

The UCLA Environmental Science and Engineering (ESE) Program was founded in 1973 by Nobel laureate Dr. Willard Libby, who perceived a need to train environmental scientists, engineers, and policymakers in a more interdisciplinary manner than is afforded by traditional PhD programs. As the program enters its third decade, Dr. Libby's vision has in fact been realized with the evolution of the program from an experimental approach into a key component of the overall effort to train environmental professionals at UCLA.

To date, the program has awarded the Doctor of Environmental Science and Engineering (D.Env.) degree to over 200 students, and UCLA remains unique in the country in awarding such a degree. Many graduates have gone on to occupy critical positions in environmental research, remediation, and policy throughout the major environmental agencies in California and the nation. Other graduates have risen to senior positions in private sector companies conducting environmental research and remediation. Still other graduates are applying scientific solutions to environmental problems at national laboratories such as Oak Ridge and Lawrence Livermore Laboratories and at research institutes such as the RAND Corporation.

Although many participating interdepartmental faculty members are from the College of Letters and Science and the Henry Samueli School of Engineering and Applied Science, the program is administered through the School of Public Health, where a core faculty is based in the Department of Environmental Health Sciences. No undergraduate major or master's degree is offered.

The program is designed to train multidisciplinary professionals with an appropriate balance of breadth and specific skills, based on a strong master's-level foundation in a science or engineering discipline. The curriculum consists of formal coursework across a full spectrum of relevant physical, biological, social, and engineering disciplines, as well as interdisciplinary research training through nine-month problems courses. Because the D.Env. degree is not a specialized research degree in the manner of a PhD, the usual extended research training period in residence at UCLA associated with a PhD is replaced by an 18- to 36-month internship in an appropriate government agency, national laboratory, or private industry, during which in-depth study of an environmental problem leads to a dissertation.

FACULTY

Director

Richard F. Ambrose, PhD

Professors

Richard F. Ambrose, PhD (*Environmental Health Sciences*)

Ann Carlson, JD (*Law*)

Yoram Cohen, PhD (*Chemical Engineering*)

Michael D. Collins, PhD (*Environmental Health Sciences*)

Randall Crane, PhD (*Urban Planning*)

William G. Cumberland, PhD (*Biostatistics*)

John R. Froines, PhD (*Environmental Health Sciences*)

Malcolm S. Gordon, PhD (*Ecology and Evolutionary Biology*)

William C. Hinds, ScD (*Environmental Health Sciences*)

Matthew Kahn, PhD (*Institute of the Environment*)

Antony R. Orme, PhD (*Geography*)

Shane Que Hee, PhD (*Environmental Health Sciences*)

Michael K. Stenstrom, PhD (*Civil and Environmental Engineering*)

Irwin H. Suffet, PhD (*Environmental Health Sciences*)

Stanley W. Trimble, PhD (*Geography*)

Richard Turco, PhD (*Institute of the Environment*)

Arthur M. Winer, PhD (*Environmental Health Sciences*)

Professor Emeritus

Richard L. Perrine, PhD (*Civil and Environmental Engineering*)

Associate Professors

J.R. DeShazo, PhD (*Policy Studies*)

Peggy Fong, PhD (*Ecology and Evolutionary Biology*)

Thomas Gillespie, PhD (*Geography*)

Linwood Pendleton, DFES (*Environmental Health Sciences*)

Beate R. Ritz, MD, PhD (*Epidemiology*)

Assistant Professors

Jennifer A. Jay, PhD (*Civil and Environmental Engineering*)

Terri Hogue, PhD (*Civil and Environmental Engineering*)

Field Program Supervisor

Paul Rosenfeld, PhD (*Environmental Health Sciences*)

CONTACT INFORMATION

46-081 Center for the Health Sciences
Box 951772
Los Angeles, CA 90095-1772

(310) 825-9901
www.ph.ucla.edu/ese

■ DOCTOR OF ENVIRONMENTAL SCIENCE AND ENGINEERING (D.ENV.)

◆ Admission Requirements

Applicants must hold a master's degree in engineering, public health, or one of the natural sciences before being formally admitted to the program. In addition to meeting the University minimum requirements, (see the Graduate Study section in the *UCLA General Catalog*, www.registrar.ucla.edu/catalog), applicants must have an excellent scholastic record (3.0 GPA in undergraduate work and 3.5 in graduate work) and must be acceptable to the admissions committee. Applicants must also perform satisfactorily on a recent (within the last five years) Graduate Record Examination (GRE) General Test. There is no minimum combined score requirement. As a guideline, the average scores for those offered admission to the school over the past three years are Verbal: 600 and Quantitative: 740. The averages are generally higher for those admitted into doctoral programs than for those admitted into master's programs. The analytical section



Environmental Health Sciences student Jane Curren receives the Samuel J. Tibbitts Fellowship from Dean Rosenstock and Professor Irwin Suffet.

is not required. The overall academic record must reflect exceptional verbal and quantitative skills and drive toward academic achievement. The program is also interested in special qualities, awards, and achievements not reflected in the student's academic record. All applicants must submit a narrative statement indicating how their professional goals can be met through the ESE Program, and submit three letters of recommendation. All students must have taken the following preparation courses:

1. One year of introductory biology with laboratory.
2. One year of general chemistry with laboratory, including analytical methods, and one term of organic chemistry.
3. One year of calculus and one course in elementary statistics.
4. One year of introductory physics with laboratory.

In some cases, students may be allowed to complete missing coursework after admission to the program.

As English language skills are essential to completion of the curriculum, applicants for whom English is a second language are required to score successfully on the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS) examination. Students accepted into the program with identified language deficiencies must remove the deficiencies before being advanced to candidacy.

Subject to available funds, the program offers fellowships or graduate student researcher appointments to eligible first-year students. Prospective students may contact the program for brochures.

◆ Major Fields or Subdisciplines

Specialties within the program include, but are not limited to, the assessment and management of hazardous substances in the air, soil, and water environments, migration of contaminants in groundwater, health risks of toxic substances, mitigation of adverse effects on the biological environment, and environmental economics. Research projects are conducted on a wide range of air and water pollution problems with biological and health impacts. Also, students may balance their work toward greater emphasis either on the science/engineering side or on the science/policy side of their specialty.

◆ Course Requirements

Course requirements consist of core, breadth and problems courses, seminars, and a technical writing course.

◆ *Core and Breadth Courses*

Sixteen courses are required (one of which may be waived based on prior coursework), including four core courses (Environmental Health Sciences 212, 225, 235, 264) offered by program faculty. At least seven courses must be at the graduate level. Courses are selected from the following categories, with electives chosen from a list of approved courses.

Environmental Science: Seven courses, including Environmental Health Sciences 212 (core), 225 (core), 240, 264 (core), and electives in environmental biology, microbiology, or ecology, in environmental geology, and in atmospheric sciences.

Environmental Engineering: Five courses, including Civil and Environmental Engineering 150, 155, and three electives.

Environmental Management, Law, and Policy: Four courses, including Environmental Health Sciences 235 (core), Urban Planning M264, and two electives.

◆ *Seminar and Writing Course*

Students are required to enroll in Environmental Science and Engineering M411 (seminar) twice per year and M412 (technical writing course) during their first year.

◆ *Problems Courses*

Problems courses constitute intensive multidisciplinary applied research directed toward the solution of current environmental problems. Before proceeding to the problems courses, students must have completed all but six of the required courses, successfully passed all core courses taken (with grades of B– or better), and maintained a cumulative GPA of 3.0. Twenty-four quarter units of the combined Environmental Science and Engineering 400 and 410 series courses must be completed during the three quarters prior to advancement to candidacy. Enrollment in more than one problems course per quarter is not allowed. No more than 8 units of other coursework may be taken when enrolled in a problems course. Normally problems course credit is earned only through courses offered by the program. However, students may petition the faculty for permission to earn problems course credit through multidisciplinary environmental projects offered in other departments at UCLA.

◆ *Qualifying Examinations*

The written qualifying examination is normally taken before the second year in residence, after completing

the core courses and most of the breadth courses. If all or parts of the examination are failed, one and only one repeat is allowed — at the next offering. The written examination covers the material in the core courses, the breadth courses, and selected topics in classical and contemporary subjects in the program’s areas of interest.

When students have completed all other course requirements and are in the final quarter of the problems courses, a doctoral committee is established. The committee conducts the University Oral Qualifying Examination, which explores the depth, breadth, and extent of the preparation, with appropriate emphasis on practical problems and situations. After successful completion of the oral examination, students are advanced to candidacy. In case of failure, students may repeat the oral examination once after completing any additional coursework or individual study the doctoral committee may recommend.

◆ *Internship*

Once students have advanced to candidacy, an 18- to 36-month internship in the field of interest is arranged at an outside institution. Arrangements for the internship are primarily each student’s responsibility and must be approved by the doctoral committee and program director. Supervision during the field training experience is by the doctoral committee and the field program supervisor. During the internship, students must register for 8 units of a 599 course in each academic-year term.

◆ *Dissertation/Final Oral Examination*

A dissertation is required and should be a scholarly treatment of the problem area in which students have worked, but not a description of the totality of the experience. It should show evidence of critical thought and originality. No later than nine months after advancement to candidacy, at the beginning of the internship, students are required to present a written prospectus, including an outline, of the dissertation and defend it before the doctoral committee. After completing the internship, students must defend the dissertation before the doctoral committee.

The final oral examination may be waived by unanimous consent of the doctoral committee. If the dissertation and performance on the final oral examination are judged satisfactory, students are awarded the degree of Doctor of Environmental Science and Engineering (DEnv).

Faculty from a variety of departments and schools at UCLA, including Biological Chemistry, Chemistry and Biochemistry, Environmental Health Sciences, Epidemiology, Medicine, Molecular and Medical Pharmacology, and Pathology and Laboratory Medicine, have joined forces to create an interdisciplinary PhD program in Molecular Toxicology. The program is designed to train multidisciplinary professionals in molecular toxicology, as well as to develop linkages between researchers and educators in the basic biological and chemical sciences with faculty whose interests are in toxicology. There is a particular emphasis on mechanisms of toxicity.

The program is administered through the School of Public Health, where the existing toxicology concentration in the Department of Environmental Health Sciences has been expanded. Program faculty and students seek to address problems of societal significance in California related to public exposure to toxic chemical agents in the environment, from foods and therapeutic drugs to other lifestyle exposures, and to investigate gene-environment interactions that have toxicologic significance. Specialties within the program include, but are not limited to, neurotoxicology, immunotoxicology, genetic toxicology, carcinogenesis, and nanotoxicology.

Toxicology is a discipline that is central to the long-term development of environmental programs in the next century. The traditional training programs in the University are changing to better address societal need and to provide the highest level of intellectual leadership. Whether and how to address chemical toxicity is now recognized as a chief limitation in the ability to stimulate growth and new technological change. The training of new scientists equipped with skills to address toxicologic issues and who also understand the multidisciplinary nature of the problems is key to our long-term progress as a society.

CONTACT INFORMATION

56-070 Center for the Health Sciences
Box 951772
Los Angeles, CA 90095-1772

(310) 206-1619
www.ph.ucla.edu/moltox

■ DOCTOR OF PHILOSOPHY (PHD) IN MOLECULAR TOXICOLOGY

◆ Admission Requirements

A master's degree is not a requisite for admission. In addition to meeting the University minimum requirements, (see the Graduate Study section in the *UCLA General Catalog*, www.registrar.ucla.edu/catalog), applicants must have an excellent scholastic record, perform satisfactorily on the Graduate Record Examination (GRE), have completed a minimum of a 4-unit undergraduate course in statistics, and be acceptable to the admissions committee. Deficiencies

FACULTY

Director

Oliver Hankinson, PhD

Professors

Judith A. Berliner, PhD (*Pathology and Laboratory Medicine*)
Gautam C. Chaudhuri, MD, PhD (*Molecular and Medical Pharmacology*)
Marie-Françoise Chesselet, MD, PhD (*Neurobiology*)
Catherine F. Clarke, PhD (*Chemistry and Biochemistry*)
Michael D. Collins, PhD (*Environmental Health Sciences*)
Curtis D. Eckhart, PhD (*Environmental Health Sciences*)
John R. Froines, PhD (*Environmental Health Sciences*)
Richard Gatti, MD (*Pathology and Laboratory Medicine*)
Hillary A. Godwin, PhD (*Environmental Health Sciences*)
Oliver Hankinson, PhD (*Pathology and Laboratory Medicine*)
Louis J. Ignarro, PhD (*Molecular and Medical Pharmacology*)
David E. Krantz, MD, PhD (*Psychiatry and Biobehavioral Sciences*)
William H. McBride, DSc (*Radiation Oncology*)
Sabeeha Merchant, PhD (*Chemistry and Biochemistry*)
Jeffrey H. Miller, PhD (*Microbiology, Immunology, & Molecular Genetics*)
Andre Nel, MD, PhD (*Medicine*)
Stephen J. Pandol, MD (*Medicine*)
Suzanne E. Paulson, PhD (*Atmospheric Sciences*)
Beate R. Ritz, MD, PhD (*Epidemiology*)
Michael D. Roth, MD (*Medicine*)
Robert H. Schiestl, PhD (*Pathology and Laboratory Medicine*)
Joan S. Valentine, PhD (*Chemistry and Biochemistry*)
Zuo-Feng Zhang, MD, PhD (*Epidemiology*)

Associate Professors

Jeff Bronstein, MD, PhD (*Neurology*)
William P. Melega, PhD (*Molecular and Medical Pharmacology*)
Wendie A. Robbins, PhD, MSN (*Environmental Health Sciences, Nursing*)

may be made up during the first two years in the program.

Generally, applicants must have achieved a grade-point average of at least 3.0 in undergraduate work and 3.5 in any graduate work. The ideal training for an undergraduate is either a major in Chemistry or Biology and a solid background in both of these disciplines. Additional recommended courses include calculus, statistics, cell biology, genetics, physiology, microbiology, molecular biology, inorganic chemistry, organic chemistry, biochemistry, and physical chemistry. However, excellent students from all disciplines are considered for admission and, if admitted, can make up deficiencies during their graduate study.

Students who apply directly to the program do so through the application process in the School of Public Health. Applications are accepted for Fall Quarter only. The deadline is December 1 for priority admission to the following Fall Quarter. Completed applications consist of the UCLA Application for Graduate Admission, the School of Public Health supplemental application, two official copies of transcripts, three letters of recommendation, GRE General Test scores, and a statement of purpose. International applicants whose native language is not English must also submit results from the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS) examination.

Students who apply to the program through *UCLA ACCESS to Programs in the Molecular, Cellular, and Integrative Life Sciences* must complete a standard, first-year graduate biomedical curriculum that allows entry into a department in the student's second year. They must declare Molecular Toxicology as their preferred major at the end of the first year, submit a supplemental Public Health application and, once accepted, file a change of major form. More information about the UCLA Access Initiative can be obtained from:

❖ *UCLA Access 172 Boyer Hall, UCLA, Box 951570, Los Angeles, CA 90095-1570, www.uclaaccess.ucla.edu, e-mail: uclaaccess@mednet.ucla.edu. (310) 206-1845*

◆ *Major Fields or Subdisciplines*

Consult the graduate advisor.

◆ *Course Requirements*

During the first year, all students follow the ACCESS curriculum. Therefore, in Fall Quarter they begin by taking Biological Chemistry CM253. In Winter Quarter students take Biological Chemistry CM267A/B and CM248. In Spring Quarter students take Environmental Health Science 240. In their second year they take

Molecular Toxicology 245 and Molecular Toxicology 246. In all quarters, students take a three-unit seminar Molecular Toxicology 211A-211B-211C, and a six-unit laboratory rotation Molecular Toxicology (596) within the department of a faculty sponsor. Students must attain a B- grade or better in all core courses and must pass all core courses (excluding courses offered every other year) within two years of entering the program, unless there are extraordinary circumstances, which will be reviewed by the Faculty Advisory Committee.

◆ *Qualifying Examinations*

Both a written and oral qualifying examination are required. The format for the written qualifying examination consists of a research proposal on a topic that is approved by members of the doctoral committee. The doctoral committee consists of four faculty members, including the student's advisor who serves as chair. The advisor recommends the composition of the committee, which is appointed by the Graduate Division. The research proposal topic must be approved by the doctoral committee.

The University Oral Qualifying Examination is organized to question the candidate regarding the written proposal, and also to query the candidate in a more general way regarding scientific topics that should be common knowledge to a doctoral-level toxicologist. Two attempts are allowed to pass both the written and oral qualifying examinations.

The written qualifying examination is normally taken during the second or third year in residence, after completing required coursework. The examination consists of a research proposal on a topic approved by the doctoral committee, which consists of four faculty members, including the student's advisor who serves as chair. The research proposal topic cannot be closely related to the dissertation topic. The University Oral Qualifying Examination allows the committee to fully evaluate the ability of the student to discuss both the proposal subject matter and general scientific topics which should be common knowledge to doctoral-level toxicologists. Two attempts are allowed to pass both the written and oral qualifying examinations.

◆ *Dissertation/Final Oral Examination*

A dissertation based on original research is required. The dissertation should consist of research equivalent to at least two peer-reviewed publications in reputable journals in the field. A final defense of the dissertation is required.