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.

Welcome!
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.

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.

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.
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.

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<th>EXAMPLE CAREERS</th>
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<td>Environmental Restoration Layout Foreman</td>
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<td>Biologist</td>
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<td>Environmental Research Assistant</td>
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<td>Research Associate</td>
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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.
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
The Natural Resources Management concentration is designed to teach students concepts of the environmentally sound use and management of natural resources. Ecosystems and human societies are linked in complex cycles and relationships between vegetation and wildlife, forests and cities, conservation and development. By learning to manage and conserve our natural resources, we will help sustain a harmonious relationship between the environment and human activities.

### Sample Courses
- Ecosystem Services: An Integrated Analysis
- Introduction to Fish and Wildlife
- Watershed Science
- Applied Forestry Practices
- Geographic Information Systems
- Ecological and Natural Resources Ethics
- Environmental Conflicts and Decision Making

### Example Careers
- Soil and Water Conservationist
- Natural Resources Manager
- Resource Conservation and Development Coordinator
- Environmental Educator
- Environmental Protection Officer
- Natural Resources Planner
- Fish and Wildlife Technician

As part of an ecosystem service field exercise, graduate student, Brent West, shows undergraduates how to evaluate wildlife habitat in a forested ecosystem and describes the rewards of working in the field of environmental health and natural resources management.
GRADUATE PROGRAM

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

As part of a field exercise, Dr. Bob Tjaden teaches undergraduate students how to determine the age of trees using an increment borer, evaluate the overall health and ecosystem service values of a forest. Soils students examine and describe a paleosol buried by late Pleistocene loess (windblown silts) that is exposed in a bluff along Chesapeake Bay.
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.

**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

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.
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.
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/enstrestore

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 judgers have captured titles in 3 National and 23 Northeast Regional competitions.
🌐 enst.umd.edu/undergraduate/soil-judging

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 graduates-studies-ENST@umd.edu.
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