

ENVIRONMENTAL SCIENCE

The Environmental Science Program at SMSU was developed with three goals in mind: first, to prepare students for a variety of career opportunities in the environmental field; second, to provide students with basic skills and knowledge needed for advanced study in professional or graduate school; and third, to promote an appreciation and understanding of the natural world. To meet these goals, the Environmental Science Program offers a diversified selection of courses in the biological, chemical, and physical sciences. Supporting courses in biology, chemistry and geology are an important part of this curriculum in that they provide additional skills and knowledge required of environmental scientists.

Note: Students must complete a minimum of 120 credits in order to graduate with a Bachelor's degree.

Programs Bachelors

- Environmental Science, BS (<http://catalog.smsu.edu/academic-programs-degrees/environmental-science/environmental-science-bs-humanity-option/>)

Minors

- Environmental Education, Minor (<http://catalog.smsu.edu/academic-programs-degrees/environmental-science/environmental-education-minor/>)
- Environmental Science, Minor (<http://catalog.smsu.edu/academic-programs-degrees/environmental-science/environmental-science-minor/>)

Faculty

Kelly, Bridget (<https://www.smsu.edu/directory/profiles/bridget-kelly.html>)

Assistant Professor of Science/Environmental Science

Vaughan, Elliot (<https://www.smsu.edu/directory/profiles/elliott-vaughan.html>)

Assistant Professor of Environmental Science

See the "Environmental Science Program Contact Information (<https://www.smsu.edu/directory/environmentalscience/>)" page for more details.

Undergraduate Courses

ENVS 100 Earth Science Credits: 3

This course is designed to provide non science majors with an introduction to Earth Science. Students examine the general physical environment, and the emphasis of study is Earth-sun relationships, meteorology, climatology, geology, geomorphology, hydrology, natural hazards, and environmental degradation. Particular attention is devoted to the exploration of the inherent global interconnectedness of natural environmental systems and human interactions with the physical environment.

Goal: Goal: 03- Natural Science 10- People/Environment

Fall: Department Discretion **Summer** All Years

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00001336/>)

ENVS 100L Earth Science Lab Credits: 1

This is the laboratory component of ENVS 100-Earth Science.

Students will engage in the practical application of the knowledge they acquire about natural environmental systems during lectures through observation, experimentation, and analysis. Topics of focus include Earth-sun relationships, meteorology, climatology, geology, geomorphology, hydrology, natural hazards, and environmental degradation. Particular attention is devoted to the exploration of the inherent global interconnectedness of natural environmental systems and human interactions with the physical environment.

Goal: Goal: 03- Natural Science 10- People/Environment

Fall: Department Discretion **Summer** All Years

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00002225/>)

ENVS 101 Introduction to Geology Credits: 3

The study of the earth and the forces that shape it, including minerals and rocks, landforms, and geological processes.

Goal: Goal: 03- Natural Science 10- People/Environment

Fall: All Years **Spring:** Department Discretion **Summer** Department Discretion

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00001327/>)

ENVS 101L Introduction to Geology Lab Credits: 1

The study of the earth and the forces that shape it, including minerals and rocks, landforms, and geological processes.

Goal: Goal: 03- Natural Science 10- People/Environment

Fall: All Years **Spring:** Department Discretion **Summer** Department Discretion

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00001481/>)

ENVS 102 History of Life Credits: 3

Study of the history and evolution of the earth including its lithosphere, hydrosphere, atmosphere, and biosphere. Topics also include the change in tectonics, rocks, environments, life, and fossils through geological time.

Goal: Goal: 03- Natural Science

Spring: All Years

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00001328/>)

ENVS 102L History of Life Lab Credits: 1

Study of the history and evolution of the earth including its lithosphere, hydrosphere, atmosphere, and biosphere. Topics also include the change in tectonics, rocks, environments, life, and fossils through geological time.

Goal: Goal: 03- Natural Science

Spring: All Years

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00001482/>)

ENVS 107 Introduction to ArcGIS Credits: 2

Introduction to the basic features of Arc GIS software with hands-on exercises in a computer lab setting. Exercises will provide practice in basic GIS functions such as spatial data creation, editing, manipulation, and analysis. Basic cartographic principles will be applied to produce map displays of exercise results.

Fall: All Years **Spring:** All Years

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00001986/>)

ENVS 115 Redwood River Monitoring Credits: 2

This course provides a unique opportunity for students to learn about river monitoring issues and techniques and to teach these skills to others as they mentor high school and 7th grade students. The course also allows students to take an active role in a community-based service-learning project in which data generated are directly applicable to local water conservation issues.

Fall: Department Discretion **Spring:** Department Discretion
Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00002386/>)

ENVS 120 Regional Geography of the U.S. & Canada Credits: 3

An introduction to the various regions of North America and the study of relationships between physiography, climate, ecosystems, human activities, and environmental issues in the regions.

Spring: Department Discretion
Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00001337/>)

ENVS 180 Environmental Science: Introduction Credits: 3

This course presents an overview of environmental science as well as basic principles of ecology and their implications for identifying and analyzing environmental problems. Also discussed is the impact of human activities on ecosystems and possible solutions to environmental problems.

Goal: Goal: 03- Natural Science 10- People/Environment
Fall: All Years **Spring:** All Years
Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00000175/>)

ENVS 180L Environmental Science: Introduction Lab Credits: 1

This course presents an overview of environmental science as well as basic principles of ecology and their implications for identifying and analyzing environmental problems. Also discussed is the impact of human activities on ecosystems and possible solutions to environmental problems.

Goal: Goal: 03- Natural Science 10- People/Environment
Fall: All Years **Spring:** All Years
Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00001398/>)

ENVS 186 Special Topics in Environmental Science Credits: 1-4

A study of environmental science topics not ordinarily covered in established courses.

Fall: Department Discretion **Spring:** Department Discretion
Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00002074/>)

ENVS 200 Environmental Science Seminar Credits: 1

This one-credit seminar class will provide an opportunity for environmental science majors, instructors, and guest speakers to discuss and critically examine current events and environmental issues, journal articles, internship and career opportunities, career preparation, and to network with potential employers.

Fall: Department Discretion **Spring:** Department Discretion
Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00001563/>)

ENVS 270 Soil Profile Description Credits: 1

This is a field course used to prepare students for intercollegiate soil judging contests.

Pre-Requisite : ENVS 251
Fall: Department Discretion
Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00002016/>)

ENVS 271 Collegiate Soil Judging Credits: 1

Methods of soil profile description and field interpretation of landscapes. Participation in soil judging team during regional or national contests is required.

Pre-Requisite : ENVS 251
Fall: Department Discretion
Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00002017/>)

ENVS 286 Special Topics Credits: 1-3

A study of environmental science topics not ordinarily covered in established courses.

Fall: Department Discretion **Spring:** Department Discretion
Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00000176/>)

ENVS 301 Basic Soil Science Credits: 3

Basic physical, chemical, and biological properties of soil. Soil genesis, classification, and principles of soil fertility. The required preparation for this course is three years of high school mathematics or MATH 060.

Fall: All Years
Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00002653/>)

ENVS 301L Basic Soil Science Lab Credits: 1

Laboratory experimentation related to the physical, chemical, and biological properties of soil including soil genesis, classification, and principles of soil fertility. The required preparation for this course is three years of high school mathematics or MATH 060.

Fall: All Years
Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00002654/>)

ENVS 302 Geomorphology Credits: 3

An in-depth, interdisciplinary investigation into landform development, landscape evolution, and the effects of geological processes and climate change on the Earth's surficial systems. Special emphasis on Quaternary environmental changes, glacial and interglacial transitions, and the resulting landscapes.

Pre-Requisite : ENVS 101
Spring: Even Years
Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00001394/>)

ENVS 303 Meteorology Credits: 3

This course provides students with an introduction to atmospheric characteristics and phenomena including: weather, composition and physical processes, air masses and global patterns of air circulation, frontal systems and severe weather, climate and climate change. Particular emphasis will be placed on human interactions with the atmosphere-natural hazards, forecasting, predicting and monitoring, pollution, and climate change-and the global nature of those interactions.

For students interested in fulfilling their LAC requirements, the companion lab for this course is currently ENVS 100L - Earth Science Laboratory.
Spring: Department Discretion
Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00002652/>)

ENVS 307 Advanced GIS and Spatial Analysis Credits: 3

This course will offer hands-on experience using Geographic Information System (GIS) software to conduct geographic and spatial analyses common to many different fields. Students will learn to manage and manipulate spatial data using geodatabases, work with digital elevation models, and analyze spatial relationships while working with diverse datasets.

Pre-Requisite : ENVS 107

Spring: Odd Years

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00206776/>)

ENVS 310 Hydrology Credits: 3

This course deals with the processes governing the depletion and replenishment of the water resources of the land areas of the earth. Students will be introduced to basic principles of the water cycle and the methodology used in determining water flow.

Pre-Requisite : MATH 110 AND ENVS 101 OR MATH 115 AND ENVS 101 OR MATH 140 AND ENVS 101

Fall: Department Discretion

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00000177/>)

ENVS 310L Hydrology Lab Credits: 1

This lab will give the student an opportunity to experience problems and case studies of hydrology in detail. The lab sessions will consist of data manipulation and analysis, computer simulation, and systems design for major topics of hydrology. These topics will include irrigation, drainage, groundwater use and flow, contaminant transport and remediation. Laboratory exercises and field trips are designed to provide a practical introduction to hydrologic methods.

Pre-Requisite : MATH 110 AND ENVS 101 OR MATH 115 AND ENVS 101 OR MATH 140 AND ENVS 101

Fall: Department Discretion

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00001399/>)

ENVS 311 Natural Hazards and Disasters Credits: 3

Study of the effects of geological processes on human society and the application of geological principles in identifying, evaluating, predicting, and mitigating natural hazards such as volcanoes, earthquakes, and floods. Other topics include global climactic change and human impacts on the environment from energy and resources extraction and utilization.

Pre-Requisite : ENVS 100 OR ENVS 101

Fall: Department Discretion **Spring:** Department Discretion **Summer** Department Discretion

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00001344/>)

ENVS 312 Rocks & Minerals Credits: 3

This course encompasses the description, identification, classification, interpretation, and formation of important common minerals and rocks and their geological implications.

Pre-Requisite : ENVS 101

Spring: Department Discretion

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00149179/>)

ENVS 312L Rocks & Minerals Lab Credits: 1

This course encompasses the description, identification, classification, interpretation, and formation of important common minerals and rocks and their geological implications.

Pre-Requisite : ENVS 101

Spring: Department Discretion

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00149181/>)

ENVS 320 Soils and Fertility Credits: 3

This course is the study of how soil fertility affects plant growth and what soil conditions are required to grow specific plants and crops, methods for testing plants and soils are reviewed. Fertilizer requirements, economics, placement, evaluation, residual effects and environmental effects are reviewed.

Spring: Department Discretion

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00000178/>)

ENVS 351 Environmental Toxicology Credits: 3

The study of potentially harmful agents in the environment and their effects on organisms and ecosystems. Topics covered include dose-response relationships, toxicity test methods, factors influencing toxicity, fate and effects of natural and synthetic chemicals in the environment, and ecological risk assessment.

Pre-Requisite : ENVS 180 AND BIOL 200 AND CHEM 121

Spring: Department Discretion

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00002013/>)

ENVS 352 Plant Nutrients in the Environment Credits: 3

Basic concepts related to plant nutrient availability in soils. Emphasis on the dynamic reactions of mineral elements in soil and water, and subsequent evaluation of plant growth and the environment. Diagnostic techniques for measuring specific soil fertility parameters.

Pre-Requisite : ENVS 251

Fall: Department Discretion

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00002018/>)

ENVS 353 Soil Conservation and Land Use Management Credits: 3

Soil erosion and land degradation processes on rural and urban landscapes. Technical, historical, economic, social, and international considerations of soil conservation. Land use management practices of soil conservation and methods of natural resource assessment.

Pre-Requisite : ENVS 251

Spring: Department Discretion

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00002019/>)

ENVS 390 Research Methods in Environmental Science Credits: 2

This course is designed to introduce students to the basic methods of research in Environmental Science. Emphasis will be placed on how to select a research project, how to conduct a literature search, how to write a project proposal, and field methods for data collection. This course is a prerequisite for ENVS 400, the capstone course in Environmental Science.

Pre-Requisite : ENVS 101 AND ENVS 180 and junior status.

Spring: All Years

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00156584/>)

ENVS 400 Environmental Data Analysis & Presentation Credits: 2

This is the capstone course for the environmental science major. Students will be expected to conduct an independent research project investigating various environments topics selected in conjunction with a faculty research advisor. Students will incorporate field, laboratory, and GIS experiences in environmental data gathering, analysis, interpretation, synthesis, and presentation. Students will present their findings in a variety of oral and written formats including at the annual SMSU Undergraduate Research Conference.

Pre-Requisite : ENVS 390

Fall: All Years

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00156625/>)

ENVS 401 Wetland Ecology Credits: 3

This course is a comprehensive review of the biological, physical, and chemical aspects of wetland ecosystems. The course also covers the restoration, creation, and management of wetlands as well as policy regulating these activities. The course will include North American wetland systems as well as other wetlands around the globe. Various field data collecting exercises will emphasize local wetlands.

Pre-Requisite : CHEM 121 OR CHEM 231

Fall: Even Years

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00000179/>)

ENVS 401L Wetland Ecology Lab Credits: 1

This course is a comprehensive review of the biological, physical, and chemical aspects of wetland ecosystems. The course also covers the restoration, creation, and management of wetlands as well as policy regulating these activities. The course will include North American wetland systems as well as other wetlands around the globe. Various field data collecting exercises will emphasize local wetlands.

Pre-Requisite : CHEM 121 OR CHEM 231

Fall: Even Years

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00001400/>)

ENVS 406 Limnology Credits: 3

Energetics, nutrient cycling, productivity and pollution of lakes and streams; abiotic and biotic diversity of aquatic ecosystems.

Pre-Requisite : BIOL 302

Fall: Odd Years

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00149183/>)

ENVS 406L Limnology Lab Credits: 1

Energetics, nutrient cycling, productivity and pollution of lakes and streams; abiotic and biotic diversity of aquatic ecosystems.

Pre-Requisite : BIOL 302

Fall: Odd Years

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00149184/>)

ENVS 426 Soil Morphology & Genesis Credits: 3

Physical and chemical weathering processes, factors of soil formation, introduction to soil mineralogy, soil survey utilization and interpretation. This course will also introduce students to various landscapes, their genesis, and land use impacts.

Pre-Requisite : ENVS 301

Fall: Department Discretion

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00002020/>)

ENVS 426L Soil Morphology & Genesis Lab Credits: 1

Description

Pre-Requisite : ENVS 301

Fall: Department Discretion

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00002642/>)

ENVS 480 Environmental Education Practicum Credits: 1-4

Applied, supervised experience in which students gain practical experience in environmental education. Specific proposal and approval by supervising instructor required prior to enrollment. A minimum of 30 hours of work experience is required per credit hour.

Fall: Department Discretion **Spring:** Department Discretion

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00204236/>)

ENVS 486 Advanced Special Topics Credits: 1-3

A study of environmental science topics not ordinarily covered in established courses.

Spring: Department Discretion

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00000181/>)

ENVS 494 Independent Study Credits: 1-3

Independent research, directed by a faculty member, which must be laboratory research, library research, or other experiences approved by the Environmental Science program.

Fall: All Years **Spring:** All Years

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00000182/>)

ENVS 499 Internship in Environmental Science Credits: 1-15

Supervised experiences in learning situations that cannot be obtained on campus.

Fall: All Years **Spring:** All Years

Course Outline (<https://eservices.minnstate.edu/registration/rest/rcld/0075/curricld/00000183/>)