

# NATURAL RESOURCE ECOLOGY AND MANAGEMENT

Faculty in the Department of Natural Resource Ecology and Management (NREM) have expertise in conducting interdisciplinary instruction, research and extension education that focuses on the natural resources of fisheries, forests, rangeland, and wildlife within and beyond the boundaries of Oklahoma. An important goal of the NREM faculty is to increase public understanding of the ecology and management of these natural resources as they relate to agriculture, forest and livestock production, hunting and fishing, wildlife habitat, ecotourism, and the conservation of natural ecosystems..

The NREM faculty supports undergraduate and graduate programs in the general areas of fisheries, forestry, rangeland, and wildlife. The NREM curriculum prepares students to plan, implement and research the management, protection, and sustainable use of natural resources within Oklahoma and throughout the world. The department provides an integrated education in renewable natural resource management, conservation and utilization, land use policy and ethics, as well as a valuable perspective for understanding and solving critical contemporary environmental problems at local, regional, and global scales.

Courses in NREM undergraduate degree options fulfill the requirements for many applied and professional careers in the natural resource disciplines, including preparation for graduate programs, veterinary school, and certification with the Society of American Foresters. NREM also maintains strong ties to The Wildlife Society, The American Fisheries Society and The Society for Range Management. Graduates may be employed by governmental agencies, non-profit organizations, private industry, or individuals. Federal agencies hiring NREM graduates include U.S. Department of Agriculture, U.S. Forest Service, USDA-Natural Resources Conservation Service, U.S. Bureau of Land Management, U.S. Geological Survey, U.S. Fish and Wildlife Service, USDA-Agricultural Research Service, Bureau of Indian Affairs, National Park Service, Animal and Plant Health Inspection Service, and the U.S. Environmental Protection Agency. In addition, state, county, and municipal governments, including Oklahoma Forestry Service and Oklahoma Division of Wildlife Conservation, employ NREM graduates in a variety of resource management consultant, restoration, service, and technical positions.

## Natural Resource Ecology and Management Undergraduate Degree Options

Fisheries and Aquatic Ecology is designed for students with interest in the management of fish and other aquatic species populations and their habitats in streams, rivers, lakes, and ponds. Students gain the skills in research techniques and methodology in fisheries science, including habitat measurements, population sampling techniques and abundance estimation, age and growth analysis, recreational surveys, data analysis and report writing. Recreational use, sustainable management of fish populations, natural resource policy and land use ethics are additional topic areas emphasized.

Forest Ecology and Management emphasizes the science-based conservation and management of forest lands, ecosystems, and related natural resources. Students gain the skills that are necessary for the measurement, assessment, valuation and development of management strategies for forests and related natural resources.

Successful completion of the curriculum will provide competency in the general areas of basic science, forest biology, forest mensuration, forest plant species identification, forest economics, natural resource policy, decision-making and problem-solving, and communications. The option is accredited by the Society of American Foresters (SAF). Requirements for this option include the successful completion of field camps in May, which are scheduled to follow the sophomore and junior spring semesters and are held annually in diverse forest settings. Field forestry skills, forest ecology, integrated natural resource management, timber cruising, resource economics and land use ethics are emphasized at camp and integrated in the senior-level capstone course.

Rangeland Ecology and Management emphasizes understanding management of grasslands, shrub lands, and savannas for livestock forage production, wildlife habitat, and other ecosystem services such as carbon sequestration, soil health and off-site water yield. Courses teach the effects of livestock grazing, fire, invasive species and other disturbances on biotic and abiotic processes, and strategies for restoration of damaged rangeland ecosystems. The importance of prescribed fire as a rangeland restoration tool, livestock grazing management, and the identification and value of native grass and forb species for livestock forage, wildlife food and habitat cover, and other uses are emphasized. Students learn to integrate their knowledge of soil, water, vegetation, wildlife habitat and natural resource policies into management of public or private rangelands for multiple uses.

Wildlife Ecology and Management provides insight into the biological basis for management of wildlife populations and habitats, with emphasis on current management problems. Students gain the skills in wildlife research techniques, including aging and sexing, wildlife and vegetation sampling, and wildlife population and habitat analysis with the methodology of wildlife science. Students learn the fundamentals of why certain ecosystems support certain wildlife species and how these species are adapted to those environments. Recreational use, sustainable management of wildlife populations, natural resource policy and land use ethics are additional topic areas emphasized.

Wildlife Biology and Pre-Veterinary Science provides the ecological background and training in natural wildlife science and population dynamics in addition to the basic sciences necessary to prepare students for graduate education in veterinary medicine. The option combines research and management training in population ecology with basic biology and chemistry of wildlife species and habitat requirements.

Students entering the NREM department are encouraged to join and become active members of one of many student organizations: Society of American Foresters, Society for Range Management, The Wildlife Society, and the American Fisheries Society. Participation in one or more of these organizations provides students the opportunity to attend state, regional or national meetings where they will gain valuable advantages through networking, student competitions and interacting with various career-related activities.

## Courses

### **NREM 1012 Introduction to Natural Resource Ecology and Management**

**Description:** Introduction to the wide variety of natural resources found globally with a focus on Oklahoma ecoregions. Overview of the ecology and management of natural resources in the pine-hardwood forest, the Cross Timbers, and the tallgrass, mixed-grass and shortgrass prairies. Academic and career options presented through guest speakers.

**Credit hours:** 2

**Contact hours:** Lecture: 2 Contact: 2

**Levels:** Undergraduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

### **NREM 1014 Introduction to Natural History (LN)**

**Description:** The study of living organisms especially their origins, life histories, behaviors, conservation, and unique adaptations for reproducing and relating to their environment. Laboratory emphasis is on observation and investigation of the diversity and adaptations of living organisms.

**Credit hours:** 4

**Contact hours:** Lecture: 3 Lab: 2 Contact: 5

**Levels:** Undergraduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

**General Education and other Course Attributes:** Scientific Investigation, Natural Sciences

### **NREM 1113 Elements of Forestry**

**Description:** Survey of forestry as an art, science and profession including forestry and natural resource management theory, forest distribution and ownership, history of forest resource policy development, forest protection, wildlife interactions, forest ecosystem process, current issues, and career opportunities. Previously offered as NREM 1114.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Undergraduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

### **NREM 1213 Introduction to Wood Properties and Products**

**Description:** Anatomical, physical and mechanical properties of solid wood and wood products. Macroscopic and microscopic identification of wood. Principles of manufacture of lumber, plywood and wood composites. Biological deterioration of wood and main wood preservation techniques. One weekend field trip required. Previously offered as NREM 1214.

**Credit hours:** 3

**Contact hours:** Lecture: 2 Lab: 2 Contact: 4

**Levels:** Undergraduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

### **NREM 2013 Ecology of Natural Resources**

**Prerequisites:** BIOL 1114 or (BIOL 1113 and BIOL 1111) or PLNT 1213.

**Description:** Introductory focus on understanding and applying general ecological principles to agricultural and natural ecosystems. Emphasis on relationships between climate, soils, agricultural, and natural ecosystems. Topics include nutrient cycles, energy flow, species interactions, biological diversity, productivity, sustainability, and landscape and ecosystem management. Previously offered as RLEM 2913.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Undergraduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

### **NREM 2083 Geospatial Technologies for Natural Resources**

**Prerequisites:** MATH 1513.

**Description:** Principles and application of geospatial technologies for natural resource ecology and management including remote sensing (serial photography and satellite data), geographic information systems (GIS) and global positioning system (GPS) technologies. Previously offered as NREM 3083.

**Credit hours:** 3

**Contact hours:** Lecture: 2 Lab: 2 Contact: 4

**Levels:** Undergraduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

### **NREM 2113 Wood Properties, Products, & Harvesting**

**Description:** Management and planning of timber harvesting, including products derived from wood. Harvesting techniques, safety and cost analysis. Anatomical, physical and mechanical properties of solid wood and wood products. Macroscopic and microscopic identification of wood. Manufacture of lumber and wood composites, including wood preservation to prevent deterioration. Previously offered as FOR 2002, FOR 2113 and NREM 2112.

**Credit hours:** 3

**Contact hours:** Lecture: 2 Lab: 2 Contact: 4

**Levels:** Undergraduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

### **NREM 2134 Dendrology**

**Description:** Identification, taxonomy and distribution of forest trees and shrubs of the United States; their environmental requirements and utilization. Previously offered as FOR 2134.

**Credit hours:** 4

**Contact hours:** Lecture: 2 Lab: 4 Contact: 6

**Levels:** Undergraduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

**NREM 3012 Applied Ecology Laboratory**

**Prerequisites:** NREM 3013 or concurrent, NREM major or instructor permission.

**Description:** Field experience aimed at navigating and working effectively and safely in the natural environment. Identification, measurement and interpretation of abiotic and biotic components to understand and describe ecosystem function and current natural resource management tools and issues. Focus on representative forest, grassland and aquatic ecosystems.

**Credit hours:** 2

**Contact hours:** Lab: 4 Contact: 4

**Levels:** Undergraduate

**Schedule types:** Lab

**Department/School:** Natural Res Eco & Mgmt

**Additional Fees:** NREM or FOR Course Field Trip fee of \$46 and NREM or FOR Course Field Trip fee of \$46 apply.

**NREM 3013 Applied Ecology and Conservation**

**Prerequisites:** BIOL 1114 or (BIOL 1113 and BIOL 1111), or BIOL 1604, or PBIO 1404, or PLNT 1213; Sophomore, Junior, or Senior class standing; SOIL 2124 preferred.

**Description:** Development of critical thinking for conservation and land management through the application of ecological concepts and theory. Principles of population, community, ecosystem and landscape ecology, with applications to management of wildlife, fisheries, forest and rangeland resources. Application of scientific method and literature to natural resource ecology and management.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Undergraduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 3063 Natural Resource Biometrics**

**Prerequisites:** STAT 2013; and MATH 1513 or MATH 1483.

**Description:** Application of statistical concepts to problems in natural resource sampling and estimation including simple random sampling, stratified sampling, regression analysis, double sampling and ratio and regression estimation. Statistical analysis using spreadsheets. Applications to forest, range and wildlife management. Previously offered as NREM 3363.

**Credit hours:** 3

**Contact hours:** Lecture: 2 Lab: 2 Contact: 4

**Levels:** Undergraduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

**NREM 3091 Field Applications of Geospatial Technologies for Natural Resources**

**Prerequisites:** NREM 2083.

**Description:** Field-based use of global navigation satellite systems, geographic information systems and topographic maps to measure and interpret the environment with application to fishery, forest, range, and wildlife planning and management.

**Credit hours:** 1

**Contact hours:** Lab: 3 Contact: 3

**Levels:** Undergraduate

**Schedule types:** Lab

**Department/School:** Natural Res Eco & Mgmt

**NREM 3101 Forest Resource Field Studies**

**Prerequisites:** NREM 2134 and PBIO 1404 and SOIL 2124.

**Description:** One-week summer presession field experience at an off-campus site. Field study in the dynamics of forest ecosystems and related components including trees, soils, water, fauna, and associated flora as they relate to site productivity and the production of resource outputs, products, and services. Previously offered as NREM 3112.

**Credit hours:** 1

**Contact hours:** Lab: 2 Contact: 2

**Levels:** Undergraduate

**Schedule types:** Lab

**Department/School:** Natural Res Eco & Mgmt

**NREM 3111 Natural Resource Field Studies**

**Description:** One-week summer presession field experience at off-campus site. Field study, analysis, and assessment of natural resource ecosystems at multiple scales with application to integrated management of forest, wildlife, range, water, soil, and recreation resources to sustain a broad array of uses and values, and to understand associated ecological, social, policy, and ethical issues. Includes visits to private and public natural resource lands and projects. Previously offered as FOR 3103 and NREM 3103.

**Credit hours:** 1

**Contact hours:** Lab: 2 Contact: 2

**Levels:** Undergraduate

**Schedule types:** Lab

**Department/School:** Natural Res Eco & Mgmt

**NREM 3123 Forest Measurements I**

**Prerequisites:** MATH 1513; STAT 2013 (or concurrent).

**Description:** Measurement of trees, forests, and forest products. Application of mensurational techniques to forest growth and productivity. Methods of forest sampling and inventory. Use of topographic maps, U.S. Public Land Survey system maps, global navigation satellite systems and mapping software. Previously offered as NREM 2103.

**Credit hours:** 3

**Contact hours:** Lecture: 2 Lab: 2 Contact: 4

**Levels:** Undergraduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

**NREM 3133 Forest Measurements II**

**Prerequisites:** NREM 2134 and NREM 3123.

**Description:** Forest-level measurements emphasizing statistical and tactical design of forest inventory methods with application and implementation in the field. Principles of forest growth and yield. Analysis, interpretation and presentation of data. Creation of professional reports. Overnight fieldtrips required. Previously offered as NREM 3102.

**Credit hours:** 3

**Contact hours:** Lecture: 2 Lab: 2 Contact: 4

**Levels:** Undergraduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

**NREM 3143 Forest Biology****Prerequisites:** PBIO 1404.**Description:** The response of trees and forest ecosystems to biotic and abiotic factors. Understanding of life history traits, tree structure, and genetics as they relate to the establishment, growth, and regeneration of species. Application of physiological and ecological principles in predicting the effects of resource availability, site quality, and competition on tree growth, forest growth, and community interactions. Previously offered as NREM 4213 and FOR 4563.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt**NREM 3153 Forest Health and Disturbance Ecology****Prerequisites:** NREM 2013, or (NREM 3012 and NREM 3013), or BIOL 3034.**Description:** Dynamics of ecological disturbance, resilience and recovery in forests. Natural role of fire in forest ecosystems and theory of fire behavior. Traits, population dynamics, and life cycles of major diseases and insect groups related to infestations and outbreaks that threaten forests. Previously offered as NREM 3713.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt**NREM 3224 Silviculture****Prerequisites:** NREM 2013, or NREM 3012 and NREM 3013, or BIOL 3034.**Description:** Theory and practice of controlling forest establishment, composition, structure, and growth to achieve multiple objectives including timber production, wildlife habitat, water quality, forest health, and recreation. Principles and techniques related to regeneration, thinning, prescribed fire, and harvest methods to increase the productivity, resilience, and output of desired ecosystem services. A two-day field trip is required. Previously offered as NREM 3223.**Credit hours:** 4**Contact hours:** Lecture: 3 Lab: 2 Contact: 5**Levels:** Undergraduate**Schedule types:** Lab, Lecture, Combined lecture and lab**Department/School:** Natural Res Eco & Mgmt**NREM 3502 Wildlife Law Enforcement****Prerequisites:** Junior standing and consent of instructor.**Description:** Survey of state and federal wildlife laws with emphasis on Oklahoma statutory and regulatory laws pertaining to wildlife. Lectures, guest lectures, videotapes and field exercises. Previously offered as COSC 3502 and ZOOL 3502.**Credit hours:** 2**Contact hours:** Lecture: 2 Contact: 2**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt**NREM 3503 Principles of Wildlife Ecology and Management****Prerequisites:** NREM 3013 or BIOL 3034 or concurrent.**Description:** An introduction to the biological basis of the management of wildlife habitats and populations. Previously offered as NREM 4513, ZOOL 4513, WLDL 4513, and COSC 4513.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt**NREM 3523 Fish and Wildlife Population Biology****Prerequisites:** NREM 3012 and NREM 3013, or BIOL 3034 or concurrent enrollment.**Description:** Dynamics of fish and wildlife populations resulting from reproduction, competition, predation, movement, and exploitation. Effects of life history patterns on population growth and management strategies. Methods for measuring distribution, abundance, survival, and growth of fish and wildlife populations. Management strategies for fish and wildlife populations.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt**NREM 3613 Principles of Rangeland Management****Description:** Overview of the science of applying ecological principles to managing rangeland resources, including rangeland characteristics; goods and services provided by rangelands; primary threats to rangelands; North American rangeland resources; principles of grazing management and current topics in range management. Previously offered as RLEM 3913.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt**NREM 4001 Issues In Global Change****Prerequisites:** (NREM 3012 and NREM 3013) or BIOL 3034.**Description:** Student led discussion to learn the causes and consequences of global change and practical implications for natural resource ecology and management.**Credit hours:** 1**Contact hours:** Contact: 1 Other: 1**Levels:** Undergraduate**Schedule types:** Discussion**Department/School:** Natural Res Eco & Mgmt**NREM 4013 Herbaceous Plants of the Great Plains****Description:** Identification (by sight and dichotomous key), characteristics (vegetative and floral), ecological/agricultural importance, and management of important native range grasses and broadleaf plant families, genera, and species, with emphasis on rangeland management applications. May not be used for degree credit with NREM 5013.**Credit hours:** 3**Contact hours:** Lecture: 2 Lab: 2 Contact: 4**Levels:** Undergraduate**Schedule types:** Lab, Lecture, Combined lecture and lab**Department/School:** Natural Res Eco & Mgmt



**NREM 4023 Restoration Ecology****Prerequisites:** 40 semester credit hours.**Description:** Application of ecological theory to the practice of ecological restoration to improve populations, communities, and ecosystems degraded directly or indirectly by human activities.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt**NREM 4033 Ecology Of Invasive Species****Prerequisites:** BIOL 1114 or (BIOL 1113 and BIOL 1111); (PBIO 1404 and BIOL 1604 recommended).**Description:** Ecological principles and their application to invasive species. Population level characteristics; community and ecosystem level effects of a wide variety of taxa including microbial, fungal, plant invertebrate, and vertebrate examples. Global consequences and governmental policies/programs designed to limit the spread of invasives. Same course as ENVR 4033.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt**NREM 4043 Natural Resource Administration and Policy****Prerequisites:** Senior standing.**Description:** Natural resource policy and legislation; ethics relating to natural resources; natural resource organizations and how they function to include structure, supervision, and financing of federal, state, and private natural resource enterprises. Previously offered as NREM 4343 and FOR 4443. May not be used for degree credit with NREM 5843.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt**NREM 4053 Natural Resource Recreation****Description:** Ecological, historical, social and policy basis for recreational use and management of natural resources, including an analysis of planning, management, and administrative frameworks for providing a diversity of recreational opportunities, benefits, and resource values. Previously offered as NREM 4353 and FOR 4553. May not be used for degree credit with NREM 5853.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt**NREM 4093 Natural Resources, People and Sustainable Development (I)****Description:** Relationship between people, the land, and associated natural resources in the developing world, including the ecological and cultural basis for resource use and development. Examines issues of traditional agriculture and deforestation, and explores sustainable strategies for land use, resource management, and community development. Includes two-week study abroad component. Previously offered as NREM 4393.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt**General Education and other Course Attributes:** International Dimension**NREM 4234 Forest Management and Economics****Prerequisites:** NREM 3133, NREM 3224 and AGECE 1113.**Description:** Regulation of forest growing stock to meet financial and biological management objectives; stand level optimization; linear programming principles in harvest scheduling; timberland taxation; timberland investment criteria; risk and uncertainty in timberland investment; economics of non-market goods. Previously offered as NREM 4323.**Credit hours:** 4**Contact hours:** Lecture: 3 Lab: 2 Contact: 5**Levels:** Undergraduate**Schedule types:** Lab, Lecture, Combined lecture and lab**Department/School:** Natural Res Eco & Mgmt**NREM 4333 Forest Resource Management: Planning and Decision-Making****Prerequisites:** NREM 4234.**Description:** Integrated problem solving, to apply biological, quantitative, economic, political, and administrative principles in solving forest resource management problems. Previously offered as FOR 4333.**Credit hours:** 3**Contact hours:** Lecture: 2 Lab: 2 Contact: 4**Levels:** Undergraduate**Schedule types:** Lab, Lecture, Combined lecture and lab**Department/School:** Natural Res Eco & Mgmt**NREM 4360 Ecotourism and Wilderness****Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt**NREM 4403 Wetland Ecology and Management****Prerequisites:** NREM 3012 and NREM 3013, or BIOL 3034 or consent of instructor.**Description:** Ecology, classification, restoration, and management of wetlands. Adaptations of wetland plants and animals, structure and function of wetlands, field identification of wetland plants, restoration techniques, wetland classification systems, management and conservation of wetlands, and regulatory processes. Previously offered as COSC 4403 and ZOOL 4403.**Credit hours:** 3**Contact hours:** Lecture: 2 Lab: 3 Contact: 5**Levels:** Undergraduate**Schedule types:** Lab, Lecture, Combined lecture and lab**Department/School:** Natural Res Eco & Mgmt**Additional Fees:** NREM or FOR Course Field Trip fee of \$40 applies.

**NREM 4414 Fisheries Management****Prerequisites:** NREM 3012 and NREM 3013, or BIOL 3034.**Description:** Techniques and principles involved in management of fishes. Field trip fee required. Previously offered as COSC 4414, ZOOL 4414, and ZOOL 4524. May not be used for degree credit with NREM 5414 or NREM 5433.**Credit hours:** 4**Contact hours:** Lecture: 2 Lab: 4 Contact: 6**Levels:** Undergraduate**Schedule types:** Lab, Lecture, Combined lecture and lab**Department/School:** Natural Res Eco & Mgmt**NREM 4424 Fisheries Techniques****Prerequisites:** NREM 4414.**Description:** Research techniques and methodology in fisheries science, including sampling design, habitat measurements, sampling gears and abundance estimation, age and growth analysis, recreational surveys, data analysis, and report writing. No credit for students with credit in NREM 5424. Previously offered as COSC 4424.**Credit hours:** 4**Contact hours:** Lecture: 3 Lab: 3 Contact: 6**Levels:** Undergraduate**Schedule types:** Lab, Lecture, Combined lecture and lab**Department/School:** Natural Res Eco & Mgmt**Additional Fees:** NREM or FOR Course Field Trip fee of \$27 applies.**NREM 4443 Watershed Hydrology and Water Quality****Description:** Processes that comprise the hydrologic cycle and how land use affects those processes and the quantity and quality of water from watersheds, focusing on surface water from forest, range and agricultural watersheds. Measurement and evaluation of water quantity and quality. Previously offered as NREM 4413 and FOR 4813.**Credit hours:** 3**Contact hours:** Lecture: 2 Lab: 2 Contact: 4**Levels:** Undergraduate**Schedule types:** Lab, Lecture, Combined lecture and lab**Department/School:** Natural Res Eco & Mgmt**NREM 4452 Pond Management****Prerequisites:** BIOL 1114 or (BIOL 1113 and BIOL 1111).**Description:** Principles and practice of aquatic plant management, pond construction, and maintenance, fish population management, and human factors associated with pond ownership and management. No credit for students with credit in NREM 5452.**Credit hours:** 2**Contact hours:** Lecture: 2 Contact: 2**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt**NREM 4453 Aquaculture****Prerequisites:** BIOL 1114 or (BIOL 1113 and BIOL 1111).**Description:** Introduction to the principles of freshwater finfish production with an emphasis on warm water species. No credit for student having completed NREM 5453.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt**NREM 4464 Ornithology****Prerequisites:** BIOL 1604.**Description:** Classification, evolution, distribution, identification, life histories, and morphological, ecological, and behavioral adaptations of birds. Two weekend field trips required. Same course as BIOL 4464. May not be used for degree credit with BIOL 5464, NREM 5564.**Credit hours:** 4**Contact hours:** Lecture: 3 Lab: 3 Contact: 6**Levels:** Undergraduate**Schedule types:** Lab, Lecture, Combined lecture and lab**Department/School:** Natural Res Eco & Mgmt**Additional Fees:** NREM or FOR Course Field Trip fee of \$53 applies.**NREM 4522 Wildlife Management Applications and Planning****Prerequisites:** NREM 4523 or concurrent.**Description:** Applications of wildlife research and monitoring techniques to inventory and assess wildlife populations. Data collection methods, habitat assessment, and management plan development. Field trips required.**Credit hours:** 2**Contact hours:** Lab: 4 Contact: 4**Levels:** Undergraduate**Schedule types:** Lab**Department/School:** Natural Res Eco & Mgmt**NREM 4523 Wildlife Management Techniques****Prerequisites:** NREM 3503; ENGL 3323 strongly recommended.**Description:** Theoretical and conceptual basis for research and management techniques in wildlife science. Experimental design, wildlife population and habitat analysis, wildlife and vegetation sampling, habitat management techniques, and aging and sexing techniques. Previously offered as COSC 4524, COSC 4523, ZOOL 4523, NREM 4524.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt**NREM 4533 Wildlife Management for Game Species****Prerequisites:** NREM 3012 and NREM 3013, or BIOL 3034; and NREM 3503.**Description:** Life history attributes and habitat relationships of game species relative to life history strategies; conservation and management strategies for game species; and federal and state policies influencing game species management.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Undergraduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt

**NREM 4543 Wildlife Management for Biodiversity**

**Prerequisites:** NREM 3013 and NREM 3503 recommended.

**Description:** Identification, life history, and conservation management issues affecting non-game species in North America, stressing rare, threatened, and endangered species occurring in Oklahoma. Principles of landscape ecology, wildlife management, and conservation biology applied to management scenarios aimed at recovery of rare species and biodiversity conservation at broad scales. Previously offered as COSC 4543 and ZOOL 4543.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Undergraduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 4603 Rangeland and Pasture Utilization**

**Prerequisites:** NREM 3613.

**Description:** Investigation of livestock and forage interactions that impact productivity in the utilization of rangeland and improved pastures. Same course as ANSI 4203. May not be used for degree credit with NREM 5603.

**Credit hours:** 3

**Contact hours:** Lecture: 2 Lab: 2 Contact: 4

**Levels:** Undergraduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

**NREM 4613 Rangeland Resources Planning**

**Prerequisites:** 40 semester credit hours including NREM 3613 and ANSI 3653.

**Description:** Inventory of ranch resources, survey and evaluation of ranch practices, and economic analysis. Development of a comprehensive ranch management plan. Managing rangeland and ranch resources in a social context. Written and oral reports. Field trips required. Same course as ANSI 4973. Previously offered as RLEM 4973 and AGRN 4973.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Undergraduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 4741 Wildland Firefighter Training**

**Description:** Training for Type 2 (FFT2) wildland firefighting positions with US government agencies. Provides qualifications to participate in prescribed fire and other wildland fire operations including: ignition, control, mop-up, suppression, and monitoring.

**Credit hours:** 1

**Contact hours:** Lecture: 1 Contact: 1

**Levels:** Undergraduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 4783 Prescribed Fire**

**Prerequisites:** NREM 3613.

**Description:** When to use prescribed fire and how to use prescribed fire to accomplish specific land management objectives. Writing prescribed fire plans, policy and laws, weather, equipment, conducting burns, and post-burn mop-up. Previously offered as RLEM 4983.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Undergraduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 4793 Advanced Prescribed Fire**

**Prerequisites:** NREM 4783 or consent of instructor.

**Description:** Preparing fire plans and executing prescribed fires as the fireboss. No credit for both NREM 4793 and NREM 5793. Previously offered as RLEM 4993.

**Credit hours:** 3

**Contact hours:** Lecture: 2 Lab: 3 Contact: 5

**Levels:** Undergraduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

**NREM 4960 Undergraduate Internship**

**Prerequisites:** Consent of instructor.

**Description:** Supervised internship with an approved natural resource business, government agency, or nongovernment organization, including a diversity of learning opportunities in a work environment. For every hour of credit, 45 hours of work are required. Graded on a pass-fail basis. Offered for variable credit, 1-6 credit hours, maximum of 6 credit hours.

**Credit hours:** 1-6

**Contact hours:** Contact: 1-6 Other: 1-6

**Levels:** Undergraduate

**Schedule types:** Independent Study

**Department/School:** Natural Res Eco & Mgmt

**NREM 4980 Undergraduate Research**

**Prerequisites:** Upper-division standing, GPA of 2.50 or better and consent of instructor.

**Description:** Participation in faculty research or execution of a research problem formulated by the student. Previously offered as FOR 4500. Offered for variable credit, 1-3 credit hours, maximum of 3 credit hours.

**Credit hours:** 1-3

**Contact hours:** Lecture: 1-3 Contact: 1-3

**Levels:** Undergraduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 4990 Special Topics in Natural Resource Ecology and Management**

**Description:** Advanced topics and new developments in natural resource ecology and management. Previously offered as RLEM 4990. Offered for variable credit, 1-3 credit hours, maximum of 12 credit hours.

**Credit hours:** 1-3

**Contact hours:** Lecture: 1-3 Contact: 1-3

**Levels:** Undergraduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5000 Master's Thesis Report**

**Description:** Independent research planned, conducted and reported in consultation with a major professor. Previously offered as RLEM 5000. Offered for variable credit, 1-12 credit hours, max 12 (Thesis) 4 (Report).

**Credit hours:** 1-12

**Contact hours:** Lecture: 1-12 Contact: 1-12

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5013 Herbaceous Plants of the Great Plains**

**Description:** Identification (by sight and dichotomous key), characteristics (vegetative and floral), ecological/agricultural importance, and management of important native range grasses and broadleaf plant families, genera, and species. May not be used for degree credit with NREM 4013.

**Credit hours:** 3

**Contact hours:** Lecture: 2 Lab: 2 Contact: 4

**Levels:** Graduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

**NREM 5020 Graduate Seminar**

**Description:** Special topics in Natural Resource Ecology and Management; philosophy, methods and interpretation of research. Previously offered as RLEM 5020. Offered for fixed credit, 1 credit hour, maximum of 10 credit hours.

**Credit hours:** 1

**Contact hours:** Lecture: 1 Contact: 1

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5023 Restoration Ecology**

**Description:** Application of ecological theory to ecological restoration with the goal of improving populations, communities and ecosystems degraded directly or indirectly by human activities. Case studies and applications of ecological principles to restorations across circumstances and systems will be discussed. May not be used for degree credit with NREM 4023.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5030 Special Problems in Natural Resource Ecology and Management**

**Description:** Special problems in areas of natural resource ecology and management other than those covered in the student's thesis research. Previously offered as FOR 5030. Offered for variable credit, 1-9 credit hours, maximum of 9 credit hours.

**Credit hours:** 1-9

**Contact hours:** Lecture: 1-9 Contact: 1-9

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5033 Ecology of Invasive Species**

**Description:** Ecological principles and their application to invasive species. Discussion of population level characteristics and community and ecosystem level effects of a wide variety of taxa including invasive microbial, fungal, plant, invertebrate, and vertebrate examples. Current global consequences and governmental policies/programs designed to limit the spread of invasives. May not be used for degree credit with NREM 4033 or ENVR 4033.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5043 Ecology and Evolution of Symbiosis**

**Description:** Ecology and evolution of symbiotic and mutualistic interactions in different ecosystems. Theory, current questions, and general patterns involving biotic interactions of plants and animals with other plants, animals, or microbes.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5053 Global Ecology and Biogeochemistry**

**Description:** Examines key nutrient pools and transformations in the atmosphere, soils, and hydrosphere, with an emphasis on the role of living organisms in nutrient transformations and fluxes. Emphasis placed on processes relevant to biogeochemical cycles at ecosystem and global scales in reference to aspects of global change.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5063 Production Ecology**

**Prerequisites:** NREM 3012 and NREM 3013, or BIOL 3034.

**Description:** Mechanisms driving the growth and productivity of terrestrial ecosystems in response to resource availability, genetics, disturbance, and climate. Factors affecting the distribution and productivity of biomes, relationship between leaf area and productivity, effects of diversity on productivity, the proximal causes of increased growth associated with resource additions, and using process models to predict growth. Previously offered as NREM 4103.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5073 Modeling Ecosystem Processes and Species Distributions**

**Prerequisites:** Basic understanding of population ecology and statistics strongly encouraged.

**Description:** Theories of modeling ecosystem processes and species distributions; model building; applying models with real data. No prior modeling experience is expected. Basic understanding of ecology and statistics strongly encouraged.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5083 Applied Landscape Ecology**

**Description:** Advanced ecology and management of grasslands, shrublands, and forests. Understanding the effects of grazing, fire and other disturbances on biotic and abiotic processes. Vegetation dynamics, wildlife habitat evaluation, woody plant encroachment, rangeland monitoring, and landscape ecology. Field trips required at additional cost to students. Previously offered as NREM 5054.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt



**NREM 5130 Topics In Forestry**

**Description:** Advanced study on special topics in forestry. Offered for variable credit, 1-3 credit hours, maximum of 9 credit hours.

**Credit hours:** 1-3

**Contact hours:** Contact: 1-3 Other: 1-3

**Levels:** Graduate

**Schedule types:** Independent Study

**Department/School:** Natural Res Eco & Mgmt

**NREM 5133 Advanced Topics in Forest Biometrics**

**Prerequisites:** NREM 3063 or equivalent; STAT 5013 concurrently or equivalent.

**Description:** Quantitative description of forest populations and methods for modeling forest growth and development. Sampling techniques for forest populations. Previously offered as FOR 5053.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5193 Spatial and Non-Spatial Database Management**

**Prerequisites:** One course in statistics and programming experience.

**Description:** Methods of acquiring, managing and analyzing spatial data using geographic information systems. Management of non-spatial data using relational database managers. Development of applications using these tools for evaluating and managing natural resources. Previously offered as SOIL 5193.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5234 Forest Management and Economics**

**Description:** Regulation of forest growing stock to meet financial and biological management objectives; stand level optimization; linear programming principles in harvest scheduling; timberland taxation; timberland investment criteria; risk and uncertainty in timberland investment; economics of non-market goods. May not be used for degree credit with NREM 4234.

**Credit hours:** 4

**Contact hours:** Lecture: 3 Lab: 2 Contact: 5

**Levels:** Graduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

**NREM 5313 Human Dimensions of Natural Resources**

**Description:** Principles and applications of managing natural resources in the human social context. Importance of sociology to natural resource management, design of human dimension studies related to use of forest, wildlife, fish, and range resources, complexities and challenges of balancing natural resource sustainability with human needs, and the role of leadership, education, and communication in addressing human-natural resource needs.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5333 Forest Recourse Management: Planning and Decision-Making**

**Prerequisites:** NREM 4234.

**Description:** Integrated problem solving, to apply biological, quantitative, economic, political, and administrative principles in solving forest resource management problems. May not be used for degree credit with NREM 4333.

**Credit hours:** 3

**Contact hours:** Lecture: 2 Lab: 2 Contact: 4

**Levels:** Graduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

**NREM 5403 Advanced Wetland Ecology**

**Prerequisites:** A course in aquatic ecology or wetland management recommended.

**Description:** Principles and theory of wetland ecology with a focus on wetland processes, functions, and services. Topics include wetland geomorphology, biogeochemistry and hydrology of wetlands, wetland functions and services, wetland development, wetland restoration, water issues, wetland policy, philosophy of wetland management, and educating society about wetlands. Same course as BIOL 5403.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5414 Fisheries Management**

**Prerequisites:** NREM 3012 and NREM 3013, or BIOL 3034.

**Description:** Techniques and principles involved in management of fishes. Field trip fee required. May not be used for degree credit with NREM 4414 or NREM 5433.

**Credit hours:** 4

**Contact hours:** Lecture: 2 Lab: 4 Contact: 6

**Levels:** Graduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

**NREM 5424 Fisheries Techniques**

**Prerequisites:** NREM 4414.

**Description:** Research techniques and methodology in fisheries science, including sampling design, habitat measurements, sampling gears and abundance estimation, age and growth analysis, recreational surveys, data analysis and report writing. No credit for students with credit in NREM 4424. Previously offered as COSC 5424.

**Credit hours:** 4

**Contact hours:** Lecture: 2 Lab: 4 Contact: 6

**Levels:** Graduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

**NREM 5430 Special Topics in Fisheries**

**Prerequisites:** Consent of instructor.

**Description:** Advanced study on special topics in fisheries. Offered for variable credit, 1-3 credit hours, maximum of 9 credit hours.

**Credit hours:** 1-3

**Contact hours:** Lecture: 1-3 Contact: 1-3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5433 Fisheries Science**

**Prerequisites:** NREM 4414 or equivalent or consent of instructor.

**Description:** Principles of fisheries science as they relate to fish and aquatic biota, their habitats, and the humans who utilize them. Previously offered as COSC 5433.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5443 Watershed Hydrology and Water Quality**

**Description:** Processes that comprise the hydrologic cycle and how land use affects those processes and the quantity and quality of water from watersheds, focusing on surface water from forest, range and agricultural watersheds. Measurement and evaluation of water quantity and quality. Intended for graduate students new to the water resources field. No credit for students having completed NREM 4443.

**Credit hours:** 3

**Contact hours:** Lecture: 2 Lab: 2 Contact: 4

**Levels:** Graduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

**NREM 5452 Pond Management**

**Prerequisites:** BIOL 1114 or (BIOL 1113 and BIOL 1111).

**Description:** Principles and practice of aquatic plant management, pond construction and maintenance, fish population management, and human factors associated with pond ownership and management. No credit for students with degree credit in NREM 4452.

**Credit hours:** 2

**Contact hours:** Lecture: 2 Contact: 2

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5453 Aquaculture**

**Prerequisites:** BIOL 1114 or (BIOL 1113 and BIOL 1111).

**Description:** Introduction to the principles of freshwater finfish production with an emphasis on warm water species. No credit for student having completed NREM 4453.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5473 Stream Ecology**

**Prerequisites:** Course in ecology strongly recommended.

**Description:** Ecology of streams and rivers, physical and chemical properties, biotic assemblages and interactions, ecosystem processes and theories and human impact. Two day field trip required at additional costs to students. Previously offered as NREM 5464.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate, Undergraduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5483 Ecohydrology**

**Prerequisites:** Ecology course strongly recommended.

**Description:** Concepts, framework and challenges in ecohydrology. Soil water control on vegetation structure, function and distribution. Vegetation feedback on water budget in water limited ecosystems. Ecological and hydrological interaction associated with land use, land cover change and climate variability.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5493 Social Dimensions in Aquatic Ecology**

**Prerequisites:** Consent of instructor.

**Description:** Role of humans as implementers of policy, as users of resources, and as scientists in aquatic ecology.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5513 Applied Wildlife Behavior**

**Description:** Importance of wildlife behavior to Individual survival, reproduction, and implications for population ecology, community ecology, conservation, and management. Wildlife is broadly defined in this class; topics include habitat selection, dispersal, & migration.

**Credit hours:** 3

**Contact hours:** Lecture: 2 Lab: 2 Contact: 4

**Levels:** Graduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

**NREM 5523 Population Ecology**

**Prerequisites:** BIOL 3034, MATH 1513.

**Description:** Theory and principles of predicting and analyzing population abundance and dynamics. Life history theory, foraging theory, habitat selection, population genetics, and species interactions. Same course as BIOL 5523.

**Credit hours:** 3

**Contact hours:** Lecture: 2 Lab: 2 Contact: 4

**Levels:** Graduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

**NREM 5530 Special Topics in Wildlife**

**Prerequisites:** Consent of instructor.

**Description:** Advanced study on special topics in Wildlife. Offered for variable credit, 1-3 credit hours, maximum of 9 credit hours.

**Credit hours:** 1-3

**Contact hours:** Lecture: 1-3 Contact: 1-3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5533 Occupancy Modeling of Animal Populations**

**Description:** Theory and practice for the use of occupancy modeling in natural resource management and ecological research. Topics covered include estimation of encounter probabilities, study design considerations, single-species single-season models, multi-season models, multi-state models, multi-scale models, false-positive models, and multi-species models.

**Credit hours:** 3

**Contact hours:** Lecture: 2 Lab: 2 Contact: 4

**Levels:** Graduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

**NREM 5564 Ornithology**

**Description:** Classification, evolution, distribution, identification, life histories, and morphological, ecological, and behavioral adaptations of birds. Two weekend field trips required. May not be used for degree credit with BIOL 4464, NREM 4464. Previously offered as BIOL 5464.

**Credit hours:** 4

**Contact hours:** Lecture: 3 Lab: 3 Contact: 6

**Levels:** Graduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

**NREM 5603 Rangeland and Pasture Utilization**

**Prerequisites:** NREM 3613 and ANSI 3653.

**Description:** Investigation of livestock and forage interactions that impact productivity in the utilization of rangeland and improved pastures. May not be used for degree credit with ANSI 4203 or NREM 4603.

**Credit hours:** 3

**Contact hours:** Lecture: 2 Lab: 2 Contact: 4

**Levels:** Graduate

**Schedule types:** Lab, Lecture, Combined lecture and lab

**Department/School:** Natural Res Eco & Mgmt

**NREM 5630 Special Topics in Rangeland Science**

**Prerequisites:** Consent of instructor.

**Description:** Advanced study on special topics in rangeland science. Previously offered as NREM 5660. Offered for variable credit, 1-3 credit hours, maximum of 9 hours.

**Credit hours:** 1-3

**Contact hours:** Lecture: 1-3 Contact: 1-3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5673 Rangeland Resources Watershed Management**

**Description:** Management of anthropogenic activities and physical/biological functions or processes on water and rangeland watersheds. Emphasizes preventative and restorative strategies in a natural resource rangeland setting. Course available online only through distance education.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5682 Grassld Plant Identification**

**Prerequisites:** Consent of instructor.

**Description:** Study and identification of plants that have ecological and/or agricultural importance in the Great Plains. Grassland ecosystems and plant characteristics including forage value, palatability, and utilization by both domestic livestock and wildlife. Cultural and historical uses of grassland. Course available online only through distance education.

**Credit hours:** 2

**Contact hours:** Lecture: 2 Contact: 2

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5683 Grazing Ecology and Management**

**Prerequisites:** Graduate standing.

**Description:** Ecological principles of livestock grazing and applications to grazing land management for production and conservation.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5692 Grassland Monitoring and Assessment.**

**Description:** Vegetation sampling theory and plot selection. Quantitative measures used in vegetation analysis, root growth, and utilization. Use of the similarity index, and plant community health and trends for grassland monitoring and assessment. Course available online only through distance education.

**Credit hours:** 2

**Contact hours:** Lecture: 2 Contact: 2

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5693 Principles of Forage Quality and Evaluation to Ruminant**

**Prerequisites:** Consent of instructor.

**Description:** Chemical characteristics of forage components and the laboratory procedures used to evaluate forages for grazing livestock. Interactions with ruminant physiology and digestion that influence forage feeding value. Students should have a strong background in the basic principles of chemistry, ruminant nutrition, and plant physiology. Course available online only through distance education.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5713 Grassland Fire Ecology**

**Description:** Ecological effects of fire on grassland ecosystems. Examination of the history of fire, societal use of fire, fire behavior in relation to fuel and weather, and conducting and safety of prescribed burns. Course available online only through distance education.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Natural Res Eco & Mgmt

**NREM 5723 Ecol Fire Dependent Ecosystems****Prerequisites:** Any ecology course.**Description:** Role of fire and the interactions with land use, weather, and climate change in fire-dependent ecosystems. Responses of species composition, diversity, annual net primary productivity, nutrient cycling, and ecosystem management in diverse ecosystems.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt**NREM 5783 Prescribed Fire****Description:** When to use prescribed fire and how to use prescribed fire to accomplish specific land management objectives. Writing prescribed fire plans, policy and laws, weather, equipment, conducting burns, and post-burn mop-up. Field trips required. Previously offered as RLEM 5983.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt**NREM 5793 Advanced Prescribed Fire****Prerequisites:** NREM 4783 or consent of instructor.**Description:** Preparing fire plans and executing prescribed fires as the fireboss. No credit for both NREM 4793 and NREM 5793. Previously offered as RLEM 5993.**Credit hours:** 3**Contact hours:** Lecture: 2 Lab: 3 Contact: 5**Levels:** Graduate**Schedule types:** Lab, Lecture, Combined lecture and lab**Department/School:** Natural Res Eco & Mgmt**NREM 5843 Natural Resource Administration and Policy****Description:** Natural resource policy and legislation; ethics relating to natural resources; natural resource organizations and how they function to include structure, supervision, and financing of federal, state, and private natural resource enterprises. May not be used for degree credit with NREM 4043.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt**NREM 5853 Natural Resource Recreation****Description:** Ecological, historical, social and policy basis for recreational use and management of natural resources, including an analysis of planning, management, and administrative frameworks for providing a diversity of recreational opportunities, benefits, and resource values. May not be used for degree credit with NREM 4053.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt**NREM 6000 Doctoral Dissertation****Description:** Independent research planned, conducted and reported in consultation with major professor. Previously offered as RLEM 6000. Offered for variable credit, 1-15 credit hours, maximum of 45 credit hours.**Credit hours:** 1-15**Contact hours:** Contact: 1-15 Other: 1-15**Levels:** Graduate**Schedule types:** Independent Study**Department/School:** Natural Res Eco & Mgmt**NREM 6010 Advanced Topics and Conference****Prerequisites:** MS degree.**Description:** Supervised study of advanced topics. A reading and conference course designed to acquaint the advanced student with fields not covered in other courses. Previously offered as RLEM 6010. Offered for variable credit, 1-6 credit hours, maximum of 6 credit hours.**Credit hours:** 1-6**Contact hours:** Lecture: 1-6 Contact: 1-6**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Natural Res Eco & Mgmt

## Undergraduate Programs

- Natural Resource Ecology & Management: Fisheries & Aquatic Ecology, BSAG (<http://catalog.okstate.edu/ferguson-college-agriculture/natural-resource-ecology-management/fisheries-aquatic-ecology-bsag/>)
- Natural Resource Ecology & Management: Forest Ecology & Management, BSAG (<http://catalog.okstate.edu/ferguson-college-agriculture/natural-resource-ecology-management/forest-ecology-management-bsag/>)
- Natural Resource Ecology & Management: Rangeland Ecology & Management, BSAG (<http://catalog.okstate.edu/ferguson-college-agriculture/natural-resource-ecology-management/rangeland-ecology-management-bsag/>)
- Natural Resource Ecology & Management: Wildlife Biology & Preveterinary Science, BSAG (<http://catalog.okstate.edu/ferguson-college-agriculture/natural-resource-ecology-management/wildlife-biology-preveterinary-science-bsag/>)
- Natural Resource Ecology & Management: Wildlife Ecology & Management, BSAG (<http://catalog.okstate.edu/ferguson-college-agriculture/natural-resource-ecology-management/wildlife-ecology-management-bsag/>)

## Graduate Programs

The Department offers MS and PhD degrees in Natural Resource Ecology and Management with specializations in Fisheries and Aquatic Ecology, Forest Resources, Rangeland Ecology and Management, and Wildlife Ecology and Management. The NREM department also houses the Oklahoma Cooperative Fish and Wildlife Research Unit (OKCFWRU) that provides funding and mentoring for some NREM graduate students in fisheries and wildlife topic areas. In addition, students may work toward MS and PhD degrees in the Environmental Science Graduate Program and the PhD degree in the Plant Science Graduate Program with faculty members from the Department.

The overall goals of the Department's graduate program are to provide high-quality advanced training and instruction in the application of the scientific method to problems in natural resource ecology and management. This includes problem analysis and identification, research methods, statistical analysis and/or modeling, synthesis of results, and

dissemination of findings through publications and presentations. The Department strives to develop the capability for original and creative work under the guidance of established professionals and scientists. Graduate instruction is a critical component of the research, instruction, and Extension missions of the Department.

Students work directly with a member of the NREM faculty to design a program of study to serve individual career goals. The prerequisite for graduate study in the Department is a bachelor's degree in an area aligned with the student's research interests with a minimum overall GPA of 3.00. Please refer to the website <https://agriculture.okstate.edu/departments-programs/natural-resource/> for a full description of the application process. A student must be accepted by a member of the Department's faculty prior to official admission to the program.

## Minors

- Fisheries and Aquatic Ecology (FAEC), Minor (<http://catalog.okstate.edu/ferguson-college-agriculture/natural-resource-ecology-management/fisheries-aquatic-ecology-minor/>)
- Forestry (FOR), Minor (<http://catalog.okstate.edu/ferguson-college-agriculture/natural-resource-ecology-management/forestry-minor/>)
- Natural Resource Ecology and Management (NREM), Minor (<http://catalog.okstate.edu/ferguson-college-agriculture/natural-resource-ecology-management/natural-resource-ecology-management-minor/>)
- Rangeland Ecology and Management (REM), Minor (<http://catalog.okstate.edu/ferguson-college-agriculture/natural-resource-ecology-management/rangeland-ecology-management-minor/>)
- Wildlife Ecology (WLEC), Minor (<http://catalog.okstate.edu/ferguson-college-agriculture/natural-resource-ecology-management/wildlife-ecology-minor/>)

## Faculty

Robert J. (Jim) Ansley Jr., PhD—Professor and Head

**Regents Professors:** Samuel D. Fuhlendorf, PhD; Gail W.T. Wilson, PhD

**Professors:** Craig A. Davis, PhD; R. Dwayne Elmore, PhD; Daniel E. Shoup, PhD; Rodney E. Will, Jr., PhD; Chris Zou, PhD

**Associate Professors:** W. Sue Fairbanks, PhD; Laura E. Goodman, PhD; Omkar Joshi, PhD; Scott R. Loss, PhD; Timothy J. O'Connell, PhD

**Assistant Professors:** Colter Chitwood, PhD; Courtney Duchardt, PhD; Bryan D. Murray, PhD; Jia Yang, PhD; Lu Zhai, PhD

**Adjunct Faculty in the Oklahoma Cooperative Fish and Wildlife Research**

**Unit:** James Long, PhD; Robert Lonsinger, PhD

**Non-Tenure Track Faculty:** Marley Beem, PhD; Nicole Colston, PhD; Jacob D. Hennig, PhD; Anna K. Moeller, PhD; John R. Weir, MS