Graduate School Announcement, 2009-2010

Program in Environmental Engineering and Water Resources

Director
Catherine A. Peters

Executive Committee
Elie Bou-Zeid, Civil and Environmental Engineering
Kelly Caylor, Civil and Environmental Engineering
Michael A. Celia, Civil and Environmental Engineering
Lars Hedin, Ecology and Evolutionary Biology
Peter R. Jaffé, Civil and Environmental Engineering
Denise L. Mauzerall, Civil and Environmental Engineering and WWS
François M. M. Morel, Geosciences
Satish Myneni, Geosciences
Tullis C. Onstott, Geosciences
Catherine A. Peters, Civil and Environmental Engineering
Ignacio Rodriguez-Iturbe, Civil and Environmental Engineering
James A. Smith, Civil and Environmental Engineering
Eric F. Wood, Civil and Environmental Engineering
Mark Zondlo, Civil and Environmental Engineering

Population growth and industrial development will continue to place strains on environmental systems and vital natural resources, including water resources. Engineers and scientists trained in hydrology, water and soil chemistry, atmospheric sciences, and biological sciences are needed to address critical environmental issues that involve interconnections between the earth's water, energy, and biogeochemical cycles as well as the connections between these cycles and human activities. The Program in Environmental Engineering and Water Resources (EEWR) provides students with the opportunity to study a wide range of topics related to environmental problems and to pursue advanced research in their specific area of interest, with a focus on the application of modern quantitative techniques to practical problems in environmental engineering.

EEWR is an interdepartmental program offered jointly by the Departments of Civil and Environmental Engineering, and Geosciences. Its aim is to train outstanding engineers and scientists, and to conduct advanced research in areas that are vital to national and international needs in the areas of environmental engineering and water resources. Because environmental problems are, by nature, interdisciplinary, the program maintains strong interactions among faculty from the Departments of Chemical Engineering, Chemistry, Civil and Environmental Engineering, Ecology and Evolutionary Biology, and Geosciences; the Program in Atmospheric and Oceanic Sciences; the Princeton Environmental Institute; and the Woodrow Wilson School of Public and International Affairs; as well as affiliated faculty from the National Oceanic and Atmospheric Administration's Geophysical Fluid Dynamics Laboratory. Research within the EEWR program focuses on environmental problems in areas such as groundwater contamination and remediation; incorporation of risk measures into cleanup performance assessments; land

surface-atmosphere interactions, including energy and moisture fluxes and their relationship to large-scale climate modeling; remote sensing of environmental variables such as soil moisture and rainfall; urban hydrology, and the biogeochemistry of contaminated waters.

Admission

A candidate for admission to the program should apply to the Department of Civil and Environmental Engineering or the Department of Geosciences. The department and the interdepartmental committee of EEWR then make recommendations on admission to the dean of the Graduate School. The candidate normally will have fulfilled the requirements for admission as set forth in the respective departmental statements. To undertake work at the graduate level, students entering the program should be adequately prepared in mathematics and have a solid background in the biological, chemical, or physical sciences.

Plan of Study

Upon entering the program, a student is assigned an adviser and together they select a plan of study emphasizing the student's major goals. The program usually focuses on the application of modern quantitative techniques to problems encountered in the field of environmental engineering, and is built around elements of the following: advanced analytical, numerical, and statistical methods applied to water chemistry; microbiology; transport processes in surface and ground waters; hydrology of surface and ground waters; hydroclimatology of land-atmospheric interactions; hydrometeorology; ecohydrology; remote sensing of the land surface; and geochemistry, geomorphology, and applied geophysics. Specific courses of study often involve interaction with related programs, including the Program in Applied and Computational Mathematics, and the Program in Atmospheric and Oceanic Sciences, as well as related departments and schools. The scope of the program is intended to enable the student to conduct effective research in environmental engineering and water resources.

Cooperative Program with Rutgers

Under an agreement with Rutgers, the State University of New Jersey, graduate students in EEWR may elect pertinent graduate courses at Rutgers (at the New Brunswick campus). The areas of emphasis at Rutgers that may be of particular interest include atmospheric sciences, environmental sciences, hydraulics, microbiology, and toxicology.

General Examination

Students in EEWR take a general examination prepared by their department in consultation with the EEWR committee. Students are expected to complete the general examination successfully within the first two years of their Ph.D. studies, and are not normally readmitted to a third year (fifth term) of graduate study unless they have completed it.

Dissertation

The dissertation is written under the supervision of faculty members approved by the student's department and the EEWR program committee. The committee recommends to the appropriate department the acceptance of the dissertation. With the approval of and together with the department, the committee then sets and administers the final public oral examination.

Financial Assistance

Fellowship awards and assistantship appointments in EEWR are made by the University upon the recommendation of the cooperating departments and with the concurrence of the committee.

Pertinent Courses in Allied Departments

Applied and Computational Mathematics
503 Analytical Techniques in Differential Equations

Program in Atmospheric and Oceanic Sciences
537 Atmospheric Chemistry
571 Introduction to Geophysical Fluid Dynamics
572 Atmospheric and Oceanic Wave Dynamics
573 Physical Oceanography
575 Numerical Prediction of the Atmosphere and Ocean
578 Chemical Oceanography

Chemical Engineering
504 Chemical Reactor Engineering
505 Advanced Heat and Mass Transfer
508 Numerical Methods for Engineers
522 Colloidal Dispersions I

Chemistry
523 Coordination Chemistry
539 Introduction to Chemical Instrumentation

Civil and Environmental Engineering
524 Random Heterogeneous Materials
571 Environmental Chemistry
576 Water Quality Modeling and Analysis
581 Theory of Groundwater Flow
582 Advanced Groundwater Modeling
586 Physical Hydrology
587 Ecohydrology
591 Radar Hydrometeorology

Ecology and Evolutionary Biology
519 Theoretical Ecology

Geosciences
500 Field Geology
523 Geomicrobiology
524 Environmental Issues Seminar
543 Rock Fracture

Mechanical and Aerospace Engineering

501 Mathematical Methods of Engineering Analysis I
502 Mathematical Methods of Engineering Analysis II

Woodrow Wilson School of Public and International Affairs
511c Microeconomic Analysis (advanced)
585 Population, Environment, and Health

Undergraduate Courses of Interest

Because of the interdisciplinary nature of the program, students may wish to elect certain undergraduate courses from cooperating departments.