Energy, Environmental & Chemical Engineering

The Department of Energy, Environmental & Chemical Engineering (EECE) provides integrated and multidisciplinary programs of scientific education in cutting-edge areas, including the PhD in Energy, Environmental & Chemical Engineering. Research and educational activities of the department are organized into four clusters: aerosol science & engineering; engineered aquatic processes; multiscale engineering; metabolic engineering & systems biology. These overlapping clusters address education and research in four thematic areas: energy; environmental engineering science; advanced materials; and sustainable technology for public health and international development. In addition to the core faculty in the department, faculty in the schools of Medicine, Arts & Sciences, Business, Law, and Social Work collaborate to provide students with a holistic education and to address topical problems of interest.

The department is a key participant in the university’s Energy, Environment & Sustainability initiative and supports both the International Center for Energy, Environment and Sustainability (InCEES) and the McDonnell Academy Global Energy and Environment Partnership (MAGEEP). Major externally funded research centers in the department include the Consortium for Clean Coal Utilization, the Nano Research Facility (NRF) and Jens Environmental Molecular and Nanoscale Analysis Laboratory (Jens Lab), and the Solar Energy Research Institute for India and the United States (SERIUS).

Contact: Irma Adams
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Endowed Professors

Richard L. Axelbaum (https://engineering.wustl.edu/Profiles/Pages/Richard-Axelbaum.aspx)
Stifel and Quinette Jens Professor
PhD, University of California, Davis
Combustion, advanced energy systems, clean coal, aerosols, nanoparticle synthesis, rechargeable battery materials, thermal science

Milorad P. Dudukovic (https://engineering.wustl.edu/Profiles/Pages/Milorad-Dudukovic.aspx)
Laura and William Jens Professor
PhD, Illinois Institute of Technology
Chemical reaction engineering, multiphase reactors, visualization of multiphase flows, tracer methods, environmentally benign processing

Daniel E. Giammar (https://engineering.wustl.edu/Profiles/Pages/Daniel-Giammar.aspx)
Walter E. Browne Professor of Environmental Engineering
PhD, California Institute of Technology
Aquatic chemistry, environmental engineering, water quality, water treatment

Vijay Ramani (https://eece.wustl.edu/faculty/Pages/faculty.aspx?bio=108)
Roma B. and Raymond H. Witcoff Distinguished University Professor of Environment Engineering
PhD, University of Connecticut, Storrs
Electrochemical engineering, energy conversion

Professors

Young-Shin Jun (https://engineering.wustl.edu/Profiles/Pages/Young-Shin-Jun.aspx)
Director of Graduate Studies
PhD, Harvard University
Aquatic processes, molecular issues in chemical kinetics, environmental chemistry, surface/physical chemistry, environmental engineering, biogeochemistry, nanotechnology

Palghat A. Ramachandran (https://engineering.wustl.edu/Profiles/Pages/Palghat-Ramachandran.aspx)
PhD, University of Bombay
Chemical reaction engineering, applied mathematics, process modeling, waste minimization, environmentally benign processing

Yinjie Tang (https://engineering.wustl.edu/Profiles/Pages/Yinjie-Tang.aspx)
Director of Undergraduate Studies
PhD, University of Washington, Seattle
Metabolic engineering, bioremediation

Faculty Chair and Endowed Professor

Pratim Biswas (https://engineering.wustl.edu/Profiles/Pages/Pratim-Biswas.aspx)
Lucy and Stanley Lopata Professor
PhD, California Institute of Technology
Aerosol science and engineering, air quality and pollution control, nanotechnology, environmentally benign energy production
Jay R. Turner (https://engineering.wustl.edu/Profiles/Pages/Jay-Turner.aspx)
Vice Dean for Education
DSc, Washington University
Air quality planning and management; aerosol science and engineering, green engineering

Jian Wang (https://eece.wustl.edu/faculty/Pages/faculty.aspx?bio=126)
PhD, California Institute of Technology
Aerosol properties and processes, nucleation and new particle formation, aerosols in the marine environment, effects of aerosols on cloud microphysical properties and macrophysical structure, and development of advanced aerosol instruments

Associate Professors

John Fortner (https://engineering.wustl.edu/Profiles/Pages/John-Fortner.aspx)
InCEES Career Development Associate Professor
PhD, Rice University
Environmental engineering, aquatic processes, water treatment, remediation, and environmental implications and applications of nanomaterials

John T. Gleaves (https://engineering.wustl.edu/Profiles/Pages/John-Gleaves.aspx)
PhD, University of Illinois
Heterogeneous catalysis, particle chemistry

Tae Seok Moon (https://engineering.wustl.edu/Profiles/Pages/Tae-Seok-Moon.aspx)
PhD, Massachusetts Institute of Technology
Metabolic engineering and synthetic biology

Brent Williams (https://engineering.wustl.edu/Profiles/Pages/Brent-Williams.aspx)
Raymond R. Tucker Distinguished InCEES Career Development Associate Professor
PhD, University of California, Berkeley
Aerosols, global climate issues, atmospheric sciences

Fuzhong Zhang (https://engineering.wustl.edu/Profiles/Pages/Fuzhong-Zhang.aspx)
PhD, University of Toronto
Metabolic engineering, protein engineering, synthetic and chemical biology

Assistant Professors

Peng Bai (https://engineering.wustl.edu/Profiles/Pages/Peng-Bai.aspx)
PhD, Tsinghua University, China
Develop next-generation batteries, probe the in situ electrochemical dynamics of miniature electrodes down to nanoscales, capture the heterogeneous and stochastic nature of advanced electrodes, and identify the theoretical pathways and boundaries for the rational design of materials, electrodes and batteries through physics-based mathematical modeling and simulation

Rajan Chakrabarty (https://engineering.wustl.edu/Profiles/Pages/Rajan-Chakrabarty.aspx)
PhD, University of Nevada, Reno
Characterizing the radiative properties of carbonaceous aerosols in the atmosphere; and researching gas phase aggregation of aerosols in cluster-dense conditions

Marcus Foston (https://engineering.wustl.edu/Profiles/Pages/Marcus-Foston.aspx)
PhD, Georgia Institute of Technology
Utilization of biomass resources for fuel and chemical production, renewable synthetic polymers

Fangqiong Ling (https://eece.wustl.edu/faculty/Pages/faculty.aspx?bio=178)
PhD, University of Illinois at Urbana-Champaign
Microbial ecosystem analysis and modelling, process modelling, machine learning, NextGen sequencing bioinformatics, environmental microbiology, and bioreactor design

Kimberly M. Parker (https://engineering.wustl.edu/Profiles/Pages/Kimberly-Parker.aspx)
PhD, Stanford University
Investigation of environmental organic chemistry in natural and engineered systems

Elijah Thimsen (https://engineering.wustl.edu/Profiles/Pages/Elijah-Thimsen.aspx)
PhD, Washington University
Gas-phase synthesis of inorganic nanomaterials for energy applications, and novel plasma synthesis approaches

Research Associate Professor

Tianxiang Li
PhD, University of Kentucky
Combustion and applications in energy, pollutant control, biofuel synthesis, flame synthesis of nanomaterials

Research Assistant Professor

Benjamin Kumfer
DSc, Washington University
Advanced coal technologies, biomass combustion, aerosol processes and health effects of combustion-generated particles
Degree Requirements

Doctor of Philosophy (PhD) in Energy, Environmental & Chemical Engineering (EECE)

The doctoral degree requires a total of 72 credits beyond the bachelor's degree. Of these, a minimum of 36 must be