



# Environmental Studies

## Graduate Faculty

Dr. William Sea, Dr. Carl Isaacson (CSS Chair), Dr. Miriam Rios-Sanchez, Dr. Paul Kivi, Dr. Michael Murray, Dr. Corrie Santos, Dr. Anna Carlson, Dr. Jeffrey Ueland, Dr. Mark Lawrence, Dr. Jill Stackhouse, Samantha Jones

**Note:** Graduate faculty from the following programs also participate in the teaching and research associated with this program: Biology, Chemistry, Computer Science, Economics, Geography, Geology, Mathematics, Physics, Political Science, Sociology.

## Master of Science - Environmental Studies

The Master of Science program accommodates individual student needs and backgrounds and provides students with several curricular and research opportunities. The interdisciplinary curriculum focuses on the natural and social sciences as they relate to environmental problem solving. Each graduate student is required to select a specialization, complete course work requirements, and conduct a research project leading to a thesis.

## Center for Sustainability Studies

The Center provides a focus for (1) applied environmental research by faculty and students and (2) the interdisciplinary academic Environmental Studies program. Applied environmental research in the Center focuses on both generic and regional problems related to pollution impacts and abatement, and natural resource utilization and protection. Special features of the Center include: laboratories and equipment devoted to ecological, chemical, microbiological, and toxicological studies. Working with the Center, students have opportunities to interact with authorities across disciplines through seminars, conferences, and cooperative research.

## Programs

- Environmental Studies, M.S. *master*

## Environmental Studies, M.S. *master*

### Preparation Requirements

Bachelor's degree from regionally accredited U.S. or approved international college or university, with course work equivalent to a major or minor in the natural or social sciences. One-page letter of intent stating the Environmental Studies research you want to pursue, your academic background, your professional work experience (if any), and any additional information you believe will assist those reviewing your application. For the application to be complete, the Graduate Record Exam (GRE) is required.

Required Credits: 30

Required GPA: 3.0

### I. REQUIRED CORE

COMPLETE THE FOLLOWING COURSES:

- ENVR 6300 Advanced Project in Literature Review (2 credits)
- ENVR 6400 Advanced Project in Methodology (2 credits)
- ENVR 6500 Advanced Graduate Project I (2 credits)
- ENVR 6600 Advanced Graduate Project II (2 credits)
- ENVR 6890 Grants and Contracts (2 credits)
- ENVR 6350 Computer Applications in Statistics (3 credits)

COMPLETE THE FOLLOWING COURSE:

Enroll for 1 credit - two different terms

- ENVR 6700 Graduate Environmental Seminar (1 credit)

### II. REQUIRED ELECTIVE COURSES

Select, with the consent of thesis advisor, at least 9 credits of graduate level coursework in Environmental Studies, Geology, or related field. Course options include:

- ECON 5040 Environmental Economics (3 credits)  
*or* ENVR 5040 Environmental Economics (3 credits)
- ENVR 5050 Geochemistry (3 credits)
- ENVR 5110 Environmental Chemistry (3 credits)
- ENVR 5200 Wastewater Treatment (3 credits)
- ENVR 5210 Environmental Law and Policy (3 credits)
- ENVR 5220 Sampling and Analysis (4 credits)
- ENVR 5230 Air Pollution Technology (4 credits)
- ENVR 5240 Waste Management (4 credits)
- ENVR 5260 Risk Assessment and Auditing (3 credits)
- ENVR 5300 Environmental Management and Safety (3 credits)
- ENVR 5400 Environmental Microbiology (3 credits)
- ENVR 5500 Environmental Toxicology (4 credits)
- ENVR 5600 Environmental Justice and Sustainability (3 credits)
- ENVR 5840 Wetlands Ecology (3 credits)  
*or* BIOL 5840 Wetlands Ecology (3 credits)
- ENVR 6920 Directed Group Study: Seminar (2 credits)
- GEOL 5120 Soils (4 credits)  
*or* BIOL 5120 Soils (4 credits)
- GEOL 5211 Environmental Hydrology (3 credits)
- GEOL 5212 Hydrogeology (3 credits)
- GEOL 5400 Glacial and Pleistocene Geology (3 credits)
- GEOL 5500 Topics in Paleontology (3 credits)
- GEOL 5600 Stratigraphy and Sedimentation (3 credits)
- GEOL 5700 Environmental Geophysics (3 credits)

ENVR 6700 may be repeated two additional times for 2 additional elective credits

- ENVR 6700 Graduate Environmental Seminar (1 credit)

### III. THESIS

COMPLETE THE FOLLOWING COURSE FOR 6 CREDITS:

- ENVR 6990 Thesis (1-6 credits)

### COMPETENCY REQUIREMENT

All graduate students in Environmental Studies are required to demonstrate competency in the computer application of statistics. This requirement is to be satisfied by the completion of the following course with a grade of B or better: ENVR 6350 Computer Applications in Statistics, 3 credits.

### Written Examination

All major programs require satisfactory completion of a final written examination, which needs to be successfully completed prior to scheduling the oral examination. Please consult with your academic advisor for requirements specific to your area of study.

## Environmental Studies Courses

---

### ENVR 5040 Environmental Economics (3 credits)

Examines environmental problems as consequence of market's failure to accurately value environmental resources. Alternative private and public policies are examined in terms of their effectiveness in improving the efficiency and equity with which water, air, and other resources are allocated. Also offered under ECON 5040.

### ENVR 5050 Geochemistry (3 credits)

Study of processes in the lithosphere, hydrosphere, and atmosphere; cycling of the elements; weathering; microbe-mineral interactions; nanoparticles; microscopic imaging. Prerequisite: Consent of instructor.

### ENVR 5110 Environmental Chemistry (3 credits)

Intensive study of biogeochemical cycles of natural and man-made pollutants including transformations, transport, fate and persistence mechanisms. Environmental effects, long-term impacts, and methods of treatment/prevention are discussed. Prerequisite: Consent of instructor.

### ENVR 5200 Wastewater Treatment (3 credits)

Introduction to the operation of the principal methods and treatment processes of municipal and industrial wastewaters, and for the disposal of treated effluent and sludges, and other solid materials. Integration of fundamental principles of science with different aspects of sanitary technology. Prerequisite: Consent of instructor.

### ENVR 5210 Environmental Law and Policy (3 credits)

Overview of environmental laws, regulations, and policies. Prerequisite: Consent of instructor.

### ENVR 5220 Sampling and Analysis (4 credits)

Methods of sampling and analysis of air, water, soil and other environmental compartments will be described in lecture and experienced in laboratory session. The focus is on regulations and prescribed protocols for environmental field and lab work. Lecture and laboratory. Prerequisites: CHEM 1112 or CHEM 2212 or ENVR 2000 or GEOL 1110 or consent of instructor.

### ENVR 5230 Air Pollution Technology (4 credits)

In-depth overview of sources and types of air pollution, major environmental impacts, regulations, and technologies for control and cleanup. Prerequisite: ENVR 5210 and ENVR 5300 or consent of instructor.

### ENVR 5240 Waste Management (4 credits)

An overview of the solid and hazardous waste situation at the local, state, national, and international levels. The focus on management will include a systems approach to prevention, control, and remediation of wastes. Prerequisite: ENVR 5300 or consent of instructor.

### ENVR 5260 Risk Assessment and Auditing (3 credits)

Overview of human/environmental risk assessment methods and environmental auditing techniques, with a focus on regulatory compliance and case studies. Prerequisites: ENVR 5300, ENVR 5210 and ENVR 5240 or consent of instructor.

### ENVR 5300 Environmental Management and Safety (3 credits)

Helps students pursuing environmental studies to develop environmental management skills required in both manufacturing and non-manufacturing businesses. Safe handling, transport, and storage of hazardous materials with respect to their physical and chemical nature, and application of regulatory requirements relevant to specific business and hazardous materials involved. Prerequisite: Consent of instructor.

### ENVR 5400 Environmental Microbiology (3 credits)

Fundamental aspects of microbiology as related to land production, environmental pollution and water quality control processes. The role of major groups of microbes as pollutants, as purifying agents, and as agents of biochemical changes, and ecological functions and importance of each group in the environment. Prerequisite: Consent of instructor.

### ENVR 5500 Environmental Toxicology (4 credits)

An overview of major environmental pollutants, their transport, fate, and toxicology. Pollutant effects studied from practical and theoretical focus on stress at various levels of biological organization. Prerequisite: Consent of instructor.

### ENVR 5600 Environmental Justice and Sustainability (3 credits)

The ethical and moral dimensions of environmental choices. The legal, philosophical, political, and economic underpinnings of various theories of justice. A major focus is the inequitable distribution of environmental risks and the implications of policies that attempt to combat these risks. Prerequisite: Consent of instructor.

**ENVR 5610 Sustainability: Theory and Practice (4 credits)**

Becoming agents of positive change in our communities requires building many different skill sets. This course will build core competencies of community leadership and focus on sustainability issues in our community. We will integrate theories, principles and practices of sustainability throughout the course and explore how various entities such as the University, the City of Bemidji, local tribes, companies, non-profits and individuals approach sustainability actions and choices. We will explore issues such as energy, water, waste, food and transportation as well as diversity, equity and inclusion in decision making. Students will be asked to identify a specific problem facing our community and utilize Problem and Project Based Learning (PBL) techniques to directly engage with these local issues, connect with the stakeholders involved and work together to propose potential solutions. Prerequisite(s): ENVR 2000 or consent of instructor.

**ENVR 5700 Natural Resource Management (3 credits)**

This class offers an interdisciplinary introduction to the principles of natural resource management highlighting the biological and physical science aspects of natural resource management at local, national, and global scales. Topics covered may include resource management of soil, water, forests, rangelands, wetlands, waterways, and wildlife. This is an intermediate-level course designed to introduce key concepts and topical areas in natural resource management. A specific focus for the course will be the application of adaptive natural resource management to key Minnesota resources at multiple levels of government (local, county, state, federal, and tribal) over time. Prerequisite(s): consent of instructor.

**ENVR 5710 Indigenous Environmental Knowledge: Global Perspective (3 credits)**

Indigenous cultures refer to pre-colonial societies who today represent a minority, non-dominant group in the societies presently residing in territories these cultures once developed. Throughout their history, Indigenous people have developed their own body of environmental knowledge that they have passed on, generation to generation. This course will provide students with a global perspective of Indigenous environmental knowledge and how this knowledge has affected the relationship of the Indigenous peoples with the natural world and its resources. Students will also investigate present-day political, economic, social, and technological issues related to incorporating Indigenous environmental knowledge into sustainability efforts.

**ENVR 5720 Food Sovereignty, Health & Indigenous Environments (3 credits)**

This course is designed to help students understand the interconnections of food sovereignty, health and environmental sustainability. Students will explore why it is not only important for people to control the way their food is produced, distributed, and consumed but why the food should be appropriate to the cultural background of the people consuming it. Students will learn the critical connections between food and health with an exploration of those influences within the context of Indigenous worldviews and ways of knowing. This is an experiential learning course -- learning through interaction, projects, and reflection. This course may be suitable as an elective in Indigenous Studies and Environmental Studies, Health and Nursing degree programs.

**ENVR 5730 Sustainable Communities: Local Indigenous Perspective (3 credits)**

Human societies all across the globe have developed rich sets of experiences and explanations relating to the sustainable communities they live, work and play in. This course is designed to introduce students to the basic concepts of these sustainable communities. Students will learn how these communities function, their challenges, and the critical networks that exist with the environment. This class will explore the role of Indigenous knowledge and traditional ways of learning, as well as scientific knowledge in maintaining the sustainability of a community. This is an experiential learning course -- learning through interaction, projects, and reflection.

**ENVR 5740 Environment, Wellness & the Sacred Connection to Place (3 credits)**

In Indigenous communities, there is a deep and lasting connection to place. Today, there exists overwhelming evidence that connection to place offers important elements for overall individual wellness. However, many communities face challenges in their environments that are detrimental to their health and well-being. To support these communities, there is a need to reconnect them with ways to restore the sustainability of their environment and connection to place. In this course, students will learn the critical connections between the environment and health and will explore the influences of connection to place within the context of Indigenous worldviews and ways of knowing. This is an experiential learning course -- learning through interaction, projects, and reflection.

**ENVR 5750 Sustainable Communities: Global Indigenous Perspective (3 credits)**

Throughout their history, Indigenous people have developed their own body of knowledge on global sustainability that they have passed on, generation to generation. This course will provide students with a large picture perspective of global Indigenous sustainability knowledge and viewpoints and how this perspective continues to affect the relationship of the Indigenous peoples with the natural world and its resources. Students will also investigate present-day global political, economic, social, and technological issues related to incorporating Indigenous views into sustainability efforts across the continents.

**ENVR 5840 Wetlands Ecology (3 credits)**

Survey course develops a basic understanding of the terminology, classification, ecology, values, and conservation of wetlands. Covers wetland systems from around the world, with emphasis on wetlands in North America.

**ENVR 6300 Advanced Project in Literature Review (2 credits)**

A comprehensive literature search of a selected research project as it applies to the natural sciences, including the trends in research perspectives over time, finding the historical roots of current lines of research, and identifying obvious gaps in the research on the selected project, and ending with specific research questions, purposes, or hypotheses.

**ENVR 6350 Computer Applications in Statistics (3 credits)**

An examination of several computer-based packages for statistical analysis, focusing on selection of appropriate statistical procedures, processing by computer, and interpretation of results.

**ENVR 6400 Advanced Project in Methodology (2 credits)**

Advanced learning in research methodology as it applies to qualitative and quantitative research, sampling and data collection methods, experimental vs. non-experimental procedures, and various statistical methods for data analysis.

**ENVR 6500 Advanced Graduate Project I (2 credits)**

Students learn a combination of literature, laboratory, or field techniques and carry out research under the supervision of a faculty advisor. Students will work together to critique and improve course projects during the semester.

**ENVR 6600 Advanced Graduate Project II (2 credits)**

Students work on further developing a research plan based on a combination of literature, laboratory, or field methods and carrying it out under supervision of a faculty advisor in preparation for completing their thesis. Students will work together to critique and improve course projects during the semester.

**ENVR 6700 Graduate Environmental Seminar (1 credit)**

This course exposes graduate students to a range of topics within environmental science. In a seminar format, students will discuss environmental problems in a deeper context and present progress reports on their thesis research. Faculty and guests will make presentations for students to discuss. Students must enroll in ENVR 6700 a minimum of twice over two semesters. Students may enroll for credit up to 4 times.

**ENVR 6890 Grants and Contracts (2 credits)**

A practical investigation of grantsmanship with emphases on funding sources, creative writing, effective conduct of project and reporting results. Gives students first-hand practice in all phases of grantsmanship. Review and critique both qualitative and quantitative model proposals.

**ENVR 6920 Directed Group Study: Seminar (2 credits)**

When taken as Graduate Seminar the following description applies: Interdisciplinary study and detailed discussion of major areas of environmental controversy with emphasis on individual investigation of the available literature and effective oral presentation. Prerequisite: Consent of instructor.

**ENVR 6990 Thesis (1-6 credits)**

A thesis written by the student that reports extensive original research carried out by the student and demonstrates appropriate methodology and scholarship.

**All-University Courses**

The course numbers listed below, not always included in the semester class schedule, may be registered for by consent of the advisor, instructor, or department chair, or may be assigned by the department when warranted. Individual registration requires previous arrangement by the student and the completion of any required form or planning outline as well as any prerequisites.

1910, 2910, 3910, 4910 DIRECTED INDEPENDENT STUDY

1920, 2920, 3920, 4920 DIRECTED GROUP STUDY

1930, 2930, 3930, 4930 EXPERIMENTAL COURSE

1940, 2940, 3940, 4940 IN-SERVICE COURSE

1950, 2950, 3950, 4950 WORKSHOP, INSTITUTE, TOUR

1960, 2960, 3960, 4960 SPECIAL PURPOSE INSTRUCTION

1970, 2970, 3970, 4970 INTERNSHIP

1980, 2980, 3980, 4980 RESEARCH

1990, 2990, 3990, 4990 THESIS