



Graduate Program

Environmental Engineering

Since 1960 more than 400 sanitary and environmental engineers have graduated with M.S. and Ph.D. degrees from the Civil and Environmental Engineering Department (CEE) at the University of Massachusetts Amherst. These graduates are employed in industry, consulting firms, government agencies, research institutions, and universities. The highest priority of the Environmental Engineering Program is the education of our students. The Program consists of eight core faculty members and 30 to 40 students pursuing advanced degrees in environmental engineering. Virtually all graduate students are supported with assistantships, fellowships, and/or teaching assistantships. Our Graduate Environmental Engineering Program enjoys an excellent national reputation, and was recently ranked 26th in the nation by US News & World Report.

Facilities

Our environmental laboratories occupy some 13,000 square feet of space in the new, \$25-million Engineering Laboratory II. This state-of-the-art building houses a Water & Air Pollution Control Lab, an Environmental Microbiology Lab Suite, a Groundwater Lab Suite, a Water Chemistry Lab Suite, a Water Treatment Process Lab Suite, a Pathogen Control Lab, and a Trace Analysis Suite. Specialized research equipment includes bench scale instruments for studying water and wastewater treatment processes, biological reactors for studying aerobic and anaerobic treatment processes, and general-purpose microbiological and chemical equipment. Our groundwater research capabilities provide researchers with facilities for column degradation studies and soil microcosm analysis. The water resources computational laboratory capabilities include high-speed computers, graphical display equipment, and a software library suitable for modeling, design, and management of water resource systems. Analytical and process equipment available in the research laboratories equip researchers with instruments for sample preparation, electrochemistry, spectroscopy, chromatography, and field instrumentation such as portable gas chromatographs.

Research

The Environmental Engineering Program has an active research program with annual expenditures of \$2 million. Graduate students in the Program can expect to participate in projects falling into the following areas of faculty research.

Drinking Water Treatment: Our faculty are especially well-known for their strengths in the area of physical, chemical, and biological technologies for the purification of drinking water. They study the control of carcinogenic organic byproducts of drinking water disinfection, factors that affect the formation of such byproducts, and the use of ozone to purify drinking water, among many other issues.

Wastewater Treatment: The Program has been an innovator in wastewater treatment since its inception. The types of wastewater studied have ranged from municipal, to industrial, to those classified as hazardous wastes, and the work has involved elements of process performance, design, operation, and monitoring.

Soil and Groundwater Contamination: Faculty in the Program conduct research to characterize subsurface pollution and to understand the nature of bioremediation in contaminated soils, providing expertise in groundwater modeling, biological processes in the subsurface, and transport of particles and colloids in the subsurface, along with other related research.

Environmental Chemistry and Pollutant Analysis: Among many other important contributions in the field of environmental chemistry, our faculty have specialized in the areas of oxidation and complexation reactions in homogeneous aqueous systems, chemical analysis of organic oxidation byproducts in water, and measurement of VOC emissions for hazardous waste sites.



Environmental Microbiology: Work in this area has focused on the microbial ecology of anaerobic engineered systems, bioremediation of contaminated groundwater, microbial source tracking and survival of pathogen indicators in source waters, control of drinking water pathogens such as viruses, and other studies.

Water Resources Engineering, Planning, and Management: Program faculty have conducted research on a variety of aspects relating to quality and quantity of water. A few ongoing projects include analysis of flow and contaminant transport of stream/aquifer boundaries, strategies for designing and monitoring stormwater flows, impacts of urbanization on flood frequency and severity, and identification of pathogenic contamination source areas.

Numerical Modeling of Water Resource Systems: Among other modeling work, our faculty have developed models for groundwater flow and solute transport to analyze groundwater contamination sites, for enhancing the efficacy of sparging for groundwater remediation, and for studying the growth of biofilms for application to both natural and engineered systems.

Environmental Geotechnology: Our environmental engineering faculty have worked closely with their colleagues in geotechnical engineering to study groundwater contaminant transport and reaction in the natural environment; specifically leaky underground storage tanks, spilled aviation fuel plumes, and the impact of alternative highway deicers.

Air Pollution: Research in this area has focused on both laboratory and field studies of biofiltration and membranes systems for the control of volatile organic compound and odorous air emissions, as well as the characterization and measurement of emissions from hazardous waste remediation and wastewater treatment plants.

Financial Assistance

Approximately 35 graduate students are currently seeking degrees in the Environmental Engineering Program. It is the goal of our faculty to provide research assistantships and/or fellowships to all graduate students in the Program. Usually this funding is associated with specific research projects, upon which each study, thesis, or dissertation is based. Though limited in number, teaching assistant positions may be available for those either interested in teaching as a career, or involved in research projects that don't have funding. Typically, tuition and fee (partial) waivers are part of the assistantship contract.

Employment

Our M.S. and Ph.D. graduates from the Environmental Engineering Program have accepted employment in a variety of areas. In general, alumni receiving an M.S. degree find employment with consulting engineering firms and federal, state, and local governments. Most Ph.D. graduates are employed by private research firms, academic institutions, or consulting engineering companies. Recent graduates have accepted lucrative and interesting positions at Baystate Environmental, Black & Veatch Inc., Camp, Dresser & McKee, Carollo Engineers, CH2M Hill, Hazen & Sawyer, Tighe & Bond, and Woodward & Curran.

Location

The University of Massachusetts is the state university of the Commonwealth. It was founded in 1863 under the provisions of the Morrill Land Grant Act, which was passed by the United States Congress one year earlier. Situated in one of the most picturesque sections of the state, UMass Amherst joins with its academic neighbors – Amherst, Smith, Mount Holyoke, and Hampshire colleges – in the Five College Consortium, which helps maintain the rich tradition of educational benefits (including cross-registration for coursework) and cultural activity (numerous concerts, Broadway shows, plays, readings, entertainers of every kind, and dance performances) associated with the Connecticut Valley. Amherst is also located within easy access to New York, Boston, and Montreal, and has a reputation throughout New England for its numerous outdoor activities, which can all be easily accessed through the UMass Amherst Outing Club.

Contact

For more information on graduate studies in environmental engineering contact:
Jodi Ozdarski, *Academic Assistant*, 413-545-0686, ozdarski@ecs.umass.edu
Carlton L. Ho, *Civil Engineering Graduate Program Director*, ho@ecs.umass.edu
John E. Tobiason, *Environmental Engineering Program Area Coordinator and Environmental Engineering Graduate Program Director*, tobiason@ecs.umass.edu