

# Forest & Natural Resource Sciences

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## 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.