

Graduate Studies

Environmental Engineering

ENVIRONMENTAL ENGINEERING (EnvE) at Georgia Tech provides comprehensive educational and research opportunities in air, land and water science & engineering. The principal focus areas include: environmental biotechnology; water quality and treatment; wastewater reclamation and reuse; hazardous and solid waste engineering; ground water modeling and treatment; air quality monitoring, pollution control and modeling; environmental sciences; and industrial ecology. Because of the multidisciplinary credentials of its faculty, the excellence of its research facilities, and extensive collaboration with other engineering and science faculty, the program attracts high-caliber students from a variety of engineering and science disciplines. Environmental engineering is also a key component in the campus initiatives on bioengineering, bioscience & biotechnology, nanotechnology, materials science & technology, sustainable technology & development, environmental science & technology and energy systems.

Our mission is to educate scientists and engineers through a stimulating and diverse educational experience, to create new knowledge through innovative research, and to transform research products to new environmental technologies to benefit engineering practice and society. Course offerings in Environmental Engineering emphasize basic engineering and scientific principles, system design, applications of environmental engineering operations and processes, and regional and global atmospheric and hydrological systems.

FACILITIES

The program faculty, staff, students and research activities of Environmental Engineering are housed in the Environmental Science & Technology (ES&T), Daniel Laboratory (DEEL) and Sustainable Education (SEB) buildings on the Georgia Tech campus.

Interactive collaborations with faculty in Earth & Atmospheric Sciences (EAS), Biology, Chemistry & Biochemistry, Biomedical Engineering (BME), Material Science & Engineering (MSE), Chemical and Biomolecular Engineering (ChBE), and other disciplines within Civil & Environmental Engineering (CEE) provide expanded resources and capabilities for EnvE students. We also have collaborations in Atlanta with units at Emory University and the US Centers for Disease Control and Prevention.

ES&T and DEEL have an excellent range of laboratories with exceptional capabilities and instrumentation for educational and research programs. The multimedia environmental simulations laboratory (MESL) in SEB provides advanced capabilities in environmental modeling and exposure assessment.

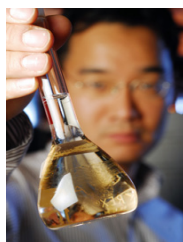
COURSES

- Advanced Environmental Chemistry
- Advanced Topics in Air Pollution
- Air Pollution Formation and Control
- Air Pollution Meteorology
- Air Pollution Physics and Chemistry
- Atmospheric Aerosols
- Atmospheric Boundary Layer
- Atmospheric Chemical Modeling
- Biological Processes
- Biotransformations of Xenobiotic Compounds
- Chemical Principles
- Contaminant Sediment Geochemistry
- Design of Treatment Facilities for Drinking Water
- Environmental Modeling
- Fate of Contaminants in the Subsurface
- Flow and Transport through Porous Media I, II
- Hazardous Waste Site Remediation
- Industrial Ecology
- Membrane Processes
- Microbial Principles
- Modeling and Simulation of Biological Treatment Systems
- Process Principles
- Physicochemical Processes
- Separation Processes
- Solid Liquid Separations

RESEARCH

Opportunities are available in these and other areas:

- Air pollution: formation, transport, and deposition of aerosols
- Analytical chemistry and applied spectroscopy
- Atmospheric and oceanic dynamics
- Atmospheric dynamics of air and contaminant dispersion
- Carbon sequestration
- Characterization of ambient air quality and air pollutant source emissions
- Chemical and environmental multiphase transport processes
- Ecology and physiology of microorganisms involved in degradation processes
- Environmental and aquatic chemistry
- Environmental biotechnology for bioremediation of contaminated soil, sediments & waters
- Evolution and adaptation of microbial communities
- Green chemistry and biochemistry
- Hazardous substances in sediments, soils, waters and residues
- Multimedia (air, water/groundwater) environmental simulations
- Nanotechnology in the environment
- Physical, chemical, and biological processes influencing subsurface fate and transport of contaminants
- Physicochemical processes for water and wastewater treatment
- Sustainable technology and development



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EnvE FACULTY

Mustafa Aral, Ph.D., Professor

Large scale environmental simulations in surface water and groundwater specialization areas; environmental exposure analysis; exposure-dose reconstruction and health risk assessment. Dr. Aral has numerous publications in these areas and actively pursues a state-of-the-art research program on these topics in the Multimedia Environmental Simulations Laboratory (MESL).

Michael Bergin, Ph.D., Professor

Air pollution; formation, transport, and the deposition of aerosols; influence of aerosols on climate; air/snow exchange of aerosol chemical species; paleoclimate studies based on ice core chemistry; fog/cloud formation and chemistry; microcontamination in industrial processes.

Yongsheng Chen, Ph.D., Associate Professor

Nanotechnology for water and air purification and pollutant sensing; fate, transport, transformation, and toxicity of manufactured nanomaterials; physicochemical processes for algae harvesting and water treatment in biofuel production; urban sustainability.

John Crittenden, Ph.D., P.E., Director of Brook Byers Institute for Sustainable Systems, High-tower Chaired Professor, and Georgia Research Alliance Eminent Scholar

Sustainable engineering; physical chemical treatment processes; modeling of wastewater and water treatment processes; reforming of biomass to create commodity chemicals and fuels; preparation of zeolites and catalysts; surface chemistry and thermodynamics; mass transfer; numerical methods.

Ching-Hua Huang, Ph.D., Associate Professor

Transformation and fate of emerging contaminants in natural and engineered aquatic systems; surface reactions and catalysis involving natural minerals and novel nanomaterials; chemistry of emerging disinfection by-products in water treatment systems; physicochemical water treatment processes; Fundamental reaction activity, kinetics and mechanisms in environmental systems; development and applications of novel analytical techniques for emerging environmental contaminants.

Joseph B. Hughes, Ph.D., P.E., Tellepsen Chaired Professor

Environmental biotechnology; nanomaterial and transport; environmental engineering needs in developing countries.

Jaehong Kim, Ph.D., Associate Professor

Environmental implication and application of nanomaterials; chemical and UV disinfection process design and optimization; mechanism of pathogen inactivation; disinfection by-product formation mechanism and control; membrane processes (ultrafiltration, nanofiltration and reverse osmosis) for water treatment and reuse; seawater desalination.

Kostas T. Konstantinidis, Ph.D., Assistant Professor

Environmental microbiology and genomics; computational approaches for studying the ecology and evolution of microorganisms; genomic and proteomic techniques to investigate and quantify in-situ important microbial-mediated processes; population and singlecell genomics; assessing the extent and value of biodiversity within natural assemblages of Bacteria and Archaea; biotechnological applications of microbial functional diversity; environmental relevance of microbial diseases.

James A. Mulholland, Ph.D., Professor and EnvE Program Coordinator

Combustion byproduct formation and control; incineration; thermochemistry of polycyclic aromatic hydrocarbons and chlorinated aromatic species; molecular modeling; spatio-temporal analysis of ambient air pollutants.

Spyros G. Pavlostathis, Ph.D., B.C.E.E., Professor

Environmental biotechnology and bioprocesses for bioremediation of contaminated natural systems and treatment of industrial and municipal wastewater; bioavailability, fate and biotransformation of recalcitrant organic compounds such as dyes, pesticides, antioxidants, disinfectants, and antibiotics; biotransformation of emerging environmental contaminants; bioenergy and biofuels from biomass and waste streams; development of halophilic and thermophilic microbial processes; kinetics and modeling of biotransformation/treatment processes.

Armistead (Ted) Russell, Ph.D., Georgia Power Distinguished Professor

Atmospheric dynamics of air; gas-phase and aerosol pollutants; air quality modeling; atmospheric chemistry; control strategy planning and evaluation; environmental policy analysis; emissions control technology development; emissions inventory modeling and assessment; environmental risk assessment and uncertainty analysis; combustion modeling.

Jim Spain, Ph.D., Professor

Environmental distribution, persistence, and biodegradation of chemical pollutants; green chemistry synthesis of organic compounds by biocatalysis; biodegradation pathways in bacteria for application to bioremediation; environmental biotechnology related to marine, freshwater and subsurface ecosystems; evolution and adaptation of microbial communities; biochemistry, ecology, and molecular biology of environmentally relevant microbes; discovery and characterization of bacteria that degrade synthetic organic compounds; photobiological hydrogen production by cyanobacteria.

Marc Stieglitz, Ph.D., Associate Professor

Watershed dynamics with emphasis on the interactions between climate, climate variability, hydrology, and terrestrial biology; terrestrial carbon and nitrogen cycling; hydroclimatology and land-atmosphere interactions; impacts of climate change.

Sotira Yiaccoumi, Ph.D., Professor

Colloidal and interfacial phenomena in environmental systems; sorption phenomena; colloidal interactions; influence of sorption on colloidal behavior; molecular techniques; and novel environmental processes.

RESEARCH FACULTY

Min Cho, Ph.D., Research Engineer II
Jiabao Guan, Ph.D., P.E., Sr. Research Engineer
Yongtao Hu, Ph.D., Research Scientist II
Wonyong Jang, Ph.D., P.E., Research Engineer II
Shirley Nishino, Ph.D., Sr. Research Scientist
Talat Odman, Ph.D., Principal Research Engineer
Guangxuan Zhu, Ph.D., Sr. Research Scientist

ASSOCIATED FACULTY

Kevin Haas, Ph.D., Associate Professor
Hermann Fritz, Ph.D., Associate Professor
Paul Work, Ph.D., P.E., Associate Professor
Costas Tsouris, Ph.D., joint appointment with Oak Ridge National Laboratory and Georgia Institute of Technology

