



DEPARTMENT OF
ENVIRONMENTAL
SCIENCE & TECHNOLOGY

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ENVIRONMENTAL SCIENCE AND TECHNOLOGY
AT THE UNIVERSITY OF MARYLAND



Welcome!

The Department of Environmental Science and Technology is *the* place for ecological discovery and natural solutions! Our primary mission is to educate students on the fundamentals of environmental science, while instilling a deep fascination and intellectual capacity to work in Natural Resources Management, Ecological Technology Design, Soil and Watershed Science or Ecosystem Health.

UNDERGRADUATE PROGRAM

Ecological Technology Design
Ecosystem Health
Soil and Watershed Science
Natural Resources Management



WHY ENST?

As human populations continue to grow, so do concerns about the effects of humans on ecosystems and, in turn, how ecosystems and the built environment affect human health and well-being. The ENST undergraduate major trains students in not only understanding the science behind impacts to ecosystems and human health, but also how to develop solutions addressing these impacts.

CAREER OPTIONS

In today's economy there are many career options for graduates from the ENST major, including careers in government agencies, environmental consulting firms, "green" industries, and non-governmental organizations. Furthermore, the ENST major includes a strong science and math foundation that prepares students for study in a wide range of graduate programs.



FACULTY

The major is taught by a group of award winning faculty with a rich background in environmental sciences who are as comfortable lecturing in a classroom as they are leading students through wetlands, wastewater treatment plants, and forests.



As part of the energy and environment course, students visited Watershed to learn about ecological technologies such as green roofs, green walls, constructed wetlands, and rain gardens as well as solar electricity and solar thermal energy for hot water.



ECOLOGICAL TECHNOLOGY DESIGN

The Ecological Technology Design concentration prepares students for integrating natural systems with the built environment to solve environmental problems while achieving economic, ecological, and social sustainability. The science and applications of using natural systems, processes, and organisms to address environmental issues has evolved during the last few decades to a mature level whereby there are strong employment opportunities for graduates that are cross-educated in ecology and technology.

| SAMPLE COURSES

- Ecological Design
- Renewable Energy
- Industrial Ecology
- Energy and Environment
- Wetland Restoration
- Ecosystem Services: An Integrated Analysis

| EXAMPLE CAREERS

- Environmental Restoration Layout Foreman
- Environmental Project Manager
- Design Engineer
- Project Engineer
- Environmental Consultant
- Environmental Scientist
- Staff Scientist
- Environmental Educator
- Water Quality Technician
- Biologist
- Environmental Research Assistant
- Research Associate
- Ecological-Social Entrepreneur

ECOSYSTEM HEALTH

The Ecosystem Health concentration gives students the concepts and skills to work in this broad and increasingly important field with wide ranging applications at the intersection of environmental science and public health. The field encompasses environmental factors and ecosystem functions that affect human health and the effects of human activities on the ecosystem products and services we depend on. Example topics in the field include ecological risk analysis, environmental toxicology, environmental impact assessment, chemical fate and transport, human health risk assessment, industrial hygiene, air quality, environmental microbiology, food safety and security, biodiversity, and human health.

| SAMPLE COURSES

- Fundamentals of Soil Science
- Introduction to Ecosystem Health
- Ecosystem Health and Protection
- Emerging Environmental Threats
- Ecological Risk Assessment
- Environmental Toxicology
- Energy and Environment

| EXAMPLE CAREERS

- Environmental Risk Assessor
- Public Health Investigator and/or Inspector
- Resource Manager-Health of Fisheries and Wildlife
- Environmental Policy Analyst
- University Professor and/or Researcher
- K-12 Environmental and/or STEM Educator
- Environmental Compliance Officer



Students using backpack electrofishing to survey fish populations as an indicator of stream health. For example, largemouth bass from many Chesapeake Bay tributaries have been found with high levels of intersex, a pathological condition suggesting exposure to chemical contaminants.



SOIL AND WATERSHED SCIENCES


The Soil and Watershed Sciences concentration provides students with one of the top soil science programs in the nation. The concentration enables students to understand the complex ways in which aquatic and terrestrial ecosystems are influenced by soil properties and processes and land management decisions. Soil performs such critical ecological functions as supplying and purifying water, recycling wastes, nurturing plants, modifying the atmosphere by emitting or sequestering gases and particulates, providing habitat for the most diverse biological communities on Earth, and serving as a medium for human engineering projects.

SAMPLE COURSES

- Fundamentals of Soil Science
- Field Soil Morphology
- Soil Morphology, Genesis, and Classification
- Soil Physics and Hydrology
- Soil Chemistry
- Soil Microbial Ecology
- Soil-Water Pollution
- Wetland Soils

EXAMPLE CAREERS

- Soil Conservationist
- Soil Scientist/Soil Mapper
- Environmental Consultant
- Wetland Delineator
- University Professor and/or Researcher
- K-12 Environmental and/or STEM Educator
- Environmental Scientist
- Environmental Educator



Students examine a soil profile exposed in a core collected with MacCauley sampler during a field assessment to delineate wetlands.



GRADUATE PROGRAM

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Soil and Watershed Sciences
Ecological Technology Design
Wetland Science

Ecosystem Health and Natural Resources Management



FACULTY

The ENST graduate program is guided by faculty recognized for their research and teaching excellence and committed to providing a high quality experience of education and mentoring for graduate students.

RESEARCH

Our faculty are committed to the principle that graduate education at both the M.S. and Ph.D. levels requires a commitment to research. Graduate students, therefore, will pursue a research project under the tutelage of their advisor and advisory committee. Prospective students are encouraged to identify one or more potential faculty advisors with whom they share areas of research interest.



COLLABORATIONS

The University of Maryland is located between Beltsville, MD and Washington DC and is thus near the headquarters and principal laboratories of several federal agencies, including the U.S.D.A., the U.S. Geological Survey, National Academy of Sciences, National Aeronautic and Space Administration, National Institutes of Health, Department of Energy, Smithsonian Institution, National Park Service, and others.

SOIL AND WATERSHED SCIENCES

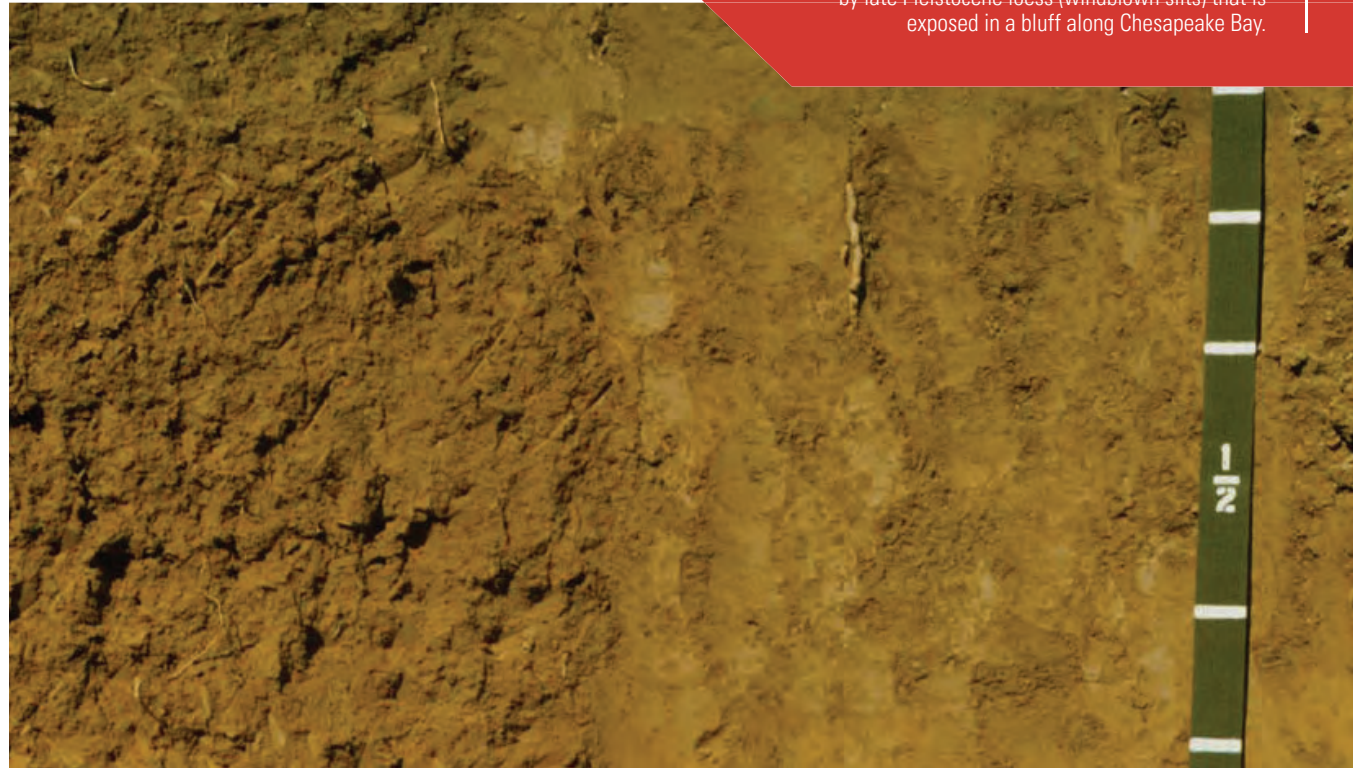
The specialization in Soil and Watershed Sciences prepares students to address challenging environmental issues that involve the soil resource at field, landscape, and watershed scales. Soils are the most complex and ecologically significant biogeochemical systems on Earth. Soil processes and the soil resource are critical to all terrestrial ecosystems from prairies to the Alaskan tundra, to wetlands, to our cities, to forests, to biofuel farms. Soil science is at the center of what the National Science Foundation terms the Critical Zone - the confluence of atmosphere, lithosphere, hydrosphere, and biosphere near the surface of the Earth.

POTENTIAL RESEARCH AREAS

- Pedology
- Soil Biology, Microbiology, and Ecology
- Soil Chemistry and Biochemistry
- Soil Fertility and Nutrient Management
- Soil Conservation and Management
- Soil Health and Sustainable Agriculture Systems
- Wetland and Subaqueous Soils
- Urban Soil Ecosystems
- Hydrology
- Soil Physics



Soils students examine and describe a paleosol buried by late Pleistocene loess (windblown silts) that is exposed in a bluff along Chesapeake Bay.





Dr. Stephanie Lansing and Ph.D. student, Ashley Belle, oversee the construction of small-scale anaerobic digesters built to treat dairy manure using microbial processes. They harness renewable energy inherent in the waste and reduce greenhouse gas emissions, odors, and pollution from manure management practices.



ECOLOGICAL TECHNOLOGY DESIGN

The graduate specialization in Ecological Technology Design prepares students to integrate natural systems with the built environment to solve environmental problems while achieving economic, ecological, and social sustainability. The science and application of using natural systems, processes, and organisms to address environmental issues has evolved during the last few decades to a mature level whereby there are strong employment opportunities for graduates that are educated jointly in ecology and technology.

POTENTIAL RESEARCH AREAS

- Green Infrastructure
- Ecological Engineering and Design
- Renewable Energy
- Systems Ecology
- Natural Treatment Systems
- Urban-Social-Ecological Systems
- Water-Energy-Food Nexus
- Environmental Accounting
- Ecohydrology and Stormwater Management

WETLAND SCIENCE

The graduate specialization in Wetland Science addresses the keen awareness among the environmental community that wetlands represent a critical and understudied component of many larger ecosystems. Hydrophytic vegetation, hydric soils and wetland hydrology all contribute to endow wetlands with specialized biota and valuable ecosystem services. In addition to the more obvious recreational and aesthetic contributions of wetlands, they provide fish and wildlife habitat, protect and enhance water quality through biogeochemical processes, reduce stream and coastal flooding, and afford protection against shoreline erosion. Wetlands have rapidly gained public attention in recent decades as they have been brought into the limelight by state and federal regulations and through the attention given by large scale environmental issues such as Hurricane Katrina.

POTENTIAL RESEARCH AREAS

- Systems Ecology
- Coastal Processes
- Wetland Soils
- Mosquito Ecology
- Global Change
- Restoration Ecology
- Invasive Species
- Remote Sensing
- Emerging Contaminants
- Fish and Wildlife
- Ecohydrology
- Plant Ecology
- Linked Socio-ecological Systems
- Ecological Engineering
- Microbial Ecology and Biogeochemistry

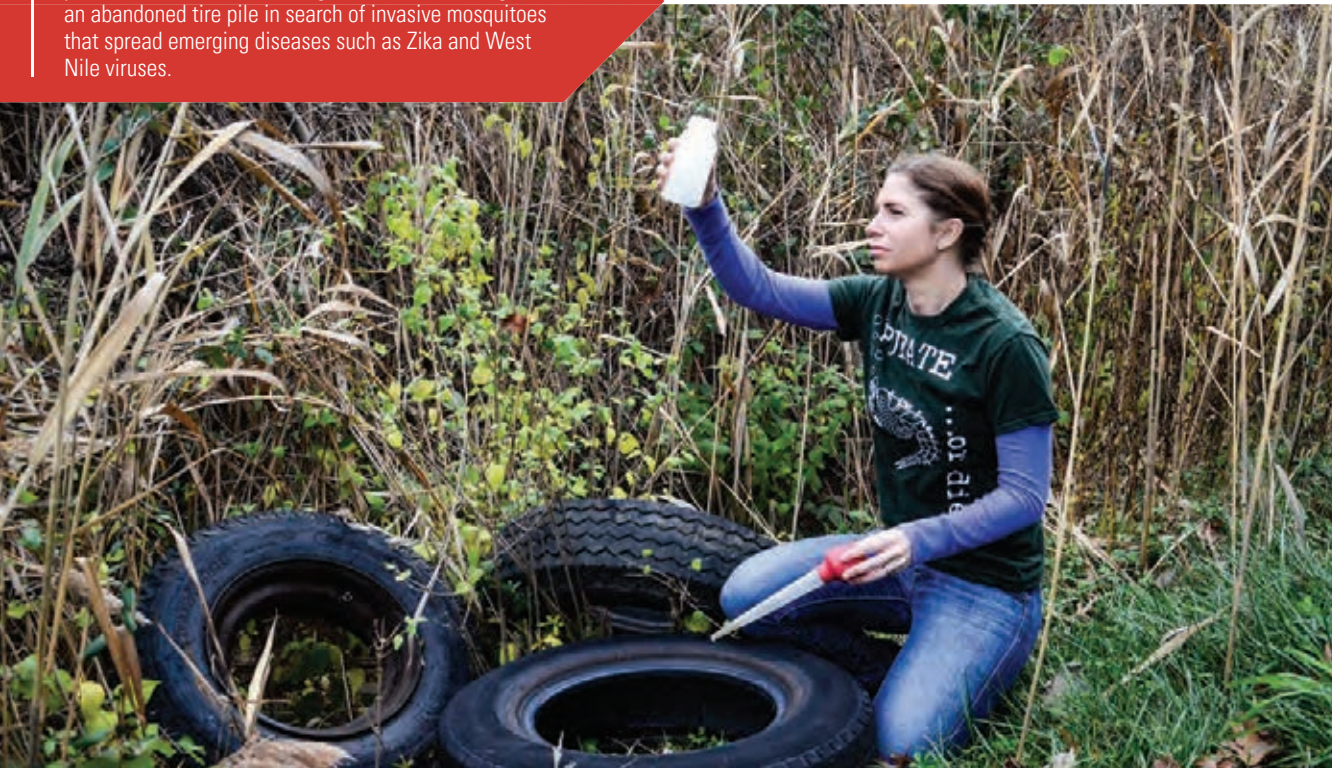


Graduate students collect rhizomes of *Phragmites australis* (common reed) for planting in greenhouse and field experiments. *Phragmites* is well known as an Eurasian invasive species in wetlands, but there is also a native North American lineage that may be useful in wetland restoration projects.





Graduate student Kendall Simon uses birds at the top of the food chain as indicators of bioaccumulative compounds of concern, while Megan Saunders investigates an abandoned tire pile in search of invasive mosquitoes that spread emerging diseases such as Zika and West Nile viruses.



ECOSYSTEM HEALTH AND NATURAL RESOURCES MANAGEMENT

The graduate specialization in Ecosystem Health and Natural Resources Management examines the complex interactions between ecosystem functioning, ecological health, and sustainability from a primarily ecological context. This program recognizes the shared need within Environmental Science and Human Health communities for an improved understanding of how environmental factors and ecosystem functions affect ecological communities. Integrity of these communities is critical to the continued availability of natural resources and ecosystem services on which we depend. Comprehension of how human activities affect ecosystem functioning allows development of effective “knowledge-based” policy and management tools to mitigate environmental decline and promote sustainable growth and development.

POTENTIAL RESEARCH AREAS

- Human Dimensions and Ethics
- Natural Resources Management
- Ecological Risk Assessment
- Sustainable Forests and Wildlife Ecology
- Ecosystem Services
- Ecotoxicology
- Vectors and Disease Ecology
- Human and Ecosystem Health

MAPPING YOUR FUTURE

The ENST Department has mandatory advising for each of its undergraduate concentrations. Students are required to meet with their advisor at least once each semester. Our online advising materials will provide you important resources to assist you in planning your 4-year program here in ENST.

📍 www.enst.umd.edu/undergraduate/advising

REAL WORLD EXPERIENCE

College students want to obtain their degree and land a rewarding job. Having internship experience is one of the best ways to achieve this goal and is highly desired by employers. Like many UMD majors, the Environmental Science and Technology major requires it!

📍 www.enst.umd.edu/undergraduate/internship-faq

GET INVOLVED!

RESTORE

RESTORE is the student society for Environmental Science and Technology undergraduate students. Founded 20 years ago, RESTORE provides undergraduates with professional, educational, and social opportunities to prepare them for working in the environmental science field. Past events include professional networking opportunities with ENST alumni, resume workshops, environmental documentary screenings, stream clean-ups, and group hikes.

📍 enst.umd.edu or facebook.com/enstore

GATES

The Graduate Association for Technology and Environmental Science (GATES) is the graduate student organization within ENST. Their stated mission is to promote interaction, inspiration and support among ENST-advised graduate students, and seeks to foster networking, communication, and professional development among graduate students, faculty, and staff.

📍 enst.umd.edu/graduate

SOIL JUDGING TEAM

Soil judging develops and evaluates students' abilities to apply knowledge and skills to real-world natural systems. To "judge" a soil, students examine a 4-foot-deep soil profile, describing a host of properties and characteristics of the various layers (horizons) that have formed, and classifying the soil according to Soil Taxonomy. They then assess the suitability of the soil for a variety of uses like growing plants, building homes, and for waste disposal. Over the years UMD soil judges have captured titles in 3 National and 23 Northeast Regional competitions.

📍 enst.umd.edu/undergraduate/soil-judging

Apply

UNDERGRADUATE STUDENTS

To apply to the Department of Environmental Science and Technology, please visit the University of Maryland admissions website at www.uga.umd.edu/admissions/apply. Once there, please find your category (freshman, transfer, international) and follow the form's instructions. For more information, contact the Undergraduate Program Advisor at enst@umd.edu.

GRADUATE STUDENTS

General information regarding applications can be found on the Graduate School admissions page at graduateschool.umd.edu/admissions. The University Graduate School accepts applications online. Applicants are required to submit: transcripts, GRE scores, a personal statement of research interests, and contact information for three references. Prospective students are encouraged to contact graduate faculty within their area of interest. Faculty profiles can be found at enst.umd.edu/People. For more information contact the Coordinator for the Graduate Program at graduatestudies-enst@umd.edu.

100%
UNDERGRAD STUDENTS
LAND INTERNSHIP
WHILE AT ENST

133+
ONGOING
RESEARCH PROJECTS

47+
INTERNATIONAL
COLLABORATIONS

37
FACULTY
MEMBERS

12
LABORATORIES,
RESEARCH CENTERS

130+
UNDERGRAD/GRAD
COURSES OFFERED

