ENVIRONMENTAL SCIENCE
(ENVR)

ENVR 1113 Elements of Environmental Science
Description: Application of biology, chemistry, ecology, economics, geology, hydrology, mathematics, physics, and other agricultural sciences to environmental issues. Addressing environmental problems from the standpoint of ethics, risk, and scientific and social feasibility. Emphasis on agricultural systems and natural resources.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Dean of Agriculture

ENVR 3113 Sampling and Analyses for Solving Environmental Problems
Prerequisites: ENVR 1113 and CHEM 1215 or CHEM 1314 and BIOL 1114.
Description: Provide multiple examples for evaluating the evidence which documents environmental problems. Develop sampling skills required to obtain biological and physical data needed in the evaluation of environmental problems. Analyze biological and physical data using basic statistical methods and determine the 1) severity of water, soil, and air pollution, and 2) degree of ecosystem degradation. Present findings as written reports which emphasize the use of comparative graphs, tables, and figures.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 3 Contact: 5
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Dean of Agriculture

ENVR 4010 Internships in Environmental Science
Prerequisites: Junior standing in environmental science or consent of instructor.
Description: Supervised internships with business, industry, or governmental agencies in environmental assessment and remediation. 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: Dean of Agriculture

ENVR 4112 Land Measurement and Site Analysis
Prerequisites: MATH 1513 or equivalent.
Description: Methods and techniques used to locate sites and evaluate physical conditions with the goal of collecting the required information for an environmental impact report; includes Public Land Survey System (PLSS), equipment selection and use, Global Positioning System (GPS), data collection and analysis, and mapping. Same course as MCAG 4112.
Credit hours: 2
Contact hours: Lecture: 1 Lab: 2 Contact: 3
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Dean of Agriculture

ENVR 4363 Environmental Soil Science
Prerequisites: BIOL 1114 and SOIL 2124.
Description: Re-emphasis of soil science concepts vital in the understanding of processes that are within the realms of the ecological regulator function of the soil; discussions on the role of soil as the foundation of forest, rangeland/pastureland, agricultural, urban and suburban, as well as wetland ecosystems; impact of soil processes on global environmental concerns; soil as the ultimate recipient of waste; impact of soil processes on groundwater and surface water quality Same course as SOIL 4363.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Dean of Agriculture

ENVR 4512 Environmental Impact Analysis
Prerequisites: Upper-division standing, GPA of 2.50 or better, and consent of instructor.
Description: Individual or small group study of selected problems in environmental science. Course may be used twice for up to six credit hours to meet degree requirements. 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: Dean of Agriculture

ENVR 4573 Ethical Issues in Agriculture and the Environment
Prerequisites: BIOL 1114 and SOIL 2124.
Description: Application of ethical concepts and economics theory to real-world agricultural and environmental issues. Recognition of the moral, ethical, and economic dimensions of value that aid in understanding and resolving the controversial aspects of these private and public issues.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Dean of Agriculture

ENVR 4811 Professional and Capstone Planning
Prerequisites: Senior standing.
Description: Preparation for work and communicate with environmental professionals and develop a written proposal to solve an environmental application or problem.
Credit hours: 1
Contact hours: Lecture: 1 Contact: 1
Levels: Undergraduate
Schedule types: Lecture
Department/School: Dean of Agriculture
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Description</th>
<th>Credit hours: 1-3</th>
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<tbody>
<tr>
<td>ENV 4813</td>
<td>Environmental Science Applications and Problem Solving</td>
<td>ENVR 4811 or consent of instructor.</td>
<td>Team work on environmental problems, to develop solutions and communicate recommendations to professionals as part of a senior capstone project. Results are presented by oral and written reports directly to professionals.</td>
<td>Contact hours: 3</td>
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<td>ENV 4893</td>
<td>Soil Chemistry and Environmental Quality</td>
<td>SOIL 2124 and CHEM 1225</td>
<td>Chemical and colloidal properties of clays and organic matter in soil systems, including ion exchange, retention, and precipitation; soil acidity and salinity; minerals weathering and formation; oxidation-reduction reactions; trace and toxic elements, water quality, land application of wastes, and soil remediation. Same course as SOIL 4893.</td>
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<td>ENV 4913</td>
<td>Animal Waste Management</td>
<td>SOIL 2124</td>
<td>Aspects of animal waste management related to animal nutrition, system design, land application, socioeconomic issues and environmental impacts. Same course as ANSI 4913 and SOIL 4913.</td>
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<td>ENV 5000</td>
<td>Master's Thesis</td>
<td>Approval of advisory committee and departmental steering committee.</td>
<td>Research leading to master's thesis or report. Offered for variable credit, 1-6 credit hours, maximum of 6 credit hours.</td>
<td>Contact hours: 1-6</td>
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<td>ENV 5033</td>
<td>GIS Applications for Water Resources</td>
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<td>ENV 5050</td>
<td>Readings in Environmental Science</td>
<td>Consent of the instructor.</td>
<td>This course provides an avenue for masters students to extend their knowledge of Environmental Science topics not covered in other courses. Offered for variable credit, 1-3 credit hours, maximum of 9 credit hours.</td>
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<td>ENV 5123</td>
<td>Environmental Problem Analysis</td>
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<td>This course reviews the process of environmental problem analysis using current practical examples. This course draws on theories from various disciplines and applies appropriate techniques of analysis.</td>
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<tr>
<td>ENV 5200</td>
<td>Special Topics in Environmental Science</td>
<td>Graduate standing.</td>
<td>Topics and issues in the broad field of environmental science. Group discussions and projects not covered by existing courses such as ecological risk assessment, water chemistry and environmental law. Offered for variable credit, 1-4 credit hours, maximum of 10 credit hours.</td>
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<td>ENV 5210</td>
<td>Seminar in Environmental Science</td>
<td>Consent of the instructor.</td>
<td>This seminar is offered as a special topics course for masters students. The theme of the seminar will vary in accordance with recent advances in environmental science and the interests of the faculty instructor. Offered for variable credit, 1-3 credit hours, maximum of 6 credit hours.</td>
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<td>ENV 5303</td>
<td>Issues in Environmental Sustainability</td>
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<td>This course reviews human-nature relationships and how they affect the ability of future generations to sustainably improve their quality of life. The course also considers methods of environmental stewardship that can contribute to sustainability. In-class and/ or online discussions of issues, guest presentations by outside experts, and reports on selected topics are included.</td>
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ENVR 5313 Clean Air Act: Regulation, Compliance and Reporting
Description: This course will present an overview of the Federal Clean Air Act including regulatory history and framework, key concepts such as technology forcing, enforceability and adequate margin of safety. This course addresses the preparation of emissions calculations for reporting and permitting, discussion of emissions monitoring and control technologies, and review of reporting requirements and legal standards for compliance. Course will focus on U.S. Federal and State application.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5353 Environmental Outreach and Education
Description: Techniques for environmental education and outreach programs for adults and children in the classroom and in the public arena.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5403 Water Resource Management, Law, and Policy
Description: This course explores ways to secure the right to obtain and use water, as well as the law relating to water pollution permitting. Surface and groundwater resources will be the focus. The course covers doctrines of water allocation, groundwater management regimes, the public rights to water, federal and tribal water management and regulation of water resources, and the permitting regime under the Clean Water Act.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

Description: This course focuses on the federal, state, and local agencies, policies, strategies, and public law that influence public lands management of the United States, and, to a lesser extent, other countries. Focus is on the historical and contemporary land management approaches used to protect, exploit, manage, and/or use public lands, with specific emphasis on the application of the National Environmental Policy Act (NEPA), jurisdiction, and contemporary issues.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5433 Environmental Law for Management Professionals
Description: This course blends fundamental environmental policy with legal and practical information for the management professional with emphasis on case and statutory histories. The course will explore why environmental laws and policies developed, how they are implemented, and how compliance is achieved. Students will gain the ability to evaluate the need for permits and know how to work practically and cooperatively with relevant state and federal agencies.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5443 Hazardous Waste Regulations for Environmental Managers
Description: Covers air, water and waste permitting and plans as well as DOT transportation of hazardous materials and several OSHA standards.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5453 Bioremediation for Environmental Managers
Description: Teaches the fundamental biological mechanisms that allow microorganisms and plants to degrade and/or remove contaminants from the environment.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5503 Environmental Management Practicum
Prerequisites: 18 graduate credit hours.
Description: This course explores methods of analyzing sustainable solutions to complex environmental, safety and health problems using an integrated team approach. This approach combines technical, legal, economic, and sociopolitical information into a coherent analytical framework.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5510 Environmental Management Internship
Prerequisites: ENVR 5503 and consent of program director.
Description: The student must identify and solve an environmental problem under the supervision of a competent professional environmental manager, and submit and defend a formal report presenting the problem, solution analysis methodologies, and recommended solution. The internship must involve at least 240 contact hours with the manager. The course is required of all masters students pursuing a plan of study in environmental management. Course previously offered as ENVR 5600.
Credit hours: 3
Contact hours: Contact: 3 Other: 3
Levels: Graduate
Schedule types: Independent Study
Department/School: Graduate College
ENVR 5513 Advanced Environmental Impact Analysis
Description: National Environmental Policy Act (NEPA) outlines documentation of potential environmental impacts for decision makers. Development of environmental assessment, environmental impact statements, and categorical exclusion documents that result from the NEPA processes. Development of environmental assessment projects graded on a pass/fail basis.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Graduate College

ENVR 5523 Industrial Ecology
Prerequisites: General biology.
Description: Provides students with an overview and broad understanding of ecology principles as applied to an industrial setting. The course begins with an overview of general ecological principles such as ecosystem components and structures, biogeochemical cycles, energy flows, and properties of populations. The course concludes with a consideration of industrial ecology principles such as sustainability, pollution prevention, life cycle assessment and waste minimization.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5533 Genres of Environmental Writing
Description: This course focuses on three written genres: proposals, reports and academic articles. Students will learn the basic Introduction, Methods, Results, and Discussion (IMRD) structure. This structure is the basis of workplace reports and research articles in a wide variety of academic disciplines. Students will examine how the language features and organizational structure of these documents are influenced by their audience and context.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5543 Environmental Management Systems
Description: This course introduces strategies for the design and operation of environmental management systems that reduce environmental impacts in conformance with ISO 14000 standards. Topics include aspect identification, impact assessment, impact reduction strategies, and management oversight. Other topics such as training, internal and external auditing, and integration with other management programs will also be addressed.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5553 Environmental Management Systems
Description: This course will fulfill the Federal Department of Transportation (DOT) training requirements for General Awareness and Security Awareness in accordance with 49 CFR, Part 172, Subpart H. The course covers shippers’ responsibilities associated with the many hazardous materials regulated by the DOT. Students will learn how to use the hazmat table and complete shipping papers; when to use specific hazard placards, markings and labels; and how to appropriately package specific hazardous materials.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5573 Applied Standards for Environmental Managers
Description: Foundational understanding of the complex regulatory framework related to waste management.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5583 Safety Aspects for Environmental Managers
Description: This course fulfills OSHA's 30-hour General Industry training requirements as per 29 CFR 1910. The course provides environmental managers with specialized training to recognize, avoid, and prevent potential jobsite hazards. Students will gain a practical understanding of hazard analysis calculations and their application within the rules and regulations of OSHA.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5593 Hazardous Waste Operations and Emergency Response: HAZWOPER
Description: This course fulfills the off-site requirements of OSHA 40-hour Hazardous Waste Operations and Emergency Responses Standard (HAZWOPER) requirements for General Site Workers as per 29 CFR 1910.20. The course uses discussion, demonstration, simulations, and hands-on experiences to address personal protective equipment use, decontamination procedures, and tactics for establishing safe work areas at hazardous waste sites or in emergency response work.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5633 Physical Geology for Environmental Managers
Description: Overview of the physical and chemical nature of the solid and fluid earth. Focuses on how these physical attributes and processes influence interactions between humans and the earth’s environment.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College
ENVR 5703 Chemical Aspects of Environmental Science I
Prerequisites: CHEM 1225, MATH 2155.
Description: For non-chemists with a basic understanding of industrial environmental chemistry. For the environmental professional student in the calculations required for permitting, such as the Clean Air Act, the Clean Water Act, release reporting (CERCLA), RCRA and Industrial Hygiene. The chemical interpretation of MSDS sheets and review of basic chemistry for individuals sitting for professional examinations. Fundamental scientific basis required for dealing with any environmental area.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5713 Chemical Aspects of Environmental Science II
Prerequisites: ENVR 5703.
Description: A continuation of 5703. Applications of statistical methods for environmental monitoring, environmental sampling, chemical wastewater treatment, fugacity (air emission calculations) and environmental chemical analysis.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5723 Field Investigation for Environmental Managers
Description: This course focuses on practical environmental investigations of soil, surface water, and groundwater contamination within an industrial setting. Students will research study sites to design, estimate cost, and implement actual field investigations. Samples will be analyzed and results used to make recommendations for operational improvement and/or remediation.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5733 Environmental Site Assessment
Description: This course introduces concepts associated with conducting environmental site assessments (ESAs) and contaminant remediation. Topics include review of federal regulations regarding site assessments, an overview of Phase I and Phase II ESA methodologies, proper soil/water sampling techniques, soil/geochemistry/hydrogeology principles relating to environmental assessments, and various remediation strategies. The course includes field exercises simulating Phase I and Phase II ESA investigations, interpretation of historical aerial photos, and wetland identification.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5743 Environmental Impact Assessment
Description: The course teaches students how to understand and apply the National Environmental Policy Act to evaluate and document potential environmental impacts for decision makers. The course reviews the development of environmental assessment, environmental impact statement and categorical exclusion documents that result from the NEPA process. Emphasis is placed on the development of an environmental assessment program.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5753 Environmental Site Remediation
Description: Introduction to concepts associated with environmental site remediation. Emphasis will be placed on the application and assessment of site clean-up.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5783 Watershed Management
Description: This course provides an overview of watershed management that integrates law, politics, economics, watershed science, engineering, education, social marketing, and conflict resolution. Students will also learn how to critically evaluate watershed management programs. Field trips to watersheds are included.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 5803 Field Stream Assessment
Description: Techniques for evaluating the health of streams. Laboratory techniques for fish and aquatic insect collection, habitat assessments, chemical water quality analysis, and stream discharge measurement.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 6000 Doctoral Research for Dissertation
Prerequisites: Approval of advisory committee.
Description: Research leading to the PhD dissertation. Offered for variable credit, 1-12 credit hours, maximum of 24 credit hours.
Credit hours: 1-12
Contact hours: Contact: 1-12 Other: 1-12
Levels: Graduate
Schedule types: Independent Study
Department/School: Graduate College
ENVR 6011 Survey of Environmental Science
Description: This course introduces newly admitted environmental science students to environmental research conducted by faculty at OSU. The course also helps students prepare interdisciplinary plans of study that support their professional and research goals. It is required of all ES doctoral students during their first year of enrollment. The course may also be taken by ES masters students, but is not required.
Credit hours: 1
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 6023 Research Methodologies in Environmental Science
Prerequisites: Permission of student's research adviser.
Description: Introduction to research techniques and literature in environmental science for doctoral students.
Credit hours: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 6031 Interdisciplinary Research Report Preparation
Prerequisites: ENVR 6023 or AGED 5983 and permission of the student's research adviser.
Description: This course teaches students how to prepare and defend interdisciplinary dissertations. Students will learn how to interpret results, articulate findings, justify conclusions, and identify implications. They will also learn how to deliver professional conference presentations and write professional papers. The course requires permission of the student’s research adviser. The course is required of all ES doctoral students just before they intend to prepare and defend their dissertations. ES master's students who want to learn more about preparing and defending a thesis may also enroll.
Credit hours: 1
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 6050 Advanced Readings in Environmental Science
Prerequisites: Consent of the instructor.
Description: This course provides an avenue for doctoral students to extend their knowledge of environmental science topics not covered in other courses. Offered for variable credit, 1-3 credit hours, maximum of 9 credit hours.
Credit hours: 1-3
Levels: Graduate
Schedule types: Independent Study
Department/School: Graduate College

ENVR 6101 Advanced Seminar in Environmental Science
Prerequisites: Consent of the instructor.
Description: This course is offered as a special topics course for doctoral students. The theme of the course will vary in accordance with recent advances in environmental science and the interests of the faculty instructor. No masters student may enroll in this course. Offered for variable credit, 1-3 credit hours, maximum of 9 credit hours.
Credit hours: 1-3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 6310 Advanced Topics in Environmental Science
Prerequisites: 24 credit hours of graduate credit and permission of instructor.
Description: This course covers current topics and issues in environmental science. Though the topics will vary, each course will typically include environmental assessment, environmental sustainability and environmental policy. Group discussions and team projects may be required. Offered for variable credit, 1-3 credit hours, maximum of 6 credit hours.
Credit hours: 1-3
Levels: Graduate
Schedule types: Independent Study
Department/School: Graduate College

ENVR 6503 Advanced Environmental Management Practicum
Prerequisites: 30 graduate credit hours.
Description: This course discusses and compares advanced methods of analyzing sustainable solutions to complex environmental, safety and health problems. A framework for integrating technical, legal, economic, and sociopolitical analysis into a risk-based model will be developed and applied to a real-world case study. Required for doctoral students pursuing a plan of study in environmental management.
Credit hours: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College

ENVR 6505 Advanced Environmental Management Internship
Prerequisites: ENVR 6503 and consent of program director.
Description: The student must identify and solve an environmental problem in collaboration with a competent professional environmental manager, and submit and defend a formal report presenting the problem, problem and solution analysis methodologies, and recommended solution. The internship must involve at least 480 contact hours with the manager. The course is an experience for all ES doctoral students pursuing a plan of study in environmental management.
Credit hours: 6
Levels: Graduate
Schedule types: Lecture
Department/School: Graduate College
ENVR 6623 Social Aspects of Environmental Planning

**Description:** This course develops students' theoretical and practical understanding of social aspects of environmental planning. The course addresses topics such as social impact assessment, the role of public involvement, environmental justice, and other social considerations in the implementation of environmental programs. It will also demonstrate the application of social science techniques in environmental planning and prepare students for the application of social perspectives in environmental decision-making - in both the public and private sectors.

**Credit hours:** 3  
**Contact hours:** Lecture: 3 Contact: 3  
**Levels:** Graduate  
**Schedule types:** Lecture  
**Department/School:** Graduate College