Natural Resources (NAT_R)

NAT_R 1001: Topics in Natural Resources
Specialized topic content in natural resources. Subject content and credit may vary by semester based on faculty resources and student needs. Offered periodically.

Credit Hour: 1-3

NAT_R 1040: Conservation Studies
A one-week field experience in natural resource management issues-soil and water conservation, air pollution, fish and wildlife habitat requirements, importance of forest ecosystems. Limited to high school students who have completed their junior year and taken the PSAT or equivalent. Graded on S/U basis only.

Credit Hour: 1

NAT_R 1070: Ecology and Conservation of Natural Resources
This course is designed to introduce you to the concepts that are important in natural resource management and conservation. The course is divided into three parts. Part one identifies the key ecological concepts that are important to natural resource management. We will also start a discussion on careers in natural resources. Part two focuses on key concepts in the human dimensions of natural resource management and conservation. The final portion of the course covers the application of ecological and human dimensions concepts to natural resource issues. The course is also designed to introduce you to career opportunities in natural resources management and conservation.

Credit Hours: 3

NAT_R 1120: Population, Environment and Sustainability
(same as SOCIOL 1120, PEA_ST 1120, ABM 1120). Changes in the structures and characteristics of population groups and their relationships to central environmental, development and sustainability issues. Graded on A-F basis only.

Credit Hours: 3

NAT_R 1400: A Series of Unfortunate Events in Global Water Issues
Introduction to broad aspects of water resources science and management. Focus on global case studies of water quality and quantity issues. Topics include water contamination by physical, chemical, and biological processes. Graded on A-F basis only.

Credit Hours: 3
Recommended: Non-majors only

NAT_R 2002: Topics in Natural Resources - Biological
Organized study of selected topics. Subjects and credit may vary from semester to semester.

Credit Hour: 1-99

NAT_R 2003: Topics in Natural Resources
Organized study of selected topics. Subjects and credit may vary from semester to semester.

Credit Hour: 1

NAT_R 2004: Topics in Natural Resources - Social Science
Organized study of selected topics. Subjects and credit may vary from semester to semester.

Credit Hour: 1-99

NAT_R 2080: Outdoor Recreation Consortium
Outdoor Recreation Consortium is a collaborative course taught by MU, North Carolina State University, Penn State University, East Carolina University, Texas A&M University and Western Illinois University. The course uses Great Smoky Mountains National Park as a case study for understanding the relationship between ecosystem management, natural resources management, tourism, and outdoor recreation. This course is based around a one week trip to the Smokies. Graded on A-F basis only.

Credit Hours: 2
Prerequisites: NAT_R 1070 or PRST 2111 or ENV_SC 1100 and/or permission of instructor

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NAT_R 2160: Issues in Natural Resources and the Environment
This course provides an introduction to ecological and environmental challenges in natural resource management in our rapidly changing world. Topical discussions will provide students with informed perspectives of several contemporary issues that affect the sustainability of our natural resources.

Credit Hours: 3
Recommended: This course is recommended as an introductory course for non-science majors

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NAT_R 2325: Introduction to Geographic Information Systems
Cover basic theories and techniques of GIS; including vector and raster data representation, vector data digitizing, attribute data input, map projection, layout database manipulation, terrain analysis and spatial interpolation.

Credit Hours: 3
Prerequisites: NAT_R 1070 or ENV_SC 1100

NAT_R 3001: Topics in Natural Resources
Organized study of selected topics. Subjects may vary from semester to semester.

Credit Hour: 1-99

NAT_R 3290: Hydrologic Measurement Techniques
Students will be introduced to field methods and tools used by water resource and environmental science professionals. Students will sample and measure hydrologic and environmental variables, learn about data storage systems, and access and analyze data. Course may be repeated for credit. Graded on A-F basis only.

Credit Hour: 1
Prerequisites: MATH 1100 or permission of instructor

NAT_R 3290W: Hydrologic Measurement Techniques - Writing Intensive
Students will be introduced to field methods and tools used by water resource and environmental science professionals. Students will sample and measure hydrologic and environmental variables, learn about data storage systems, and access and analyze data. Course may be repeated for credit. Graded on A-F basis only.

Credit Hour: 1
Prerequisites: MATH 1100 or permission of instructor

NAT_R 3300: Urban Agroecology and Agroforestry
Lecture/discussion course emphasizing food production in urban environments, including products from trees and shrubs. Lectures will cover topics such as designing multi-functional edible landscapes, selecting trees and shrubs for nut and fruit production, optimizing benefits of plant production spaces, and overcoming challenges of growing food in urban environments. Group discussions will critically review topics including material from required readings. Students will engage in analysis and design of an existing site to integrate multiple functions, emphasizing the permanent infrastructure and perennial vegetation. Graded on A-F basis only.

Credit Hours: 3
Recommended: FOREST 2151 or BIO_SC 1200 or PLNT_SCI 2110

NAT_R 3400: Water Quality and Natural Resource Management
(same as ENV_SC 3400). Introduction to broad aspects of water quality science, management, and policy. Topics include aquatic ecology, eutrophication, lake and coastal management, water supply and treatment, watershed management with respect to agriculture and urban development, and toxicology. Graded on A-F basis only.

Credit Hours: 3
Recommended: CHEM 1320 and ENV_SC 1100 or NAT_R 1070

NAT_R 3400H: Water Quality and Natural Resource Management - Honors
Introduction to broad aspects of water quality science, management, and policy. Topics include aquatic ecology, eutrophication, lake and coastal management, water supply and treatment, watershed management with respect to agriculture and urban development, and toxicology. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: Honors eligibility required
Recommended: CHEM 1320 and ENV_SC 1100 or NAT_R 1070

NAT_R 4001: Topics in Natural Resources
Organized study of selected topics. Subjects may vary from semester to semester.

Credit Hour: 1-99

NAT_R 4024: Foundations of Environmental Education
(same as ENV_SC 4024; cross-leveled with NAT_R 7024). This course provides a theoretical foundation to environmental education (EE). The purpose of this course is to develop the knowledge and skills for developing quality, age-appropriate EE for students in both formal and non-formal education setting. The emphasis is on EE curriculum materials, resources, and programs that can be used with students in settings at classrooms, nature centers, museums, and parks. This course involves training in the Missouri Department of Conservation Discover Nature School educational materials, and in observing and teaching EE lessons in a local nature center. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: ENV_SC 1100 or NAT_R 1070

NAT_R 4100: Lake Ecology
(same as ENV_SC 4100; cross-leveled with NAT_R 7100, ENV_SC 7100). Ecology of inland waters with emphasis on productivity. Graded on A-F basis only.

Credit Hours: 3
Recommended: senior standing or BIO_SC 3650

NAT_R 4110: Natural Resource Biometrics
(cross-leveled with NAT_R 7110). Sampling methods and analysis as applied to a variety of natural resources, including fisheries, range, recreation, forests, water and wildlife.

Credit Hours: 4

NAT_R 4300: Methods in Lake Ecology
(same as ENV_SC 4300; cross-leveled with NAT_R 7300, ENV_SC 7300). Methods used for quantitative assessment of water quality and quantity in inland waters. Graded on A-F basis only.

Credit Hours: 2
Recommended: Senior standing or BIO_SC 3650 and ENV_SC 4100 or NAT_R 4100 or NAT_R 3400

NAT_R 4308: Methods in Stream Ecology
(same as ENV_SC 4308; cross-leveled with NAT_R 7308, ENV_SC 7308). Students will be introduced to common techniques to measure streamflow and characterize stream ecosystems from a physical and biological perspective. The course combines lectures with field and lab experiences. Graded on A-F basis only.

Credit Hours: 2
Recommended: Senior standing or BIO_SC 3650 and ENV_SC 4200 or FOREST 4390

NAT_R 4353: Natural Resource Policy/Administration
(cross-leveled with NAT_R 7353). This course examines law, policy, and administration related to public lands and natural resources in the United States. The focus of this course is U.S. federal decision-making; we will also discuss Missouri state-level processes and selected topics in international environmental governance. Substantive policy areas addressed by this course include: public lands, wildlife and fisheries, water resources, forests, and energy and mineral resources. This course uses case studies to illustrate historical and contemporary natural resource management challenges. It also addresses topics on governance such as public participation, the role of lobbyists, campaign finance, and the use of technology to improve policy-making. This course will use a variety of teaching methods, including lecture and classroom discussion, guest speakers, map quizzes, and a natural resources book club.

Credit Hours: 3
Prerequisites: Junior or senior standing or instructor's consent

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NAT_R 4365: GIS Applications
Introduces logical thinking and techniques in applying GIS to practical problems. Covers general GIS functionalities, Arc View Spatial Analyst including georeference, terrain analysis, hydrological analysis, grid, and remote sensing image processing.

Credit Hours: 3
Prerequisites: GEOG 3040 or NAT_R 2325

NAT_R 4370: Society, Environment and Natural Resources
(same as SOCIOL 4370, ABM 4370; cross-leveled with SOCIOL 7370, NAT_R 7370, AAE 7370). An interdisciplinary examination of environmental and natural resource issues focusing on social, cultural, and policy dimensions. Diverse perspectives on human-nature interactions in domestic and international settings are included.

Credit Hours: 3
Recommended: ABM 1120, NAT_R 1120 or SOCIOL 1120

NAT_R 4385: Landscape Ecology and GIS Analysis I
(same as GEOG 4810; cross-leveled with GEOG 7810, NAT_R 7385). Examination of the landscape-scale approach to biodiversity, ecosystem dynamics, and habitat management. Particular emphasis on the use of Geographic Information Systems to analyze the spatial dimension of ecological patterns and processes.

Credit Hours: 3
Prerequisites: GEOG 3040 or NAT_R 2325

NAT_R 4940: Natural Resources Science and Management Internship
Internships offer a unique opportunity for students in the Fisheries and Wildlife Sciences, Forestry, Human Dimensions of Natural Resources, and Terrestrial Ecosystem Management Emphasis to develop knowledge and apply concepts from their coursework to short-term work experiences in natural resources research, conservation and management. Graded on S/U basis only.

Credit Hours: 3
Prerequisites: NAT_R 1070

NAT_R 4950: Undergraduate Research in Natural Resources Science and Management
Individually directed field or laboratory research, relevant to fundamental and applied questions in natural resource, for students under faculty supervision. Project must be arranged by student and faculty member prior to registration. Graded on S/U basis only.

Credit Hours: 3
Prerequisites: NAT_R 1070 or equivalent; Permission of instructor

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NAT_R 7001: Topics in Natural Resources
Organized study of selected topics. Subjects may vary from semester to semester.

Credit Hour: 1-99

NAT_R 7024: Foundations of Environmental Education
(cross-leveled with NAT_R 4024, ENV_SC 4024). This course provides a theoretical foundation to environmental education (EE). The purpose of this course is to develop the knowledge and skills for developing quality, age-appropriate EE for students in both formal and non-formal education setting. The emphasis is on EE curriculum materials, resources, and programs that can be used with students in settings at classrooms,

nature centers, museums, and parks. This course involves training in the Missouri Department of Conservation Discover Nature School educational materials, and in observing and teaching EE lessons in a local nature center. Graded on A-F basis only.

Credit Hours: 3

NAT_R 7100: Lake Ecology
(same as ENV_SC 7100; cross-leveled with ENV_SC 4100, NAT_R 4100). Ecology of inland waters with emphasis on productivity. Graded on A-F basis only.

Credit Hours: 3
Recommended: BIO_SC 3650

NAT_R 7110: Natural Resource Biometrics
(cross-leveled with NAT_R 4110). Sampling methods and analysis as applied to a variety of natural resources, including fisheries, range, recreation, forests, water and wildlife. Graded on A-F basis only.

Credit Hours: 4

NAT_R 7300: Methods in Lake Ecology
(same as ENV_SC 7300; cross-leveled with ENV_SC 4300, NAT_R 4300). Methods used for quantitative assessment of water quality and quantity in inland waters. Graded on A-F basis only.

Credit Hours: 2
Recommended: senior standing or BIO_SC 3650. ENV_SC 4100/ NAT_R 4100 or NAT_R 3400

NAT_R 7308: Methods in Stream Ecology
(same as ENV_SC 7308; cross-leveled with NAT_R 4308, ENV_SC 4308). Students will be introduced to common techniques to measure streamflow and characterize stream ecosystems from a physical and biological perspective. The course combines lectures with field and lab experiences. Graded on A-F basis only.

Credit Hours: 2
Recommended: BIO_SC 3650 and ENV_SC 4200/ENV_SC 7200 or FOREST 4390/FOREST 7390

NAT_R 7353: Natural Resource Policy/Administration
(cross-leveled with NAT_R 4353). This course examines law, policy, and administration related to public lands and natural resources in the United States. The focus of this course is U.S. federal decision-making; we will also discuss Missouri state-level processes and selected topics in international environmental governance. Substantive policy areas addressed by this course include: public lands, wildlife and fisheries, water resources, forests, and energy and mineral resources. This course uses case studies to illustrate historical and contemporary natural resource management challenges. It also addresses topics on governance such as public participation, the role of lobbyists, campaign finance, and the use of technology to improve policy-making. This course will use a variety of teaching methods, including lecture and classroom discussion, guest speakers, map quizzes, and a natural resources book club.

Credit Hours: 3
Prerequisites: instructor's consent

NAT_R 7370: Society, Environment and Natural Resources
(same as SOCIOL 7370, AAE 7370; cross-leveled with NAT_R 4370, SOCIOL 4370, ABM 4370). An interdisciplinary examination of environmental and natural resource issues focusing on social, cultural, and policy dimensions. Diverse perspectives on human-nature interactions in domestic and international settings are included.

Credit Hours: 3

NAT_R 8001: Topics in Natural Resources
Organized study of selected topics. Subjects may vary from semester to semester.

Credit Hour: 1-99

NAT_R 8024: Program Development and Evaluation in Informal Settings
This advanced level course focuses on designing, conducting, and analyzing quantitative educational research data and evaluation studies that measure the impact and effectiveness of environmental education and/or STEM education programs. Applied statistics in educational research will be taught. Evaluation is a set of approaches and techniques used to make judgments about the effectiveness or quality of a program or treatment; to inform decisions about its design, development, and implementation. This course provides theoretical background and techniques of program development and evaluation. This course will practice using qualitative and quantitative data for data analysis and manuscript writing. This is designed for those who will be working in leadership or supervisory capacities to gain skills in conducting needs assessments, designing programs, and conducting formative and summative evaluations of these programs for citizen science, inquiry-based learning, place-based program, students-centered, science outreach program, and nature explore study programs. By the end of the semester, students will have a ready-to-submit manuscript completed. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: ENV_SC 4024 or NAT_R 4024 or NAT_R 7024

NAT_R 8050: Masters Non-Thesis Research in Natural Resources
Research credits associated with a non-thesis M.S. project. May be repeated for credit. Graded on S/U basis only.

Credit Hour: 1-10
Prerequisites: restricted to Masters students in the School of Natural Resources

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NAT_R 8085: Graduate Problems in Natural Resources
Individualized problems studies to supplement regularly organized graduate courses in Natural Resources. Graded on A-F basis only.

Credit Hour: 1-5
Prerequisites: Instructor's permission

NAT_R 8090: Master Thesis Research in Natural Resources
Research credits leading to M.Sc. thesis. May be repeated for credit. Graded on S/U basis only.

Credit Hour: 1-10
Prerequisites: Restricted to Masters students in the School of Natural Resources

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NAT_R 8200: Ecological Restoration
This course will examine ecological restorations through the lens of a practitioners while taking into account the needs of all stakeholders, including the species, policies, human dimension, economics. Graded on A-F basis only.

Credit Hours: 3

NAT_R 8287: Seminar on Sustainable Development
(same as SOCIOL 8287, AAE 8287). An interdisciplinary examination of sustainable development focusing on social, economic, cultural and environmental dimensions of development. Theoretical and methodological approaches to sustainable development (systematic review and meta-analysis) as well as international and domestic issues are included. Graded on A-F basis only.

Credit Hours: 3
Recommended: AAE 7370/SOCIOL 7370

NAT_R 8290: Hydrologic Measurement and Synthesis
Students are introduced to methods fundamental to measuring hydrologic processes, and assessing physical data, including field measurement, and data logging and acquisition information systems. Students will gain experience analyzing and synthesizing hydrologic data using tools commonly used by water resource professionals. May be repeated for credit. Graded on A-F basis only.

Credit Hours: 2
Prerequisites: MATH 1100, STAT 2530, PHYSCS 1210. If deficient in prerequisite courses, or unsure of qualification, contact instructor for consent

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NAT_R 8300: Urban Biodiversity, Conservation, and Planning
The importance of urban biodiversity is debated by many in the conservation community. Some researchers and managers focus on threats to biodiversity associated with urbanization and land use change. In contrast to this approach people who live in, study, or care about cities: ecologists, wildlife managers, conservation biologists, planners, and local residents have debated what biodiversity means in urban settings. Recent literature on biodiversity in cities notes the range of ecological, social, and cultural meanings of urban biodiversity and stresses the importance of defining the setting and scales at which biodiversity is being assessed. This approach to urban biodiversity has documented the importance of conservation of rare species and habitats but also the importance of managing the range of habitats in and around where people live, work, and play. This course builds on the work of the NSF-funded Urban Biodiversity Research Coordination Network (UrBioNet), with course modules taught by UrBioNet steering committee members.

Credit Hours: 3
Recommended: Coursework in ecology, conservation / management or planning will be helpful in this course

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NAT_R 8325: Introduction to Geographic Information Systems
Cover theories and techniques of GIS; including vector and raster data representation, vector data digitizing, attribute data input, map projection, layout database manipulation, terrain analysis and spatial interpolation.

Credit Hours: 3
Prerequisites: Instructor's consent

NAT_R 8365: GIS Applications
Introduces logical thinking and techniques in applying GIS to practical problems. Cover general GIS functionalities, Arc View Spatial Analyst including georeference, terrain analysis, hydrological analysis, grid, and remote sensing image processing. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: GEOG 3040 or NAT_R 2325, or instructor's consent

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NAT_R 8395: Landscape Ecology and GIS Analysis II
(same as GEOG 8815). Provide students with principles and applications of landscape ecology and firm understandings of spatial analysis techniques using GIS. Discuss metrics for spatial pattern and models for landscape-scale dynamics.

Credit Hours: 3
Prerequisites: NAT_R 4365; FOREST 4320 or equivalent; basic statistics; instructor's consent
Recommended: GEOG 4810 or GEOG 7810

NAT_R 8435: Quantitative Data Analysis
This course introduces students to the fundamentals of quantitative data analysis in the social sciences. Emphasis is placed on understanding, interpreting, and applying statistical techniques commonly used in social research, including descriptive statistics, correlation, t-tests, ANOVA, chi-square tests, and linear regression. Students will gain hands-on experience managing data, running analyses, and reporting results in clear, meaningful ways. No prior statistical software experience is required. Graded on A-F basis only.

Credit Hours: 3

NAT_R 8450: Scientific Peer Review
The first portion of this graduate course will teach students how to critically read, interpret, and evaluate scientific journal publications. They will learn the publication process from beginning to end. The second portion of the course will cover the physical, chemical, and biological processes of lakes and streams emphasizing biological production, water quality, and emerging issues. This seminar-style graduate course will familiarize students with the limnological literature and give them the opportunity to provide perspectives and assessments of emerging manuscripts in the limnological field.

Credit Hour: 1-3
Recommended: NAT_R 4100 or NAT_R 7100 and NAT_R 4300 or NAT_R 7300

NAT_R 8485: Advanced Horticultural Breeding
Nuts, fruits, and vegetables are essential components of the food system and are highly valued for promoting human health and crop diversification. Recent years have seen considerable advancement in the genetic improvement of these crops, with breeding generations maturing, many new cultivars released, and modern genomic approaches integrated. This course introduces students to the essentials of horticultural crop breeding, offering an opportunity to learn about cross-pollinating species. In this course, we cover the priorities of the leading fruit and nut tree breeding programs (including hazelnut, walnut, chestnut, apple and other species) to give an in-depth look at the classical, current, and innovated breeding and genetic techniques used. Graded on A-F basis only.

Credit Hours: 3
Recommended: Introductory coursework in plant breeding and genetics will be helpful in this course

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NAT_R 8490: Crop Wild Relatives
Crop wild relatives are the undomesticated close cousins of cultivated crop species. They are an invaluable resource, not just for the roles they fill in their endemic ecosystems, but also as a source of genetic diversity with potential to expand the gene pool of the cultivated species. Crop wild relatives often harbor wider adaptive traits to both abiotic and biotic stresses compared to their cultivated counterparts, which represents an essential source of genetic variation in the face of climate change. Efforts to conserve these species face urgent threat of habit destruction and climate change. In this course, we review and discuss major manuscripts in this field to learn about the global efforts to organize, conserve, and use crop wild relatives.

Credit Hours: 3
Recommended: Background courses in plant breeding and genetics are helpful

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NAT_R 8500: Qualitative Analysis for Environment-Society Inquiry
Introduces students to qualitative field research from design, data collection, analysis, reporting, and peer-reviewed publication. Readings emphasize qualitative methods in a variety of social and behavioral sciences to address environmental problems.

Credit Hours: 3
Recommended: PRST 8430

NAT_R 8510: Interdisciplinary Quantitative and Mixed Research Methods
(same as AAE 8510). This course will give students a foundational understanding of quantitative and mixed research methodology in agricultural, environmental, natural resource, and sustainability social sciences. The main objective is to help students identify and formulate their own research questions and develop and implement a process for answering them. Graded on A-F basis only.

Credit Hours: 3

NAT_R 8800: Stakeholder Engagement in Environmental Management and Research
Environmental problems of the 21st century can be effectively addressed using processes that link sound scientific analysis with effective public deliberation. Many nations have laws requiring stakeholder identification and invitation for involvement in the development and implementation of environmental policy. Most of these laws, however, do not specify how to structure public participation in such situations, nor do they provide sufficient guidance on how information gathered from the public should be incorporated into management decisions. As society has become increasingly aware of development issues and has expressed a desire to participate in the regulatory process, the problems of structuring appropriate public participation opportunities, identifying appropriate stakeholders, and constructively incorporating public interests into decision making has become a central concern for many natural resource agencies, eNGOs, and other groups interested in conservation policy. Graded on A-F basis only.

Credit Hours: 3

NAT_R 8860: International Comparative Rural Policy
(same as PUB_AF 8860, AAE 8860). Compares the rural policy objectives and implementation strategies of various countries, and assesses these policies in terms of economic, social, environmental outcomes and their implications for international relations. Includes 2-

weeks of study Abroad. May be repeated for credit. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: Instructor's consent

NAT_R 9001: Topics in Natural Resources
Organized study of selected topics. Subjects and topics may vary from semester to semester. Graded on S/U basis only.

Credit Hour: 1-10
Prerequisites: instructor's consent. Restricted to School of Natural Resources Graduate Students

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NAT_R 9087: Graduate Seminar in Natural Resources
The course is designed to help students gain experience with presenting a research seminar in their academic area, conveying relevant information to audiences from diverse backgrounds, and interacting with others, professionally and efficiently. Some sections may be graded on A-F or S/U basis only.

Credit Hour: 1-10
Prerequisites: M.S. or Ph.D. students of Natural Resources, or consent of the instructor

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NAT_R 9090: Dissertation Research in Natural Resources
Research leading to a dissertation and Ph.D. in the School of Natural Resources. Graded on S/U basis only.

Credit Hour: 1-10
Prerequisites: Restricted to PhD students in the School of Natural Resources

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NAT_R 9490: Ecohydrology: Contemporary Topics
A series of discussions centered on primary literature within disciplines relevant to the participants. All Natural Resources disciplines are encouraged to participate (e.g., ecology, wildlife, fisheries, recreation/ tourism, hydrology, atmospheric sciences, soils, etc.) with emphasis on interdisciplinary research (i.e. integrated natural, social and/or physical scientific research). May be repeated for credit. Graded on A-F basis only.

Credit Hour: 1