Environmental Studies

Website: environmental.sewanee.edu

The environmental studies program at Sewanee offers students a rich array of curricular options including a major, a minor, and a certificate of curricular study. This expansive curriculum— including natural and social sciences as well as the humanities and fine arts — offers students multiple pathways to appreciating the ecological complexity and wonder of the earth we inhabit. The program's spread of curricular options enables majors to develop not only depth of exposure to certain fields and methodologies of study, but also cross-disciplinary breadth of understanding. This broad-gauged outlook is crucial for graduates looking to address the inherently interdisciplinary challenges of environmental study in today's world. So an overarching belief in the value and need for interdisciplinary inquiry suffuses the entire program. Students share common exposure to the program's team-taught offering ENST 101, as well as involvement in various other collaborative opportunities and occasions for interaction across academic disciplines.

A major asset of the environmental studies program at Sewanee is the unparalleled opportunity for field study available throughout the University's 13,000-acre land-base, commonly known as "the Domain." This extensive tract includes extensive woodlands, lakes, trails, caves, and bluffs that surround the central campus and encompass the residential village of Sewanee. The Domain's amalgamation of wildlife preserve, working forest, farmland, and settlements thus offers students and faculty members rare benefit as a "living laboratory" for inquiry.

Faculty

Professors Bachman, Brown, Dale, Durig, Evans, John Gatta, Haskell, Knoll, Kuers, Malde, McGrath, Michael, S. Miller, Peters, Pond, Potter, Ray, Shaver, J. Smith, K. Smith, Torreano, Willis

Assistant Professors Carter, Cecala, Elrod, Fielding, White

Associate Professors Levine, Sherwood, Shibata, Zigler

Majors

The College of Arts and Sciences offers four majors focused on the environment:

Ecology and Biodiversity (http://e-catalog.sewanee.edu/archives/2015-2016/arts-sciences/departments-interdisciplinary-programs/biology/ecology-biodiversity-major) (offered through the Department of Biology)
Environmental Arts and Humanities (http://e-catalog.sewanee.edu/archives/2015-2016/arts-sciences/departments-interdisciplinary-programs/environmental-studies/environmental_arts_and_humanities_major) (offered through the Environmental Studies Program)
Environment and Sustainability (http://e-catalog.sewanee.edu/archives/2015-2016/arts-sciences/departments-interdisciplinary-programs/earth-environmental-systems/environment-sustainability-major) (offered through the Department of Earth and Environmental Systems)
Natural Resources and the Environment (http://e-catalog.sewanee.edu/archives/2015-2016/arts-sciences/departments-interdisciplinary-programs/earth-environmental-systems/natural-resources-environment-major) (offered through the Department of Earth and Environmental Systems)

Minors

The College of Arts and Sciences offers two minors focused on the environment:

Environmental Studies (http://e-catalog.sewanee.edu/archives/2015-2016/arts-sciences/departments-interdisciplinary-programs/earth-environmental-systems/environmental-studies-minor) (offered through the Department of Earth and Environmental Systems)
Religion and Environment (http://e-catalog.sewanee.edu/archives/2015-2016/arts-sciences/departments-interdisciplinary-programs/environmental-studies/religion_and_environment_minor) (offered through the Environmental Studies Program)

Certificate

The watershed science certificate of curricular study is designed for students interested in gaining a better understanding of the interactions among the physical, chemical, and biological factors that affect our watersheds and wetlands. Students pursuing the certificate take a range of courses that focus on water resources and watershed science. In addition to hydrology, students take at least one half-course in applied watershed science, and choose additional watershed science courses from a list that contains offerings in a variety of disciplines, including biology, chemistry, forestry, geology, and environmental studies. Each student completes the certificate with the watershed science capstone course, a multidisciplinary, project oriented course in which students address issues related to two or more of the following topic areas: the interaction of biological processes and watershed function, chemical processes in streams and watersheds, the relationship between forested landscapes and hydrologic systems, or geological processes in terrestrial aquatic systems. The capstone

project may be a semester project created solely for the capstone, or may begin as a watershed-related summer internship project that is further developed by the student during an academic semester.

Students who obtain the certificate will be better prepared to pursue graduate training in watershed science and other hydrologic disciplines, or to begin careers associated with watershed science and management.

Students deciding to pursue the certificate should contact one of the faculty members of the Watershed Certificate Organizing Committee to develop his or her study plan. The Organizing Committee is also available to help a student identify his or her area of emphasis and primary faculty supervisor for the ESCI 430; together the student and primary supervisor identify the second discipline and arrange to work with a faculty member in that area. The Watershed Certificate Organizing Committee is comprised of Professor Knoll, Forestry and Geology; Associate Professor McGrath, Biology; and Assistant Professor White, Chemistry.

Requirements for the Certificate in Watershed Science

The certificate of curricular study requires successful completion of the following:

Course Requirements		
ESCI 430	Watershed Science Capstone	4
FORS/GEOL 314	Hydrology (Lab)	4
Select one of the following:		2
ESCI 444	Independent Study (approved by the Organizing Committee)	
FORS 260	Forest Watershed Measurements	
GEOL 315	Watershed Contaminant Hydrology	
Select twelve hours from the following:		12
BIOL 210	Ecology (Lab)	
BIOL 237	Freshwater Biology (Lab)	
ENST 217	Fundamentals of GIS	
ENST 235	Freshwater Conservation	
ENST 240	Island Ecology (Lab)	
ENST 301	Introduction to Spatial Information Systems and Field Mapping	
ENST 310	Comparative Watershed Studies	
ENST 311	Comparative Watershed Studies Field Course	
ENST 317	Advanced Applications of GIS	
FORS 215	Fisheries Ecology and Management (Lab)	
FORS 262	Forest and Watershed Restoration (Lab)	
FORS 270	Water Resource Policy and Law	
FORS 303	Soils (Lab)	
FORS 305	Forest Ecology (Lab)	
GEOL 303	Soils (Lab)	
GEOL 411	Geochemistry of Natural Waters	
Total Semester Hours		**22**

Off-Campus Study

Island Ecology Program

The island ecology program is an interdisciplinary summer field school in the sciences. Following a seminar during the Easter (spring) semester, students study geological, biological, and broadly ecological topics for five weeks on St. Catherines Island, an undeveloped barrier island off the coast of Georgia. The experience emphasizes the interdependence of these disciplines by exploring how the fragile ecosystem of the island functions. The program is limited to ten Sewanee students but is open to non-science as well as science majors. Four faculty members from two departments teach in the program each spring and summer.

Courses

Environmental Science Courses

Courses with the ESCI designation are interdisciplinary in nature, focus on environmental sciences, and do not otherwise fit into one of Sewanee's traditional science disciplines. ESCI courses differ from Environmental Studies courses (ENST) in that the major focus is on

environmental science and scientific methodology. Interdiscipinary non-science aspects of the environment, which are often central to ENST courses, play a more minor role in ESCI courses.

ESCI 430 Watershed Science Capstone (4)
Capstone course for students pursuing the watershed science certificate. A multidisciplinary, project-oriented course in which students address issues related to two or more of the following topic areas: the interaction of biological processes and watershed function, chemical processes in streams and watershed, the relation between forested landscapes and hydrologic systems, or geological processes in terrestrial aquatic systems. *Open only to seniors pursuing curricular certificates in watershed science.*

ESCI 444 Independent Study (2 or 4)
A supervised field or laboratory investigation of an interdisciplinary topic in environmental science. May be taken more than once for credit. *Prerequisite: Professor consent and prerequisite override required.*

Environmental Studies Courses

ENST 100 Walking the Land (4)
A field-oriented geology and writing course, conducted on the Cumberland Plateau and surrounding provinces. The emphasis will be on observation of geological features, particularly geomorphology, and how these relate to other natural parts of the landscape. Historical aspects of human use of the land will also be emphasized. Extensive walking and hiking. Field journals will be part of the writing-intensive approach.

ENST 101 Introduction to Environmental Studies (4)
An interdisciplinary introduction to Environmental Studies through the examination of the scientific and social aspects of environmental issues. Field components of the course focus on the University Domain and the surrounding area. This course is required for all students who major or minor in environmental studies and should be taken before the junior year.

ENST 140 Readings in Island Ecology (2)
Supervised readings and discussion in geology, hydrology, invertebrate zoology, marine zoology, maritime plant communities, and wildlife behavior as preparation for participation in the interdisciplinary summer Island Ecology program. *Prerequisite: Approval of the Island Ecology program director.*

ENST 201 Foundations of Food and Agriculture (4)
Integrating local, regional, and global perspectives, this course outlines the history of agriculture, introduces the development of food systems and policy, and reviews the environmental impact of food production. Among topics addressed are the history of agricultural expansion in the US, the development of agriculture and food policies, interaction among agricultural markets at home as well as abroad, and sustainable agriculture. Classroom activities emphasize the involvement of multiple constituencies in identifying and articulating agricultural issues. Field opportunities include garden activities and local trips aimed at relating broader issues to how livelihoods are pursued on the Cumberland Plateau.

ENST 211 Sustainability and Global Environmental Change Seminar (2)
This seminar-style course exposes students to literature on a variety of issues related to climate change and other examples of our dynamic global environment including natural resource use and natural hazards. *Prerequisite: Approval of the Sustainability and Global Environmental Change program director.*

ENST 212 Sustainability and Global Environmental Change Field Studies (2)
This course is an interdisciplinary field immersion into a selected location that provides tangible experience of the concepts introduced in ENST 211. Students travel throughout the field site, exploring real-world examples of sustainability efforts in the context of our changing global environment. Concepts of sustainability, climate change, natural resource use, and natural hazards will be explored in the field context. Field sites may change from year to year.

ENST 217 Fundamentals of GIS (4)
An introduction to the basic concepts and applications of geographic information systems (GIS). Topics include geographic data acquisition, data management, cartography, and methods of geospatial analysis. Laboratory exercises and projects focus on applications of GIS in understanding and managing the environment. Laboratory course.

ENST 220 Reading the Landscape (4)
A study of how patterns in the current biological and physical landscape of the Cumberland Plateau can be explained by historical human land use and natural disturbances. Landscape change is examined through field investigation of specific places on the Domain conducted in combination with the analysis of aerial imagery and other geospatial data resources. The course also addresses how disturbance history can influence one's aesthetic valuation of the landscape and guide landscape-level conservation efforts. This course may count as a non-laboratory science course.

ENST 235 Freshwater Conservation (4)
A survey of existing and emerging threats to wetland ecosystems and the consequences for animal and human populations. This course discusses causes, consequences, and solutions for issues of international and local concern based on an understanding of freshwater ecology and function. Also considers multiple perspectives on water use and attempts to reconcile these differences so as to identify and publicize potential conservation solutions. *Prerequisite: BIOL 130 or ENST 101 or FORS 121.*

ENST 240 Island Ecology (Lab) (8)
This interdisciplinary field course combines the study of geology, oceanography, marine biology, botany, and wildlife behavior in a single coastal island ecosystem. *Prerequisite: ENST 140 and approval of the Island Ecology program director.*

ENST 250 Environmental and Biological Non-Fiction (4)
An examination of contemporary intersections among literature, journalism, biological science, and the study of the environment, supplemented by readings of nineteenth- and twentieth-century antecedents. Assignments allow students to develop their own writing abilities in these areas. Consideration is also given to the relationships among non-fiction, fiction, and other forms of creative expression.

ENST 285 The Development of Aldo Leopold's Land Ethic (4)
This course traces the development of Aldo Leopold's famous essay "The Land Ethic" through his 40-year career at the beginning of the ecology and conservation movements. Early writings by this noted conservationist are analyzed from the perspectives of environmental history and natural resource management and policy. Leopold essays from a broad spectrum of time (1915-1949) are discussed. Topics include ecosystem management, wildlife conservation and utilization; outdoor recreation, public lands, and wilderness; and agriculture as a land use. To contextualize Leopold's historical voice, perspectives on modern issues are contrasted with perspectives contemporary to Leopold. *Not open to new first-year students.*

ENST 300 Seminar in Ecology and Ethics (4)
Students will analyze and evaluate scientific and ethical arguments from selected environmental issues. Emphasis will be on exploring the relationship between science and ethics. A research project is required.

ENST 301 Introduction to Spatial Information Systems and Field Mapping (4)
An introduction to the ArcView Geographic Information System and the concepts and uses of Spatial Information Systems, the analytic side of GIS. The course will focus on the use of GIS in natural systems but will not have modules and exercises in the social science aspects including crime mapping and human demographics. The course will also contain three modules on field mapping. Knowledge of trigonometry is very useful and students should know the basics of Windows and Excel. Not open for credit to students who have completed FORS/GEOL 410.

ENST 302 Ecology, Evolution, and Agriculture (4)
An investigation of the reciprocal interaction between human and the organisms that nourish us. The class examines the origins and subsequent evolution of domesticated plants, animals, and agricultural pests, and the ways in which these organisms have shaped our bodies and communities. The class will also focus on the relationship between food production and hunger. Class will involve reading, writing, and discussions, invited speakers, field trips, and the study of ecological processes and natural history in and around an organic garden.

ENST 305 Ecological Integrity in Agriculture (4)
This course develops a critique of problems and solutions relating to agricultural technology, policy, and practice with a specific focus on ecology and ecological integrity. The course begins with a brief survey of agricultural history, through the era of modern food systems, with emphasis on the development of industrial agriculture. After evaluating the environmental impact of modern agriculture, the course addresses the foundations of sustainability, with specific reference to the ecology of sustainable agriculture. Field opportunities are provided for students to interact with local producers on their farms and to engage directly the ecological processes involved in food production on the Domain. *Prerequisite: BIOL 130.*

ENST 310 Comparative Watershed Studies (2)
The course compares watersheds of the Cumberland Plateau to those of the Kraichgau region of southwestern Germany. Emphasis is on the hydrology, geology, forest cover, and history of human use of select watersheds and how these factors have defined the present natural and cultural landscapes. *Prerequisite: GEOL 121.*

ENST 311 Comparative Watershed Studies Field Course (2)
A two-week field course in the Kraichgau region of southwestern Germany. The course is hiking-based and requires students to keep a detailed notebook. *Prerequisite: ENST 310.*

ENST 317 Advanced Applications of GIS (4)
This course uses spatial analysis methods for environmental analysis and management. Topics include remote sensing and image analysis, surface analysis, spatial statistics, internet mapping, visualization of geographic data, and other advanced GIS methods. *Prerequisite: ENST 217.*

ENST 320 Environment and Sustainability Colloquium (4)
This required course for junior environment and sustainability majors addresses some topical themes from an interdisciplinary perspective and with focus on the connections between science and policy. Colloquium themes vary from year to year, and students present relevant research articles and lead discussions with emphasis on developing skill in public speaking. Students also work with course instructors and faculty mentor(s) to propose a research project to be completed as part of their senior environment and sustainability capstone. *Open only to juniors pursuing majors in environment and sustainability. Prerequisite: ENST 101 and completion of the foundational science requirement in major.*

ENST 334 Environmental Policy and Law (4)
This course combines the study of public policy with the study of major environmental problems. Students will explore public policy concepts and the instruments used in environmental regulation. Topics will include air and water quality issues hazardous waste and risk management, natural resources and biological diversity. The course will also discuss the impact of environmental groups and citizen activism on this highly complex area of public policy. Not open for credit to students who have completed POLS 334. *Prerequisite: ENST 101 or ENST 200.*

ENST 336 Environmental Land-Use Policy (4)
This course examines the complex systems and values influencing land-use decision-making in both rural and urban settings throughout the U.S. and abroad. Students learn how government agencies and local citizens often conflict in their attitudes and values regarding the costs and benefits of growth and development. Particular attention is paid to forest conversion issues on the South Cumberland Plateau. Students attend local planning sessions and meetings with local officials. *Prerequisite: ENST 101 or ENST 200.*

ENST 340 Tools for Environmental Policy Analysis (4)
This course introduces students to quantitative tools applicable to the analysis of environmental policy–including forecasting methods, simulation modeling, and mathematical programming. Probability distributions, risk modeling, and decision-making under uncertainty are also addressed. Students apply such tools to a range of policy analyses and also, where relevant, learn to work with large-scale models developed by others.

ENST 341 Environmental Data Analysis (4)
A survey of the principles of study design and data analysis in the field of environmental studies. Topics include study design, hypothesis testing, sampling methodology, exploratory data analysis, and the graphical presentation of results. These concepts and techniques are examined through discussion of the primary literature and problem sets.

ENST 350 "Nature" Writing (4)
An exploration of the literature of "nature." Students interrogate ideas of nature and investigate literary responses to these ideas. Readings for the class include works from multiple cultural perspectives, including texts by writers for whom the idea of nature is alien or oppressive.

ENST 351 Field Studies in "Nature" Writing (4)
Students conduct experiments in writing and critique, informed by contemplative engagement with the community of life on the University's land. *Prerequisite: ENST 350.*

ENST 400 Environmental Arts and Humanities Capstone (4)
A capstone experience for Environmental Arts and Humanities majors. An examination of selected environmental issues from a variety of perspectives in the natural and social sciences and humanities. Special emphasis on student research on the Domain and in the region. *Open only to seniors.*

ENST 421 Environment and Sustainability Capstone (4)
This course provides a capstone experience for the Environment and Sustainability major. Major components include independent student research projects and an examination of selected environmental issues from a variety of perspectives in the natural and social sciences. *Open only to seniors pursuing majors in environment and sustainability. Prerequisite: ENST 320.*

ENST 431 Practicum in Religion and Environment (2)
This course, which calls for involvement in some faith-based or otherwise engaged form of appropriate activity or service, offers students a capstone opportunity to examine their spiritual experiences and religious beliefs in the context of active engagement with environmental issues in a variety of ways. Reflection on the engagement experience, expressed both in written form and through oral presentation, is required. *Open only to juniors or seniors pursuing minors in religion and the environment. Prerequisite: Professor consent and prerequisite override required.*

ENST 444 Independent Study (2 or 4)
An opportunity for students to explore a topic of interest in an independent or directed manner. *Prerequisite: Professor consent and prerequisite override required.*