

Environmental Engineering

CEEatGT
2016-2017
GRADUATE
STUDIES

THE Environmental Engineering program at the Georgia Institute of Technology provides comprehensive educational and research opportunities in air, land and water science and 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. Environmental engineering is also a key component in Institute-wide initiatives in bioengineering, bioscience and biotechnology, nanotechnology, materials science and technology, sustainable technology and development, environmental science and technology, and energy systems. The multi-disciplinary credentials of our faculty, our state-of-the-art research facilities, and extensive collaborations with other engineering and science faculty all combine to attract high-caliber students from a variety of disciplines.

FACILITIES

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

Interactive collaborations with faculty in earth and atmospheric sciences, biology, chemistry and biochemistry, biomedical engineering, materials science and engineering, chemical and biomolecular engineering, and other disciplines within civil and environmental engineering provide expanded resources and capabilities for students. We also have collaborations in Atlanta with units at Emory University and the U.S. 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 in SEB provides advanced capabilities in environmental modeling and exposure assessment.

SELECTED 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 in Environmental Engineering
- Biotransformations of Xenobiotic Compounds
- Chemical Principles in Environmental Engineering
- Contaminant Sediment Geochemistry
- Design of Treatment Facilities for Drinking Water
- Environmental Modeling
- Fate of Contaminants in the Subsurface
- Flow and Transport through Porous Media
- Hazardous Waste Site Remediation
- Industrial Ecology
- Membrane Processes
- Microbial Principles
- Modeling and Simulation of Biological Treatment Systems
- Process Principles in Environmental Engineering
- Physicochemical Processes
- Separation Processes
- Solid Liquid Separations
- Sustainable Engineering



RESEARCH 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
- 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 and 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

LEARN MORE

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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. He 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.

JOE BROWN, PH.D., P.E. Assistant Professor

Water infrastructure sustainability; detection methods for pathogens and pathogen indicators in the environment; water treatment technology characterization and innovation; human health effects of exposure to waterborne pathogens, including epidemiological methods and quantitative microbial risk assessment, environmental health microbiology, water and sanitation technologies in the developing world. His work has a global focus with currently funded research projects in Cambodia, Zambia, Tanzania, Malawi, Pakistan, India, the U.K., and Alabama.

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,

Brook Byers Institute for Sustainable Systems, Hightower Chair & Georgia Research Alliance Eminent Scholar in Environmental Technologies & Professor 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. Professor

& Group Coordinator: Environmental organic and inorganic chemistry; contaminant transformation kinetics and mechanisms; innovative drinking water and wastewater treatment technology; advanced analytical chemistry; water reuse and sustainability; emerging contaminants and disinfection by-products; remediation of heavy metals and resource recovery in energy production wastes.

JOHN H. KOON, PH.D., P.E. Professor of

the Practice: Industrial and municipal wastewater treatment, including the treatment of groundwaters; contaminated site remediation; environmental project strategy development; technology evaluations; water quality assessment; permitting; solving environmental problems in chemically complex systems.

KOSTAS T. KONSTANTINIDIS, PH.D.

Carlton S. Wilder Junior Faculty Professorship & Associate Professor: Environmental microbiology and genomics; culture-independent genomic analysis (aka metagenomics) of microbial communities; new technologies to study microbial processes *in situ*; bioremediation of environmental pollutants; novel organisms and enzymes; molecular methods for fecal pollution testing and source tracking; the air microbiome and its role in cloud formation; biotechnological applications of microbial functional diversity; population and single-cell genomics; genome evolution and the species concept; bioinformatic tools for the analysis of microbial genomes and metagenomes.

JAMES A. MULHOLLAND, PH.D.

Associate Chair, Graduate Programs & Professor: Combustion by-product 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., BCEEM

Professor: Environmental biotechnology and bioprocess engineering for the bioremediation of contaminated natural systems and the treatment of industrial and municipal wastewater; fate and biotransformation of recalcitrant organic compounds and emerging environmental contaminants; disinfectant-induced antibiotic resistance; bioenergy and biofuels from biomass and waste streams; development of halophilic and thermophilic microbial processes; microbial fuel cell and bioelectrochemical technology; kinetics, modeling and simulation of biotransformation and biotreatment processes.

ARMISTEAD (TED) RUSSELL, PH.D.

Howard T. Tellepsen Chair & Regents 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.

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.

XING XIE, PH.D. Assistant Professor

Water treatment and reuse; desalination; microbial detection and quantification; energy and resource recovery; electrochemical energy conversion and storage. His research applies materials science and environmental biotechnology at the nexus of water and energy

SOTIRA YIACOUMI, PH.D. Professor

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

RESEARCH FACULTY

JIABAO GUAN, PH.D., P.E. Senior Research Engineer

YONGTAO HU, PH.D. Research Scientist II

M. TALAT ODMAN, PH.D. Principal Research Engineer

ARKA PANDIT, PH.D. Research Engineer I

GUANGXUAN ZHU, PH.D. Senior Research Scientist

ADJUNCT & AFFILIATE FACULTY

MICHAEL BERGIN, PH.D.

MAOHANG FAN, PH.D.

JAEHONG KIM, PH.D.

JUSTIN REMAIS, PH.D.

COSTAS TSOURIS, PH.D.

EMERITUS FACULTY

F. MICHAEL SAUNDERS, PH.D.

JIM SPAIN, PH.D.