate Record Examination (GRE) or Graduate Management Admissions Test (GMAT). Verbal and quantitative scores at the 50 percentile or better are recommended.
- Three letters of recommendation (at least one from a faculty member who has taught or supervised the applicant).
- Personal statement
- Official TOEFL scores (international students only).
- Official GRE/ GMAT, TOEFL scores and copies of official transcripts must be submitted by the applicant directly to SOPHAS or HAMPCAS.
- Applicants must also submit a supplemental application to the University of Kentucky's Graduate School; http://gradschool.uky.edu/welcome-university-kentucky
- Applicants are encouraged to apply early for all scholarship/financial aid consideration.
- Application deadline for international students March 15th.
- Application deadline for all other applicants is June 30th.
- Admission is competitive and decisions are made on a rolling basis, so applicants are encouraged to apply early.
- Students are admitted only in the fall semester.

**Prerequisites**

Students who have not taken courses in financial accounting and microeconomics are required to take ECO 201 and ACC 201 or the equivalent before they begin the economics and accounting courses in the MHA curriculum.

**Curriculum**

The MHA curriculum consists of 54 semester hours, including an internship and an Integrative Final Exam. Degree requirements include the successful completion of all course work with a 3.0 or better GPA and successful completion of the Integrative Final Exam. For more information about the program, contact:
Office of Admissions and Student Affairs
College of Public Health Building, Suite 120
859.218.2096 or ukcph@uky.edu

**Course Requirements**

Completion of 54 credit hours of coursework is required.

## MHA Curriculum

| | | |
|---|---|---|
| CPH 600 | Health Services and Systems Organization | (3) |
| CPH 614 | Managerial Epidemiology | (3) |
| CPH 652 | Health Finance | (3) |
| CPH 655 | Management Accounting for Healthcare Organizations | (3) |
| CPH 658 | Health Economics | (3) |
| CPH 663 | An Introduction to Public Health Practice and Administration | (3) |
| CPH 681 | Legal Aspects of Healthcare Management | (3) |
| CPH 682 | Quantitative Methods for Healthcare Management | (3) |
| CPH 683 | Healthcare Operations Management | (3) |
| CPH 684 | Human Resources Management in Healthcare | (3) |
| CPH 687 | Organizational Theory and Behavior | (3) |
| CPH 688 | Internship in Health Administration | (1) |
| CPH 780 | Strategic Planning and Marketing in Healthcare | (3) |
| CPH 781 | Healthcare Ethics and Governance | (2) |
| CPH 782 | Information Systems in Healthcare | (3) |
| CPH 784 | Case Studies in Health Administration | (3) |
| CPH 785 | Health Policy | (3) |
| CPH 787 | Independent Study in Health Administration | (1) |
| | Electives | (5) |

## MHA/JD Dual Degree

The JD/MHA Dual Degree Program encompasses the Master of Health Administration (MHA) degree from the College of Public Health and the Juris Doctor (JD) degree from the College of Law. Students who are currently enrolled in either the JD or the MHA program can be considered for admission to the JD/MHA dual degree program after the end of the first full-time year. Students can complete the dual program in four years, one year less than completing each program individually. Earning a dual degree will make students highly marketable in the job market. For more information on the MHA/JD dual degree program, contact the MHA Program Director.

## MHA/MPH Dual Degree

The MHA/MPH Dual Degree Program combines the Master of Health Administration (MHA) degree and the Master of Public Health (MPH) degree, both housed in the College of Public Health. This dual degree addresses the knowledge gap between delivery of healthcare services and management of the health of a population. Students may complete the degree in two and a half or three years rather than the four years required if the degrees are completed separately. Initial students will be in the MPH concentration in Population Health Policy & Management, which is housed in the same department as the MHA program. For more information on the MHA/MPH Dual Degree Program, contact the MHA Program Director/DGS or the MPH Director of Graduate Studies.

## Graduate Courses

| | | |
|---|---|---|
| CPH 600 | Health Services and Systems Organization | (3) |
| CPH 614 | Managerial Epidemiology | (3) |
| CPH 652 | Health Finance | (3) |
| CPH 655 | Management Accounting for Healthcare Organizations | (3) |
| CPH 658 | Health Economics | (3) |
| CPH 663 | An Introduction to Public Health Practice and Administration | (3) |
| CPH 681 | Legal Aspects of Healthcare Management | (3) |
| CPH 682 | Quantitative Methods for Healthcare Management | (3) |

| | | |
|---|---|---|
| CPH 683 | Healthcare Operations Management | (3) |
| CPH 684 | Human Resources Management in Healthcare | (3) |
| CPH 687 | Organizational Theory and Behavior | (3) |
| CPH 688 | Internship in Health Administration | (1) |
| CPH 755 | Leading Change with Healthcare Teams | (3) |
| CPH 780 | Strategic Planning and Marketing in Healthcare | (3) |
| CPH 781 | Healthcare Ethics and Governance | (2) |
| CPH 782 | Information Systems in Healthcare | (3) |
| CPH 784 | Case Studies in Health Administration | (3) |
| CPH 785 | Health Policy | (3) |
| CPH 787 | Independent Study in Health Administration | (1) |
| CPH 788 | Special Topics in Health Administration: Health Finance II | (3) |

Incoming students are informed of the graduate school/departmental academic policies at the MHA Orientation held before classes begin each fall. The MHA handbook is also on the College of Public Health Website: http://www.uky.edu/publichealth/student-resources/student-handbooks

# Public Health

## College of Public Health

A defining characteristic of the area of public health is its focus on population groups rather than individuals. Public health professionals are concerned with the health of communities, relying heavily on collaboration with local, state, and national entities to improve the health status of their targeted populations. With the current interest in health care reform, bioterrorism and preparedness, concerns over managed care, and other factors impacting the nation's health care system, the need for highly trained public health professionals is increasing. The College of Public Health offers the Master of Public Health degree. The MPH is an applied professional/graduate degree designed for highly motivated students who have either a previously earned professional degree or a baccalaureate degree and substantial interest in public health. Unique sequencing of courses, community-based program activities, and field/laboratory research provide students with multiple opportunities to define their course of study in the four areas of concentration, , Epidemiology, Environmental/Occupational Health, Health Behavior, or Health Systems & Policy Analytics. The MPH. degree is designed to prepare graduates for entry and advancement in public health careers in public, non-profit and proprietary health care organizations.

Professionals with the MPH. hold important roles in a variety of public and private settings, e.g., local, state, and national health departments, health care facilities, military service, social service agencies, private industry, universities, and community-centered health education facilities. In these positions, they can be involved directly with the development, implementation and assessment of efforts to improve the health of the public and prevention of disease. The curriculum is designed to provide skills and knowledge upon which to build or enhance a career in public health. Unique sequencing of courses, community-based program activities, and field/laboratory research provide students with multiple opportunities to define their public health specialty and provide a broad overview of the disciplines of public health.

The Master of Public Health degree requires a minimum of 42 credit hours of study for completion. All students must complete a minimum of 18 semester hours of required core course work and at least 18 hours of specialty work in one of the four areas of concentration. In addition, a three credit-hour field practicum course (CPH 609), and a three credit-hour final integrative Capstone Project (CPH 608) are required. The dual MD/MPH. and PharmD/MPH. degrees are currently available.

## Admission Requirements

Admission into the MPH program is competitive, and consideration is given to academic background, a history of service, interest in the field, a personal statement, career plans, and letters of recommendation. Applicants must also have achieved an acceptable score on the Graduate Record Examination (GRE) or the Graduate Management Admission test (GMAT).

Applicants must complete a UK Graduate School Application and make a separate application through the Schools of Public Health Application Service (SOPHAS.org), the centralized application process for accredited schools/colleges of public health. Applications will not be reviewed until the SOPHAS application is completed. For additional information concerning the University of Kentucky, College of Public Health and its degrees, call (859) 218-2096, send e-mail to ukcph@uky.edu , or go to http://www.uky.edu/publichealth/

## Graduate Courses

- CPH 551 Comparative Health Systems (3)
- CPH 600 Health Services and Systems Organization (3)
- CPH 601 Occupational and Environmental Health I (3)
- CPH 604 Foundations Of Health Behavior I (2)
- CPH 605 Epidemiology (3)
- CPH 608 Public Health Capstone (3)
- CPH 609 Public Health Practicum (1-3)
- CPH 610 Injury Epidemiology & Control (3)
- CPH 612 Infectious Disease Epidemiology (3)
- CPH 615 Cancer Epidemiology (3)
- CPH 617 Environmental/Occupational Epidemiology (3)
- CPH 620 Occupational & Environmental Health II (3)
- CPH 621 Understanding and Communicating Environmental Health Risks (3)
- CPH 622 Toxic Agents and their Implications in Public Health (3)
- CPH 636 Data Mining in Public Health (3)
- CPH 640 Women's Health (3)
- CPH 641 Public Health and Anthropology (3)
- CPH 643 Measuring Health Behavior: Quantitative & Qualitative Approaches (3)
- CPH 644 Rural Health Disparities (3)
- CPH 645 Food Systems, Malnutrition and Public Health (3)
- CPH 648 Eliminating Racial and Ethnic Health Disparities (3)
- CPH 650 Public Health Systems Administration (3)
- CPH 653 Public Health Law & Policy (3)
- CPH 660 Disease Mapping & Data Visualization (3)
- CPH 662 Public Health Response to Terrorism, Disasters and Emergencies (3)
- CPH 663 Introduction to Public Health Practice (3)
- CPH 698 Occupational Safety and Health: Field Surveys (3)
- CPH 711 Chronic Disease Epidemiology (3)
- CPH 712 Advanced Epidemiology (3)
- CPH 716 Proseminar in Occupational Health and Safety (3)
- CPH 746 Research Methods and Program Evaluation for Health Behavior (3)

- CPH 763 Ethics for Public Health (3)

## Course Descriptions

**CPH 551 COMPARATIVE HEALTH SYSTEMS. (3)** An overview of healthcare system structure in selected countries with attention to their developmental history, financing, and delivery infrastructure. Prereq: Enrollment in a public health degree program or permission of instructor.

**CPH 600 HEALTH SERVICES AND SYSTEMS ORGANIZATION. (3)** An introduction to the health care delivery system in the United States, including its composition, functioning, the interrelationships of organizations and professional groups within the system in various settings, health care terminology, and major problems and issues in the delivery of health services. Prereq: College of Public Health graduate program enrollment or permission of instructor.

**CPH 601 OCCUPATIONAL & ENVIRONMENTAL HEALTH I. (3)** This course provides an introduction to the theory and practice of assessing, correcting, controlling, and preventing environmental health hazards that may adversely affect the health of current and future generations. Prereq: Undergraduate chemistry and biology, or permission of instructor.

**CPH 604 FOUNDATIONS OF HEALTH BEHAVIOR I. (2)** This course will demonstrate how changes in health behavior can and do impact population-level indicators of morbidity and mortality. Within the context of the socio-ecological framework, students will focus on health behavior theories and interventions targeting the intra- and interpersonal levels of the framework. Students will apply an intervention mapping approach to identify priority needs for health promotion and design health promotion programs. Students will be able to make clear linkages between health promotion practices and the overarching goals of public health. Selection and design of strategies will be achieved through an understanding of theory-based approaches that have been widely applied in health promotion research. Prereq: Admission to MPH program or permission of instructor.

**CPH 605 EPIDEMIOLOGY. (3)** This is an initial graduate level course in the principles of epidemiology and applications in preventive medicine and environmental health. The course consists of lectures and informal discussions. Principles and methods of epidemiologic research with a focus on issues of study design and analysis will be presented. Prereq: Graduate student in good standing in the MPH program, MSPH program, or community health nursing, or consent of instructor.

**CPH 608 PUBLIC HEALTH CAPSTONE. (3)** To be successful in the MPH degree program and the profession, students are expected to demonstrate excellence in communication skills both orally and in writing. The 'manuscript' format for the capstone project is intended to familiarize students with the rigors of preparing manuscripts for professional journals. This course provides course credit for students who successfully complete the MPH capstone project and oral final examination. Prereq: MPH students only.

**CPH 609 PUBLIC HEALTH PRACTICUM. (1-3)** The public health practicum is designed as an integrative experience in the workplace. The practicum is an opportunity to apply classroom theories and methods

under the guidance of an experienced public health practitioner with faculty oversight. Prereq: Admission to MPH program or permission of instructor.

**CPH 610 INJURY EPIDEMIOLOGY AND CONTROL. (3)** The epidemiological basis for understanding the distribution and determinants for traumatic injury and poisonings including both intentional and unintentional events. Topics include sources of data, methodological approaches to studying injuries, evaluation of injury interventions and the link between epidemiology and public health policy impacting injuries. Prereq: PM 620 and/or permission of instructor.

**CPH 612 INFECTIOUS DISEASE EPIDEMIOLOGY. (3)** This course applies the principles of infectious disease epidemiology to infectious and emerging diseases of public health importance. Prereq: CPH 605 or consent of instructor.

**CPH 615 CANCER EPIDEMIOLOGY. (3)** This course applies and integrates the principles and tools of epidemiology to the study of cancer. The course includes discussion of the burden of various kinds of cancer across the United States and the world by age, gender, and race/ethnicity. The underlying biology behind the development of cancer in humans, cancer surveillance, the epidemiology of various kinds of cancer by category of major risk factors such as human behavior, (e.g. smoking and alcohol use), endogenous/exogenous hormones, viruses, environmental/occupational exposures, and diet, and courses of data and methods for evaluating cancer screenings, measuring the impact of risk factors, determining the incidence of cancer and cancer clusters, measuring patterns of care, and understanding the determinants of survival. Prereq: CPH 605 or consent of instructor.

**CPH 617 ENVIRONMENTAL/OCCUPATIONAL EPIDEMIOLOGY. (3)** A study of work-related and environmental exposures and hazards associated adverse health outcomes. Integrating the fields of occupational and environmental epidemiology. Prereq: Enrollment in a Public Health degree program and CPH 605/PM 620 or consent of instructor.

**CPH 620 OCCUPATIONAL & ENVIRONMENTAL HEALTH II. (3)** This course addresses advanced theories and practices of identifying, assessing, and controlling occupational and environmental hazards that may adversely affect the health of communities and working populations. The course emphasizes harmful effects of non-chemical hazards, such as radiation, noise, hypoxia, and physical agents that lead to morbidity and mortality. However, evaluation and control measures will cover many types of hazardous exposures, including those from chemical exposures. Prereq: CPH 601 or consent of instructor.

**CPH 621 UNDERSTANDING AND COMMUNICATING ENVIRONMENTAL HEALTH RISKS. (3)** Public health practitioners and researchers require knowledge of how exposure to environmental and occupational contaminants can adversely affect the health of both current and future generations. Public health professionals also require skills to communicate clearly with multiple stakeholders about opportunities to assess, control, and/or prevent complex environmental health hazards. In this course, students will develop foundational environmental health concepts and build cultural competencies for effective stakeholder communication. Prereq: Admissions to College of Public Health program or consent of instructor.

**CPH 622 TOXIC AGENTS AND THEIR IMPLICATIONS IN PUBLIC HEALTH. (3)** This course provides an overview of chemical agents within the environment, their interaction with the human organism, and resultant public health implications. The goal of this course is to utilize toxicological information to create, understand, and explain control strategies that protect and improve public health. Prereq: CPH 601.

**CPH 636 DATA MINING IN PUBLIC HEALTH. (3)** This course concerns statistical techniques for and practical issues associated with the exploration of large public health data sets, the development of models from such data sets, and the effective communication of one's findings. Prereq: BST 600 and CPH 535, or good standing in Statistics or Epidemiology and Biostatistics graduate programs.

**CPH 640 WOMEN'S HEALTH. (3)** This course will cover a variety of women's health topics including substance abuse, violence against women, nutrition, chronic diseases, reproductive and sexual health, and menopause. The course content will also emphasize the social, economic, environmental, behavioral, and political factors associated with women's health. We will address these content areas using a lifecourse perspective. The epidemiology, measurement and interpretation of these factors, and how these factors can be translated into interventions, programs, and policy, will be of major interest. Our focus will be primarily within the United States though we will touch on some aspects of global health. Prereq: Enrollment in the MPH program or permission of instructor.

**CPH 641 PUBLIC HEALTH AND ANTHROPOLOGY. (3)** Examination of how the perspectives and methods of anthropology can be and have been applied in public health research and intervention projects. Prereq: Enrollment in the MPH. or DrPH program, or consent of instructor.

**CPH 643 MEASURING HEALTH BEHAVIOR: QUANTITATIVE & QUALITATIVE APPROACHES. (3)** This course focuses on measurement, the key component of research. Topics include types of measurement; units of measurement; theory and measurement; reliability and validity; survey development; how and where to find "good" measures of health behaviors; quantitative and qualitative approaches; and cultural considerations in measurement. The course relies upon the socioecological framework, acknowledging that health behaviors (as well as their determinants, consequences, and correlates) can and should be measured at all levels of society (e.g., individual, relational, community, and societal). The goal of the course is to train the student in how to measure health behaviors both responsibly and effectively. Prereq: Enrollment in the MPH, or consent of instructor.

**CPH 644 RURAL HEALTH DISPARITIES. (3)** Through class meetings, course readings, and assignments, this course will provide students with a comprehensive overview of issues pertaining to health disparities of rural populations by examining current programs and policies, relevant literature, public health practice, and quantitative and qualitative research pertaining to the health and well-being of rural populations.

**CPH 645 FOOD SYSTEMS, MALNUTRITION AND PUBLIC HEALTH. (3)** Exploration of the role of the global food system in shaping food consumption and the implications for public health. Prereq: Enrollment in College of Public Health or consent of instructor.

**CPH 648 ELIMINATING RACIAL AND ETHNIC HEALTH DISPARITIES. (3)** This course will help the learner understand differences in minority populations in order to help build and lobby for the infrastructure needed to prevent excess disease and death among underserved populations. A special emphasis in this class will be placed on understanding the role of culture in influencing the adaptation of health attitudes, practices, and behaviors. An additional focus will be placed on health status, current trends, and health indicators for special populations. Prereq: Graduate student in Public Health and others by instructor permission.

**CPH 650 PUBLIC HEALTH SYSTEMS ADMINISTRATION. (3)** This course introduces students to foundational concepts of health policy, the US health care and public health systems, and areas of management that are critical to the design, development and evaluation of health policy. Prereq: College of Public Health major or consent of instructor.

**CPH 653 PUBLIC HEALTH LAW & POLICY. (3)** Overview of public health law with emphasis on topics and materials used by public health practitioners, as well as the use of law to advance a public health agenda. Prereq: Graduate status or approval of instructor.

**CPH 660 DISEASE MAPPING & DATA VISUALIZATION. (3)** This course will introduce students to basic concepts in disease mapping and data visualization using a variety of software packages. These will include Excel from Microsoft, EpiInfo from the Centers for Disease Control & Prevention (CDC), QGIS from the open-source QGIS Project, and more. Students will use these tools to gain experience producing figures and tables appropriate for publication in epidemiologic manuscripts. Prereq: CPH 605 or consent of instructor.

**CPH 662 PUBLIC HEALTH RESPONSE TO TERRORISM, DISASTERS AND EMERGENCIES. (3)** This course will focus on the public health concepts, history, methods, planning, and response preparedness to weapons of mass destruction, terrorism, natural and human-made disasters, and other health emergencies. Prereq: Enrollment in a Public Health degree program and CPH 605, or consent of instructor

**CPH 663 INTRODUCTION TO PUBLIC HEALTH PRACTICE. (1)** This course is to be a practical introduction to public health at the national, state, and local levels. This course is intended for students in the Master of Health Administration, PhD in Gerontology, and PhD in Epidemiology & Biostatistics. Prereq: Enrollment in Master of Health Administration, PhD in Gerontology, PhD in Epidemiology & Biostatistics or consent of instructor

**CPH 698 OCCUPATIONAL SAFETY AND HEALTH: FIELD SURVEYS. (3)** The course provides students with the opportunity to visit various work sites and industries in the Appalachian region. This course will provide students with onsite, direct experience recognizing hazards and evaluating control measures to reduce occupational health and safety risks. This is a cross-disciplinary course for graduate students in occupational safety, industrial hygiene, environmental health, occupational health nursing, ergonomics, injury prevention, agricultural health and safety, occupational epidemiology and occupational medicine. Prereq: CPH 620 Occupational Health.

**CPH 711 CHRONIC DISEASE EPIDEMIOLOGY. (3)** A survey course on the leading chronic diseases in the U.S., including cardiovascular disease, cancer and diabetes with focus on surveillance and risk factors. Prereq: Enrollment in a Public Health degree program, CPH 605/PM 620 Introduction to Epidemiology or consent of instructor.

**CPH 712 ADVANCED EPIDEMIOLOGY. (3)** This course provides students with the understanding of advanced issues in the design, analysis, and interpretation of epidemiologic studies. The course text and associated readings will focus on study designs and the methodologic approaches to addressing bias, confounding, and error in the design of population-based health research. The development of a systematic approach for evaluating evidence from epidemiologic studies as it relates to demonstrating causality will be emphasized. Focusing on study design, measures of associations, confounding, interaction, sources of bias and error, the student will gain an understanding of epidemiology and its role in the medical and public health sciences. Prereq: Enrollment in a public health degree program and CPH 605 or consent of instructor.

**CPH 716 PROSEMINAR IN OCCUPATIONAL HEALTH AND SAFETY. (0-1)** This course will provide students, in a seminar format for 6 sessions during the semester, presentations from occupational health and safety professionals from a variety of disciplines and experiences. The seminar is 2.5 hours long at each session. Knowledge regarding workplace exposures and related health outcomes will be provided. Students should acquire basic understanding of current topics in the fields of occupational medicine, nursing, safety, industrial hygiene, epidemiology, biostatistics, mining, and agriculture.

**CPH 746 RESEARCH METHODS AND PROGRAM EVALUATION FOR HEALTH BEHAVIOR. (3)** This course provides the student with basic knowledge about the design and analysis of research in the field of health promotion. The theory, design, applications, and analytic strategies used for various types of research are presented in a sequential format. Goals of the course include: 1) gaining the ability to critically evaluate research in health promotion practice, 2) achieving competence in research methodology, and 3) understanding the conceptual application of analytic techniques to data. This course also prepares second-year MPH students concentrating in Health Behavior to successfully construct and defend their capstone in April of the current academic year. Prereq: CPH 672 and CPH 643, or permission of instructor.

**CPH 763 ETHICS FOR PUBLIC HEALTH. (3)** The focus of this class is on applied ethics and its application to public health issues. In addition to examining current issues that might arise during the timeframe of the course, we will address the following: ethical frameworks, theories, and approaches; a unique public health ethics; social justice; ethics surrounding infectious diseases, including surveillance and control; health disparities; environmental and occupational health issues; genetics; smoking cessation; end-of-life issues; conundrums regarding vulnerable populations; public health research; and ethical leadership of public health organizations. Prereq: Enrollment in the MPH program or consent of instructor.

# COLLEGE OF SOCIAL WORK

# Social Work

## College of Social Work

The College of Social Work offers a graduate curriculum of full-time and part-time study, leading to the Master of Social Work degree. This program is accredited by the Council on Social Work Education. The MSW degree is designed to prepare students for advanced practice in the field of social work.

## Master of Social Work

**Application Requirements**
Students must meet the general requirements of the Graduate School, as listed elsewhere in this Bulletin, as well as other specific requirements of the College of Social Work for the Master of Social Work degree as indicated below.

1. Applicants who do not qualify for advanced standing must earn 60 hours of credit with a grade-point average of 3.0 or above and no more than one course grade below a "B". Fifty-four of these credits must be in the required social work courses either for the Community and Social Development or Clinical Social Work concentrations and students complete six hours of electives. Minimum academic requirements for admission to the 60-hour program are: baccalaureate degree from an accredited institution of higher learning with a grade point average of 3.0 and a grade point average of 3.0 on all graduate work attempted. Applicants with less than a 3.0 UGPA will be placed in a "Waiting List" pool where the minimum GPA requirement for admission is the Graduate School's 2.75 GPA. Only a limited number of applicants will be admitted from this pool. These students must submit a "Petition for Exceptional Consideration". It is recommended that they take the Graduate Record Exam (GRE) as well. All applicants must complete the College's application form and the Graduate School's application form, submit transcripts from all colleges or universities attended, three letters of recommendation, resume, as well as autobiographical and values statements.
2. Advanced standing of 21 credit hours may be granted in the Master of Social Work program to graduates of social work programs accredited by the Council on Social Work Education who earned:
   a) an overall 3.0 GPA, and
   b) a 3.5 GPA in their social work major.
   Additionally, some work experience is preferred.

**Degree Requirements**
All MSW students must complete the final comprehensive examination. This examination covers the foundation and concentration areas of the student's educational program to determine the breadth and depth of knowledge acquired for professional practice.

## Doctor of Philosophy

The College offers a program leading to a Ph.D. degree through the Joint UK-U of L Ph.D. in Social Work Program which draws upon the academic resources of the University of Kentucky and the University of Louisville. Faculty members from both schools participate on students' dissertation committees.

The program consists of a minimum of 44 credits of post-master's course work plus 4 hours of dissertation research. Students are required to complete a core curriculum of 26 hours and to pass the Preliminary Exam. Students work on an individualized plan of study of 15 credit hours that includes scholarly study of an area of social work practice or research (9 credit hours) and pertinent research and teaching practica

(6 credit hours). These courses assist the student in developing a dissertation research area. Students are also required to complete a course on teaching (3 credit hours). After meeting these requirements, students take the Qualifying Examination which consists of a defense of the dissertation proposal. After successfully passing the Qualifying Exam, 4 hours of dissertation research and a dissertation must be completed.

The major aim of the program is to produce scholars with skills to expand the base of tested knowledge that can guide the profession of social work in addressing major social problems as well as to meet the challenges facing the doctoral level researcher and educator. The program emphasizes theory development and research.

**Core Curriculum (29 credit hours)**

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|---|---|
| Theory Development in the Social Work Profession | (3) |
| Advanced Analysis of Social Welfare Problems | (3) |
| Human Behavior & Change Theories | (3) |
| Ethics, Social Work & Society | (3) |
| Social Work Research I | (3) |
| Social Work Research II | (3) |
| Statistics (e.g., STA 570) | (3-4) |
| Statistics for Social Work II | (3) |
| Professional Seminar I | (1) |
| Professional Seminar II | (1) |
| Teaching in Social Work | (3) |

**Preliminary Examination**
**Individualized Plan of Study** (15 credit hours)

| | |
|---|---|
| Course work in an area of scholarly study | (9) |
| Research/Teaching Practica (3 hrs. must be in research) | (6) |

**Qualifying Exam**
**Dissertation Research** (4)

**Admission Requirements**

Applicants must have career objectives consistent with the social work profession and demonstrate strong potential to complete a vigorous academic program as evidenced in the following:

- a master's degree in social work from a program accredited by or judged to be equivalent by CSWE (applicants with other master's degrees can also be considered);
- at least two years' post-master's full-time, paid experience in social work preferred;
- an undergraduate grade point average (GPA) of 3.0 on a 4.0 scale and a graduate GPA of 3.5;
- official transcripts from each college/university attended;
- Graduate Record Examination (GRE) test scores of 1,000 when verbal and quantitative sections are summed;
- three letters of reference (two academic and one from employer)
- a writing sample or publication
- an autobiography that describes career and research interests and the rationale for pursuing a doctoral degree.

SW 505 CHILD WELFARE SERVICES. (2-3)
This course provides a comprehensive introduction to child abuse and neglect, including historical perspectives, indicators of maltreatment, theories about its etiology, and effective interventions on the micro and macro levels. Students will learn about child protective policies and services, and the social worker's roles and responsibilities.

SW 511 GENOCIDE: INTERVENTION WITH SURVIVORS AND GLOBAL PREVENTION. (3)
This course will examine the psychological, cultural, and societal roots of human cruelty, mass violence, and genocide. It explores what enables individuals collectively, and individually to perpetrate mass cruelty/genocide or to stand by and watch such horrors. The course will cover key concepts, perpetrator psychology, biopsychosocial effects on and intervention with survivors. Prereq: Open to students with a minimum of sophomore status and an introductory social science course, or consent of instructor.

SW 512 SOCIAL WORK IN THE CRIMINAL JUSTICE SYSTEM. (3)
Criminal justice processes are studied and evaluated. Factors influencing criminality are examined, as well as consequences and costs to offenders and to society of current policies to control and prevent crime. Traditional and innovative community and institutional programs for adult and juvenile offenders are emphasized to prepare those wanting to work with this population. Prereq: Junior standing or consent of instructor.

SW 514 ALCOHOLISM AND PROBLEM DRINKING. (2-3)
This course will examine traditional and emerging concepts of alcoholism and problem drinking with special attention to problems in definition. The contributions of recent research to our understanding of risk factors associated with various populations will be reviewed. Selected strategies for identification of and intervention into alcoholism and problem drinking will be discussed with particular attention to the unique problems and needs of racial minorities, youth, female, and other populations.

SW 515 MEDICAL AND PSYCHOSOCIAL ASPECTS OF DISABILITIES I. (3)
This course is designed to prepare rehabilitation and mental health counselors, social works and students in related fields with a working knowledge of the medical and psychosocial aspects of disability and chronic illness, and to provide students with the knowledge and understanding necessary to function and serve effectively in rehabilitation counseling and related interdisciplinary, allied health, and mental health settings. Topic areas include: human body systems, medical terminology, medical, functional, environmental and psychosocial aspects of dis abilities and chronic illness, professional ethics, assistive technology, diagnostic classification systems, psychopharmacology, functional capacity, and wellness and illness prevention concepts and strategies. Specific disabilities covered in this course include neurologic, hearing, vision, intellectual disabilities, developmental disabilities, autism and Asperger's, learning disabilities, attention deficit disorders, and substance abuse. Prereq: College level courses in biology and psychology or consent of instructor. (Same as RC 515.)

SW 516 MEDICAL AND PSYCHOSOCIAL ASPECTS OF DISABILITIES II. (3)
This course is designed to prepare rehabilitation and mental health counselors, social workers, and students in related fields with a working knowledge of the medical and psychosocial aspects of disability and chronic illness, and to provide students with the knowledge and understanding necessary to function and serve effectively in rehabilitation counseling and related interdisciplinary, allied health, and mental health settings. Topic areas include: human body systems, medical terminology, medical, functional, environmental and psychosocial aspects of disabilities and chronic illness, professional ethics, assistive technology, diagnostic classification systems, psychopharmacology, functional capacity, and wellness and illness prevention concepts and strategies. Specific disabilities covered during this semester include

psychiatric and psychological impairments, endocrine, gastroenterology, cancer, burns and skin disorders, blood and the immune system, respiratory, kidney and renal function and musculoskeletal. Prereq: College level courses in biology and psychology or consent of instructor. (Same as RC 516.)

SW 518 INTERNATIONAL SOCIAL WORK. (3)
This course assists students in developing an in-depth understanding of complex, global social problems accounting for their cultural context through application of a theoretical and conceptual framework to prepare them for international social work or work with immigrants and refugees in the United States. The course explores four areas: 1) International social development and macro practice; 2) Globalization, socio-political and economic interdependence, and global social issues; 3) International agreements, models of social development, and best practices; and 4) International social work practice at home and abroad. Students will learn to evaluate interventions and practice models in cultures with values and ideologies that are different from their own and critically analyze their impact at local, regional, national or international levels.

SW 519 UNDERSTANDING INTIMATE PARTNER VIOLENCE. (3)
The course is designed to provide students with opportunities to explore the prevalence and impact of intimate partner violence (IPV) and history of systemic response to it. Students will be introduced to methods of engagement, assessment, and intervention based on current research and practice knowledge. Particular attention will be given to the examination of personal and professional values regarding IPV as well as co-occurring issues.

SW 523 SOCIAL PERSPECTIVES ON RACISM AND ETHNIC PREJUDICES IN AMERICA. (2-3)
The course is designed to provide the knowledge needed in understanding the dynamics of institutional racism from a broader perspective of five specific ethnic minorities in rural and urban America. Particular emphasis is placed upon planned community change and strategies pertinent to minority group communities. Students who wish to make a special, in-depth study of one of the specified content areas may take this course for one additional credit. Prereq: Consent of instructor. (Same as AAS 523.)

SW 530 RESPONDING TO MILITARY AND VETERAN POPULATIONS. (3)
This course provides an overview of social work practice with military members, veterans, and military families. Students will learn to appreciate the unique experiences and stresses of military members and their families, and resultant implications for helping professionals serving this population. Topics to be covered include: (a) Warfare's historical role in shaping public policy, (b) the military as a distinct subculture of American society, (c) common psychosocial problems and stresses experienced by military members, veterans, and military families, (d) a survey of evidenced-based treatments for common psychopathologies and psychosocial problems experienced by this population, (e) an overview of systems of care serving this population, including the roles of social workers within these systems, and special ethical considerations for social workers serving military and veteran populations. Prereq: Open to graduate and upper division undergraduate students.

#SW 550 CHILD SEXUAL ABUSE: ASSESSMENT AND INTERVENTION. (3)
This course is designed to prepare students to practice with individuals and families affected by child sexual abuse. Theory, process models, and evidence based practices relevant to child sexual abuse will be presented. The course will focus on developing practice behaviors necessary to assess and provide case management for children, families, and offenders in child sexual abuse cases. Additionally, there will be an emphasis on the role of social work in a multidisciplinary team approach specific to child sexual abuse, including advocacy to prevent abuse, raise awareness, and ensure treatment for survivors.

SW 571 SOCIAL WORK AND THE LAW. (3)

The course examines the lawyer's method and the legal system; the organization and ethics of the practicing bar; the impact of legal decision-making and lawyers on society in such selected situations as civil rights, juvenile and criminal justice and consumer debtor-creditor relationships; and working relationships between social workers and lawyers.

SW 580 TOPICAL SEMINAR IN SOCIAL WORK. (1-4)
Study of issues of current and special significance for social work practice. Issues selected in accordance with the needs and interests of students enrolled. May be repeated to a maximum of eight credits. Prereq: Open to the student of social work or consent of instructor.

SW 595 COOPERATIVE SOCIAL WORK EDUCATION. (0)
A course designed for social work students who, through the cooperative education office, secure full-time, salaried, career-related positions under the supervision of a sponsoring employer. Enrollment in the course constitutes full-time status. Course may be taken on a pass-fail basis only and repeated with the permission of the cooperation education office. Prereq: Approval of the Cooperative Education Coordinator.

*SW 600 SOCIAL WORK PRACTICE WITH INDIVIDUALS AND FAMILIES. (3)
This course introduces students to generalist social work practice with individuals and families. SW 600 teaches the generalist practice model and related skills: engagement, interviewing, assessment, planning/intervention, implementation, evaluation and termination with a focus on helping students to master professional skills for direct practice with individuals and families. Additionally, this course offers an examination of social work practitioners' roles in the direct delivery of social services within the context of professional values and ethics. Special attention is paid to the social worker's obligations towards populations-at-risk. Prereq: Acceptance into the MSW program.

†SW 601 THEORY-INFORMED PRACTICE WITH FAMILIES.
*SW 602 THEORY-INFORMED SOCIAL WORK PRACTICE WITH GROUPS. (3)
This course introduces students to generalist social work practice with groups. SW 602 reviews the theoretical and philosophical formulations that underlie direct practice with groups and focuses on helping students develop and apply professional skills based on these formulations. Prereq: SW 600, SW 620.

SW 606 SEMINAR IN CRIMINAL JUSTICE PROCESSES. (2)
Criminal justice processes are studied and evaluated emphasizing system aims, theories of criminality and societal reaction, the consequences and costs to offenders and to society of current policies to control and prevent crime. Traditional and innovative community and institutional programs for adult and juvenile offenders will be examined.

SW 613 URBAN ECOLOGY AND AGING. (2 or 3)
Effects of an urban environment upon the aging population, including community design, city planning, housing, transportation, relocation, and mobility. The impact of technological advances will be examined from the point of view of theory, current research, and the process of man-environmental relationships.

SW 616 SOCIAL WORK PRACTICE IN SCHOOL SETTINGS. (2-3)
A presentation and examination of school social work practice. Emphasis will be placed on roles, competencies and skills necessary for effective service provision. The differences in services to children in schools will be contrasted with those in primary social service settings. Focus will also be given to the impact of school legislation and regulations on the choice of populations served and programs provided.

SW 617 FAMILY VIOLENCE: SOCIAL WORK INTERVENTIONS. (2-3)
The development of a knowledge based framework for understanding, preventing and intervening in

family violence as seen in child, spouse and elder abuse.

SW 618 SOCIAL WORK PRACTICE WITH GAY AND LESBIAN PEOPLE. (2-3)
This course is designed to expand the knowledge and understanding of students about the theory and dynamics of homophobia, heterosexism, and homonegativity. The effects of living with prejudice and discrimination among the gay and lesbian support systems available. Micro and macro social work intervention strategies will be studied as they relate to overall themes. Prereq: SW 600 or 601 or consent of instructor.

#SW 620 UNDERSTANDING THEORY IN SOCIAL WORK PRACTICE. (3)
SW 620 presents theory as a tool for understanding human behavior and serves as a theoretical foundation for understanding human behavior and subsequent social work intervention. Specific attention is paid to incorporating theories that are evidence based and knowledge informed in being able to understand clients within the larger context of their environment. Theories related to understanding the individual's transactional relationships within families, groups, organizations and communities are emphasized as well as understanding the cultural influences and aspects of difference that impact each client.

#SW 621 UNDERSTANDING POVERTY, INEQUALITY, AND INJUSTICE:
FOUNDATIONS OF PRACTICE. (3)
Poverty, inequality, and inequity are among the most pervasive social problems of our time. This course explores the causes and consequences of inequity and inequality and focuses on understanding the experiences of vulnerable and at risk populations in the 21st Century. An exploration of historical and current context of social problems will utilize a social justice framework and will allow students to understand the complexities of social problems as faced by the vulnerable population's social work serves and how social work defines and addresses these issues.

SW 623 SOCIAL WORK PRACTICE WITH GROUPS. (2-3)
This course critically analyzes approaches to group practice in social work emphasizing socialization and resocialization purposes and leader activities. Research and practice issues are examined. Prereq: SW 600 or 601 or consent of instructor.

SW 624 PERSPECTIVES ON HUMAN SEXUALITY. (3)
An examination and study of historical and current perspectives of sexuality as it relates to behavioral patterns, cultural attitudes, social policy and practice. Prereq: Knowledge of human behavior and personality theory highly recommended. (Same as FAM 624.)

#SW 625 INTRODUCTION TO SOCIAL WORK: PROFESSIONAL BEHAVIOR AND ETHICS. (3)
Students are introduced to the roles, responsibilities, and professional behaviors of social work, and the place of ethics and professionalism in social work practice. The development process of morality and professional ethics and the use of self-reflection and professional use of self in direct social work practice are examined. Philosophical formulations that underlie ethics and relevant concepts, the NASW Code of Ethics, and other ethical and professional guides are employed to develop ethical reasoning and decision-making to address ethical dilemmas faced in practice and cultivate professionalism to build and sustain worker-client relationships. Prereq: SW 600 or concurrent.

SW 626 FORENSIC MENTAL HEALTH: EVALUATION AND TREATMENT. (2-3)
An intensive analysis and study of forensic mental health including court evaluation, courtroom testimony and treatment of the victim. Students who wish to take this course for three credits will be expected to make an in-depth study of a specific content area. Lecture, two hours; laboratory (only for those taking the course for three hours), two hours per week. Prereq: Knowledge of behavior and personality theory is

highly recommended.

*SW 630 INTRODUCTION TO SOCIAL WELFARE POLICY AND SERVICES. (3)
While emphasizing the critical analyses of social policies and policy making processes, this course critically examines the history of the social welfare system, services, and programs. An important focus of this course is to identify and understand the impact of a wide range of social policies on social work clients and human service delivery systems within a social justice framework. Analytic frameworks with regard to social welfare policies and services are presented and course content reflects the interdisciplinary efforts of the social, political, legal, economic, and administrative processes which are vital to policy making at all levels. Prereq: Acceptance into the MSW program.

†SW 635 INTRODUCTION TO PROFESSIONAL ETHICS IN SOCIAL WORK.
#SW 636 SOCIAL WORK PRACTICE WITHIN ORGANIZATIONS AND COMMUNITIES I. (3)
This social work practice course explores theories and practice approaches appropriate for work with organizations and community systems. Recognizing the structural determinants of individual and family wellbeing, the course focuses on a strengths-based approach to engaging, assessing, and planning evidence-based interventions for clients at the macro level. Students will explore community practice models that aim to: empower marginalized populations, build human capacity, advocate for just policy, and create sustainable political, economic, environmental, and social justice. Prereq: SW 625, SW 600, SW 620, SW 630, SW 621 or concurrent.

*SW 640 FOUNDATION PRACTICUM. (3)
Students in this course engage in a generalist social work field placement under the direction of a faculty field professor and an agency field instructor. Through field education seminars students integrate knowledge, skills, and behaviors from prerequisite and concurrent courses, to demonstrate foundation social work practice with individuals, families, small groups, organizations and communities. The focus includes attention to context, policy, ethical considerations, the application of theory, and the use of research-informed interventions. Prereq: SW 600, 630, 650 or concurrent.

SW 642 PSYCHOLOGICAL ASPECTS OF HUMAN AGING.
Description and explanation of behavior, socialization and personality differentiation during the post-maturation developmental period: emotional aspects of aging; perception; intelligence; learning; motivation; normal and abnormal behavior; sexuality; life style. Prereq: SW 620 or equivalent, or consent of instructor.

SW 650 RESEARCH METHODS IN SOCIAL WORK. (3)
Introduction to systematic approaches to scientific thinking necessary for building knowledge and evaluating one's own practice. Includes ethical use of scientific inquiry, critical appreciation of quantitative and qualitative methodologies, and use of research for program evaluation. Prereq: Open only to students admitted to the graduate Social Work program.

SW 680 SPECIAL PROBLEMS IN SOCIAL WORK PRACTICE. (2-6)
Current issues that have special significance for social work practice. Selected problems in accordance with the needs and interests of the students registered for the course. May be repeated to a maximum of six credits. Prereq: Consent of instructor.

SW 701 ASSET-BASED AND SUSTAINABLE COMMUNITY ASSESSMENT AND DEVELOPMENT. (3)
This course is a practice course focusing on assessment and intervention in the Social and Community Development Concentration. The course examines the community context of social work practice with

an emphasis on neighborhoods, communities, and larger social systems that influence the quality of life. Models of community practice are presented to assess and intervene in social problems and social injustice that constrain opportunities and limit access to resources for individuals and families. Particular attention is given to the concept of asset-based development for building community capacity and empowering individuals and groups. Prereq: SW 721.

SW 702 SUBSTANCE MISUSE, VIOLENCE AND RISK MANAGEMENT. (3)
This course is designed to enhance students' clinical judgment and decision making with populations at high risk for victimization or perpetration of violence and substance misuse. It provides contemporary scientific and clinical knowledge and explores the associations of violence, child abuse, and mental disorders with substance misuse. Theories of addiction are explored with attention to genetic, familial, gender, geographical, and cultural contributions. Neurochemical and neuroanatomical correlates of addiction are explored. Assessment approaches and major interventions are analyzed and applied in practice sessions. Prereq: Completion of SW 600, SW 601, and SW 635, or admission to the MSW program with advanced standing, or permission of instructor.

SW 711 ADVANCED LEADERSHIP ROLES IN SOCIAL WORK. (3)
Advanced study and analysis of leadership roles in social work practice with emphasis upon administration and supervision. Some attention is given to consultation, staff development and teaching, and review of theories of adult learning. Prereq: SW 701 or consent of instructor.

SW 718 CLINICAL DECISION MAKING AND JUDGMENT FOR SOCIAL WORK. (3)
This course provides the foundation for decision and judgment processes necessary for effective clinical social work practice, and is usually taken concurrently with the Psychopathology II course. Prereq: Admission to the Clinical Social Work concentration.

SW 720 SOCIAL WORK PERSPECTIVES ON HUMAN AND CULTURAL DIVERSITY. (2)
This second required course in the human behavior and social environment sequence builds upon the foundation course. The focus of this course is upon the effects of discrimination and oppression experienced by diverse population groups with special attention to the effects of racism, sexism, ageism, classism and geography upon vulnerable groups; and upon institutionalized societal and cultural themes in diversity; with implications for social work practice. Prereq: SW 620 or advanced standing in the MSW program. (Same as AAS 720.)

SW 721 POVERTY AND INEQUALITY. (3)
Poverty and inequality are among the most pervasive social problems of our time. According to the NASW code of ethics, tackling poverty is a primary goal for social workers. The course aims to unmask the complexities of poverty and inequality by introducing students to the nature and characteristics of poverty, examining the predominant explanations of poverty and inequality, exploring the consequences of poverty and inequality, and surveying historical and contemporary approaches to poverty reduction. Diverse perspectives will be presented through the course. Special attention will be given to issues related to values and ethics including social justice, human rights and well-being. Prereq: Admission to the Community and Social Development Concentration.

SW 722 PSYCHOPATHOLOGY FOR SOCIAL WORK PRACTICE.
This course offers a survey of the major mental disorders typically encountered by social workers in clinical practice, protective services, family services, and other practice areas. It is designed to increase the social worker's working familiarity with diagnostic classifications, criteria, etiologies, and natural histories of disorders and social work treatments of disorders. Prereq: Admission into the MSW program with advanced standing or completion of SW 600, SW 601, and SW 635.

SW 724 ASSESSMENT AND TREATMENT PLANNING IN SOCIAL WORK. (3)
This course is designed to prepare the social worker to conduct structured, semi-structured and observational clinical assessments of adults, children, families and groups. Special attention will be paid to diagnostic assessments, substance use evaluations, lethality assessments, motivational interviewing, and other evidence-based and evidence-informed approaches. This course is designed to be taken after or concurrently with the clinical decision making course. Prereq: Admission to the clinical social work concentration; SW 718, SW 726 or concurrent.

SW 726 PSYCHOPATHOLOGY FOR CLINICAL SOCIAL WORK. (3)
This course provides the Master's level social work student an opportunity for advanced study of differential diagnostic assessment using the current edition of the Diagnostic and Statistical Manual of Mental Disorders. The course also provides an opportunity for more detailed study of the more common mental disorders seen in social work practice. In conjunction with the Decision Making course it provides an opportunity for advanced study of clinical decision making as it pertains to current mental health assessment. Prereq: SW 722, SW 702, admission to the Clinical Social Work concentration, SW 718 or concurrent.

SW 728 COMPARATIVE TREATMENT MODALITIES. (3)
This course builds on previous content related to clinical decision- making, psychopathology and clinical assessment, and is designed to 1) apply a range of intervention theories to children, adults, families and groups, 2) facilitate the student's capacity to conduct a comparative analysis of the approaches across common, conceptual, clinical, cultural and ethical domains, and to provide the forum for a critique of each approach using the latest empirical evidence on efficacy and effectiveness. Prereq: SW 718, SW 724, SW 726.

SW 730 EVIDENCE-BASED PRACTICE FOR SOCIAL WORKERS. (3)
This course offers an intensive study of three evidence based practices one for adult, one for children and one group intervention. It is designed to increase the social worker's familiarity with evidence based practices for social work treatment of mental health disorders. Prereq: SW 718, SW 724, and Psychopathology II.

SW 731 ADVANCED SOCIAL WELFARE POLICY AND ANALYSIS. (3)
This course builds on the social justice tradition and the policy analysis framework provided in SW 630 to prepare students to engage in the policy-making processes that impact and are impacted by the family and community service delivery system. Controversial issues within the child welfare, school social work, aging, and community development policy arenas are examined. Prereq: SW 721, SW 737.

SW 733 COMMUNITY-INFORMED ORGANIZATIONAL INTERVENTIONS.(3)
This course is an advanced Master's level class designed to explore the organizational context for creating change in communities. Students will be introduced to practice behaviors related to designing programs that respond to changing community demographics and needs and that promote inclusion of diverse community constituencies. The course emphasizes using community-based data and assessments and reflective learning models to evaluate programming and design program modifications and innovations that will benefit the community. Prereq: SW 721, SW 737, SW 701 or concurrent.

SW 734 CLINICAL SOCIAL WORK INTEGRATIVE SEMINAR. (3)
This seminar is taken by MSW students in their last semester to prepare for the comprehensive examination. Foundation level and concentration course content and practice behaviors will be reviewed to assist students to integrate their course of study. Prereq: SW 724 or concurrent.

SW 735 COMMUNITY AND SOCIAL DEVELOPMENT INTEGRATIVE SEMINAR. (3)
This seminar is taken by MSW students in their last semester to prepare for the comprehensive examination. Foundation level and concentration course content and practice behaviors will be reviewed to assist students to integrate their course of study. Prereq: SW 743 or concurrent.

SW 737 NON-PROFIT MANAGEMENT IN HUMAN SERVICE ORGANIZATIONS.
This course focuses on social work management practices and leadership skills required in the development and management of non-profit organizations. With a particular focus on the human services delivery system, this course emphasizes achievement of human service goals and objectives through management control processes such as strategic planning, human resource management, program development and evaluation, finance, and advisory board governance. Prereq: SW 721 or concurrent.

SW 738 GUIDED INDEPENDENT WORK: MILITARY AND VETERAN POPULATIONS. (3)
This guided independent study is a graduate student-directed learning experience, for which faculty provide oversight and direction. Participation in SW 780 requires critical thinking and reflection regarding relevant material, conceptualization of an independent study project and the development of an electronic portfolio which addresses each learning outcome. Students will meet with the course instructor and/or other certificate-seeking students via electronic resources such as Echo 360, Adobe Connect, or Skype. The seminar instructor will determine the most effective means of communication with students, considering access to various web-based communication tools. Prereq: Admission to the Graduate Certificate in Military Behavioral Health; SW 530; FAM 759.

SW 740 CLINICAL SOCIAL WORK PRACTICUM. (3)
Students in this course engage in learning that prepares them to practice as clinical social workers at the advanced level. Students work in public and private agencies that provide services to a wide range of individuals (e.g., children, the elderly, persons with disabilities, etc.), families, and groups. Students will integrate knowledge, skills and behaviors from prerequisite and concurrent CSW concentration courses in field settings that provide opportunities to practice advanced clinical social work. Students will perform a variety of tasks including clinical decision-making, assessment and treatment planning. Includes 300 hours per semester of seminar and experiential learning. Prereq: SW 718, 724, 726, or concurrent. This class is to be taken concurrently with the SW 750 research course.

SW 740A CLINICAL SOCIAL WORK PRACTICUM I. (4)
This field-based course prepares students to practice as social workers at the advanced level in an area of concentration. Students perform a variety of tasks including assessment, case management, psycho-education, as well as individual, family, and/or community-based interventions. Placement in a human service agency and experiential learning of 300 hours including weekly seminars. Prereq: SW 640 or advanced standing.

SW 741 CSD PRACTICUM I. (3)
Students in this course engage in learning that prepares them to practice as social workers at the advanced level in public and private settings. Students work in government and non-profit community based agencies that provide services to a wide range of individuals (e.g., children, the elderly, persons with disabilities, etc.), families, and communities. Students will integrate knowledge, skills and behaviors from prerequisite and concurrent CSD concentration courses and will be engaged in work that provides opportunities to become competent social work practitioners at the organizational and macro levels. Students will perform a variety of tasks including in-depth agency/ organizational assessment, policy analysis, and review of contexts that shape practice at the organizational level. Includes 300 hours per semester of seminar and experiential learning. Prereq: SW 721, 737 or concurrent. This class is to be taken

concurrently with the SW 751 research course.

SW 741A FAMILY AND COMMUNITY CONCENTRATION PRACTICUM I. (4)
This field-based course prepares students to practice as social workers at the advanced level in an area of concentration. Students perform a variety of tasks including assessment at the individual and community level, case-management, and individual, family, and communitybased interventions. Placement in a human service agency and experiential learning of 300 hours including weekly seminars. Prereq: SW 721, 737 or concurrent. This class is to be taken concurrently with the SW 751 research course.

SW 742 CLINICAL SOCIAL WORK PRACTICUM II. (3)
This course builds on the experiences and activities of SW 740. Students in this course engage in learning that prepares them to practice as clinical social workers at the advanced level. Students work in public and private agencies that provide services to a wide range of individuals (e.g. children, the elderly, persons with disabilities, etc.), families, and groups. Students will integrate knowledge, skills and behaviors from prerequisite and concurrent CSW concentration courses in field settings that provide opportunities to practice advanced clinical social work. Students will perform a variety of tasks including clinical decision-making, assessment, treatment planning, evidencebased clinical intervention and research-informed evaluation of practice. Includes 300 hours per semester of seminar and experiential learning. Prereq: SW 740, SW 750, SW 728, SW 730 or concurrent.

SW 743 COMMUNITY AND SOCIAL DEVELOPMENT PRACTICUM II.
This course builds on the experiences and activities of SW 741. Students in this course engage in learning that prepares them to practice as social workers at the advanced level in public and private settings. Students work in government and non-profit community based agencies that provide services to a wide range of individuals (e.g. children, the elderly, persons with disabilities, etc.), families, and communities. Students will integrate knowledge, skills and behaviors from prerequisite and concurrent CSD concentration courses and will be engaged in work that provides opportunities to become competent social work practitioners at the organizational and macro levels. Students will perform a variety of tasks including organizational and community assessment, advocacy, development and promotion of policy, research and evaluation, and development of community based interventions. Includes 300 hours per semester of seminar and experiential learning. Prereq: SW 741, SW 751; SW 701, SW 731, and SW 733 or concurrent.

SW 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

SW 750 CLINICAL SOCIAL WORK RESEARCH. (3)
This course builds on the introductory research class designed to study the processes of research in enhancing social work knowledge and developing effective social work practice. This course helps students develop the skills necessary to become sophisticated consumers of clinical research; execute single subject designs in clinical practice to assess and monitor progress, and participate in clinical intervention studies to test the efficacy and effectiveness of interventions. Prereq: SW 650 or advanced standing. This course is designed to be taken concurrently with SW 740.

SW 751 RESEARCH SKILLS FOR COMMUNITY AND SOCIAL DEVELOPMENT. (3)
This is an intermediate research course with an emphasis on program evaluation. The course will provide instruction in research methodology as well as research design. In addition, there is an emphasis on developing competencies and skills that will allow students to work with multifaceted research teams in diverse settings. Prereq: SW 650 or advanced standing. This course is designed to be taken concurrently

with SW 741.

SW 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

SW 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely. Prereq: Successful completion of qualifying exam.

SW 770 DOCTORAL RESEARCH I. (3)
This course focuses on the role of research in the profession, the logic of research, the major strategies and techniques for conducting research in social work settings, and preparation of a research proposal. This is the first of a two-course sequence with a primary focus on quantitative methods. Prereq: Admission into the Social Work doctoral program.

SW 771 DOCTORAL RESEARCH II. (3)
In this second of two required research methods courses, students will conduct and report on the quantitative research project proposed in the first semester. They will also conduct a meta-analysis, test a research instrument's reliability and validity, conduct an exercise using qualitative methodology, and explore large public databases. Prereq: SW 770.

SW 773 DOCTORAL STATISTICS II. (3)
This social work course aims to help students understand and apply multivariate techniques in the fields of social welfare and social work research. Topics covered will include multivariate regression, factor analysis, path analysis, event history analysis, as well as logit and probit analysis. Prereq: STA 570 or other graduate level statistics course.

SW 774 MENTAL HEALTH RESEARCH METHODS.
This course will explore the principles and procedures that govern mental health research by examining the different ways researchers study mental health phenomenon. In this course, students will learn the skills to engage in the scientific investigation of significant mental health problems, and dissemination strategies utilized to transfer empirical findings into mental health practice and policy development. This course emphasizes aspects of methodological design essential for conducting meta-analysis, treatment, prevention and epidemiological research that may be outside the scope of a general research course. Prereq: SW 770 and SW 771 (SW 771 may be taken concurrently).

SW 780 INDEPENDENT WORK. (1-6)
Organized study, research and/or tutorial focused on special issues or problems. May be repeated to a maximum of six credits. Prereq: Major, graduate standing of 3.0 overall GPA, or consent of dean, and consent of adviser and instructor.

SW 781 THEORY DEVELOPMENT IN THE SOCIAL WORK PROFESSION. (3)
Explores the nature of knowledge, how it is generated and acquired. Students will distinguish explanatory from practice theory, understand paradigms as bases for ideas, recognize and formulate concepts, understand relational statements, theoretical statements, and how these relate to theory and data. Strategies for building knowledge will be discussed. Students will analyze theories into their components, construct mini-theories, and propose how they can be tested in social work practice. Prereq: Admission into the doctoral program or consent of the program director.

SW 782 ADVANCED ANALYSIS OF SOCIAL PROBLEMS, POLICY AND PRACTICE. (3)
This course provides students with a theoretical and conceptual framework for understanding social problems and their implications for macro social work practice. Critical perspectives related to social science theory will be identified, assumptions assessed, values examined, and empirical evidence analyzed. Theories covered will be drawn from sociological, socio-cultural, political, economic, historical and other perspectives. Students will be expected to develop their abilities to analyze and critique social problems and macro social work practice. Prereq: Admission into the doctoral program.

SW 783 HUMAN BEHAVIOR AND CHANGE THEORIES IN SOCIAL WORK PRACTICE. (3)
A critical analysis of theories which seek to explain human behavior and serve as foundations for current clinical change interventions; includes an examination of the empirical support for and efficacy of major treatment modalities used in social work practice. Prereq: Admission to the doctoral program.

SW 784 ETHICS, SOCIAL WORK AND SOCIETY. (3)
This course will identify and articulate the philosophical formulations of relevant ethical traditions and their implications for social work. Students will examine approaches to ethical analysis as well as major ethical problems facing contemporary social work. The course will emphasize the development of advanced ethical reasoning and decision-making skills. Prereq: Admission to the doctoral program and SW 781.

SW 785 PROSEMINAR IN SOCIAL WORK RESEARCH. (1)
This seminar introduces beginning doctoral students to the research activities of social work faculty and advanced students. Presentations will familiarize students with practical issues in the conceptual development and conduct of current research. May be repeated to a maximum of two credits. Prereq: Admission into the doctoral program.

SW 786 DOCTORAL RESEARCH PRACTICUM. (3-6)
Provides the doctoral student opportunity to conduct social work research under the supervision of a chosen faculty member. This experience is expected to result in one or more reports suitable for submission to a scholarly journal at conclusion of the practicum. Prereq: Completion of first year of doctoral study.

SW 787 DOCTORAL TEACHING PRACTICUM. (3-6)
Supervised teaching and other classroom experiences designed to prepare doctoral students to be social work educators. Prereq: Completion of first year of doctoral study.

SW 788 RESEARCH IN SOCIAL WORK SEMINAR. (3)
This course is designed to facilitate the student's completion of the dissertation prospectus and the dissertation itself. Students will make formal presentations on their research plans and will address available literature, measurement and methodological issues, analysis of data, limitations, and importance of the investigation. Prereq: Six hours doctoral level research.

SW 790 SEMINAR IN TEACHING AND LEARNING.
Students will facilitate seminar sessions drawing upon educational theory and relevant literature, create syllabi, observe each other teaching, and develop papers elucidating their grading practices and philosophy of teaching. Prereq: Admission into the doctoral program or consent of instructor.

SW 795 ADVANCED DOCTORAL SEMINAR IN SOCIAL WORK (Subtitle required). (3)
Topics of current importance in Social Work research and practice, including philosophical, theoretical,

ethical, and technical considerations. May be repeated to a maximum of twelve credits under different subtitles. Prereq: Admission to the joint Ph.D. program.

# GATTON COLLEGE OF BUSINESS AND ECONOMICS

# Accounting

## Gatton College of Business & Economics

### Master of Science

The Master of Science in Accounting (MSACC) degree at the University of Kentucky offers students a program of advanced study in accounting. The program provides preparation for professional positions in public accounting, industry, and other organizations. When coupled with a bachelor's degree from an accredited college or university and satisfactory completion of prerequisites of undergraduate courses in accounting, the MSACC allows students to prepare for the CPA exam while they complete their graduate courses which are offered in lock step with the CPA exam. Specifically, the program's objectives are to:

- Help students develop communication and technology skills expected in the accounting profession;
- Enhance the accounting knowledge of students entering the accounting profession;
- Enable students to develop both leadership skills and teamwork in researching accounting issues;
- Enhance students' creative problem-solving skills and ability to think logically and analytically.

**Admission Requirements**

Most students are admitted into the MSACC program during the fall semester, and a few students can be admitted during the spring semester if circumstances dictate a later start. Applicants to the program must have an undergraduate degree from an accredited college or university and complete the Graduate Management Admission Test (GMAT). Applicants who have a GPA in accounting and overall of at least a 3.5 are exempted from the GMAT exam. Applicants will be evaluated for admission based on their undergraduate grade point averages (GPA), both overall and in accounting, their GMAT score if applicable, personal essay, 3 reference forms, and TOEFL score, if applicable. The required course prerequisites (3 credit hours each) for the MSACC program are: ACC 301 - Intermediate Accounting I; ACC 302 - Intermediate Accounting II; ACC 324 - Accounting Information Systems; ACC 403 - Auditing; ACC 407 - Concepts of Income Taxation; and ACC 418 - Cost Management. These courses must be based on US accounting standards and codes. Minimum admission requirements are as follows:

- Minimum overall GPA of 3.0
- Minimum undergraduate accounting GPA of 3.2
- Minimum GMAT score of 600, however, applicants can be accepted into the program with a GMAT score less than 600 if their GPA score is higher than the minimum specified above.
- International students must have a minimum TOEFL IBT score of 90 or IELTS score of 7, and no less than a 30 on the verbal converted score on the GMAT exam.

**Degree Requirements**

Students must complete at least thirty semester hours in courses carrying graduate credit. The MSACC degree requirements are:

1. A minimum of 21 semester hours of accounting courses, of which at least 15 semester hours must be in courses numbered at the "600" level.
2. The required courses include: ACC 507, ACC 516, ACC 601, ACC 603, ACC 617, ACC 621, ACC 624, and three graduate level electives outside of accounting (at least two of these courses must be at the 600 level).
3. A minimum of 21 semester hours must be in courses must be in courses reserved exclusively for graduate students (i.e., 600 level courses).
4. All graduate-level elective courses require approval in advance by the DGS of the MS Accounting program.

5. A minimum average GPA of 3.0 in all courses attempted for graduate credit after being admitted to The Graduate School.

The program generally follows a lock-step approach. Therefore, certain required courses are only offered in a fall semester; other required courses are only offered in a spring semester/first summer session. You can learn more about the MSACC program by going to the following web page address: http://gatton.uky.edu/programs/masters/master-science-accounting/

## Doctor of Philosophy

The Business Administration program offers a Ph.D. degree with a concentration in Accounting. For more information, see the Business Administration program description.

## Course Descriptions

ACC 507 ADVANCED TOPICS IN TAXATION. (3)
A study of advanced topics in taxation, including corporate taxation, accounting for income taxes, and international tax. Prereq: ACC 302and ACC 407 or consent of the Director of the School of Accountancy.

ACC 508 CONTROLLERSHIP. (3)
A comprehensive study of the controller's objectives, responsibilities, functions, organizational roles, etc. Prereq: ACC 418.

ACC 516 ADVANCED TOPICS IN FINANCIAL REPORTING. (3)
A comprehensive study of financial accounting and reporting issues involving business combinations, partnerships, foreign currency transactions, not-for-profit accounting and other current accounting issues. Prereq: ACC 302 or consent of the Director of the School ofAccountancy.

ACC 555 FORENSIC ACCOUNTING AND FRAUD EXAMINATION. (3)
This course will cover the principles and methodology of fraud detection and deterrence. The course includes such topics as skimming, cash larceny, check tampering, register disbursement schemes, billing schemes, payroll and expense reimbursement schemes, non-cash misappropriations, corruption, fraudulent financial statements, and interviewing witnesses. Prereq: ACC 301 or consent of the Director of the School of Accountancy.

ACC 590 SPECIAL TOPICS IN ACCOUNTING: (Subtitle required). (3)
Readings, projects, lectures and/or discussion to illuminate current topics of special interest or concern in accounting. May be repeated
to a maximum of twelve credits. May not be repeated under the same title. Prereq: Consent of instructor.

ACC 601 RESEARCH IN ACCOUNTING THEORY. (3)
Critical examination of accounting concepts and standards. Study of current problems and contemporary developments reflected in accounting literature and reports. Prereq: Admission to MSACC program, or consent of the Director of Graduate Studies.

ACC 603 ATTEST FUNCTION. (3)
A critical examination of contemporary professional attestation theory and practice including a comprehensive review of AICPA audit case studies, statements on audit procedure, and their application in simulated business situations. Prereq: ACC 403 and admission to MSACC program, or consent of the Director of Graduate Studies.

ACC 605 INTERNAL AUDITING. (3)
This course provides students an understanding of the internal audit profession and the internal audit process. Topics that will be included in this course are: the professional practices framework for internal auditing, organizational governance, risk and control issues, and experience in conducting internal audit engagements. It provides the basic preparation for students to take positions in auditing, compliance, risk management and process improvement. Prereq: Graduate standing.

ACC 610 NOT-FOR-PROFIT AND REGULATORY ACCOUNTING. (3)
A study of the contemporary issues in the area of not-for-profit and regulatory accounting. Prereq: ACC 410G or consent of instructor.

ACC 617 SELECTED TOPICS IN TAXATION. (3)
A study of selected topics in taxation, including partnership taxation, tax research, and other tax topics. Prereq: ACC 507 and admission to MSACC program, or consent of the Director of Graduate Studies.

ACC 619 INDEPENDENT STUDY IN ACCOUNTING. (1-3)
Designed for students undertaking special studies to be conducted in regular consultation with the instructor. Prereq: Consent of instructor.

ACC 621 UNDERSTANDING FINANCIAL STATEMENTS. (3)
Financial statements communicate information about a business and its operations. Students will gain an understanding of the information being communicated (or not communicated) by the business entity. Emphasis is on the uses of information, rather than its preparation. Prereq: Admission to MSACC program or consent of DGS.

ACC 624 ENTERPRISE INFORMATION AND CONTROL SYSTEMS. (3)
The course simultaneously examines two issues related to enterprise information systems development: 1) methodologies for designing and implementing information systems, and 2) assessment of enterprise risk and internal control systems. Case analyses and “real world” projects are used to accomplish the course objectives. Current computer technologies, including relational database systems and internet
data processing, are integrated into the course content. Prereq: ACC 324, ACC 403 and admission to MSACC program, or consent of the Director of Graduate Studies.

ACC 628 FINANCIAL/MANAGERIAL ACCOUNTING. (3)
A study of the application of accounting information and services in the recognition or solution of management problems in business. Prereq: Graduate standing in the MBA program, ACC 201 and ACC 202, or its equivalent. Course credit will not be given to students in the MSACC
program.

ACC 637 TAXATION OF FLOW-THROUGH ENTITIES. (3)
A detailed study of the income taxation of flow-through entities, including Partnerships, S corporations, and limited liability companies. Prereq: ACC 507 and admission to MSACC program, or consent of the Director of Graduate Studies.

ACC 647 MULTIJURISDICTIONAL TAXATION. (3)
A study of the taxation of taxpayers located in two or more tax jurisdictions. The course involves two major categories, international taxation and state and local taxation. Prereq: ACC 507 and admission to MSACC program, or consent of the Director of Graduate Studies.

ACC 700 TOPICAL SEMINAR IN ACCOUNTING RESEARCH (Subtitle required). (1-3)

An advanced seminar on selected topics such as cross-disciplinary research on behavioral decision-making, research using archival data, and analytical models in accounting. May be repeated to a maximum of eighteen credits. Prereq: Doctoral student status in business administration.

ACC 790 DOCTORAL COLLOQUIUM – ACCOUNTANCY. (1-2)
This course provides professional socialization for Ph.D. students in accountancy. Topics include research, teaching, and service, transition, preparation for a career as a professor, and special research topics, including lectures by noted scholars.

ACC 795 INDEPENDENT STUDY IN ACCOUNTING. (1-6)
Designed for students undertaking special studies to be conducted in regular consultation with instructor. May be repeated to a total of 12 credit hours. Prereq: Consent of instructor

# Business Administration

## Gatton College of Business & Economics

The Gatton College of Business and Economics offers the Master of Business Administration and the Doctor of Philosophy in Business Administration degrees. Faculty participating in the M.B.A. and the Ph.D. programs are members of the School of Accountancy, the Department of Finance and Quantitative Methods, the Department of Management, the Department of Marketing and Supply Chain, and the Department of Economics. A description of the graduate programs and graduate faculty in Accounting and in Economics can be found in those sections of this Bulletin.

## Master of Business Administration

Gatton's One Year option is an intensive, cross-disciplinary, hands-on experience that will prepare you to be a leader in business and the community. Our curriculum incorporates a number of the core business processes, including marketing, management, and finance; as well as the more technical business courses such as accounting, quantitative analysis, operations management (supply chain), global management, and data analysis. Additionally, you will cover those critical areas that the corporate world values, including leadership, communication and presentation skills, ethics, and strategic thinking. All of this takes place in highly interactive, action-based courses and learning laboratories situated in the corporate setting through Project Connect a built-in internship with companies in the area delivered in a team setting.

The Professional Evening M.B.A. program is designed for working professionals seeking to improve their business acumen and expand their soft skills. Modeled by the more traditional learning environment, evening students will study with first-rate professors who are leaders in their fields. In as little as two years, a student in the Professional Evening M.B.A. program will graduate with an advanced degree designed to broaden and enhance their skill set in order to be more competitive in the business world.

**Admission Requirements**

Prerequisites for the M.B.A. program include undergraduate accounting and economic courses. These prerequisites can be satisfied as listed below. Prerequisites may be satisfied by:

1. Passing the required courses (ACC 201 and ACC 202, ECO 201 and ECO 202) at the University of Kentucky;
2. Passing the similar courses at another accredited university, including KCTCS;
3. Passing B&E 223, Introduction to the Economics of Business and passing B&E 221 and B&E 222 Accounting courses offered in the Summer Session;
4. Passing college-level proficiency (CLEP) examinations;
5. Successfully completing correspondence courses or
6. Passing Ivy Software.

In addition to satisfying required course prerequisites, applicants should possess a four-year undergraduate degree (or its equivalent) with a minimum cumulative grade point average (GPA) of 2.75 / 4.00 scale. The Graduate Management Admission Test (GMAT) or the Graduate Record Exam (GRE) is required for admission in the M.B.A. program. Exceptions (at our discretion) to this requirement are students presently in law, medicine, or pharmacy schools, or licensed attorneys, medical doctors or pharmacists with a PharmD degree, and persons having a doctoral degree from an accredited university. Further, students with professional work experience and/or professional leadership certifications (such as C.P.A.), plus satisfactory academic achievement as evidence by a minimum G.P.A. of 3.0 may be exempt from taking

the admissions test at the discretion of the Admissions Committee. International students must present a Test of English as a Foreign Language (TOEFL) with an overall minimum score of 550 written and 213 computer. The exception for the TOEFL test is for those students who hold a degree from a U.S. institution of higher education. All international students who are not permanent residents of the U.S. must present a Test of Written English (TWE) with a score of 4.5 or higher.

Subject to the exceptions stated above, no student will be admitted to either the One Year or Professional Evening M.B.A. program before the completion of the GMAT or GRE and the completion of the prerequisites.

The mission of the M.B.A. program is to educate, train and equip graduates with the essential skills for entry and mid-level management positions in a variety of organizations and industries. Specifically, the program is designed to provide:

1. The ability to think creatively and strategically about complex real-world business problems
2. An appreciation of ethical and societal responsibilities
3. A multidisciplinary and global perspective
4. Analytical, critical and logical reasoning skills
5. Strong written and oral communication skills.
6. Entrepreneurial and business assessment skills
7. Innovation and creativity in the workplace.

The One Year M.B.A. program consists of 51 credit hours while the Professional Evening M.B.A. program of study requires 36 semester credit hours of work.

## One Year Program

| | | |
|---|---|---|
| DIS 651 | Quantitative Analysis | (3) |
| ECO 610 | Managerial Economics | (3) |
| MGT 697 | Leadership, Communications & Ethics | (3) |
| MBA 630 | Professional Development | (1) |
| MBA 640 | Project Connect I | (4) |
| ACC 628 | Managerial/Financial Accounting | (3) |
| MKT 600 | Marketing Management | (3) |
| MGT 610 | Global Management | (3) |
| FIN 600 | Corporate Financial Policy | (3) |
| MBA 642 | Project Connect II | (4) |
| MBA 615 | Supply Chain Strategy | (3) |
| MGT 611 | Managing Effective Organizations | (3) |
| MGT 699 | Business Policy & Strategy (Capstone) | (3) |
| Electives* | | (12) |

*A 600-level courses approved by the Director of Graduate Studies

## Professional Evening MBA Program - 2- or 3-Year Part-time Program

| | | |
|---|---|---|
| ACC 628 | Financial/Managerial Accounting | (3) |
| ECO 610 | Managerial Economics | (3) |
| MGT 611 | Organizational Behavior | (3) |
| FIN 600 | Corporate Financial Policy | (3) |

| | | |
|---|---|---|
| DIS 651 | Quantitative Analysis for Decisions | (3) |
| MKT 600 | Marketing Management | (3) |
| MBA 615 | Supply Chain Strategy | (3) |
| MGT 610 | Global Business Management | (3) |
| MGT 699 | Business Policy & Strategy II | (3) |
| Electives* | | (9) |

*Any 600-level courses approved by the Director of Graduate Studies

Students are required to have a minimum B grade average to graduate. Students receiving two grades of C or one grade of E may be subject to dismissal from the M.B.A. program.

## B.S. in Engineering/M.B.A.

An opportunity to study for an M.B.A. degree while pursuing a Bachelor of Science in Engineering degree is offered to eligible students admitted to the College of Engineering.

## J.D./M.B.A. Option

The College of Business and Economics and the College of Law offer the opportunity to obtain the Master of Business Administration (M.B.A.) and Juris Doctor (J.D.) degrees in a dual degree program. Because both schools recognize that some aspects of business and law are compatible and interrelated, students can obtain both degrees in less time than if the degrees were pursued separately. As a result, students gain marketable skills and specialized employment opportunities in less time than might otherwise be required. Students interested in the J.D./M.B.A. program must apply to both the College of Law and the Graduate School. These students may enroll in either the One Year or Professional Evening programs.

## M.D./M.B.A.

Through an agreement with the College of Medicine, the Gatton College admits eligible students to pursue the M.B.A. degree jointly with the M.D. degree. Students interested in this program must apply to the College of Medicine and to the Graduate School. Students interested in the joint degree will enroll in the One Year program between their third and fourth year of Medical School.

## Pharm.D./M.B.A.

Through an agreement with the College of Pharmacy, the Gatton College admits eligible students to pursue the M.B.A. degree jointly with the Pharm.D. degree. Students interested in this program must apply to the College of Pharmacy and to the Graduate School. Students interested in the joint degree will enroll in the Professional Evening program between their first and second year of Pharmacy School.

**Application for Admission**

Students who wish to apply for admission to the M.B.A. program in the Gatton College of Business and Economics should submit an online application to the Graduate School.
http://gradschool.uky.edu/welcome-university-kentucky

## Doctor of Philosophy

The mission of the doctoral program is to prepare students for successful academic careers at institutions of higher learning within the USA and internationally. To accomplish this mission, the program prepares graduates to comprehend and evaluate research, to perform research which advances knowledge and to provide effective instruction, all within a business-related discipline and in a supportive collegial environment. Specifically, the program is designed to provide:

- An academic understanding of the philosophies and basic methodological issues of academic inquiry
- An understanding of the theoretical state-of-the-art research methods in a specific discipline
- The ability to design and execute substantive research projects
- The ability to communicate research findings to diverse audiences.

**Admissions Requirements**

1. The Ph.D. is designed to provide specialization beyond the master's level, but applicants without master's degrees will be considered if suitably qualified. The educational background of candidates is reviewed by the faculty in the student's major area to identify any deficiencies.
2. Applicants with previous graduate credits are evaluated according to the following rules, but each case is individually examined by the faculty of the appropriate business department. A minimal grade point average of 3.2/4.0 is required on all previous graduate credits. Also, students without GMAT scores must take the exam and submit scores before an admission decision can be made. In some areas and at the discretion of the Director of Graduate Studies, the GRE may be accepted as an alternative to the GMAT.

Unless the most recently awarded degree is from an accredited university within the USA, applicants whose native language is not English must submit proof of English ability (TOEFL or IELTS) with scores meeting at least the minimum requirements of the Graduate School.

**Degree Requirements**

Minimum requirements for the doctoral degree are a total of 40 hours of graduate level coursework and successful completion of the Qualifying Examination followed by registration for a minimum of 2 consecutive semesters for dissertation residency credit.

*Core Requirements*

- 3 credit hours in research methodology
- 6 credit hours in theoretical foundations
- 9 credit hours in research tools (including statistics)
- 1 credit hour in techniques for business education

Total credit hours in the core 19

*Major Field Requirements*

The major field consists of at least 21 hours of graduate credit course work including at least 12 credit hours of 700 level courses exclusive of the core. Currently available major fields include:

- Accounting
- Finance and Quantitative Methods
- Management
- Marketing and Supply Chain

All course work must be approved by the Director of Graduate Studies. Written and oral comprehensive examinations are required in the major field.

*Post Qualifying Examination Requirements*

- A dissertation based on original research on a significant topic is required. The dissertation is defended in an oral examination.
- 2 consecutive semesters (4 credit hours minimum) of dissertation research residence credit.

*Maintenance of Good Standing*

- A minimum average grade of B for graduate credit in all courses after being admitted to the

Graduate School must be maintained.

- Doctoral students obtaining two grades of C are subject to dismissal from the program regardless of the number of offsetting A's.
- Doctoral students obtaining an E grade are subject to dismissal from the program.
- A student failing the Qualifying Exam is subject to dismissal.
- A student may be dismissed from the program after successfully passing the Qualifying Examination if in the judgment of the student's Advisory Committee he/she is not making satisfactory progress toward the completion of a dissertation.

Students who wish to apply for admission to the Ph.D. program should submit an online application to the Graduate School https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=ukgrad. For detailed admission information, visit the Gatton College web site www.gatton.uky.edu, call 859.257.3592, or write to

The Office of the Associate Dean
235 Gatton College of Business and Economics
University of Kentucky
Lexington, KY 40506-0034

# Course Descriptions

BA 700 TEACHING METHODS IN BUSINESS. (1)
A three-part course that examines what constitutes good teaching and explores effective techniques for college instruction. Seminars emphasize practical information for both the principal activities and the details of teaching. Departmental discussions allow students to discuss issues that arise in their teaching practice. Reviews of classroom performance provide professional feedback in order to enhance on-the-job learning. Seminar, two hours per week. Prereq: Approval of Director of Graduate Studies. (Same as ECO 700.)

BA 762 RESEARCH METHODOLOGY. (3)
Examines fundamental concepts in design, control, and measurement for social science research with emphasis on: reliability, internal and external validity, and causality. Prereq: Admission to DBA program and prior completion of or concurrent enrollment in a graduate level course on the general linear model.

BA 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

# Economics

## Gatton College of Business & Economics

**Financial Assistance**
Any student who is a graduate of a fully accredited institution of higher learning is eligible to apply for admission to the graduate program in economics. The final decision on matters of admission is made by the Graduate Studies Committee of the Department of Economics and is based on the student's academic profile and prospects for successful completion of the curriculum. For more information on the qualifications of our admitted students see http://gatton.uky.edu/programs/phd/phd-economics.

Applications are submitted online through the Graduate School, and must include:
1. A resumé
2. A one-to-two page personal essay about why you want to attend graduate school in economics
3. Two or three confidential letters of recommendation
4. Unofficial copies of your GRE scores, transcript, and TOEFL score (if required).

Along with the other application materials, the information in these items will be considered by the Economics Department in its admission and financial aid decisions.

## Master of Science

The M.S. in Economics is designed to introduce students to graduate-level study in economics. The M.S. in Economics provides a strong foundation in microeconomics, macroeconomics, and econometrics, in addition to allowing students to pursue some electives in their fields of interest.

**Degree Requirements**
The recommended minimum prerequisite undergraduate preparation includes 6 hours of intermediate theory, 6 hours of statistics, and 6 hours of calculus. Requirements for the M.S. in Economics are:
1. A minimum of 30 hours of graduate credit courses.
    a. The student must satisfactorily complete the following courses:
        ECO 590 Introduction to Quantitative Economics
        ECO 601 Advanced Microeconomic Theory
        ECO 602 Macroeconomic Theory
        ECO 603 Research Methods and Procedures
        ECO 703 Introduction to Econometrics I
    b. The student must also satisfactorily complete either:
        ECO 701 Neoclassical Microeconomic Theory or
        ECO 702 Advanced Macroeconomic Theory
    and, one course in an elective area of the Ph.D. program.
    c. Courses taken outside of the Department of Economics must be approved by the Director of Graduate Studies to count toward the 30 hour requirement.
2. Successful completion of a final examination.
3. Minimum average of grade B (a GPA of 3.0) in all courses attempted for graduate credit after being admitted to Graduate School. Students obtaining six quality points below a B average will be dropped by the department.

# Doctor of Philosophy

The Ph.D. program is designed to enable the graduate to contribute to economic research and policy-making. The program is aimed at preparing students for careers in academia, government, and the private sector. To attain these objectives, the program is structured to provide the student with the appropriate knowledge, understanding, skills and abilities, including:

1. An understanding of economic theory;
2. Skill in the use of quantitative techniques, specifically mathematics and statistics;
3. An extensive exposure to the research, institutions, and issues in several fields;
4. Experience in the development of research projects throughout their entire program;
5. Research and writing skills that will lead to the publication of original research; and
6. Competence in communicating economic knowledge to broad and diverse audiences.

**Degree Requirements**

1. 1. Economic Theory. The student must demonstrate competence in economic theory as demonstrated by passing a departmental written examination in economic theory. This examination will be given twice a year, at the beginnings of the spring semester and the eight-week summer session. Students failing the examination will be given a second attempt; those failing on the second attempt will not be allowed to continue in the program. Minimum preparation for the written examination in economic theory can be achieved by taking the following core courses:

   ECO 601 Advanced Microeconomic Theory
   ECO 602 Macroeconomic Theory
   ECO 701 Neoclassical Microeconomic Theory
   ECO 702 Advanced Macroeconomic Theory

2. Statistics/Econometrics. The student must demonstrate competence in the area of statistics and econometrics. This competence may be demonstrated by satisfactory performance in the following courses:

   ECO 603 Research Methods and Procedures
   ECO 703 Introduction to Econometrics I
   ECO 706 Introduction to Econometrics II
   and ECO 707 (Seminar) or ECO 790 (Time Series Analysis)

3. Elective Areas. All Ph.D. students must choose two fields of study approved by the student's Advisory Committee. The two fields may be chosen from the following:

   Environmental/Health Economics
   Industrial Organization
   International Economics
   Labor Economics
   Macroeconomics
   Public Economics

Minimum course preparation for each field shall consist of at least two courses as determined by the student's Advisory Committee. In addition to the two chosen fields, the student is encouraged to take elective courses in other areas of economics, such as econometrics or economic theory, or in other disciplines such as Agricultural Economics, Finance, Marketing, Management, Mathematics, or Public Administration.

4. Supporting Work. At least nine hours of supporting course work must be selected. These courses must be approved by the student's Advisory Committee. This supporting work will allow the student to

pursue more intensive study of one or both of the two chosen fields, or to pursue courses in other fields of economics. The supporting work cannot consist of 400 or 500 level courses, ECO 610 or ECO 611, ECO 652, or any of the core courses in economic theory (ECO 601, ECO 602, ECO 701, ECO 702, ECO 704, ECO 705) or econometrics (ECO 603, ECO 703, ECO 706). Supporting work can also be courses from other disciplines including Agricultural Economics, Finance, Mathematics, Statistics, or Public Policy with the approval of the Director of Graduate Studies.

5. Grades. Minimum average of grade B in all courses attempted for graduate credit after being admitted to the Graduate School. Students obtaining six quality points below a B average will automatically be dropped by the department.

6. Qualifying Examinations.

    a. Written Examination: The written examination must be taken in one of the student's two elective fields as part of the requirements for candidacy for the Ph.D. degree. The choice of the field in which the student takes the exam should reflect the intended field in which the student is to write his or her dissertation. This examination is given twice a year, at the beginning of the spring semester and at the beginning of the eight-week summer session. Fields may elect to require a paper in addition to an exam; this will be communicated to the students at the beginning of the academic year. The written examination is prepared and graded by specialists in the respective fields. In the event that the student fails the examination, the student's Advisory Committee determines the conditions which must be met before another examination is given. The minimum time between examinations is four months. Two failures to pass the written examination constitute failure of the qualifying examination.

    b. Oral Examination: After passing the written qualifying examination, the Director of Graduate Studies will, on the advice of the Advisory Committee, schedule through the Graduate School an oral examination which will be administered by the Advisory Committee. The examination will ordinarily consist of the presentation and defense of a dissertation proposal.

7. The Ph.D. Dissertation. The dissertation will be based on original research on a significant topic. The dissertation will be defended in an oral examination

## Course Descriptions

ECO 601 ADVANCED MICROECONOMIC THEORY. (3)
An intensive course covering microeconomic theory and its various methodological and analytical techniques. Prereq: ECO 401 or consent of instructor.

ECO 602 MACROECONOMIC THEORY. (3)
An analysis of a market clearing, general equilibrium macroeconomic model. Emphasis on theoretical foundations of relevant behavioral functions and comparative statics. Not open to those with credit in ECO 761. Prereq: ECO 402 or consent of instructor.

ECO 603 RESEARCH METHODS AND PROCEDURES IN ECONOMICS. (3)
The basic procedures and methods of research in economics are considered from the standpoint of their applicability to problem solving and discovery of new scientific facts and generalizations in economics. Definition of the problem, statement of hypothesis, research design, data collection methods, and data analysis constitute the major topics. Attention is given to proper style and preparation of research reports in economics.

ECO 610 MANAGERIAL ECONOMICS. (3)
Analysis of applications of economic theory to management decision making. Such problems as demand

and cost determination, pricing, and capital budgeting are treated. Prereq: Graduate standing, MA 123 or its equivalent.

ECO 619 SKILL DEVELOPMENT FOR APPLIED ECONOMIC ANALYSIS. (3)
Calculus, matrix algebra, mathematical statistics to understand basic economic models and applications and the fundamentals of econometric analysis. The intent of this course is to provide and develop the tools the students will need to engage in applied economic analysis and that will be used in subsequent courses in the MS in Economics Program. Prereq: MA 114 or its equivalent or consent of the instructor.

ECO 621 APPLIED MICROECONOMICS. (3)
This course covers essential microeconomic models and issues for the advanced applied economist and is the foundational course for the microeconomics in the applied track of the MS in economics program. The focus is on topics and methods most frequently used and relied upon in applied business and policy problems. By doing so, the course will prepare students for subsequent coursework for the applied MS track. Additionally, it will strive for students to gain strong intuitive skills regarding how to approach applied economics problems andtheir related empirical applications. Prereq: ECO 401 or its equivalent or consent of the instructor.
ECO 622 MACROECONOMICS FOR APPLIED ECONOMISTS. (3)
An applied analysis of macroeconomic conditions useful to a professional business economist is presented. Emphasis is on blending mainstream economic models of the economy with data to interpret current conditions, prospects for future conditions, and monetary and fiscal policies that influence these conditions. Prereq: ECO 402 (Intermediate Macroeconomics) or an equivalent course.

ECO 623 ECONOMETRICS FOR APPLIED ECONOMICS. (3)
This course examines a variety of topics in applied econometrics. The course begins with a review of the classic linear regression model and ordinary least squares estimation. The primary focus of the class is to examine how estimation can be done when the classic model doesn't apply. Topics include endogenous regressors and instrumental variables, limited dependent variables models and maximum likelihood estimation, unobserved heterogeneity and panel data methods. Prereq: ECO 491 or equivalent or consent of instructor.

ECO 624 EMPIRICAL DATA MANAGEMENT. (3)
This course will cover the basic ways that economic data can be obtained. The course will cover obtaining data from data from the web, from APIs, and from colleagues in various formats including raw text files, binary files and databases. It will also cover the basics of data cleaning and how to make data operational. Organized data dramatically speeds downstream data analysis tasks. The course will also cover the components of a complete data set including raw data, processing instructions, codebooks, and processed data. The course will cover the basics needed for collecting, cleaning and sharing data. Particular points of emphasis will include reading and writing datasets, data cleaning, creating, changing and labeling variables and values, automating your work, combining and reshaping files, processing observations across subgroups, .do file programming, and programming using .ado files. Prereq: ECO 491 or its equivalent or consent of the instructor.

ECO 625 PREDICTIVE MODELS AND FORECASTING. (3)
This course provides students with an overview of modern techniques in the forecast of time series used in a variety of applications in the private and public sectors including revenue and sales forecasting. As an applied course the techniques will be motivated by specific practical problems and will be put to use in forecasting practices. The course covers auto-regressive and moving average models, distributed lag models, forecasting, Vector Auto-Regression, unit roots and testing, and auto-regressive conditional heteroskedasticity. Prereq: ECO 623 or its equivalent.

ECO 631 BUSINESS ECONOMICS. (3)
ECO 631 studies the economics of organizations and the economics of strategy. The first half of the course applies transactions costs and principal-agent theories to study the internal organization of the firm. Topics to be covered include the boundaries of the firm, corporate governance, choice of production process, and internal incentive systems. The second half of the course applies economic tools to the analysis of firm strategy. Topics to be covered include basic cost and demand conditions, economies of scale and scope, product differentiation, entry, exit and mobility conditions, price discrimination and commodity bundling, vertical control, and rivalry and strategy. Basic tools of game theory and asymmetric information are integral parts of this course. Prereq: ECO 621 or its equivalent or consent of the instructor.

ECO 652 PUBLIC POLICY ECONOMICS. (3)
Principles and practices of economical resource management in the governmental sector: tax and expenditure types, intergovernmental fiscal cooperation, debt financing, budgeting and financial planning. Prereq: ECO 201 or equivalent and MPA or MPP program status or
permission of department. (Same as PA 652.)

ECO 653 HEALTH ECONOMICS. (3)
This course applies general theoretical principles of economics to the health care sector. The basic approach is to recognize the importance of scarcity and incentives, allowing for differences peculiar to health. The demand and supply of health and medical care are examined as they involve physicians, nurses and hospitals. The competitiveness of their markets, health insurance and the role of government are explored. Special topics include regulation and planning, benefits-cost analysis, and reform health plans. Prereq: The economics prerequisite can be met in three ways: (a) an undergraduate principles course in microeconomics and HA/PA 652; (b) an undergraduate microeconomics principles course and a graduate course in managerial economics; or (c) an undergraduate microeconomics principles course and an intermediate microeconomics course. (Same as PA 636.)

ECO 654 BENEFIT-COST ANALYSIS. (3)
Principles, practices and applications of applied welfare analysis are the content of this course. The basic theory of benefit-cost analysis is presented and the relevance of implementation analysis in policy analysis is established. Prereq: PA 652. (Same as PA 680.)

ECO 672 WORLD TRADE AND COMMERCIAL POLICY. (3)
An analysis of trade patterns and the implication of government policy on trade, in the light of both economic theory and empirical findings. Prereq: Successful completion of an upper division undergraduate or graduate level economics course.

ECO 674 AGRICULTURE AND ECONOMIC DEVELOPMENT. (3)
Analytical consideration of the role of agriculture in economic development in relation to overall development strategy at various stages of growth. Theoretical and policy issues of particular relevance to the agricultural development in underdeveloped agrarian economies with various resource, social, political and economic systems. Prereq: ECO 473G or consent of instructor. (Same as AEC 626.)

ECO 679 ECONOMICS OF THE PUBLIC SECTOR. (3)
Topics and methods for students who wish to become policy practitioners as well for those who will deal with policy makers. Focus is on role of the federal, state, and local government in the economic with both the expenditure and revenue sides of the government budget examined. Substantial material from standard public finance courses including welfare measures and cost-benefit analysis, program evaluation, and tax analysis. Prereq: ECO 621 or equivalent or consent of the instructor.

ECO 692 ECONOMETRICS FOR POLICY ANALYSTS. (3)
Maximum likelihood estimation, ordinary least squares (OLS) regression, instrumental variables (IV) regression, heteroscedasticityconsistent regression, fixed and random effects models, probit, logit and tobit models, and identification and two-state least squares estimation of simultaneous equations models. Prereq: Any undergraduate statistics course. MPA, MPP or PUAD program status for priority registration, other students with permission of instructor. (Same as PA 692.)

ECO 697 FINAL PROJECT IN APPLIED ECONOMICS. (3)
The purpose of this course is to assist the student in developing and completing a research study applying the tools and institutional knowledge obtained in other courses in the Applied Economics courses to evaluate an important economic policy or concern in either the public or private sector. While much of the work in the course is done independently students will meet together to discuss their progress as well as meet with the instructor individually. Prereq: ECO 623 or its equivalent or consent of the instructor.

ECO 700 TEACHING METHODS IN BUSINESS. (1)
A three part course that examines what constitutes good teaching and explores effective techniques for college instruction. Seminars emphasize practical information for both the principal activities and the details of teaching. Departmental discussions allow students to discuss issues that arise in their teaching practice. Reviews of classroom performance provide professional feedback in order to enhance on-the-job learning. Seminar, two hours per week. Prereq: Approval of Director of Graduate Studies. (Same as BA 700.)

ECO 701 NEOCLASSICAL MICROECONOMIC THEORY. (3)
The Neoclassical theory of consumer behavior, production, market equilibrium and imperfect competition. Prereq: ECO 601 and ECO 590, or consent of instructor.

ECO 702 ADVANCED MACROECONOMIC THEORY. (3)
Analysis of general equilibrium macroeconomic models and factors responsible for deviations from general equilibrium. Emphasis on issues from recent professional literature. Prereq: ECO 602 or consent of instructor.

ECO 703 INTRODUCTION TO ECONOMETRICS I. (3)
The first course in the introduction to econometrics. A comprehensive survey of the general linear regression, autocorrelation, errors in variables and distributed lag models. Prereq: ECO 590 and either ECO 603 or STA 525, or consent of instructor.

ECO 704 GENERAL EQUILIBRIUM ANALYSIS AND WELFARE ECONOMICS. (3)
Existence, stability, efficiency and Pareto satisfactoriness of competitive equilibrium. Recent developments in general equilibrium and welfare theory. Prereq: ECO 701 or consent of instructor.

ECO 705 MACROECONOMIC DYNAMICS. (3)
Theoretical and empirical assessment of dynamic issues in macroeconomics. Topics include neoclassical and endogenous growth models and vector autoregressions. Prereq: ECO 702 or consent of instructor.

ECO 706 INTRODUCTION TO ECONOMETRICS II. (3)
The second course in the introduction to econometrics. A comprehensive survey of identification, estimation and hypothesis testing in the context of simultaneous equations model. Prereq: ECO 703 or consent of instructor.

ECO 707 RESEARCH SEMINAR IN ECONOMICS. (3)
This course will help students develop research skills by requiring them to work through an independent

project from start to finish. The student will review the literature and select a topic in an area of economics of interest. The student will then complete the project under the guidance of the instructor. Students will discuss their ongoing work in class with other students and in individual meetings with the instructor. The final output of the course will be a finished paper suitable for submission to a scholarly journal for publication. Prereq: Passing the Theory Exams or permission of the instructor.

ECO 721 ENVIRONMENTAL ECONOMICS, REGULATION AND POLICY. (3)
This course takes a balanced practitioner approach to the problems of the environment and environmental regulation. Efficiency aspects will be developed carefully, so as to provide a background for an extensive coverage of various available alternative policies. Prereq: PA 652 and MPA or economics program status or consent of instructor. (Same as PA 727.)

ECO 724 ENVIRONMENTAL ECONOMICS. (3)
This seminar in environmental economics deals with market failure, benefit-cost analysis, no market failure, valuations of environmental changes, and selected topics in environmental economics. Central to the course is valuing changes in health risks, risk perception, and
behavior related to health risk. Selected topics include international issues, environmental equity and markets for environmental quality. This course and ECO 725 Health Economics are the two courses that are the basis for the area in Environmental and Health Economics in the Ph.D. Program in Economics. Prereq: ECO 601 and ECO 703 or consent of instructor.

ECO 725 HEALTH ECONOMICS. (3)
This course rigorously examines the organization, financing, and management of the US health care system and programs, and emphasizes economic analysis contemporary health policy concerns. By the end of the semester, students should have the institutional knowledge and analytic tolls needed to contribute to current public policy debates about health and medical care. This course and ECO 724 Environmental Economics are the two courses that are the basis for the area in Environmental and Health Economics in the Ph.D. program in Economics. Prereq: ECO 601 and 703 or consent of instructor.

ECO 726 ENVIRONMENTAL AND NATURAL RESOURCE ECONOMICS. (3)
This course is a graduate-level survey of environmental and natural resource economics. Students will use mathematical models and econometric analysis to address topics including externalities and other market failures, environmental policies, management of renewable and nonrenewable resources, and non-market valuation. Prereq: ECO 701 and 703 (or equivalent courses), or consent of instructor. (Same as AEC 745.)

ECO 731 LABOR ECONOMICS I. (3)
The theory and estimation of the demand for and the supply of labor are introduced. Topics include demographic changes, minimum wages, retirement, and secular trends in labor force participation. The concept of human capital is examined, including applications to income distribution. Theory and evidence on the structure of wages in the U.S. is considered. Topics include compensating wages and race and gender differences. Prereq: ECO 601 or consent of instructor.

ECO 732 LABOR ECONOMICS II. (3)
Dynamic and cyclical labor demand are examined theoretically and empirically. Models of unemployment are considered, including search theory and the implicit contract model. Aspects of labor unionism are examined including changes in union membership, strikes, and union wages and employment. The incentive effects of compensation are discussed, including sorting models and the principal-agent problem. Prereq: ECO 601 or consent of instructor.

ECO 741 THEORY OF THE FIRM AND MARKET STRUCTURE. (3)

A study of firms and markets covering such topics as organizational structure and objectives of firms; product selection, advertising and quality; price discrimination; vertical control; entry, accommodation and exit; cost structure and market organization, market structure and performance; and public policy. Prereq: ECO 601 or consent of instructor.

ECO 742 INDUSTRIAL ORGANIZATION. (3)
A comprehensive survey of the literature in industrial organizations including static theories of oligopoly, dynamic theories of oligopoly, information about strategic behavior, research and development, patents, and adoption of new technology.

ECO 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

ECO 751 PUBLIC ECONOMICS. (3)
An advanced study of both how government activities influence allocation, relative prices and welfare and what is the proper role of the public sector in resource allocation. Relevant topics include: public goods, externalities, tax incidence, optimal taxation, benefit-cost analysis, public pricing, fiscal federalism, state-municipal finance and public choice. Prereq: ECO 601 or consent of instructor.

ECO 752 ADVANCED TOPICS IN PUBLIC FINANCE. (3)
Principles of taxation and expenditure; applications to federal, state, and local policy; fiscal federalism; international public finance. Prereq: PA 752, ECO 701 or permission of the instructor. (Same as PA 754.)

ECO 753 URBAN AND REGIONAL ECONOMICS. (3)
An intensive study of the theory, evidence and policy concerning urban areas and regions. Topics typically covered include: nature of regions and urban areas, size and distribution of cities, location decisions, housing, transportation, migration and regional growth. Prereq: ECO 601 or consent of instructor.

ECO 761 MACRO AND MONETARY ECONOMICS I. (3)
Advanced study of business cycle fluctuations. Theoretical and empirical investigations of the causes of business cycles; evaluating the effectiveness of monetary, fiscal, and other policies to affect inflation, unemployment, and short-run economic goals. Emphasis on current academic research. Prereq: ECO 701, ECO 702 or consent of instructor.

ECO 762 MACRO AND MONETARY ECONOMICS II. (3)
Advanced study of long-run macroeconomic issues. Theoretical and empirical examinations of the determinants of economic growth; analysis of government policies, country endowments, and institutional factors in determining growth rates and income levels. Emphasis on current academic research. Prereq: ECO 702 or consent of instructor.

ECO 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

ECO 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

ECO 769 RESIDENCE CREDIT FOR THE DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

ECO 771 INTERNATIONAL ECONOMICS: INTERNATIONAL MONEY AND FINANCE. (3)
International finance and open economy macroeconomics; the balance of payments; theory of exchange rate determination; macroeconomic policy issues in open economies. Prereq: ECO 602.

ECO 772 INTERNATIONAL ECONOMICS: TRADE THEORY AND POLICY. (3)
Theory and empirical analysis of the effects of trade and trade policy. Prereq: ECO 601.

ECO 773 OPEN ECONOMY MACROECONOMICS. (3)
Development of rigorous models to enhance knowledge of open economies. Topics include: impact on an economy of changes in trade, the current account balance, exchange rates, and international financial markets. Prereq: ECO 702.

ECO 790 TIME SERIES ANALYSIS. (3)
Time series and stochastic processes, auto-correlation functions and spectral properties of stationary processes; linear models for stationary processes, moving average, auto-regressive and mixed auto-regressive-moving average processes; linear nonstationary models, minimum mean square error forecasts and their properties; model identification, estimation and diagnostic checking. Prereq: STA 422G or its equivalent. (Same as STA 626.)

ECO 796 SEMINAR. (1-6)
An extended original investigation of some specific topic with a view to giving training in methods of research and studying intensively a particular subject in the field of economics. May be repeated to a maximum of six credits.

ECO 797 RESEARCH PROBLEMS IN ECONOMICS. (1-9)
Students confer individually with the instructor. May be repeated to a maximum of 15 credits. Prereq: Permission of the Director of Graduate Studies is required.

# Finance

## Gatton College of Business and Economics

The Master of Science in Finance (MSF) degree at the University of Kentucky offers students a program of advanced study in finance. The program supports the goal of preparing students for leading roles in an innovation-driven economy and global society by providing them with the specialized training needed in the finance industry, which is an information- and innovation-intensive industry of global scope. The program also supports the goal of increasing the intellectual, social, and economic capital of Kentucky and the world beyond its borders by growing the financial expertise available in the state. Such expertise is increasingly important at the local, state, national, and international levels as these economies become increasingly integrated. The MSF courses also prepare students to take CFA exams if students choose to do so. Specifically, the program's objectives are to:

- Help students develop communication and technology skills expected in the finance profession;
- Enhance the finance knowledge of students entering the finance profession;
- Enable students to develop both leadership skills and teamwork in researching finance issues;
- Enhance students' creative problem-solving skills and ability to think logically and analytically.

## Master of Science

**Admission Requirements**

The MSF program only has fall admission at the moment. Applicants to the program must have an undergraduate degree from an accredited college or university and complete the Graduate Management Admission Test (GMAT). Applicants will be evaluated for admission based on their undergraduate grade point averages (GPA), their GMAT score, and TOEFL score, if applicable. There are no required course prerequisites.

Minimum admission requirements are as follows:

- Minimum overall GPA of 2.75.
- Minimum GMAT score of 550.
- International students must have a minimum TOEFL IBT score of 79 or IELTS score of 6.5.

**Degree Requirements**

Students must complete at least thirty semester hours in courses carrying graduate credit. The MSF degree requirements are:

1. The required courses include: FIN 600, FIN 650, ECO 491G, ACC 621, FIN 691-1, FIN 623, FIN 630, FIN 645, FIN 691-2, and FIN 691-3.
2. A minimum average GPA of 3.0 in all courses attempted for graduate credit after being admitted to The Graduate School.

You can learn more about the MSF program here.

**Course Descriptions**

FIN 600 CORPORATE FINANCIAL POLICY. (3)

A study of financial management from the viewpoint of the corporate financial officer. Areas studied include capital budgeting, capital structure, financing decisions, working capital management, dividend policy, and mergers and acquisitions. Prereq: Graduate standing: ECO 610, ACC 628, MGT 650 or consent of department.

FIN 623 INTERNATIONAL FINANCIAL MANAGEMENT. (3)

This course provides an overview of financial management at the international level. Topics covered include: The nature and uses of international financial markets, the financial behavior of multinational corporations, exchange rates, and hedging in international business. Prereq: FIN 600 or consent of the department.

FIN 630 FINANCIAL MODELING AND ANALYSIS. (3)
This course provides students with the skills necessary to apply modern financial theories to real world applications in both corporate finance and investments. Students will get hands-on experience implementing models from areas such as capital budgeting, financial planning, and asset valuation.

FIN 637 HEALTH FINANCE. (3)
This course applies general principles of finance to the financial management of health care institutions. The major financial incentives which dictate how health care is delivered are studied and proposals to change these incentives are explored. Prereq: MHA/MPA program status and HA 601, HA 621, PA 623, HA 635, or consent of department.

FIN 645 CORPORATE INVESTMENT AND FINANCING POLICY. (3)
Emphasizing both theory and practice, this course is an in-depth study of long-term corporate investment and financing decisions. Topics include valuation, capital budgeting, cost of capital, leasing, dividend policy, capital structure, and mergers and acquisitions. Prereq: FIN 600 or consent of department.

FIN 650 INVESTMENTS. (3)
Analysis and valuation of securities and the effects on investment decisions. Prereq: Appropriate undergraduate courses in accounting and finance or consent of department.

FIN 664 REAL ESTATE FINANCE. (3)
A basic orientation in commonly used instruments, institutional structures, and real estate financing policies. Emphasis will be placed on mortgage instruments, mortgage types, effective cost of borrowing, construction lending, financial institutions, loan underwriting, and the secondary mortgage market. Analysis is primarily from the debt investor's perspective. Prereq: FIN 600 or consent of department.

FIN 680 MONEY, INTEREST AND CAPITAL. (3)
A study of the theory of money, interest and financial intermediation. In addition to the theory, the major financial markets, financial institutions and financial instruments will be examined. Finally, the governmental agencies which regulate the industry will be discussed as will the overlapping nature of the regulatory process. Prereq: Completion of the first year MBA core or consent of instructor.

FIN 685 INVESTMENTS PRACTICUM. (3)
The course gives students a working knowledge of, and experience applying, the basic principles of value-oriented equity investing. Students manage a real-money equity portfolio, making all buy/sell decisions. Prereq: Consent of department.

FIN 691 ADVANCED TOPICS IN FINANCE (Subtitle required). (1-3)
The study of selected topics in finance for graduate students. Special title required. May be repeated for a maximum of nine credits under different subtitles. Prereq: Consent of department.

FIN 695 INDIVIDUAL WORK IN FINANCE. (1-6)
Students confer individually with the instructor. Prereq: Consent of department.

FIN 700 SEMINAR IN FINANCIAL THEORY. (3)

Primary emphasis on the theory of financial asset valuation. Topics include utility theory, investor reaction to uncertainty, cost of capital theory, dividend theory, portfolio theory, and asset pricing in equilibrium.

FIN 701 SEMINAR IN FINANCIAL THEORY II. (3)
A continuation of FIN 700. Topics covered include state-preference theory, arbitrage pricing theory, agency theory, and the pricing of contingent claims.

FIN 740 SEMINAR IN THEORETICAL CORPORATE FINANCE. (3)
This is an introduction course in theoretical corporate finance for Ph.D. students. This course has the objective of introducing doctoral students to theoretical research in corporate finance. The emphasis will be on incomplete information models, though a few models driven by other considerations will also be studied. The first part of the course will examine the fundamentals of corporate finance theory (e.g., the theory of the firm's choice of its capital structure and dividend policy under alternative assumptions), as well as various tool areas in corporate finance (e.g., the notion of moral hazard and agency problems, adverse selection and signaling, various aspects of noncooperative games with and without incomplete information, and the equilibrium concepts in such games). The second part of the course will focus on a couple of important related topics which are the focus of recent research in corporate finance. Prereq: FIN 600 and 650, or equivalent or consent of department.

FIN 745 SEMINAR IN MANAGERIAL FINANCE. (3)
Primary emphasis on the implementation of financial theory for the management of the assets of a business firm. Topics include capital budgeting, working capital planning, financing the firm, cost of capital and the financial structure of the firm, and mergers and acquisitions. Prereq: FIN 700 or consent of department.

FIN 750 SEMINAR IN INVESTMENT THEORY. (3)
Primary emphasis on the implementation of financial theory for the evaluation and management of financial assets in an efficient capital market. Topics include mean-variance efficiency, development and testing of the capital asset pricing model, stochastic dominance, and option pricing theory as well as other topics in modern capital market theory. Prereq: FIN 700 or consent of department.

FIN 780 SEMINAR IN FINANCIAL INSTITUTIONS. (3)
An examination of the role of financial institutions in the financial system and in the economy, with special emphasis on commercial banks. Topics covered include: theories of financial intermediation, asset-liability management, regulation and deposit insurance, structure of the financial institutions industry, and empirical models of banking. Prereq: FIN 700 or consent of department.

FIN 791 SEMINAR IN FINANCE (Subtitle required). (1-3)
An intensive study of current theory and research in a topic in finance as discussed in scholarly journals. Examples of possible topics include: Capital structure, agency theory, market efficiency, contingent claims. May be repeated with a different subtitle for a maximum of 12 credits. Prereq: Consent of department.

FIN 795 INDEPENDENT WORK IN FINANCE. (1-12)
Designed for advanced students who undertake research problems to be conducted in regular consultation with the instructor. May be repeated to a total of 12 credit hours. Prereq: Consent of department.

# Supply Chain Management

## Gatton College of Business & Economics

The Gatton College of Business and Economics offers a Master of Science degree with a Non-thesis Plan B option in Supply Chain Management.

## Application Requirements

1. Current curriculum vita
2. GRE or GMAT scores
    - GRE/GMAT waiver is offered to the following applicants:
        - Applicants who earned a bachelor's degree from the University of Kentucky with an undergraduate GPA of 3.3 or above.
        - Applicants who are already in possession of a terminal degree such as a JD, Ph.D., MD, PharmD, or equivalent
        - Applicants who are presently enrolled in a terminal degree program such as a JD, Ph.D., MD, PharmD, with good academic standing
        - Applicants with extensive relevant professional experience, especially those in leadership positions
3. One letter of recommendation (up to two will be accepted)
4. Application Deadlines
    - Fall: July 23

## Degree Requirements

### FULL-TIME STUDENTS

**Fall**

- MKT 630: Supply Chain Fundamentals & Strategies
- MKT 631: Production & Operations Management
- MKT 632: Supply Chain Modeling & Analysis
- MKT 633: Applied Data Analytics

**Spring**

- MKT 634: Quality Management & Lean Operations
- MKT 635: Logistics Management
- MKT 636: Sourcing, Purchasing & Contract Management
- MKT 637: Negotiation in Supply Chain

**One elective course. Choose from the following:**

- MFS 613: Sustainability, Ethics & Leadership in Manufacturing Organization (Fall/Spring)
- SCE 614: Sustainable Systems and Supply Chain (new course in progress at UK's College of Engineering
- MFS 606: Global Issues in Manufacturing (Fall)
- MKT 430: Service Marketing Management (Fall/Spring)
- MGT 610: Global Management (Fall/Spring)
- MGT 697: Leadership, Communications & Ethics (Summer)
- CPH 600: Health Services and Systems Organizations (Summer)
- PA 602: Strategic Planning and Organizational Change in the Public and Nonprofit Sectors (Fall)
- HMT 588: Strategic Management in the Hospitality & Food Service Industry (Spring)

**Capstone Course**

- MKT 740: Industry Project (10 weeks in summer)

## PART-TIME STUDENTS

**Fall, 1st year**

- MKT 630: Supply Chain Fundamentals & Strategies;
- MKT 633: Applied Data Analytics

**Spring, 1st year**

- MKT 634: Quality Management & Lean Operations;
- MKT 637: Negotiation in Supply Chain

**Fall, 2nd year**

- MKT 631: Production & Operations Management;
- MKT 632: Supply Chain Modeling & Analysis;

**Spring, 2nd year**

- MKT 635: Logistics Management;
- MKT 636: Sourcing, Purchasing & Contract Management;

**Summer, second year**

- MKT 740: Industry Project

**One elective course. Choose from the following:**

- MFS 613: Sustainability, Ethics & Leadership in Manufacturing Organization (Fall/Spring)
- SCE 614: Sustainable Systems and Supply Chain (new course being proposed at CoE)
- MFS 606: Global Issues in Manufacturing (Fall)

- MKT 430: Service Marketing Management (Fall/Spring)
- MGT 610: Global Management (Fall/Spring)
- MGT 697: Leadership, Communications & Ethics (Summer)
- CPH 600: Health Services and Systems Organizations (Summer)
- PA 602: Strategic Planning and Organizational Change in the Public and Nonprofit Sectors (Fall)
- HMT 588: Strategic Management in the Hospitality & Food Service Industry (Spring)

## Course Descriptions

**CPH 600 HEALTH SERVICES AND SYSTEMS ORGANIZATION. (3)** An introduction to the health care delivery system in the United States, including its composition, functioning, the interrelationships of organizations and professional groups within the system in various settings, health care terminology, and major problems and issues in the delivery of health services. Prereq: College of Public Health graduate program enrollment or permission of instructor.

**HMT 588 STRATEGIC MANAGEMENT IN THE HOSPITALITY AND FOOD SERVICE INDUSTRY. (3)** A course requiring students to use integrative skills to evaluate theories and applications regarding decision making, strategic planning and management concepts specific to hospitality and food service organizations. Prereq: Graduate student status or HMT 120, HMT 210, HMT 270, HMT 308, MGT 301 and MKT 300.

**MFS 606 GLOBAL ISSUES IN MANUFACTURING. (3)** The need to increase quality, productivity, efficiency and sustainability in manufacturing operations spanning the product, process and systems (manufacturing systems as well as supply chain) domains is essential for companies to be successful. The increased globalization of markets and manufacturing operations, declining natural resources and negative consequences of some manufacturing practices as well as increased legislation in many regions has led to many new challenges that companies must overcome to be successful in competitive markets. This seminar course will introduce students to a variety of global issues in manufacturing through presentations by leading national and international experts in these domains. The seminars will cover a broad range of manufacturing related topics relevant to many disciplines including manufacturing, mechanical and electrical engineering. The course can also help graduate students identify topical issues that need further investigation and could become potential research topics. (Same as EE/ME 606.)

**MFS 613 SUSTAINABILITY, ETHICS, AND LEADERSHIP IN MANUFACTURING ORGANIZATIONS. (3)** This course is intended to provide future manufacturing managers and leaders a basic understanding of important theories and practices necessary to successfully manage and lead teams to achieve manufacturing organizational objectives. The course is organized into several modules. The first module will focus on developing an understanding and capability to approach ethical and sustainability concerns confronted by manufacturing organizations. This will include coverage of tools to help identify and address societal and environmental obligations of manufacturing organizations and issues

confronting them that span multiple cultures and nations. Because people are one of the most important resources in any organization, the second and third modules will address organizational behavior (OB) and individual effectiveness. OB theories and practices that can be used to increase the capability to observe, understand and manage people's behavior will be covered. The last module considers safety and ergonomics as they relate to manufacturing organizations. Coverage will include tools and techniques that can be used to analyze the manufacturing workplaces and ensure its ergonomic design as well as an overview of the current state of occupational safety and health regulations. Prereq: Graduate standing.

**MGT 610 GLOBAL MANAGEMENT. (3)** This course examines the problems of managing a business enterprise which spans international boundaries. Students will develop an understanding of the political, social, economic, and technological factors driving globalization and will consider the impact of these forces on competition, markets, industry structure, and organization.

**MGT 697 LEADERSHIP, COMMUNICATIONS AND ETHICS. (3)** Political, historical, and philosophical perspectives on the meaning and processes of top management leadership. Applications of leadership perspective to the development of organizational culture, ethics and values, stakeholder relations, business-government relations, and competitiveness.

**MKT 430 SERVICES MARKETING MANAGEMENT. (3)** This course addresses marketing and management issues and problems faced by service organizations. Marketing and management concepts are broadened and applied to the service organizations. Topics related to service quality, the marketing mix, and service delivery are covered. Prereq: MKT 300, MGT 301. (Same as MGT 430.)

**MKT 630 SUPPLY CHAIN FUNDAMENTALS AND STRATEGY. (3)** Supply chain management concerns the integration of key business processes that enable the fulfillment of end-customers' real needs. Central to supply chain management philosophy is integration – the socio-technical linkages that facilitate the efficient flows of information, ideas, knowledge, goods, services, and cash through the supply chain. This course will introduce students to the terminology, concepts, and skills related to supply chain management, with a focus on strategic, relational, and operations issues. Through this course, students will develop an understanding of important supply chain terminology, processes, systems, and improvement methodologies that enable effective management and strategy deployment. Prereq: Only students enrolled in either the MS Supply Chain Management or the MS Supply Chain Engineering program are eligible to take this course. (Same as SCE 630.)

**MKT 631 PRODUCTION AND OPERATIONS MANAGEMENT. (3)** This course will introduce students to concepts, tools, and techniques necessary for planning and control of production and other operations of an organization. Organizational processes from sourcing and inventory management to production planning and scheduling as well as quality control will be covered. Students will learn how to model and analyze operations, and to evaluate impact of various strategies on the processes and on products/service quality, productivity, efficiency, and cost effectiveness, especially when there are uncertainties. Prereq: STA 381, MA 320 or similar (with instructor permission). (Same as SCE 631.)

**MKT 632 SUPPLY CHAIN MODELING & ANALYSIS. (3)** This course teaches students how to make business decisions based on the data and quantitative models. It introduces students to the optimization methods used in business – primarily linear and integer programming. The concepts are studied mainly in the context of applications to the operations and supply chain management field. Examples from other business disciplines such as finance and human resource management are included too. In this course, students learn to model the business problems on Excel spreadsheets, analyze and solve the models, and then interpret the solutions obtained to make recommendations to managers. Prereq: Only students enrolled in either the MS Supply Chain Management or the MS Supply Chain Engineering program are eligible to take this course.

**MKT 633 APPLIED DATA ANALYTICS. (3)** In today's business settings, knowledge workers increasingly rely on data-driven decision-making strategies. This course provides the necessary data analytics background for subsequent coursework dealing with topics such as quality control, inventory management, sourcing, and logistics management. It introduces students to the Normal distribution, Decision Tree Analysis, Demand Forecasting, and Interactive Data Visualization, all of which rely on data as the grist to help generate useful managerial information and insights. Prereq: Only students enrolled in either the MS Supply Chain Management or the MS Supply Chain Engineering program are eligible to take this course.

**MKT 634 QUALITY MANAGEMENT & LEAN OPERATIONS. (3)** This course focuses on the principles, and practices of total quality management (TQM) and lean operations. Topics that are covered include: process focus; continuous improvement; service quality; customer satisfaction; process control and capability; Six-Sigma methodology and tools; economics of quality; and organizational learning. Prereq: Only students enrolled in either the MS Supply Chain Management or the MS Supply Chain Engineering program are eligible to take this course.

**MKT 635 LOGISTICS MANAGEMENT. (3)** This course focuses on the physical distribution, movement, and delivery of goods and services throughout the supply chain so that the right amount of materials and/or products arrive at the right place at the right time. It requires the co-ordination, organization, and management of an organization's distribution network to perform such function as facility location, transportation, storage, material handling, packaging, inventory control, order fulfillment, and reverse logistics. Prereq: Only students enrolled in either the MS Supply Chain Management or the MS Supply Chain Engineering program are eligible to take this course. (Same as SCE 635.)

**MKT 636 SOURCING, PURCHASING & CONTRACT MANAGEMENT. (3)** This is an advanced course that aims to educate students about strategic considerations and complex decision-making processes in sourcing, purchasing and contract management. The course broadens and enhances students' knowledge and skills to manage related issues through a mixture of lectures and case analyses and discussions. Students will learn how to systematically and effectively approach complicated supply chain management problems on strategic sourcing, supplier selection, and contract design by integrating and applying the knowledge, analytics skills, and ways of thinking that they acquired in prior SCM coursework. Prereq: Student must complete MKT 630 and MKT 631.

**MKT 637 NEGOTIATION IN THE SUPPLY CHAIN. (3)** This course focuses on developing your negotiating skills and making you a more confident negotiator. By the conclusion of this course, you will have improved your ability to diagnose negotiation situations, strategize and plan upcoming negotiations, and engage in more fruitful negotiations, even in situations where you are dealing with difficult negotiation partners. Prereq: Only students enrolled in the MS Supply Chain Management program are eligible to take this course.

**MKT 740 INDUSTRY PROJECT. (3)** This is a team-based industry project course where collaborative teams of Supply Chain Engineering and Supply Chain Management students are paired with a company or organization. Each company or organization provides the team with a supply chain related problem of importance. Student teams are co-advised by Engineering and Business faculty who have direct contact with the company. The faculty co-advisers will mentor and guide each team to work together collaboratively to propose solutions for a real-world supply chain problem with an industry partner. Prereq: Only students enrolled in the MS Supply Chain Management are eligible to take this course. Student must complete all eight core courses and maintain a good standing.

**PA 602 STRATEGIC PLANNING AND ORGANIZATIONAL CHANGE IN THE PUBLIC AND NONPROFIT SECTORS. (3)** This course focuses on the potential for change and future directions for public and nonprofit organizations. It covers the basics of strategic planning for organizations providing public value and operating in a political context. It addresses such topics as environmental assessments, stakeholder analysis, identification of strategic issues, strategy formulation and implementation, performance measurement and evaluation, and key features of organizational change processes. Prereq: PA 621 and PA 651, Admission to Martin School Program or consent of instructor.

**SCE 614 SUSTAINABLE PRODUCTION SYSTEMS AND SUPPLY CHAINS. (3)** This course aims to provide students with an understanding of the sustainability opportunities and challenges facing manufacturing systems and supply chains. Students will be introduced to the 6R-based approach to sustainable manufacturing and the importance of product-process-system (manufacturing system, and supply chain) integration for improving sustainability performance. Students will also learn tools and techniques that can be used to model, measure and evaluate manufacturing systems and supply chains to improve economic and environmental performance while meeting the needs of consumers, employees, and other stakeholders will be covered.

# THE MARTIN SCHOOL OF PUBLIC POLICY AND ADMINISTRATION

# Public Finance Management

## Martin School of Public Policy & Administration

The Master of Public Financial Management (MPFM) program offers a professional degree that prepares students for careers as professionals in public and non-profit sectors. The program is offered 100% online and is designed for students with interests in public financial management, public sector accounting and auditing and other unique aspects of public finance. Students enter the program with diverse academic backgrounds and career goals. Applicants are strongly encouraged to have had either an undergraduate course or work experience in accounting prior to admission.

Full details about the program are available at http://martin.uky.edu/

**Admission Requirements**
The University of Kentucky uses the Hobson's ApplyYourself system. All documents must be submitted on-line: http://gradschool.uky.edu/welcome-university-kentucky. Be prepared to download:

1. A one to three page personal statement explaining why you wish to pursue an MPFM degree.
2. A resume or CV
3. An official transcript from each post-secondary institution that you have attended.
4. As an online program, admission includes IN-STATE tuition independent of your state of residency.
5. Other administrative fees as applicable.

You will enter your GRE or GMAT scores in the Graduate School application but will also need to submit official scores from ETS. International students will also need English Language test scores.

Deadlines for the program are the same as the Graduate School admission deadlines. The final selection of students for admission will be subject to the discretion of the admissions committee of the program. Competitive admission is based on a consideration of the documents listed above.

**Degree requirements**
Courses are offered in 8-week and 4-week (summer session only) blocks. Students enroll in one course at time and may complete the 36-credit program in two years. The following section outlines the courses included in the MPFM. Note that the first 4 courses listed comprise of a Graduate Certificate Program that may be taken independently of the full MPFM. The GRE/GMAT is not required for the Graduate Certificate Program.

All students must take the 3-hour capstone class and successfully complete and defend a capstone project developed in that class. The purpose of the course and the project is to integrate the learning experience of the MPP program and apply knowledge and skills acquired in the program to a policy issue. The presentation of the Capstone project serves as the final Masters exam.

## Graduate Courses

| | | |
|---|---|---|
| PA 631 | Public Financial Management: Budgeting/Debt Management | (3) |
| PA 632 | Investments/Cash Management | (3) |
| PA 625 | Governmental Accounting and Financial Condition Analysis | (3) |
| PA 627 | Governmental Auditing | (3) |
| PA 626 | Applications in Governmental Accounting and Audit | (3) |
| PA 683 | Tax Policy | (3) |

| | | |
|---|---|---|
| PA 633 | Municipal Securities | (3) |
| PA 694 | Public Pensions and Insurance | (3) |
| PA 695 | Data and Revenue Forecasting in the Public Sector | (3) |
| PA 696 | Legal Issues in Public Financial Management | (3) |
| PA 697 | Special Topics in Public Financial Management | (3) |
| PA 681 | Capstone | (3) |

# Public Policy & Administration

## Martin School of Public Policy & Administration

The Martin School of Public Policy and Administration, a research, academic and service unit of the Graduate School, offers the Ph.D. in Public Policy and Administration, the Master in Public Administration (MPA), the Master in Public Policy (MPP) degrees and the online Master of Public Financial Management. The Ph.D. in Public Policy and Administration is designed to prepare students for positions with academic institutions or policy think tanks. The MPA is a 40-credit hour program designed for those seeking careers in the public, non-profit, and private sectors. The MPP is a 37-hour program designed to prepare individuals for careers as professional policy analysts in government and non-profit organizations. The MPFM is a 36 credit-hour degree preparing students to work in the finance departments of government and nonprofit organizations. The interdisciplinary members of the faculty have primary or joint appointments in the Martin School and in one of the academic departments of the College of Business and Economics, the College of Arts and Sciences, the College of Pharmacy, the College of Education, or the College of Agriculture, Food and environment.

## Doctor of Philosophy

The curriculum of the Ph.D. program provides knowledge of the principles of organizational behavior, an understanding of the public policy process and policy issues, and an ability to analyze policy and administrative problems through research and analytical methods.

**Admission Requirements**

The University of Kentucky uses the Hobson's ApplyYourself system. All documents must be submitted on-line: http://gradschool.uky.edu/welcome-university-kentucky. Be prepared to upload:

1. A one to three page statement explaining why you wish to pursue a Ph.D. degree.
2. A resume or CV
3. An official or unofficial transcript from each post-secondary institution that you have attended.
4. The e-mail addresses of at least three individuals who have agreed to write a recommendation letter on your behalf. Ideally, at least two letters are from academic references.
5. A writing sample, while optional, is encouraged.
6. You will enter your GRE or GMAT scores in the Graduate School application but will also need to submit official scores from ETS.

Entering students are expected to have at least a 3.0 grade point average in undergraduate work (on a 4.0 scale), and a 3.5 in all graduate level work. The Martin School does not have "cut-off" scores when it comes to the GRE (or other accepted admissions exam) and considers all aspects of students' records, including evidence of improving performance during students' academic careers. The final selection of students for admission will be subject to the discretion of the director of Graduate Studies based on the advice of the admissions committee of the Ph.D. program. Competitive admission is based on a consideration of the documents listed above.

Pre-Requisites and Exemptions; Many incoming students will hold a master's degree in public administration or public policy. Other students with master's degrees in such areas as political science, economics, agricultural economics or business administration will be evaluated with respect to their background in public administration. All students are expected to have taken four University of Kentucky courses: PA 652 (Public Policy Economics), PA 631 (Public Financial Management), PA 642

(Public Organizational Theory and Behavior), and PA 651 (The Policy Process), or their equivalents from a NASPAA accredited program or their equivalents. Students who have not fulfilled these class requirements will do so before taking the relevant Ph.D. core classes. All students are also expected to have a strong background in research methodology and will need to take calculus before beginning the Ph.D. classes.

**Degree Requirements**
Students are required to take 42 hours of graduate course work beyond the master's degree or its equivalent. The program of study includes 15 credit hours of core courses, 15 credit hours in the area of concentration, 3 credit hours of theory related to and supporting the student's area of concentration, and 9 credit hours of research methodology courses. In addition to course work, students complete two examinations and a dissertation. The dissertation involves research on a public management or public policy issue.

Core Courses
PA 731 Fiscal and Budgetary Policy (3)
PA 742 Theory of Public Organizations (3)
PA 750 Introduction to Economics of Public Policy (3)
PA 751 Public Policy Formulation (3)
PA 752 The Economics of Policy Analysis (3)

**Financial Aid**
Financial Support is available to qualified students through fellowships, assistantships and research grants. All students will be considered for aid. No separate form is required. Applications received by February 1st have the maximum chance of receiving support.

## Master of Public Administration

The MPA program offers a professional degree that prepares students for careers of leadership in public service as analysts and managers in the public, not-for-profit, and private sectors. Students enter the program with diverse academic backgrounds.

Admission Requirements
The University of Kentucky uses the Hobson's ApplyYourself system. All documents must be submitted online: http://gradschool.uky.edu/welcome-university-kentucky. Be prepared to download:

1. A one to three page statement explaining why you wish to pursue an MPA degree.
2. A resume or CV
3. An official or unofficial transcript from each post-secondary institution that you have attended.
4. The e-mail addresses of at least three individuals who have agreed to write a recommendation letter on your behalf. Ideally, at least two letters are from academic references.
5. GRE or GMAT scores. They can be unofficial for admission purposes, but official scores must be submitted upon enrollment. International students will also need English Language test scores.

Questions may be addressed to:
The Martin School of Public Policy and Administration
Student Affairs Office
martinschool@uky.edu
859-257-5594

Deadlines for the program are the same as the Graduate School admission deadlines. Applications completed by February 1st will have priority for financial aid. Generally, courses are offered in the late

afternoon and evening to accommodate working students. The Martin School MPA program is accredited by the National Association of Schools of Public Administration (NASPAA).

Two dual degree programs are offered: a dual JD/MPA program and a dual Pharm.D./MPA degree. For more information about those programs, see Graduate Admission.

**Degree Requirements**

Completion of a minimum of 37 semester hours of graduate work is required:

1. An Administrative Core of 25 semester hours covering the areas of public policy formulation and analysis, public policy economics, organization and management, budgeting, finance, and analytical methods.

    PA 602 Strategic Planning in the Public and Nonprofit Sectors (3)
    PA 621 Quantitative Methods of Research (3)
    PA 622 Public Program Evaluation (3)
    PA 623 Decision Analysis (3)
    PA 631 Public Financial Management (3)
    PA 632 Public Funds Management (3)
    PA 642 Public Organization Theory and Behavior (3)
    PA 651 The Policy Process
    PA 652 Public Policy Economics (3)
    PA 691 Ethics in Public Administration (1)

2. An area of concentration of 6 semester hours in a stated area of specialization (public financial management, policy analysis, local economic development; non-profit management, environmental management, education policy, health policy, gerontology, international public policy, or transportation systems management) or in an individually designed concentration.
3. Capstone Course and Capstone Project PA 681 Capstone in Public Administration (3). All students must take the 3-hour capstone class and successfully complete and defend a capstone project developed in that class. The purpose of the course and the project is to integrate the learning experience of the MPA program and apply knowledge and skills acquired in the program to a policy issue or management problem. Oral presentation of the project before a faculty committee serves as the final masters' exam
4. Internship: PA 711 Internship in Public Administration (3). An administrative internship at an appropriate agency for 400 hours. Students with a significant professional experience may substitute an independent study policy paper or an additional graduate course.

## Master of Public Policy

The MPP program offers a professional degree that prepares students for careers as professional policy analysts in government and non-profit organizations. Students enter the program with diverse academic backgrounds, but should have taken statistics, calculus, and intermediate microeconomics.

Admission Requirements

The University of Kentucky uses the Hobson's ApplyYourself system. All documents must be submitted on-line: http://gradschool.uky.edu/welcome-university-kentucky. Be prepared to download:

1. A one to three page statement explaining why you wish to pursue an MPP degree.
2. A resume or CV
3. An official or unofficial transcript from each post-secondary institution that you have attended.
4. The e-mail addresses of at least three individuals who have agreed to write a recommendation letter on your behalf. Ideally, at least two letters are from academic references.
5. GRE or GMAT scores. They can be unofficial for admission purposes, but official scores must be submitted upon enrollment. International students will also need English Language test scores.

Deadlines for the program are the same as the Graduate School admission deadlines. Applications completed by February 1st will have priority for financial aid. The final selection of students for admission will be subject to the discretion of the admissions committee of the MPP program. Competitive admission is based on a consideration of the documents listed above.

**Course Requirements**

1. Administrative Core of 3 semester hours covering the areas of statistics, public policy formulation and analysis, public policy economics, organization and management, budgeting, finance, and analytical methods:

   PA 622 Public Program Evaluation (3)
   PA 624 Government Information Systems (3)
   PA 631 Public Financial Management (3)
   PA 642 Public Organization, Theory and Behavior (3)
   PA 651 The Policy Process (3)
   PA 652 Public Policy Economics (3)
   PA 690 Public Policy Analysis Overview (3)
   PA 692 Econometrics (3)
   PA 795 Mathematics for Policy Analysis (1)

2. Area of Specialization (6 Semester Hours). 6 semester hours in a functional area such as Health, Transportation, Education, Environmental Financial, Social Welfare, International Policy or another approved area.
3. Capstone Course and Capstone Project (3 Semester Hours). All students must take the 3-hour capstone class and successfully complete and defend a capstone project developed in that class. The purpose of the course and the project is to integrate the learning experience of the MPP program and apply knowledge and skills acquired in the program to a policy issue. The presentation of the Capstone project serves as the final Masters exam.
4. Internship: PA 711 Internship in Public Administration (3). An administrative internship at an appropriate agency for 400 hours. Students with significant professional experience may substitute an independent study policy paper or an additional graduate course.

**Course Descriptions**

PA 602 STRATEGIC PLANNING AND ORGANIZATIONAL CHANGE IN THE PUBLIC AND NONPROFIT SECTORS. (3)
This course focuses on the potential for change and future directions for public and nonprofit organizations. It covers the basics of strategic planning for organizations providing public value and operating in a political context. It addresses such topics as environmental assessments, stakeholder analysis, identification of strategic issues, strategy formulation and implementation, performance measurement and evaluation, and key features of organizational change processes. Prereq: PA 621 and PA 651.

PA 621 QUANTITATIVE METHODS OF RESEARCH. (3)
A survey of behavioral science research methods for the public administrator. Emphasis is placed upon problem selection and identification, research design, and data analytic techniques. Lecture, two hours; laboratory, one hour per week. Prereq: MPA or MHA program status.

PA 622 PUBLIC PROGRAM EVALUATION. (3)
This course is designed to provide students with the conceptual and analytical tools to evaluate the effectiveness of public programs and policies. The focus will be on program monitoring and evaluation.

Of particular concern will be program process and outcome measurement; quasi-experimental design; multiple regression analysis; and analysis of variance models. Prereq: PA 621.

PA 623 DECISION ANALYSIS AND DECISION SUPPORT SYSTEMS. (3)
An introduction to organizational decision making under conditions of certainty, uncertainty, risk and multiple objectives. Concepts of analysis from the areas of economics, mathematics, probability, and statistics will be utilized in terms of administrative decision making in public administration. Course work includes use of various management information systems with a focus on how such systems can be used to support and inform decision making. Lecture, two hours; laboratory, one hour per week. Prereq: PA/HA 621, PUAD or HLAD program status or consent of instructor.

PA 624 GOVERNMENT INFORMATION SYSTEMS. (3)
Provides an overview of information strategies and management approaches to government functions and public policy programs. It illustrates and analyzes the interaction between information technology and information systems with management and policy decisions in the public and non-nonprofit sectors by using large data. Prereq: MPA or MPP program status.

PA 625 GOVERNMENTAL ACCOUNTING AND FINANCIAL CONDITION ANALYSIS. (3)
The course will examine the characteristics of governmental and nonprofit accounting emphasizing the various fund types and account groups, review and evaluation of presently recommended accounting and financial reporting procedures (GAAP) and an exploration of practical governmental and nonprofit accounting practices and methods. The course will introduce students to public financial accounting concepts and how to apply governmental (fund) and not-for-profit accounting theory to accounting and reporting for state and local governments and other non-profit institutions.

PA 626 APPLICATIONS IN GOVERNMENTAL ACCOUNTING AND AUDIT. (3)
Students will gain hands-on experience with case studies designed to simulate real-world scenarios and common problems in today's public sector. This course goes beyond the theory and will demonstrate how to navigate the key issues that arise in governmental and not-forprofit accounting and auditing, expanding on concepts developed in PA 671. Prereq: PA 625.

PA 627 GOVERNMENTAL AUDIT. (3)
This course focuses on components of the governmental audit process unique to the public sector. Students will gain an understanding of the Government Auditing Standards (GAGAS), types of audits, the role of audit objectives and audit evidence, the fundamentals of interviewing, the preparation of audit working papers, as well as how to interpret audit findings and elements based on qualitative and quantitative evidence and communicate those findings to non-financial audiences.

PA 631 PUBLIC FINANCIAL MANAGEMENT. (3)
An analysis of budget structure and process; revenue structure and administration; and public capital acquisition and debt management. This course emphasizes an applied focus and comparative analysis of alternative budget, revenue, and debt management structures and strategies. Prereq: PUAD or PUAM program status or consent of instructor.

PA 632 PUBLIC FUNDS MANAGEMENT. (3)
A study of the management of public funds including the accumulation, management and investment of such funds and the accounting for those transactions. It will also include topics such as fund accounting, cash forecasting, cash management practices and public funds investment strategies.

PA 633 MUNICIPAL SECURITIES. (3)

An analysis of the theoretical and operational issues associated with the municipal securities industry. Prereq: PA 632 or the equivalent and Ph.D. or M.P.A. program status or consent of instructor.

PA 636 HEALTH ECONOMICS. (3)
This course applies general theoretical principles of economics to the health care sector. The basic approach is to recognize the importance of scarcity and incentives, allowing for differences peculiar to health. The demand and supply of health and medical care are examined as they involve physicians, nurses and hospitals. The competitiveness of their markets, health insurance and the role of government are explored. Special topics include regulation and planning, benefit-cost analysis, and reform health plans. Prereq: The economics prerequisite can be met in three ways: (a) an undergraduate principles course in microeconomics and HA/PA 652; (b) an undergraduate microeconomics principles course and a graduate course in managerial economics; or (c) an undergraduate microeconomics principles course and an intermediate microeconomics course. (Same as ECO 653.)

PA 642 PUBLIC AND NONPROFIT ORGANIZATION THEORY AND BEHAVIOR. (3)
A course which examines the interaction of both external and internal resources and constraints upon the administrative decision processes in a number of public organizational settings. The objective is an understanding of the practice of administration in public organizations. Prereq: MPA/MHA program status.

PA 651 THE POLICY PROCESS. (3)
Broad-based course in public policy formulation and social planning. Emphasis is on the parameters of policy formulation as well as the social planning and impact variables. Both policy processes and relevant content areas will be stressed. Prereq: MPA program status.

PA 652 PUBLIC POLICY ECONOMICS. (3)
Principles and practices of economical resource management in the governmental sector: tax and expenditure types, intergovernmental fiscal cooperation, debt financing, budgeting and financial planning. Prereq: ECO 201 or equivalent and MPA or MPP program status or permission of department. (Same as ECO 652.)

PA 653 LOCAL ECONOMIC DEVELOPMENT. (3)
The course develops the capacity to employ the theories, practices and philosophies of economic development as applied to local areas. The primary geographic focus of the course is the rural south-east of the United States, but examples will be drawn from rural areas in other developed countries. Prereq: Graduate status in agricultural economics, public administration, economics, or consent of instructor. (Same as AEC 653.)

PA 660 PUBLIC POLICY OF THE NONPROFIT SECTOR. (3)
This course offers an overview of practical, legal, ethical, and theoretical issues faced by the nonprofit sector and organizations that exist today and over time.

PA 661 FINANCIAL MANAGEMENT OF NONPROFIT ORGANIZATION. (3)
This course explores the techniques and principles of financial management including budgeting, finance, and investment decision making for non-profit orgs.

PA 662 NON-PROFIT MANAGEMENT. (3)
A graduate level management course focusing on the most significant tenets of management, including those that differentiate a non-profit organization from others. Theory and practice will be included.

Students will select a non-profit organization to explore and evaluate specific management functions. Prereq: MPA program status or permission of the instructor.

PA 665 PUBLIC POLICY AND POLITICAL ECONOMY IN AN INTERNATIONAL CONTEXT. (3)
The goal of this course is to introduce students to policy analysis and political economy issues in an international setting. This will involve the study of particular aspects of economic policy in individual countries and regions, as well as the development of fundamental principles of economics and political economy which can be used to analyze the impacts of alternative policies and the processes by which policies are made. Prereq: PA 652 or equivalent or consent of the instructor.

PA 667 POLICYMAKING IN AN INTERNATIONAL CONTEXT:
POLITICAL AND ORGANIZATIONAL DIMENSIONS. (3)
This class provides students with an understanding of the political systems of and the implementation of policy in nations around the world. We begin by comparing the political systems and the bureaucracies of the U.S. and Canada, which will serve as the backdrop for learning relevant concepts from modern political science and public administration. Having mastered these concepts, we will then use them to examine Mexico, Brazil, the People's Republic of China, India, Japan, Nigeria, Russia, the United Kingdom, Germany, and finally, the European Union as an entity. In all cases, our country studies will focus on who decides on policies and how, and then on how policies are implemented. In selected class sections, the instructor will provide practical information on working in, and with professionals from the countries featured in this class. Prereq: PA 652 or their equivalents or permission of the instructor.

PA 673 HEALTH POLICY. (3)
An analysis of the development and implementation of health policy on a national, state, local and organizational level. The course will focus on issue and policy analysis, formal and informal processes of policy development and the issues, values, and political and community factors affecting policy development and program implementation. Prereq: HA 636, MHA program status or consent of instructor. (Same as CPH 785.)

PA 675 EDUCATION: ECONOMICS AND POLICY. (3)
This course will provide an overview of current policy issues in education. The course will cover basic education policy issues with a particular emphasis on the economics and policy analytic perspectives. Many of the issues will be examined both conceptually and empirically and will expose the student to policy evaluation tools and techniques. We will examine questions such as why schooling is provided publicly in the U.S., look at ways to evaluate the current quality of schooling, and think about reform alternatives. Prereq: PA 621 and PA 652 or their equivalents or permission of the instructor.

PA 680 BENEFIT-COST ANALYSIS. (3)
Principles, practices and applications of applied welfare analysis are the content of this course. The basic theory of benefit-cost analysis is presented and the relevance of implementation analysis in policy analysis is established. Prereq: PA 652. (Same as ECO 654.)

*PA 681 CAPSTONE IN PUBLIC ADMINISTRATION. (3)
This course provides an opportunity for students to integrate the Master of Public Financial Management curriculum in an analysis of an applied management or policy problem. It is expected that students will produce papers applying different elements of the curriculum in an analysis of their internship or professional experiences. Prereq: MPA, MPP or PFM program status and completion of 33 credit hours.
*PA 683 TAX POLICY. (3)
Tax policy is analyzed from an economic perspective: efficiency and distributional effects of taxation, especially in state, local and international contexts. Prereq: PA 652 or equivalent; PUAD, PUAM, PUPO or

PFM program status or permission of instructor.

PA 684 ENVIRONMENTAL POLICY. (3)
This course examines environmental policymaking, primarily in the context of the United States. Consideration will be given to how environmental policy is adopted and implemented in a federal system. In addition, environmental regulations will be evaluated and policy alternatives will be analyzed. This course will take you through the important players in the environmental policy process, the significant factors related to policy development, adoption and implementation and a series of current environmental issues.

PA 690 PUBLIC POLICY ANALYSIS OVERVIEW. (3)
Economic and political foundations of policy analysis are considered in a survey fashion, followed by specific techniques used in the practice of policy analysis. Prereq: Graduate standing and MPA program status.

PA 691 ETHICS AND PUBLIC POLICY. (1)
This course provides an introduction to ethical theory, explores the ethical dimensions of practice in the public sector, and examines ethics in connection with policy development. Prereq: Graduate standing and MPA program status.

PA 692 ECONOMETRICS FOR POLICY ANALYSTS. (3)
Maximum likelihood estimation, ordinary least squares (OLS) regression, instrumental variables (IV) regression, heteroscedasticityconsistent regression, fixed and random effects models, probit, logit and tobit models, and identification and two-state least squares estimation of simultaneous equations models. Prereq: Any undergraduate statistics course. MPA, MPP or PUAD program status for priority registration, other students with permission of instructor. (Same as ECO 692.)

PA 694 PUBLIC PENSIONS AND INSURANCE. (3)
This course provides participants with an in-depth understanding of the conceptual and practical issues involved in the design and implementation of public pensions and insurance programs. The course draws on US state and local data, analysis and trends. It is designed to introduce public financial managers and other stakeholders to approaches for analyzing and administering pension and insurance systems along with institutional reform options. This course comprises interrelated and complementary topics: 1) the framework for public pension plans and employee insurance benefits; 2) pension and insurance plan concepts, identities, and design options; 3) diagnostic techniques, benchmarks and assessment tools to assure compliance and efficiencies; 4) pension and insurance administration, governance and investment management; 5) regulation and supervision; and 6) pension and insurance reform and financial impacts on public entities.

PA 695 DATA AND REVENUE FORECASTING. (3)
This course exposes public sector financial managers, budget officials and other stakeholders to the latest developments in fiscal analysis and revenue forecasting. This course introduces students to the tools to formulate tax budgeting plans. Through the use of lectures, case studies, presentations, etc. students will learn the statistical techniques, forecasting methods and revenue estimation models.

PA 696 LEGAL ISSUES IN PUBLIC FINANCIAL MANAGEMENT. (3)
Public finance law refers to legislation and regulations relating to the financial activities of government or public sector organizations. This topical course is designed to provide the public financial manager insight into the ever-changing legal responsibilities of government activities touching on financing strategies, public/private partnerships as well as employment financial issues and financial data security.

PA 697 SPECIAL TOPICS IN PUBLIC FINANCIAL MANAGEMENT. (3)
The course offers a detailed investigation of contemporary topics in fields of public financial management using cases, articles and guest lectures. Students will be able to draw meaningful conclusions about the efficiency and effectiveness of federal, state and local financial management systems. Topics will include budget reform, changing accounting requirements, internal audit reform, and other issues impacting the ever-changing world of public financial management.

PA 711 INTERNSHIP IN PUBLIC ADMINISTRATION. (3)
Practical field experience in an administrative setting under the direction of an academic and a workplace supervisor. Prereq: MPA program status or consent of instructor.

PA 722 POLICY AND PROGRAM EVALUATION. (3)
This is a doctoral course concerning policy and program evaluation. Major emphasis will be given to specifying the relationship between evaluation and management functions, evaluation concepts and processes and research methods applicable to evaluation systems and processes. Prereq: MKT 762 or PS 671, or equivalent and Ph.D. program status or consent of instructor.

PA 727 ENVIRONMENTAL ECONOMICS, REGULATION AND POLICY. (3)
This course takes a balanced practitioner approach to the problems of the environment and environmental regulation. Efficiency aspects will be developed carefully, so as to provide a background for an extensive coverage of various available alternative policies. Prereq: PA 652 and MPA or economics program status or consent of instructor. (Same as ECO 721.)

PA 731 FISCAL AND BUDGETARY POLICY. (3)
This course examines public budgeting and finance in the public sector. Included is an analysis of economic, managerial, and political approaches to public budgeting and finance. These approaches are then used to analyze several current topics in public finance. Prereq: PA 631 or equivalent, and Ph.D. program status or consent of instructor.

PA 742 THEORY OF PUBLIC ORGANIZATIONS. (3)
This course provides doctoral students an in-depth knowledge of the various aspects of public organization theory. It will attempt to integrate the work on public organizations which is currently spread over the fields of organization theory and behavior, executive and bureaucratic politics and public choice economics. Prereq: PA 642 or equivalent, and Ph.D. program status or consent of instructor.

PA 750 INTRODUCTION TO ECONOMICS FOR PUBLIC POLICY. (3)
Introduction to microeconomic theory and mathematical methods for policy analysis. Prereq: PUAD Master's or Ph.D. program status or permission of the instructor.

PA 751 PUBLIC POLICY FORMULATION AND IMPLEMENTATION. (3)
The major goals of this course are to examine how public issues become policy proposals, how various proposals are filtered into (or out of) the political process, shaped by political institutions and rules, and the process by which policy is implemented. Prereq: PA 651, or equivalent and Ph.D. program status or consent of instructor.

PA 752 THE ECONOMICS OF POLICY ANALYSIS. (3)
This course examines economic approaches to policy analysis. Included is an analysis of the major concepts of economic analysis and their application to a number of policy problems. Prereq: PA 652 and PA

750 or equivalent and Ph.D. program status or consent of the instructor.

PA 754 ADVANCED TOPICS IN PUBLIC FINANCE. (3)
Principles of taxation and expenditure; applications to federal, state, and local policy; fiscal federalism; international public finance. Prereq: PA 752, ECO 701 or permission of the instructor. (Same as ECO 752.)

PA 767 DISSERTATION RESIDENCY CREDIT. (2)
Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.

PA 795 SPECIAL TOPICS IN PUBLIC ADMINISTRATION. (1-3)
Analysis of specialized topics in public administration of particular interest to practitioners. May be repeated to a maximum of six credits. Prereq: MPA program status or consent of instructor.

PA 796 INDEPENDENT STUDY IN PUBLIC ADMINISTRATION. (1-3)
Tutorial course of directed readings, discussion, and analysis of special topics on public administration. May be repeated to a maximum of six credits. Prereq: MPA program status and consent of instructor.

# THE PATTERSON SCHOOL OF DIPLOMACY AND INTERNATIONAL COMMERCE

# Diplomacy & International Commerce

## Patterson School of Diplomacy & International Commerce

The Patterson School of Diplomacy and International Commerce offers a Masters of Arts program designed to prepare students academically, professionally, and personally for careers in international affairs. Formal academic coursework is combined with experiential learning via a rich variety of co–curricular activities. The Patterson School M.A. is excellent preparation for service with government agencies such as the U.S. Departments of State, Treasury, or Commerce, and in the intelligence community, careers in international organizations or non-governmental organizations or in the private sector. The Patterson School faculty is a mix of academics and former foreign-affairs practitioners whom spent decades in government service prior to starting their teaching careers. Students come to the Patterson School with diverse undergraduate degrees but most are well-prepared in political science, economics and foreign languages.

Our flexible program totals 30 credit hours and can be completed in just three semesters. Each student enrolls in core curriculum courses and seminars taught by regular Patterson School faculty in one of four concentrations: diplomacy, development/international organizations, security/intelligence, and international commerce. Beyond this core, students can work with their academic advisors to craft interdisciplinary courses of study tailored to their unique desires that draw widely upon other University of Kentucky graduate departments. Patterson School students have developed individual degree plans that include classes in agricultural economics, anthropology, finance, marketing, management, foreign languages, history, political science, communications, sociology, law, geography, public health, and more. Additionally, students can pursue certificate programs in Global Health or International Education. This flexibility in curriculum is pivotal to the Patterson School concept.

All students begin the program as a group in the fall semester. Even though three semesters are required to complete the required the coursework, some students elect to remain a fourth semester in order to obtain more breadth and/or depth in their desired fields of professional preparation, or additional language training. Entering students are expected to have a strong background in at least one foreign language but many students undertake further language study during the program (although this study does not earn credit for the M.A. degree). Students are strongly encouraged to complete a career-related internship in the United States or abroad, typically during the summer between their second and third semesters.

All students must successfully pass written and oral comprehensive examinations before being awarded their master's degree. These exams require students to draw upon the full measure of academic and professional activities they have experienced in the program, testing their universal foreign affairs knowledge as well as their unique specialized skills. During their last semester, most students join informal study groups to prepare for this critical final step. Each student has only two chances to pass the comprehensive examinations. Students are also required to maintain a 3.0 grade point average to graduate.

Patterson School students are able to take advantage of a variety of joint degree opportunities to combine the study of international affairs with other disciplines, such as law or business. Students must meet the admission requirements of the separate programs independently and commit upfront to pursue both degrees. The Patterson School currently maintains concurrent degree programs in Law, Business, Economics, and Modern Languages. While many Patterson School graduates have later obtained doctoral degrees, this M.A. program is specifically designed to prepare students for non-academic careers in international affairs. Students who contemplate working immediately on a Ph.D. are generally advised to pursue that goal elsewhere.

**Financial Assistance**
A number of non-service Patterson School fellowships are available from the bequest of James K. Patterson, the first President of the University. Additional merit fellowships are provided to Patterson School students by the Vince Davis Memorial Fund and other sources.

**Admission Requirments**
Admission to the Patterson School is highly selective. The deadline for applications is February 1st. The online application process begins at the Patterson School website http://www.uky.edu/PattersonSchool/. Each applicant is required to submit GRE scores, college transcripts, a resume, a brief statement explaining his/her interest in the Patterson School program in terms of career goals, and two to four letters of reference. International students are also required to take the Test of English as a Foreign Language or the International English Language Testing System.

## Dual Degree Program

**J.D./M.A. in Diplomacy**
The University of Kentucky Law School joins the Patterson School in offering a dual degree program in law and diplomacy that permits students to acquire both degrees in four years time. Professionals trained in both law and international affairs are well positioned to seek positions in the private, public and non-profit spheres. Interested students must apply separately to each program, noting their desire to pursue the dual degree. For further information, contact the Director of Graduate Studies in the Patterson School of Diplomacy and International Commerce and the College of Law.

**M.B.A./M.A. in Diplomacy**
The Patterson School of Diplomacy and International Commerce and the College of Business and Economics offer the opportunity to obtain the Master of Business Administration (M.B.A.) and the MA in Diplomacy degrees in a dual degree program that requires less time than would be required to achieve both degrees separately. The dual program of studies is designed to train students for international business careers or careers in government service that emphasize international business relations. Interested students must apply separately to each program, noting their desire to pursue the dual degreent.

**M.S. in Economics/M.A. in Diplomacy**
The Department of Economics of the Gatton College of Business and Economics combines with the Patterson School of Diplomacy to offer a dual degree program in economics and diplomacy that allows students to obtain both degrees in less time than would be required to achieve both degrees separately. The dual program of studies is designed to train students to become international economic analysts serving in government or international research institutions, or economic specialists headed for government departments (Treasury, State, U.S. Trade Representative) or intergovernmental organizations. Interested students must apply separately to each program, noting their desire to pursue the dual degree.

**M.A. in a Modern Language/M.A. in Diplomacy**
The Department of Modern and Classical Languages, Literatures, and Cultures in cooperation with the Patterson School of Diplomacy and International Commerce offers a dual degree program that allows students to obtain both degrees in less time than would be required to achieve both degrees separately. Interested students must apply separately to each program, noting their desire to pursue the dual degree.

# Course Descriptions

DIP 600 SPECIAL TOPICS. (1-3)
This course will vary in content depending on special needs or faculty availability.

DIP 700 DYNAMICS OF DIPLOMACY. (3)
This course explores the historical evolution of diplomacy, then focuses on post WWII diplomatic practice and especially the dynamics of diplomacy since the end of the Cold War. Emphasis will be placed on diplomacy's role in the international system, new tasks for diplomacy, and enhancing diplomatic skills in a new paradigm. Prereq: Permission of instructor.

DIP 712 WEAK STATES AND INTERNATIONAL SECURITY. (3)
This course reviews how the policy community has measured the weak state, revealing discrepancies in the quantifiable parameters, definitions, and categorizations, and analyze the efforts taken to address state weakness, particularly foreign economic and security assistance. It will review the five theoretical approaches to the weak state in the literature, which are informed by the international community's concerns with state weakness: development, intervention, post-colonialism, globalization and terrorism. The theory will be applied to specific cases of weak states in several regions (e.g., Africa, Asia, the Balkans, Latin America, the Middle East, and the Former Soviet States) and analyzes the threats they pose to international security.

DIP 715 DEMOCRACY AND INTERNATIONAL AFFAIRS. (3)
Discussion of the impact of the global spread of democracy on foreign policy and war. Prereq: Graduate status and consent of instructor. (Same as PS 735.)

DIP 716 INTERNATIONAL TRADE POLICY AND PRACTICE. (3)
This course is designed to prepare students to function comfortably in either the trade policy formulation (public trade policy producers) or commercial environment (policy consumers). Although the course is organized in two discrete sections, throughout the course, the implications of policy on commercial practice and the reverse will be stressed.

DIP 720 ECONOMIC STATECRAFT. (3)
This seminar course will explore how economic values and choices shape economic options, and the techniques used to pursue them in the diplomatic arena. Trade and fiscal techniques, financial policies, and sanctions will be explored in relationship to the interplay between economic and political/international relations theory, and the relevance of economic statecraft to achieving both economic and noneconomic goals.

DIP 725 GEOPOLITICAL MODELING. (3)
Course uses large user friendly computer model of world's political/economic systems to explore topics such as globalization, development, energy security, and political instability from a theoretical and quantitative viewpoint. Prereq: STA 570 or permission of instructor.

DIP 726 INTRODUCTION TO INTELLIGENCE. (3)
This course will introduce the student to the role of intelligence in U.S. national security policy-making.

DIP 727 ANALYTICAL METHODS FOR INTELLIGENCE ANALYSIS. (3)
This course will introduce the student to the role of intelligence analysis in U.S. national security policy-making. It will be discussed and put to practical use the various analytical methods and techniques that are used by analysts within the Intelligence Community.

DIP 730 CROSS-CULTURAL NEGOTIATION AND BARGAINING. (3)
A multidisciplinary graduate course using contemporary studies of negotiation and bargaining from the individual to the international level. Uses both public (Diplomatic) and private (Commercial) examples, including case studies and practice negotiations. Group and national differences are explored as well as the content and environment of negotiations. Prereq: Any one graduate course plus consent of instructor.

DIP 734 AFRICA'S DEVELOPMENT CHALLENGES. (3)
Examination of challenges facing sub-saharan African countries in developing economic and politically sustainable societies.

DIP 735 ENERGY SECURITY. (3)
This course uses the tools of economic analysis and economic statecraft to examine energy security. It will look at the connection between energy and the economy in both the U.S. and other states and the connections between energy and military security and power. It will include a detailed review of the U.S. energy economy, the international energy market, the economies of the major Middle Eastern states, and the Russian economy. At the end of the course each student will understand the history of energy security, be aware of the data sources for current policy analysis, be able to use the relevant tools of economic analysis including econometrics, and be familiar with the energy security policy debate both in the United States and in key foreign countries. Prereq: DIP 740 or ECO 672 or at least two semesters of undergraduate economic theory with grades of B or better. DIP 720 and DIP 750 recommended.

DIP 740 GLOBALIZATION. (3)
This course examines the phenomenon of globalization by applying core theories of the international political economy. Subjects to be covered include economic and political definitions of globalization, the technological, economic, and political causes of globalization, and the effects of globalization on national politics and wealth. By the end of the course, students should be able to apply the basic international political economy analysis to both trade and financial issues, giving them the necessary skills to prepare convincing policy analyses, political advocacy programs, and business plans. Lecture/Discussion hours per week. Prereq: Graduate status, a modest undergraduate or graduate background in Foreign Affairs or permission of the instructor.

DIP 742 NATIONAL SECURITY POLICY. (3)
This course provides a foundation in the major debates on national security policy.

DIP 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

DIP 750 DEFENSE STATECRAFT. (3)
Students will gain familiarity with the key military policy issues that confront government officials, and they will learn to evaluate the claims of journalists and advocacy organizations that confront informed American opinion on a day-to-day basis. Prereq: Graduate status.

DIP 755 POLITICS AND DIPLOMACY OF THE MIDDLE EAST. (3)
Analyzes the interplay between politics and diplomacy in the Middle East. Prereq: Permission of instructor.

DIP 756 DIPLOMACY OF NUCLEAR WEAPONS. (3)
This course explores diplomatic issues with developing and maintaining, securing, restricting and eliminating nuclear weapons.

DIP 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

DIP 777 RESEARCH PROBLEMS IN INTERNATIONAL RELATIONS. (3)
This seminar focuses on research strategies that can be utilized in dealing with problems in international relations. May be repeated once with consent of instructor. Prereq: PS 674 or consent of instructor.

DIP 780 INTERNATIONAL SCIENCE AND TECHNOLOGY POLICY. (3)
A multidisciplinary graduate course that investigates policy questions and the policy process surrounding developments in international sciences and technology. This course will focus on the intersection of scientific research, technological applications and change, and business and governmental activities in these areas that impact upon international relations. Prereq: Consent of instructor.

DIP 795 SPECIAL PROBLEMS IN DIPLOMACY AND INTERNATIONAL COMMERCE. (3)
Specially designed independent study course taken under the supervision of various instructors. May be repeated to a maximum of six credits. Prereq: Permission of instructor.