

Forestry

COLLEGE OF AGRICULTURAL SCIENCES

coas.siu.edu/academics/departments/forestry

Graduate Faculty:

Akamani, Kofi, Assistant Professor, Ph.D., University of Idaho, 2011.

Burde, John H. II, Professor, *Emeritus*, Ph.D., University of Arizona, 1974; 1974.

Carver, Andrew, Professor, Ph.D., Purdue University, 1998; 1998.

Chilman, Kenneth C., Associate Professor, *Emeritus*, Ph.D., University of Michigan, 1972; 1973.

Groninger, John W., Professor, Ph.D., Virginia Polytechnic Institute and State University, 1995; 1997.

Holzmeuller, Eric J., Associate Professor, Ph.D., University of Florida, Gainesville, 2006; 2007.

Mangun, Jean C., Associate Professor, *Emeritus*, Ph.D., Purdue University, 1991; 1996.

Nielsen, Clayton K., Professor, Ph.D., Southern Illinois University Carbondale, 2001; 2009.

Park, Logan., Assistant Professor, Ph.D., Virginia Polytechnic Institute and State University, 2009; 2010.

Phelps, John E., Professor, *Emeritus*, Ph.D., University of Missouri, 1980; 1990.

Roth, Paul L., Professor, *Emeritus*, Ph.D., Kansas State University, 1968; 1967.

Ruffner, Charles M., Professor, Ph.D., Pennsylvania State University, 1999. 1999.

Schoonover, Jon E., Associate Professor, Ph.D., Auburn University, 2005; 2006.

Williard, Karl W. J., Professor, Ph.D., Pennsylvania State University, 1999; 1999.

Zaczek, James J., Professor and *Chair*, Ph.D., Pennsylvania State University, 1994; 1997.

The Department of Forestry offers advanced courses for the Master of Science degree with a major in forestry. In addition, curricula are available which permit graduate students with an interest in forestry to pursue their interest in Doctor of Philosophy degree programs in other departments, including Agricultural Sciences.

Admission

In addition to requirements set forth by the Graduate School, the Department of Forestry requires the following:

1. A minimum grade point average of 2.7 is required for admission (A = 4.0). A grade point average of 2.7 or higher is required for stipend eligibility when available.
2. The student is required to provide proof of proficiency in technical writing. Normally an expository essay is required to evaluate whether the student should have remedial grammar or writing courses.
3. Three letters of recommendation from former professors, employers, or other responsible individuals are required.
4. Each applicant must complete the statement of interest form. This form indicates the student's area of interest in forestry and the faculty member with whom the student

desires to study. All correspondence should be directed to the chair of the Department of Forestry.

5. This program requires a nonrefundable \$65 application fee that must be submitted with the application for Admissions to Graduate Study in Forestry. Applicants must pay this fee by credit card.

Retention and Completion Requirements

Upon the graduate student's arrival on campus, an advisory committee of three-five members of the graduate faculty will be formed to guide the student's work. The same committee will be responsible for preparation and administration of thesis exams and also for the review and evaluation of the thesis. The advisory committee chair and at least one other member of the committee shall be members of the Department of Forestry. The other members may be selected from any academic unit including forestry.

Summary of Events.

1. The deadlines for receipt of applications and official transcripts in the office of the Graduate School are: (a) the second Saturday in July for admission to the fall semester (b) the last Saturday in November for admission to the spring semester (c) the last Saturday in March for admission to the summer term.
2. Letters of recommendation should reach the Department of Forestry chair by the same dates as above.
3. Acceptance by department and Graduate School should be announced one month or earlier than the desired matriculation date. A thorough review will be made by a screening committee of Department of Forestry graduate faculty and the departmental adviser. Students rejected for admission will also be notified.
4. Registration for first semester's work after student's acceptance by the department.
5. Appointment of advisory committee chair, written plan for course work, and selection of tentative thesis areas all within first two months of residence.
6. Preparation of formal written thesis outline and preparation of research proposal by the eighth week of the second semester.
7. Completion of final, typed or reproduced review copies of thesis and submission of advisory committee at least three weeks in advance of oral defense of thesis.
8. Oral exam to be followed by completion of required approval forms. If thesis requires modifications, this should be accomplished immediately to reach the graduate dean's office in due time set by the Graduate School. One bound copy of the thesis will be provided for the department, one for the chair of the advisory committee in addition to the electronic copy required for the Graduate School and a copy for the author. Additional copies may be required for projects sponsored by outside agencies.

Master of Science Programs

The Department of Forestry offers Master of Science students the opportunity to tailor their program to address their interests and career aspirations. Individual programs of study

and research are developed by students in consultations with their faculty advisor to ensure timeliness and feasibility. Concentrations include: forest resource management, ecological restoration, fire science, recreation ecology, human dimensions of natural resource management, wildlife habitat management, watershed management, hydrology, and soil science. Interdisciplinary research is encouraged. Prospective students should review the description of departmental graduate courses described later in this document. Also, please visit the Department's website for a current description of faculty interests and expertise.

Assistantships and Fellowships. Research assistantships are sponsored each year by the McIntire-Stennis Cooperative Forest Research Act and through several externally funded research projects. Teaching assistantships funded by the College of Agricultural Sciences are also available.

In addition to general awards made through the Graduate School, stipends for research studies are available from the U.S.D.A. Forest Service, the U.S. Department of Interior, other federal and state agencies, and private corporations.

Requirements

Since the normal minimum requirement for graduation is 32 semester hours, the completion of degree work for students holding assistantships should be accomplished within four semesters (including summer) which is also the normal maximum span for financial aid.

The student must attain a grade of B or better for all courses specifically required in the student's academic program and which are offered by the Department of Forestry.

To gain teaching experience, graduate students are expected to assist in the classroom or laboratory for at least one academic semester (20 hours per week) during their tenure with the Department of Forestry. The remaining semesters will also involve either research or teaching at the rate of 20 hours a week.

Staff

In addition to the faculty listed in the Graduate School Catalog, several adjunct professors also hold appointments with the Department of Forestry. These professors are assigned to various natural resource agencies and can serve on graduate guidance committees.

Research Facilities Land. SIU is well endowed with a number of different forest types and agricultural land which are available to the Department of Forestry for teaching and research purposes. In particular, we are conducting or planning research and demonstration programs on forest plots and experimental fields of the 3000 acres of the University and its experimental farms. We also have access to wooded lands of the 600 acres of the Touch of Nature Environmental Center, 400 acres at the Pine Hills Field Research Station, and other forests.

Through various memoranda of understanding and special use permits we have use of forested lands and plots on the 43,000 acres of the Crab Orchard Wildlife Refuge, the 270,000 acres of the Shawnee National Forest, and the 4000 acres of the Trail of Tears State Forest, all of which are within an hour's drive of Carbondale. A number of research projects are also ongoing on private lands in southern Illinois. Graduate research has also been conducted throughout the country through agreements

with the U.S. Forest Service Experiment Stations and the U.S. Department of Interior, as well as internationally.

Physical Facilities. A variety of laboratories are housed within the department, including those specializing in historical ecology and fire, GIS, human dimensions, and water quality. A research greenhouse operated at the Tree Improvement Center on the western side of the campus is in operation for research and graduate teaching. Greenhouses and growth chamber facilities in the agriculture greenhouses in conjunction with the Department of Plant, Soil, and Agricultural Systems are also available.

Courses (FOR)

Courses in this department may require the purchase of supplemental materials. Field trips are required for certain courses.

FOR 401-3 Fundamentals of Environmental Education. (Same as AGRI 401 and REC 401) A survey course designed to help education majors develop an understanding of environmental education principles and teaching both inside and outside the classroom. Prerequisite: ten hours of biological science or ten hours of recreation and/or education, or consent of instructor. Requires field trip transportation fee not to exceed \$25 per course registration.

FOR 402-3 Wildland Hydrology. Fundamentals of hydrology as related to forest and wildland water resources will be emphasized. Considerations will include the hydrologic cycle with emphasis on soil and groundwater regimes, evapotranspiration, surface and subsurface runoff, and the quantity and timing of water yield. Offered spring semester even years.

FOR 403-3 Agroforestry. This course examines the deliberate integration of forestry and related land management practices within agricultural landscapes, primarily addressing wildlife habitat, water quality, crop yield, and animal production enhancement and sustainability. Emphasis is placed on systems successfully implemented in North America, particularly the Midwest, but international examples will also be discussed. Prerequisite: FOR 201 or coursework in forest ecology or consent of instructor.

FOR 405-3 Forest Management for Wildlife. This course is designed to familiarize students with a scientific understanding of the theory and practice of forest management for wildlife. Students will gain knowledge of basic forestry management principles as they apply to wildlife; ecology and management of different types of forests for wildlife; and habitat requirements of forest birds, mammals, and herps and applicable forest management techniques. Restricted to Forestry, Zoology, Bio Science, Animal Science, or Environmental Science majors/minors; sophomore or higher, or with consent of instructor.

FOR 409-3 International Forest Resources Decision-Making. Examines management planning decision-making for multiple-use forests around the world. Reviews concepts useful for analyzing flow-resource problems, emphasizing systems approaches, introduces use of modern quantitative and qualitative methods to evaluate resource use alternatives. Case studies from around the world. Prerequisite: FOR 411.

FOR 411-3 Forest Resources Economics. Application of micro- and macro-economic principles to forest timber and non-

timber production; capital theory, benefit-cost analysis; and economics of conservation. Prerequisite or Co-requisite: ECON 240 or ABE 204.

FOR 412-2 Tree Improvement. Basic theories and techniques of obtaining genetically superior trees for forest regeneration. Restricted to senior standing.

FOR 414-3 Information Management. The collection of physical, biological, and social variables in the field of forestry through sampling survey. The procedures of data manipulation and calculation and the presentation of graphs and tables.

FOR 415-3 Urban Ecosystem Management. An introduction to fundamental concepts and processes associated with urban environments. Emphasis is on physical, chemical, and biological stresses imposed on landscapes and water resources influenced by land use conversion and subsequent urban sprawl. Restricted to junior standing or consent of instructor. Requires field trip transportation fee not to exceed \$30 per course registration.

FOR 416-4 Forest Resource Management. The application of business procedures and technical forestry principles to manage forest properties. Emphasis on integrated resource management for tangible and intangible benefits. Prerequisite: FOR 351, completion of Forest Resource summer camp series or consent of instructor. Requires field trip transportation fee and supplemental expenditures not to exceed \$40 per course registration.

FOR 417-2 Forest Land-Use Planning. Principles of location theory as a basis for determining land use; supply of forest land; population pressure and demand; conservation principles; determination of forest land values; institutional factors influencing forest land-use; forest taxation; special taxes, and capital gains. Taught in alternate years. Prerequisite: FOR 411 or consent of instructor.

FOR 418-2 Marketing of Forest Products. The role of marketing in the forest industries; review of economic principles; product policy, planning the product line, pricing, marketing channels, marketing programs, marketing organization, and marketing research as influences on the marketing of lumber, wood products, pulp, and paper. Taught in alternate years. Prerequisite: FOR 411 or consent of instructor.

FOR 420-3 Park and Wildlands Management. The management of state and federal parks and recreation areas. A systems approach toward management and decision-making will be emphasized. Requires field trip transportation fees and supplemental expenditures not to exceed \$50 per course registration.

FOR 421-3 Recreation Land-Use Planning. Principles and methods for land-use planning of park and recreation environments with emphasis on human dimensions of natural resource research. Focus on planning process and types of information to gather and organize. Application in group field projects. Prerequisite: FOR 220, 420, or consent of instructor. Requires field trip transportation fee not to exceed \$25 per course registration.

FOR 422C-6 Park and Wildlands Management Camp. A study of park conditions, visitors, and management practices at selected county, state, and federal park systems in the U.S., including the federal wilderness preservation system. Prerequisite: FOR 220 or consent of instructor. Requires field trip and supplemental expenditures not to exceed \$550

per course registration. Summer camp fees and costs are outlined in the Forestry major - Forest Recreation and Park Management Specialization.

FOR 423-3 Environmental Interpretation. (Same as AGRI 423 and REC 423) Principles and techniques of natural and cultural interpretation. Two hours lecture, three hours laboratory. Prerequisite: ten hours biological science or ten hours of recreation. Requires field trip transportation fee not to exceed \$40 per course registration.

FOR 428-2 Urban Forestry. An introduction to principles and practices useful in the management of trees and forests in populated settings. Emphasis is placed on the development of comprehensive management strategies consistent with the biological, physical, economic and social constraints of the urban environment. Restricted to junior or senior standing or permission of the instructor.

FOR 429-2 Watershed Management Field Laboratory. A field intensive laboratory course focused on hydrological and biological methods used to manage watersheds and assess watershed health. Laboratory topics include stream gauging, soil water and ground water sampling, channel morphology, stream benthos measurements, and water quality analysis of stream and lake ecosystems. Requires field trip transportation fee not to exceed \$30 per course registration.

FOR 430-3 Wildland Watershed Management. Emphasis is placed on the principles, technical problems, procedures, alternatives, and consequences encountered in managing wildland watersheds for the production of quality water in harmony with other uses.

FOR 431-3 Regional Silviculture. This course examines prevailing management practices within each of the major forested regions of the United States. The course is primarily intended for students interested in wildlife habitat, wood production, or restoration. Emphasis is placed on understanding how underlying soils, silvics, climate, biotic agents, social forces, and past uses drive forestry differentially across the country. Prerequisite/Co-Requisite: FOR 310, or consent of instructor.

FOR 451-3 Wildlife Habitat and Populations. This course is designed to familiarize students with a scientific understanding of major topics in wildlife ecology and management, with a special focus on Forestry majors and natural resource inventory techniques. Students will gain knowledge of the history of the field of wildlife management, primary wildlife management principles and practices, ecological theory pertinent to wildlife populations and habitats, and current important issues/problems regarding wildlife management and natural resource inventory. Restricted to Forestry, Zoology, Biological Science, Animal Science majors/minors or Environmental Science minors; or by consent of instructor.

FOR 452-3 Forest Soils. Forest Soils is designed to give the student a more comprehensive in-depth study of the patterns and processes of soil formation and their relation to forest productivity. Upon completion of the course, student will be familiar with soil/plant interactions, water relationships, and forest soil management for sustainable productivity and environmental quality. This course provides a sound basis for learning basic soils concepts specifically related to forest ecosystems which are beneficial to Forestry majors and those majoring/minoring in Soil Science or related natural science disciplines. Prerequisite: FOR 352 or consent of instructor.

Requires field trip transportation fee not to exceed \$25 per course registration.

FOR 452L-2 Forest Soils Laboratory. Companion laboratory for FOR 452. Emphasis is on methods to characterize and evaluate the chemical, physical, and biological properties of forest soils. Requires field trip transportation fee not to exceed \$25 per course registration. Offered spring semester, even years.

FOR 453-2 Environmental Impact Assessment in Forestry. Methods of assessing the environmental impact of land-use systems on forest resources and assessing the impact of forest management systems on environmental quality are presented. Case studies culminating in the preparation of environmental impact statements are emphasized. Restricted to senior standing in a natural resource major. Requires field trip transportation fee not to exceed \$25 per course registration.

FOR 454A-2 Forest Ecology Field Studies-Boreal. A study of forest communities, soils, and site conditions. Course requires a field trip of about 10 days. Each trip is worth two semester credits; a maximum of 6 credits may be applied toward graduate credit. Restricted to senior standing in natural resources or biological sciences, courses in tree identification, forest ecology, and soils. Special approval needed from the instructor. Requires field trip transportation fee not to exceed \$300 per course registration.

FOR 454B-2 Forest Ecology Field Studies-Lake States. A study of forest communities, soils, and site conditions. Course requires a field trip of about 10 days. Each trip is worth two semester credits; a maximum of 6 credits may be applied toward graduate credit. Restricted to senior standing in natural resources or biological sciences, courses in tree identification, forest ecology, and soils. Special approval needed from the instructor. Requires field trip transportation fee not to exceed \$300 per course registration.

FOR 454C-2 to 8 Forest Ecology Field Studies-Southern Appalachians. A study of forest communities, soils, and site conditions. Course requires a field trip of about 10 days. Each trip is worth two semester credits; a maximum of 6 credits may be applied toward graduate credit. Restricted to senior standing in natural resources or biological sciences, courses in tree identification, forest ecology, and soils. Special approval needed from the instructor. Requires field trip transportation fee not to exceed \$300 per course registration.

FOR 454D-2 to 8 Forest Ecology Field Studies-Southern Pine. A study of forest communities, soils, and site conditions. Course requires a field trip of about 10 days. Each trip is worth two semester credits; a maximum of 6 credits may be applied toward graduate credit. Restricted to senior standing in natural resources or biological sciences, courses in tree identification, forest ecology, and soils. Special approval needed from the instructor. Requires field trip transportation fee not to exceed \$300 per course registration.

FOR 460-2 Forest Industries. Analysis of raw material requirements, the processes and the products of forest industries. The environmental impact of each forest industry will also be discussed.

FOR 470-2 Wilderness Management, Policy, and Ethics. Study of current management philosophy and practice in America's wilderness. Analysis of current wilderness policy and its historical evolution. Discussion of the evolution of the

wilderness idea and the individuals that have influenced it. Weekend field trip required. Offered alternate (even) years. Restricted to senior standing. Required field trip transportation and materials fee not to exceed \$80 per course registration.

FOR 471-3 Interdisciplinary Approaches to Environmental Issues. Application of concepts for the biological, physical and social sciences, economics, humanities and law, are used to understand the interdisciplinary complexities of environmental issues. Students will develop and demonstrate problem-solving skills as part of a team analyzing a regional environmental issue. Team-taught seminar style discussions. Prerequisite: PLB 301I and admission to Environmental Studies minor program.

FOR 480-3 Natural Resource Conflict Management. Examines the role and methods of stakeholders in influencing natural resource policies. Emphasis on applied methods, techniques and strategies for conflict resolution, especially collaborative decision making and persuasion theory. Restricted to junior standing or consent of instructor.

FOR 494A-1 to 6 Practicum-Forest Environmental Assessment. Supervised practicum in a professional setting. Emphasis on administration, supervision, teaching and program leadership in community, school, park, forest, institution, and public or private agencies. Students should enroll according to their curriculum specialization. Special approval needed from the instructor.

FOR 494B-1 to 6 Practicum-Outdoor Recreation Resource Management. Supervised practicum in a professional setting. Emphasis on administration, supervision, teaching and program leadership in community, school, park, forest, institution, and public or private agencies. Students should enroll according to their curriculum specialization. Special approval needed from the instructor.

FOR 494C-1 to 6 Practicum-Forest Resources Management. Supervised practicum in a professional setting. Emphasis on administration, supervision, teaching and program leadership in community, school, park, forest, institution, and public or private agencies. Students should enroll according to their curriculum specialization. Special approval needed from the instructor.

FOR 500-2 Principles of Research. Research philosophy, approaches to research; theory, hypotheses inference, and predicting; problem identification, project development and organization; methods of data collection, analysis and presentation; drawing conclusions and organizing results.

FOR 501-1 Graduate Seminar. Presentation and critiques of current research project of faculty, graduate student and selected resource persons.

FOR 502-3 Advanced Watershed Hydrology and Management. A study of current issues relating to hydrology and the management of water resources in forested and mixed land-use watersheds. Readings, discussions and projects will focus on research and management topics in water quality and quantity at regional, national and international levels. Prerequisite: FOR 402 or FOR 430 or equivalent or consent of instructor.

FOR 504-2 Tree Physiology Concepts and Applications. A study of physiological concepts and attributes of trees that underlies growth, ontogeny, and reproduction in the context of genotype, environment, and their interaction. Physiological concepts will be presented and discussed in a framework that

relates their influence on forest stand management applications and activities such as regeneration, tree planting, silvicultural activities in native forests and plantations, and stand response to disturbance, and the development and maintenance of old growth. Prerequisite: PLB 200 or FOR 331 or a plant physiology course.

FOR 506-3 Advanced Landscape Ecology. (Same as FOR 406) (FOR 506-3 will have an additional lab requirement) Review and evaluation of current research and concepts in landscape ecology management. Principles of landscape ecology in the context of forested systems will be presented and discussed. Emphasis on how spatial heterogeneity and human activities influence landscape patterns. Prerequisite: G.I.S. course or consent of instructor.

FOR 508-2 Historical Ecology. Introduction to the basic concepts and foundations of historical ecology, a discipline which joins traditional ecology with an investigation of human landscape transformation. Emphasis is placed on the interdisciplinary approach to historical ecology with readings in pollen analysis, dendrochronology, land-use history, archival and historical sources, and traditional vegetation surveys and reconstructions. Offered alternate years. Prerequisite: 300 level plant ecology course or equivalent or consent of instructor. Field trip cost approximately \$35.

FOR 510-2 Advanced Silviculture: Landscape Rehabilitation. Current and emerging issues in silviculture and landscape-scale natural resource and agricultural sustainability are addressed at the individual manager/farmer or small community level. Case studies consider underlying physical and biological principles underlying successful rehabilitation practices across a wide range of social contexts and physical landscapes. Experimental methodologies and their application to management problems are critiqued. Water, grazing, food crop, wildlife/biodiversity conservation, and biofuels are emphasized with accommodations for students with related interests. This course is intended for students with undergraduate training or practical backgrounds in natural resource management or agriculture and who are seeking to integrate these disciplines toward developing actionable solutions. Special approved needed from the instructor.

FOR 511-2 Advanced Forest Resources Economics. Application of microeconomic, macroeconomic and capital theory to forest resource problems; introductory econometric methods; long range supply and demand projections; international forest economics and policy problems decision theory in forest resource management. Offered alternate years. Prerequisite: FOR 411 or equivalent or consent of instructor.

FOR 512-2 Tree Selection and Breeding. Quantitative methods of describing variation patterns of trees, testing genetic and environmental effects and interactions and evaluations of tree improvement program. Prerequisite: FOR 412 or consent of instructor.

FOR 515-3 Advanced Urban Ecosystem Management. An examination of concepts and processes associated with urban environments. Physical, chemical, and biological stresses associated with land use change and urban sprawl will be discussed and presented with a focus on water resources. Class discussion, readings, and projects will concentrate on current research in the urban environment. Restricted to graduate standing or consent of instructor.

FOR 516-2 Advanced Forest Management. Case studies in forest land management, management planning, utilizing computer programming, CFI and TSI role in long range management planning. Offered alternate years-odd. Prerequisite: FOR 416, FOR 331 and summer camp or consent of instructor.

FOR 520-2 Advanced Park Planning. Study of nature and functions of the recreation environmental planning process in theoretical and policy terms. Types of plans at local, regional and state levels. Evaluation of different types of planning approaches and their utility in particular situations. Offered alternate years. Prerequisite: FOR 421 or consent of instructor.

FOR 521-2 Recreation Behavior in Wildlands Environments. Review of sociological and psychological theories relevant to outdoor recreation planning; management alternatives. Review of current behavior research in outdoor recreation. Application of behavioral concepts to recreation planning and administration. Offered alternate years.

FOR 523-2 Advanced Resource Interpretation. Survey of theories and methods relating to resource interpretation planning and practice resulting from research in communication, education and marketing. Examines case studies and existing issues current to the profession of interpretation. Stresses relationship between theory and application. Prerequisite: FOR 423 or consent of instructor. Offered alternate years.

FOR 528-3 Urban Tree Management. Establishment and maintenance of trees as beneficial components of urban environments. Tree functionality is addressed from biological, social, and economic opportunities and constraints commonly associated with cities and towns. Management of trees and wooded areas within ecological urban landscapes is addressed from the perspective of multiple constituencies. This course is primarily intended to be taken as part of the ecological urban landscapes graduate program and is offered Online Only. May be taken as a substitute for FOR 428. Students who have achieved a passing grade in FOR 428 are not eligible to take this course.

FOR 530-2 Forest Site Evaluation. A discussion of the factors affecting site quality and their use in present site evaluation methods. Lectures will draw upon recently published scientific literature as well as forest research data collected and analyzed for southern Illinois forests. Laboratories will include sampling of forest sites and stands with subsequent analysis of data using graphic and statistical techniques and a computer to develop site evaluation models. Prerequisite: BIOL 307 or consent of instructor. Cost: \$20.

FOR 531-2 Disturbance Ecology. Provide a historical overview and current perspective on major topics in forest ecology including natural disturbance, gap and patch dynamics, and relevant restoration ecology techniques. This is accomplished through a critical examination of the literature through reading, group discussions, and field trips. Two to three field trips will be organized during the semester to observe the effects of natural disturbance with an approximate total cost of \$25 per student. Offered alternate years. Prerequisite: 300 level plant ecology course (or equivalent) or consent of instructor.

FOR 551-3 Wildlife-Habitat Relationships. Theory and practice of analyses pertaining to the study of wildlife-habitat relationships. Understanding of common data collection techniques in wildlife and forestry science. Use of computers,

statistical programs, and other forms of data analysis. Ability to work on practical and applied problems in wildlife conservation. Special approval needed from the instructor.

FOR 585-3 Human Dimensions of Natural Resource Management. Multidisciplinary study of influences and constraints on human-renewable natural resource interactions. Readings, discussion and problem solving to enhance appreciation of human dimensions as an integral component of natural resource management. Emphasis on diverse perspectives on forest, fisheries, and wildlife; conceptual frameworks and research methodologies. Offered alternate (odd) years.

FOR 588-1 to 6 International Graduate Studies. University residential graduate program abroad. Prior approval by the department is required both for the nature of program and the number of hours of credit.

FOR 590-1 to 4 Readings in Forest Resources. Intensive consideration is given to current practices and problems in forestry. Special approval needed from the instructor.

FOR 591A 1 to 4 Directed Studies in Forest Resources-Dendrology. Intensive study of disciplines fundamental to forestry. Study of the identification of native and exotic trees. Special approval needed from the instructor.

FOR 591B 1 to 4 Directed Studies in Forest Resources-Forest Autecology. Intensive study of disciplines fundamental to forestry. Study of the physiology of individual tree species in relation to their environment. Special approval needed from the instructor.

FOR 591C 1 to 4 Directed Studies in Forest Resources-Forest Community Ecology. Intensive study of disciplines fundamental to forestry. Study analysis and integration of tree growth, forest structure and classification in relation to climate/edaphic factors as an ecological basis for forest management. Special approval needed from the instructor.

FOR 591D 1 to 4 Directed Studies in Forest Resources-Forest Measurements. Intensive study of disciplines fundamental to forestry. Study of measurement, statistical and data processing concepts; volume, growth, yield of forest products and methods of sampling forest resources. Special approval needed from the instructor.

FOR 591E 1 to 4 Directed Studies in Forest Resources-Forest Recreation. Intensive study of disciplines fundamental to forestry. Study of principles and methods for land-use planning of park and recreation environments. Special approval needed from the instructor.

FOR 591F 1 to 4 Directed Studies in Forest Resources-Silviculture. Intensive study of disciplines fundamental to forestry. Study of concepts and techniques utilized in the silvicultural treatment of forests. Special approval needed from the instructor.

FOR 591G 1 to 4 Directed Studies in Forest Resources-Wildland Fire Management. Intensive study of disciplines fundamental to forestry. Study of all aspects of fire as a phenomenon in wildland management. Special approval needed from the instructor.

FOR 591H-1 to 4 Directed Studies in Forest Resources-Forest Soils. Intensive study of disciplines fundamental to forestry. An introduction to the characterization and fundamental concepts of forest soils and their relationships to forest communities and forest management practices. Emphasis is on the chemical,

biological, and physical properties of forest soils as related to forests and forest management.

FOR 593-1 to 4 Individual Research. Directed research in selected fields of forestry.

FOR 599-1 to 6 Thesis. A Minimum of three and a maximum of six hours to be counted toward a Master's degree.

FOR 601-1 per semester Continuing Enrollment. For those graduate students who have not finished their degree programs and who are in the process of working on their dissertation, thesis, or research paper. The student must have completed a minimum of 24 hours of dissertation research, or the minimum thesis, or research hours before being eligible to register for this course. Concurrent enrollment in any other course is not permitted. Graded S/U or DEF only.