Environmental Health Sciences

Center for Occupational and Environmental Health (COEH)
100 Theory Drive, Suite 100, Irvine, CA 92617; 949-824-9013
http://www.medicine.uci.edu/occupational/graduate.asp
Alpesh Amin, Chair, Department of Medicine
Ulrike Luderer, Graduate Program Director

The Division of Occupational and Environmental Medicine in the Department of Medicine provides graduate training in environmental health sciences and offers the M.S. and Ph.D. degrees in Environmental Health Sciences. The Environmental Health Sciences program is also an official graduate program of the Program in Public Health. The Ph.D. program offers tracks in Environmental Toxicology and in Exposure Sciences and Risk Assessment. The program in Environmental Health Sciences provides students with the knowledge and skills necessary and appropriate to teach and/or conduct basic and applied research programs in inhalation/pulmonary toxicology, biochemical neurotoxicology, reproductive and developmental toxicology, chemical pathology, toxicokinetics, radiation toxicology, exposure sciences, and risk assessment.

Environmental Toxicology involves the scientific study of the entry, distribution, biotransformation and mechanism of the action of chemical agents that are harmful to the body. The graduate program interprets environmental toxicology as the study of the effects and mechanisms of action of hazardous chemicals in food, air, water, and soil in the home, the workplace and the community. It considers experimentally and theoretically such diverse research problems as

- new scientific approaches to toxicological evaluation of environmental chemicals such as air and water pollutants, food additives, industrial wastes, and agricultural adjuvants at the molecular, cellular, and organism levels;
- mechanisms of action in chemical toxicity;
- the molecular pathology of tissue injury in acute and chronic toxicity.

Exposure Sciences involves the study of human exposures to environmental contaminants in different media such as air, water, and food and via multiple routes including inhalation, ingestion, and dermal absorption. Risk Assessment combines knowledge obtained from toxicological and exposure studies to come to conclusions about the risks to human health. Research in the Exposure Sciences and Risk Assessment Track includes

- new approaches to the evaluation of human exposures to environmental chemicals, including exposure modeling and biomonitoring;
- scientific principles involved in evaluating risks to human health from environmental exposures.

Students entering the program have varied backgrounds, including chemistry, biology, and physiology. The curriculum is based on a foundation of basic and health sciences with applications of scientific principles to environmental exposures and their potential health effects. Formal course work is enriched by a strong commitment to student-professor interaction throughout the program. An important and integral part of the learning process is an early and intensive involvement of the student in ongoing original research projects in environmental health sciences, especially inhalation/pulmonary toxicology, reproductive and developmental toxicology, biochemical toxicology, chemical pathology, neurotoxicology, exposure sciences, and risk assessment.

In addition to meeting the general admission requirements set by the Graduate Division, applicants must be admitted by an Admissions Committee composed of faculty members of the program. Candidates are selected on the basis of a balanced evaluation of the following criteria: (1) prior scholastic performance, including a consideration of grade point average, course load, nature of courses taken, and college attended; (2) recommendations by professors and others; (3) scores on the Graduate Record Examination; the Subject Test in either Biology or Chemistry is strongly recommended; (4) an interview by the Admissions Committee, when feasible; and (5) experience in undergraduate research. The applicant must have received a bachelor’s degree in a biological, public health, or physical science, in a premedical curriculum, or have an acceptable equivalent. Applicants with a bachelor’s degree in engineering may qualify for admission into the program if they have had sufficient training in biology, chemistry, and physical sciences.

Upper-division or graduate science courses may be considered as substitutes for the above prerequisites by the Admissions Committee.

Doctor of Philosophy in Environmental Health Sciences

All courses must be passed with an average grade of B or better.

Core Curriculum
A. Complete the following:

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tr>
<td>EPIDEM 200</td>
<td>Principles of Epidemiology</td>
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<tr>
<td>TOX 206A</td>
<td>Target Organ Toxicology I</td>
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B. Select one track:
   1. Environmental Toxicology Track (complete the following):
      - EPIDEM 204  Biostatistics
      or PUBHLTH 207  Public Health Statistics
      or STATS 201  Statistical Methods for Data Analysis I
      - TOX 201  Principles of Toxicology
      - TOX 207  Experimental Design and Interpretation of Toxicology Studies
      16 units from the approved elective pool.

   2. Exposure Sciences and Risk Assessment Track (complete the following):
      - PUBHLTH 283  Geographical Information Systems for Public Health
      - STATS 201  Statistical Methods for Data Analysis I
      - STATS 202  Statistical Methods for Data Analysis II
      - STATS 203  Statistical Methods for Data Analysis III
      - TOX 275  Environmental Modeling and Risk Management
      8 units from the approved elective pool.

Approved elective pool for both tracks:
- ANATOMY 203A  Human Microscopic Anatomy
- ANATOMY 203B  Human Microscopic Anatomy
- DEV BIO 231B  Cell Biology
- EPIDEM 205  Environmental Epidemiology
- MOL BIO 203  Nucleic Acid Structure and Function
- MOL BIO 204  Protein Structure and Function
- PHYSIO 206A  Introduction to Medical Physiology
- PHYSIO 206B  Introduction to Medical Physiology
- PUBHLTH 265  Advanced Environmental Health Science
- PUBHLTH 276  Toxic Chemicals in Environment
- TOX 202  Environmental Toxicology
- TOX 204  Neurotoxicology
- TOX 212  Inhalation Toxicology
- TOX 220  Industrial Toxicology
- TOX 269  Air Pollution, Climate, and Health
- TOX 270  Human Exposure to Environmental Contaminants

C. Fulfill the following:
   - Comprehensive Exam
   - Qualifying Exam
   - Teaching Requirement
   - Research Dissertation

The normative time for advancement to candidacy is three years. The normative time for completion of the Ph.D. is five years, and the maximum time permitted is seven years.

Master of Science in Environmental Health Sciences

All courses must be passed with an average grade of B or better.

A. Complete the following:
   - EPIDEM 200  Principles of Epidemiology
   - EPIDEM 204  Biostatistics
   or PUBHLTH 207  Public Health Statistics
or STATS 201
TOX 206A
TOX 206B
TOX 264
TOX 298A
TOX 298B
TOX 298C
TOX 299

Eight units from the approved elective pool.

C. Complete one of the following plans:

Plan I: Under the direction of a faculty advisor, prepare a thesis that is acceptable to the thesis committee

Plan II: 1. Under the supervision of a faculty member, prepare a scholarly paper based on individual study in an area of toxicology

2. Pass the written comprehensive examination.

Opportunities for individual training and independent research experience exist in inhalation and pulmonary toxicology, atmospheric chemistry and aerosol science, neurochemistry and neurotoxicology, reproductive and developmental toxicology, toxicology of naturally occurring compounds, exposure modeling, risk assessment, chemical pathology, environmental microbiology, and environmental chemistry. Research grants and contracts are available to support qualified doctoral students as research assistants.

Faculty

Dean B. Baker, M.D. University of California, San Diego, Professor of Medicine; Environmental Health Sciences; Program in Public Health

Scott Bartell, Ph.D. University of California, Davis, Associate Professor of Program in Public Health; Environmental Health Sciences; Epidemiology; Social Ecology; Statistics

Bruce Blumberg, Ph.D. University of California, Los Angeles, Professor of Developmental and Cell Biology; Biomedical Engineering; Environmental Health Sciences; Pharmaceutical Sciences (gene regulation by nuclear hormone receptors in vertebrate development physiology, endocrine disruption)

Stephen C. Bondy, Ph.D. University of Birmingham, Professor of Medicine; Environmental Health Sciences; Pharmacology; Program in Public Health

Vincent J. Caiozzo, Ph.D. University of California, Irvine, Professor in Residence of Orthopaedic Surgery; Environmental Health Sciences; Physiology and Biophysics

Jefferson Chan, Ph.D. University of California, San Francisco, Associate Professor of Pathology and Laboratory Medicine; Environmental Health Sciences

Ralph J. Delfino, M.D., Ph.D. McGill University, Professor in Residence of Epidemiology; Environmental Health Sciences

Derek Dunn-Rankin, Ph.D. University of California, Berkeley, Professor of Mechanical and Aerospace Engineering; Civil and Environmental Engineering; Environmental Health Sciences (combustion, optical particle sizing, particle aero-dynamics, laser diagnostics and spectroscopy)

Rufus D. Edwards, Ph.D. Rutgers, The State University of New Jersey, Associate Professor of Program in Public Health; Environmental Health Sciences; Epidemiology

C. Sunny Jiang, Ph.D. University of South Florida, Professor of Civil and Environmental Engineering; Environmental Health Sciences (water pollution microbiology, environmental biotechnology, aquatic microbial ecology)

Virginia Kimonis, M.D. University of Southampton, Professor of Pediatrics; Environmental Health Sciences

Michael T. Kleinman, Ph.D. New York University, Adjunct Professor of Community & Environ Medicine; Environmental Health Sciences; Program in Public Health

Charles E. Lambert, Ph.D. University of California, Irvine, Assistant Adjunct Professor of Environmental Health Sciences

Charles L. Limoli, Ph.D. University of California, San Diego, Professor of Radiation Oncology; Environmental Health Sciences

Ulrike Luderer, M.D., Ph.D. Northwestern University, Professor of Medicine; Developmental and Cell Biology; Environmental Health Sciences; Program in Public Health (reproductive toxicology, developmental toxicology, developmental basis of ovarian toxicity, ovarian cancer)

Oladele A. Ogunseitan, Ph.D. University of Tennessee, Professor of Program in Public Health; Environmental Health Sciences
Kathryn Osann, Ph.D. University of California, Berkeley, *Adjunct Professor of Medicine; Environmental Health Sciences*

Robert F. Phalen, Ph.D. University of Rochester, *Professor of Medicine; Environmental Health Sciences*

John L. Redpath, Ph.D. University of Newcastle, *Professor Emeritus of Radiation Oncology; Environmental Health Sciences*

Ronald C. Shank, Ph.D. Massachusetts Institute of Technology, *Professor Emeritus of Medicine; Environmental Health Sciences*

Veronica M. Vieira, D.Sc. Boston University, *Associate Professor of Program in Public Health; Environmental Health Sciences*

Jun Wu, Ph.D. University of California, Los Angeles, *Associate Professor of Program in Public Health; Environmental Health Sciences*