

# CENTER FOR ENVIRONMENTAL STUDIES

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The undergraduate and graduate programs in environmental studies are interdisciplinary in nature, exposing students to the critical links between the areas of environmental life sciences, technology and policy.

At the undergraduate level, students gain the necessary skills for entry-level field and research positions. Class lectures and guest speakers introduce the importance of policy-making and awareness in the environmental field, while laboratory and internship experiences provide a working knowledge of the latest in environmental technology and field practices.

The graduate programs provide two options for students to further their studies in the environmental life sciences. The Master of Science in Environmental Studies is a thesis-based program designed for those individuals interested pursuing research in the environmental field. The Master of Environmental Studies (the non-thesis program) is a terminal, two-year professional degree for individuals working in the private/public sector of the environmental field.

- Environmental Studies, Master of (M.Env.s.) (<http://bulletin.vcu.edu/graduate/vcu-life-sciences/center-environmental-studies/environmental-studies-menvs/>)
- Environmental Studies, Master of Science (M.S.) (<http://bulletin.vcu.edu/graduate/vcu-life-sciences/center-environmental-studies/environmental-studies-ms/>)

## **ENVS 510. Stream Surveys. 3 Hours.**

Semester course; 2 lecture and 3 laboratory hours. 3 credits. Prerequisite: BIOL 317 or permission of the instructor. This course will cover basic and advanced methods used to study fishes and benthic macroinvertebrates in small, wadeable streams. Topics covered will include qualitative and quantitative field surveying methods, fish and invertebrate specimen identification, and data analysis of original field data.

## **ENVS 515. Tropical Field Ecology. 4 Hours.**

Semester course; 3 lecture and 3 laboratory hours. 4 credits. Study abroad at a tropical location. This course provides students with an immersive study of tropical ecology and conservation through a unique blend of rigorous science and community engagement. While studying abroad, students learn about tropical ecosystems by collecting data on both organisms and their habitats and by reading and discussing scientific papers. Students also engage with local conservation organizations leading efforts to protect habitats. Progress and research findings are intended to be presented in a symposium format. See the Schedule of Classes for specific regions and topics.

## **ENVS 521. Introduction to Geographic Information Systems. 3 Hours.**

Semester course; 2 lecture and 2 laboratory hours. 3 credits. An introduction to creating and using geographically referenced databases for urban and environmental analysis and planning. Includes geographic and remote sensing data structures, global positioning systems, spatial analysis, geographic data standards, public domain software and data resources, and principles of cartography design. Lab exercises in the use of geographic information systems software tools. Crosslisted as: URSP 521.

## **ENVS 541. Principles of Waste Management. 3 Hours.**

Semester course; 3 lecture hours. 3 credits. Design and operation of waste treatment, storage, disposal and control processes will be covered. Design tanks, landfills and incinerators will be discussed in detail. Data acquisition and interpretation methods needed for process control and monitoring will be examined.

## **ENVS 543. Environmental Data Literacy. 3 Hours.**

Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with graduate standing, or those with one course in statistics and permission of instructor. Develop quantitative skills for the visualization, manipulation, analysis and communication of environmental "big data." This course focuses on spatial environmental data analysis, interpretation and communication, using real-time data from the Rice Rivers Center and the R statistical analysis environment.

## **ENVS 550. Ecological Risk Assessment. 3 Hours.**

Semester course; 3 lecture hours. 3 credits. Prerequisites: course work in ecology, or permission of instructor. Ecological risk assessment provides an introduction to the concepts and practice of risk assessment as applied to ecological applications, focusing on the United States. The course will examine the history of risk assessment in U.S. environmental regulation and policy, development and practice of ecological risk assessment and application to regional issues. All students will conduct a risk assessment for a regional case study.

## **ENVS 556. Historical and Cultural Landscapes. 3 Hours.**

Semester course; 3 lecture hours. 3 credits. Open only to seniors who have completed ANTH 302 or 303 and graduate students with permission of instructor. Students will study historical and contemporary landscapes as the products of the producers of human culture, with particular attention to riverine landscapes. Focus will be on the ways in which humans shape and respond to their ecosystems. Students will participate in an active field research program, including the archaeological recovery and analysis of historical landscapes. Crosslisted as: ANTH 556.

## **ENVS 590. Research Seminar in Environmental Studies. 1 Hour.**

An interdisciplinary examination of problems and issues related to environmental studies.

**ENVS 591. Topics in Environmental Studies. 1-4 Hours.**

Semester course; 1-4 lecture hours. 1-4 credits. May be repeated with different topics for a maximum of 12 credits. An in-depth study of a selected environmental topic. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

**ENVS 601. Survey in Environmental Studies. 3 Hours.**

Provides a foundational understanding of issues central to environmental studies. Lectures will address the theoretical and scientific basis for a variety of pertinent issues, including: and water quality and quantity, pollution prevention, environmental law and policy, population growth, global climate change, conservation, and human and ecological health.

**ENVS 602. Environmental Technology. 1-3 Hours.**

This course gives students the opportunity to develop skills not available in the traditional academic setting. Students take two to four workshops offered by the Center for Environmental Studies in its Environmental Technology Training Workshop series. Students will complete an additional project related to each workshop or series of workshops for evaluation purposes.

**ENVS 603. Environmental Research Methods. 3 Hours.**

Semester course; 3 lecture hours. 3 credits. Prerequisite: ENVS 543, STAT 543 or permission of instructor. Provides students with an understanding of statistical and research methods as they apply to environmental research. This course emphasizes the application of current data analysis methodologies, including the graphical display of summary data, statistical modeling and prediction, and geographic information systems.

**ENVS 627. Infographics: Visualization of Scientific Data. 3 Hours.**

Semester course; 3 lecture hours. 3 credits. This course will introduce graduate students in the natural sciences to some of the modern tools used by designers for data visualization and digital communication. The course is a mix of traditional lecture and computer lab exercises, but also makes use of the sketchbook and reflective writing. Students will proceed through a series of projects that sequentially build their technical skills in Adobe Creative Suites (particularly Illustrator and Photoshop) as well as their knowledge of fundamental concepts in graphic design and the communication arts.

**ENVS 628. Environmental Policy and Administration. 3 Hours.**

Semester course; 3 lecture hours. 3 credits. This course explores the relationship between environmental policy and its implementation within a democratic political system. It includes an investigation of basic concepts that underlie environmental policy and the difficulties encountered when attempting to apply them in a real-world setting. It also surveys a variety of tools and methodologies that may be useful in attempting to develop and implement environmental policy. Crosslisted as: PADM 628.

**ENVS 640. River Policy. 3 Hours.**

Semester course; 3 lecture hours. 3 credits. Examines public policy related to rivers and watersheds. Uses the James River for exploring and illustrating generic river policy issues. Crosslisted as: GVPA 640.

**ENVS 650. Pesticides, Health and the Environment. 3 Hours.**

Semester course; 3 lecture hours. 3 credits. Prerequisites: Course work in toxicology, chemistry or permission of instructor. This course is a balanced overview of the benefits and adverse effects of pesticides in the environment and as related to human health. The class provides an interdisciplinary study of pesticide use, fate, exposure, transport and effects.

**ENVS 654. Environmental Remote Sensing. 3 Hours.**

Semester course; 3 lecture hours. 3 credits. Prerequisite: ENVS 602, or permission of the instructor. This course provides a basic and applied understanding on the use of digital remote sensor data to detect, identify and characterize earth resources. Students are required to demonstrate an understanding of the spectral attributes of soils, vegetation and water resources through various labs involving both image- and non-image-based optical spectral data. Crosslisted as: URSP 654/BIOL 654.

**ENVS 655. Hydrogeology. 3 Hours.**

Semester course; 3 lecture hours. 3 credits. Focuses on the fundamental concepts of groundwater flow and contaminant transport with an emphasis toward environmental issues such as waste disposal, surface water hydrology, groundwater hydrology and wells, environmental impacts and hydrogeological systems. Allows students to understand and interpret the basic environmental hydrogeologic characteristics of a site and to use that knowledge to provide an informed opinion on protection and remediation.

**ENVS 660. Virginia Environmental Law. 3 Hours.**

Semester course; 3 lecture hours. 3 credits. An overview of relevant Virginia environmental law and regulations in the fields of environmental planning, management and policy. Provides students with working knowledge of documentation necessary for compliance with state environmental programs.

**ENVS 670. Pollution Physiology. 3 Hours.**

Semester course; 3 lecture hours. 3 credits. Prerequisites: Course work in: ecology, toxicology or animal physiology; or permission of instructor. Course provides an in-depth presentation of the physiology of animals in polluted habitats and examines the responses of aquatic organisms exposed to pollutants and other environmental stressors, including: thermal and salinity changes, anoxia and hypoxia, hypercapnia, chemical contamination, sedimentation and microbial contamination. The course takes a comparative approach and focuses on non-human systems. Both laboratory and field experiences are provided.

**ENVS 675. Advanced Environmental Applications of GIS. 3 Hours.**

Semester course; 3 lecture hours. 3 credits. Prerequisite: ENVS 521 or ENVS 602. The objective of this course is to give students a greater understanding of advanced GIS topics using environmental data. Knowledge gained in this course will give students the tools required to address complex natural resources and environmental issues by providing experience in advanced spatial and geostatistical analysis and environmental modeling. Students will also be exposed to programming, open source tools and interfaces that are used to disseminate large environmental data sets.

**ENVS 691. Topics in Environmental Studies. 1-4 Hours.**

Semester course; 1-4 lecture hours. 1-4 credits. May be repeated with a different topic for a maximum of 12 credits. Provides an in-depth study of a selected environmental topic. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

**ENVS 692. Independent Study. 1-3 Hours.**

Variable hours. 1-3 credits per semester. May be repeated with different topics for a maximum of 6 credits. An in-depth study of a selected environmental topic.

**ENVS 693. Internship in Environmental Studies. 1-3 Hours.**

Each credit hour represents 60 clock hours of work. Provides students with a workplace experience in a public or private agency related to Environmental Studies.

**ENVS 697. Research. 1-3 Hours.**

Planning, preparation, completion, and presentation of research in environmental studies.

**ENVS 698. Thesis. 1-3 Hours.**

Planning, preparation, completion, and presentation of research in environmental studies.