Environmental Engineering
UNIVERSITY OF HAWAI‘I AT MĀNOA

PROGRAM
The Environmental Engineering Program is a part of the Department of Civil and Environmental Engineering at UH-Mānoa. UH-Mānoa is a premier research institution whose scholars are leaders in their disciplines and whose students are prepared for leadership roles in society. The university is also famous for its unparalleled natural environment and tradition of outstanding Asia-Pacific scholarship. The environmental engineering program at UH-Mānoa includes several key areas of modern environmental engineering. Faculty members in this program have conducted research with funding support from National Science Foundation (NSF), NOAA, US Navy, US Army Corps of Engineers, US Geological Survey, Department of Agriculture, Hawaii Department of Health, Hawaii Department of Transportation, and other federal and state agencies.

RESEARCH
WATER AND WASTEWATER ENGINEERING
Research areas include water treatment via bank filtration, activated carbon, and pressure-driven membrane technology; wastewater treatment using membrane bioreactors and bioaugmentation; wastewater recycling effects including the fate of trace residuals such as bacteria, viruses, pharmaceuticals, and endocrine disrupters in the environment; and use of genetic fingerprinting for microbial diversity analysis and biological source tracking.

HYDROLOGY AND HYDRAULICS
Research has been conducted for a better understanding of the sustainable yield of Hawaiian groundwater aquifers and the potential of pollution by chemical residues by agricultural and other economic activities. Surface hydrologic and hydraulic research is conducted in relation to storm drainage, non-point source pollution and waste load allocation in water quality limited stream reaches, and bridge scour and sediment transport.

ENVIRONMENTAL FLUID MECHANICS
Environmental fluid mechanics has evolved in response to the need for an accurate determination of the fate of pollutants in the environment. Research has been conducted on pollutant transport and mixing in groundwater, streams, reservoirs, and coastal waters as well as wave effects on near field mixing of waste plumes in the open ocean.

COASTAL ENGINEERING AND MARINE ENVIRONMENT
Research in this area includes design of ocean outfalls for wastewater disposal to protect coastal water quality, studies on artificial upwelling and mixing of deep ocean water for open ocean mariculture enhancement, numerical modeling of coastal sediment transport, and computer simulation of hurricane-generated storm surge and coastal flooding caused by earthquake-generated tsunamis.

FACILITIES
The Environmental Quality Laboratory, which was completely renovated in 2002, includes wet chemistry facilities, microbiology facilities, trace chemical analyses equipment, and molecular biological analyses equipment. Equipment includes various meters and probes, spectrophotometers, incubators, baths, sterilizers, centrifuges, microscopes, microorganism culturing equipment, particle counters, and extraction devices. Trace chemical analyses equipment includes an ion chromatograph (IC), a total organic carbon analyzer (TOC), a gas chromatograph/mass spectrometer (GC/MS), a purge-and-trap gas chromatograph (GC), and a high performance liquid chromatograph/mass spectrometer (LC/MS/MS). Molecular biological equipment includes polymerase chain reaction (PCR), and denaturing gradient gel electro-phoresis (DGGE).

The Hydraulics Laboratory is equipped with a large wave tank (50 ft x 4 ft x 4 ft), a small circulation flume, and one demo pipe system. The hydraulics lab is designed for both instruction and research in hydraulic, ocean and environmental engineering. Instruments for flow measurement include: particle image velocimetry (PIV), resistance-type wave gage system (including function generator, wave gauges, A/D board, and LabView data acquisition software.), various pressure gages, Pitot tubes, digital video camera, digital still camera for measurement in the lab as well as digital current meter and fluorometer for field studies.

Field instrumentation and satellite test facilities include water quality meters, programmable portable water samplers, soil moisture probes, soil — continued on back
**GRADUATE COURSES**

Fluid Mechanics  
Groundwater Modeling  
Hydrologic Processes in Soils  
Vadose Zone Hydrology  
Surface Water Hydrology  
Groundwater Hydrology  
Water Resources Systems Planning and Management  
Physical and Chemical Treatment in Water and Wastewater  
Biological Treatment  

Environmental Chemistry  
Water Quality Biology  
Sanitary Engineering Laboratory  
Marine Disposal of Wastewaters  
Hazardous Waste Remediation  

Water Quality Modeling  
Membrane Separations in Aquatic Systems  
Numerical Methods in Engineering  
GIS in Civil and Environmental Engineering  

**UNDERGRADUATE TRACK**

Undergraduates are able to choose the senior-year environmental engineering track in order to specialize in this field.

**PUBLICATIONS**


**FACULTY**

Roger Babcock Jr., Ph.D. (UCLA 1991), P.E.; Associate Professor; Joint Appointment - Water Resources Research Center - Biological wastewater treatment, membrane bioreactors, bioaugmentation, wastewater reuse, fate of contaminants in irrigation leachate, activated carbon regeneration.

Edmond D. H. Cheng, Ph.D. (U. of State 1970); Professor - Flood hydrology, unsteady subsurface flow, streamflow and extreme wind modeling and simulation, extreme winds regionalization.

Robert A. Grace, Ph.D. (MIT 1966); Professor - Offshore and underwater engineering design and construction, ocean outfalls, marine environment.

Albert Kim, Ph.D. (UCLA 2000); Assistant Professor - Membrane separation processes, hydro-dynamics of porous fractal aggregates, computational environmental molecular science using distributed parallel processing.

Clare C. K. Liu, Ph.D. (Cornell 1976), P.E.; Professor; Joint Appointment - Water Resources Research Center - Fate and transport of agricultural residues in upper soils, watershed hydrology and modeling, river water quality modeling, ground water management modeling, artificial upwelling and deep ocean water application, wind-powered reverse osmosis.

Chittaranjan Ray, Ph.D. (Illinois Urbana-Champaign 1994), P.E.; Associate Professor; Joint Appointment - Water Resources Research Center - Water quality engineering with emphasis on groundwater, pesticides, flow and transport processes in variably-saturated media, surface and groundwater interaction.

Michelle H. Teng, Ph.D. (Caltech 1990), P.E.; Associate Professor - Hydrometabolism, coastal and hydraulic engineering, water wave generation and propagation, coastal flooding due to storm surge and tsunamis, sediment transport in tidal inlets, bridge scour, numerical simulation.

Aly El-Kadi, Ph.D. (Cornell 1983); Associate Professor; Cooperating graduate faculty - Geology and Geophysics Dept. Joint Appointment - Water Resources Research Center.

Wei-Wen Su, Ph.D. (Lehigh, 1991); Professor; Cooperating Graduate Faculty - Molecular Biosciences and Bioengineering Dept.

Ping-Yi Yang, Ph.D. (Oklahoma State, 1972); Professor; Cooperating Graduate Faculty - Molecular Biosciences and Bioengineering Dept.

To receive application materials and information, please contact the Department of Civil and Environmental Engineering, University of Hawai‘i at Mānoa, Holmes Hall 385, 2540 Dole Street, Honolulu, HI 96822, Phone (808) 956-7550, Fax (808) 956-5014. Additional information and applications available on the web at www.eng.hawaii.edu/CE/