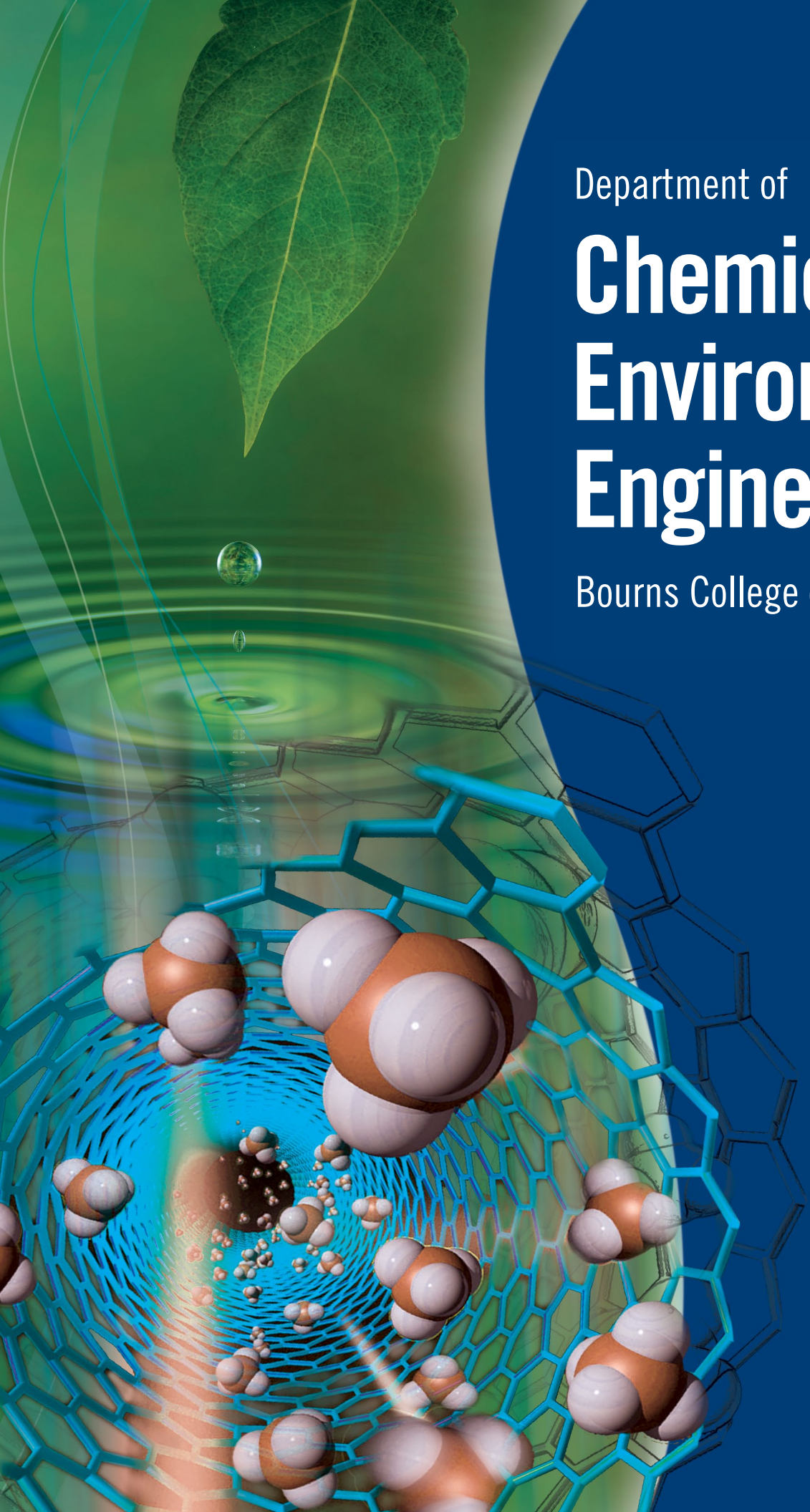

Department of

Chemical & Environmental Engineering

Bourns College of Engineering

UC RIVERSIDE UNIVERSITY OF CALIFORNIA

We Engineer Excellence

Bourns Hall, part of the Engineering complex at the University of California, Riverside (UCR).

The CEE program is housed in Bourns Hall, an award-winning $41 million building in the modern engineering complex at the University of California, Riverside. More than 7,000 sq. ft. of teaching lab space, 8,500 square feet of research lab space and 1,600 sq. ft. of computing lab space serves the department. Faculty research laboratories are equipped with extensive state-of-the-art facilities for research in biomolecular, chemical and environmental engineering. A nanofabrication clean room provides a dust-free setting for the creation of nanoscale circuits and machines that will lead to a new generation of devices and further UCR's nanotechnology research efforts.

Bourns College of Engineering (BCOE)

at UCR has been the fastest growing engineering program in the University of California system, widely recognized as the best system of public higher education in the world. Bourns combines the intellectual and material resources of the UC system with a uniquely intimate research environment, fostering frequent faculty-student interactions rarely found at other universities.

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Chemical and Environmental Engineering
242 Bourns Hall
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Riverside, CA 92521

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Welcome to the Department of

Chemical and Environmental Engineering

We are proud of our tremendous growth in recent years, and are even prouder of the high quality education we at the Department of Chemical and Environmental Engineering (CEE) offer our undergraduate and graduate students. In addition to state-of-the-art instructional facilities, even our undergraduate students have ample opportunity to get involved in **hands-on research** in our faculty laboratories. Our graduate students are engaged daily in leading edge research critical to our society's need for ***clean air, fresh water, sustainable energy, and national security.***

We haven't just recently arrived at our core strengths in today's hottest research areas. We have long been building teams of faculty members well-established as **high-impact, productive researchers** in these fields.

The department is currently working on over $12 million in active research grants. Respected measures of our faculty publication records* put CEE faculty on a par with the 25 best chemical and environmental engineering programs in the country. In fact, our U.S. News and World Report rankings have increased dramatically over the past four years, with our environmental engineering program ranked 39th in 2009.

For students interested in studying materials synthesis and processing, **nanotechnology and materials research are special strengths** of the CEE department, as well as across BCOE and the entire campus. The truly interdisciplinary Materials Science and Engineering (MSE) program was established at BCOE to meet growing demands of the high-tech industry and nanotechnology companies. In 2010 the program moves into a new $56 million building.

I invite you to look through the enclosed information or browse our Web site to find out more about our department and research. Please contact us for a campus visit if you are in the Southern California area.

Yushan Yan, Department Chair

** Collective CEE h-index of 54 for articles published between 2000 and 2008; an average citation per paper of 20; number of papers per faculty per year of 5*

What is Chemical and Environmental Engineering?

Chemical engineering deals with processes that transform energy or matter into useful products. Environmental engineering is concerned with protecting the environment from undesirable effects that may result from human activity. Together, chemical and environmental engineering ensures that tomorrow's products will not only be useful, they will also be environmentally friendly.

Chemical and Environmental Engineering – Pursuing Green

Thanks to our nation's priorities for abundant renewable energy, improved medicines and other technological advances, while promoting and maintaining a clean and sustainable environment, chemical and environmental engineers are among today's most sought after job recruits. For those wanting to make a positive impact on society, opportunities for chemical and environmental engineering graduates abound.

Chemical engineering students are prepared for careers in a wide range of fields including petrochemical and petroleum refining, renewable energy, bioengineering/biotechnology, semiconductor manufacturing, and food processing. Likewise, environmental engineering students are prepared for a broad array of professional opportunities in green engineering, air and water quality management, renewable energy, water and wastewater treatment, and global environmental issues. For those seeking research careers, chemical and environmental engineering graduates are also well positioned for admission into top graduate engineering programs, as well as other professional schools such as business, medicine, and law.

Chemistry + Sustainability = Making a Better World

Advancing technologies and applications that promote sustainability in such a way that will allow the global community to meet tomorrow's environmental, economic and societal needs — without compromising opportunities for future generations — is the challenge for today. Chemical and environmental engineers together are addressing that challenge through novel design, innovative processing, technology breakthroughs and new cleverly devised materials.

The interdisciplinary UCR Center for Nanoscale Science and Engineering, directed by CEE Distinguished Professor Robert Haddon, is devoted to researching next-generation electronics through the development of breakthrough materials and devices. Supported by the center's state-of-the-art nanofabrication clean room and nanofabrication facility, CEE researchers are working with colleagues across campus on spintronics, 3D electronics and carbon materials, including carbon nanotubes and graphene.

Chemical and Environmental Engineering at the University of California, Riverside

Whether you pursue chemical engineering, environmental engineering or both at CEE, you will receive comprehensive academic training and practical experience to well position you for multiple career choices. Most junior and senior undergraduates participate in cutting-edge research activities in faculty labs, at one of the college's interdisciplinary research centers, and/or in internships with industry or government agencies.

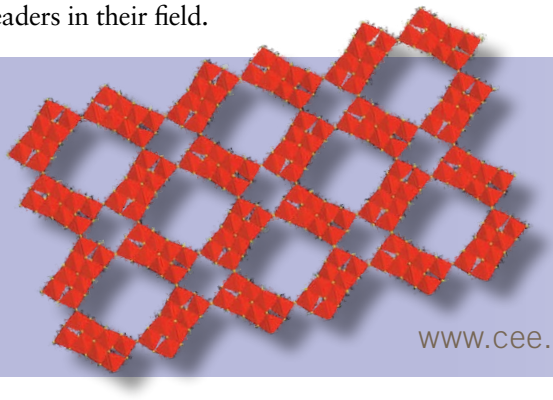
All students receive personal attention throughout their academic careers from staff advisors and faculty mentors. In addition, students have access to dedicated BCOE and campus resources, such as academic assistance, study and time management workshops, career guidance, professional development training, membership in professional societies and social activities.

CEE emphasizes small classes and one-on-one interactions with professors. Though leaders in their field and active in internationally recognized research centers such as the UCR Center for Nanoscale Science and Engineering, faculty members are approachable and engaged in mentoring. Both graduate students and undergraduates are encouraged and helped to publish results of their research, and travel to research conferences to present their work. You will find a welcoming home at CEE among people accomplishing amazing things.

- CEE faculty have twice received the Chancellor's Outstanding Faculty Mentor Award and the Excellence in Teaching Award.
- Yushan Yan is the most recent professor inducted as a Fellow of the American Association for the Advancement of Science (AAAS), joining fellow colleagues Robert Haddon, Joe Norbeck, Mark Matsumoto, Ashok Mulchandani, Wilfred Chen, and Charles Wyman.
- Two CEE professors were awarded NSF-CAREER awards, given to early-career academics most likely to become leaders in their field.

"Unlike most animals...we engineer our environment."

— Jeffrey Mount, geologist



www.cee.ucr.edu

Research for a Greener World

CEE's research is at the forefront of our nation's commitment to energy independence and sustainability. Our four fields of application—***clean air, fresh water, sustainable energy and national security***—are supported by six core areas of research strength: air quality systems; water quality systems; biotechnology; advanced materials and nanotechnology; energy systems; and theory and molecular modeling.

Air Quality Systems

Air quality researchers focus on urban and regional air quality with a combined experimental and theoretical approach. Major emphases are placed on chemical and physical characterization of gaseous and particulate emissions, mobile and non-road sources, aerosol chemistry and physics, ozone formation and outdoor air quality characterization.

Faculty: **Akua Asa-Awuku, David Cocker, Joseph Norbeck**

Water Quality Systems

Water quality research explores the quality of water in natural and engineered systems ranging from micro to macro scales. Areas of research include bacterial adhesion and transport in groundwater environments, novel methods for water and wastewater treatment, soil and groundwater remediation processes, hazardous waste treatment, environmental biotechnology and modeling.

Faculty: **David Cwiertny, Mark Matsumoto, Sharon Walker**

CEE researchers have access to the most advanced facility in the world for studying smog. The Atmospheric Processes Laboratory (APL) allows precise control of variables such as temperature, pressure, humidity, light and heat. Assistant Professor Akua Asa-Awuku uses the APL in her research on global climate change, exploring the production of cloud droplets from condensation nuclei.

Biotechnology

Employing the tools of biotechnology and nanotechnology, faculty in this area develop bioanalytical devices for applications such as medical diagnostics, personal and homeland security, environmental monitoring and water and food safety; develop technologies for remediation of heavy metals; and synthesize nanostructured materials using the sophisticated resources of the UCR Center for Nanoscale Science and Engineering. In the area of environmental biotechnology, we work on biological treatment of contaminated air and ground water and employ metabolic engineering tools to develop novel biocatalysts for decontamination of xenobiotics, heavy metals and emerging contaminants.

Faculty: **Wilfred Chen, Ashok Mulchandani**

Energy Systems

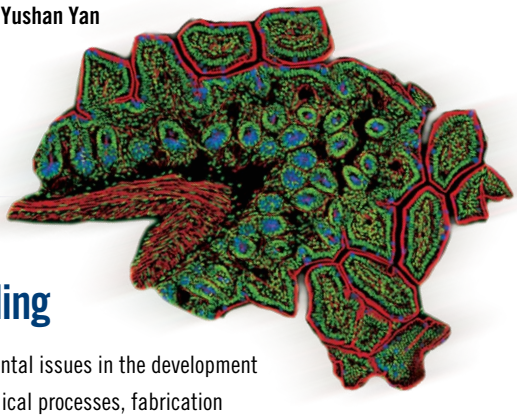
Understanding and improving alternative fuel technologies is the focus of this group, impacting our nation's dependence on petroleum and offering substantial economic, strategic, and environmental benefits. One element of the group is directed at biological conversion of cellulosic biomass to ethanol and other sustainable products. Another element applies thermochemical processes to produce diesel and other fuels from biomass, coal and other carbonaceous materials. We also work on new catalysts and membranes for fuel cells.

Faculty: **Joseph Norbeck, Charles Wyman, Yushan Yan**

Advanced Materials and Nanotechnology

Research in this group focuses on the design, synthesis and processing of nanostructured materials including thin-film zeolites, carbon nanotubes, and nanowires and nanotubes of metals and semiconductors. These nanostructured materials are assembled into multifunctional devices for a wide range of applications such as spintronics, biosensors, thermoelectrics, dielectrics, and fuel cell catalysts and membranes. Several members of this group are active in the UCR Center for Nanoscale Science and Engineering, including the center director Robert Haddon.

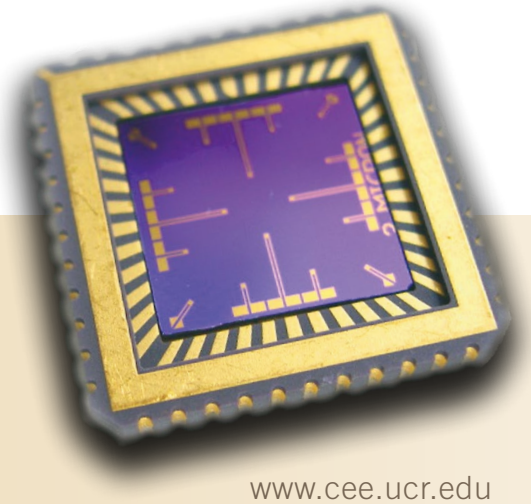
Faculty: **Robert Haddon, David Kisailus, Nosang Myung, Jianzhong Wu, Yushan Yan**



Theory and Molecular Modeling

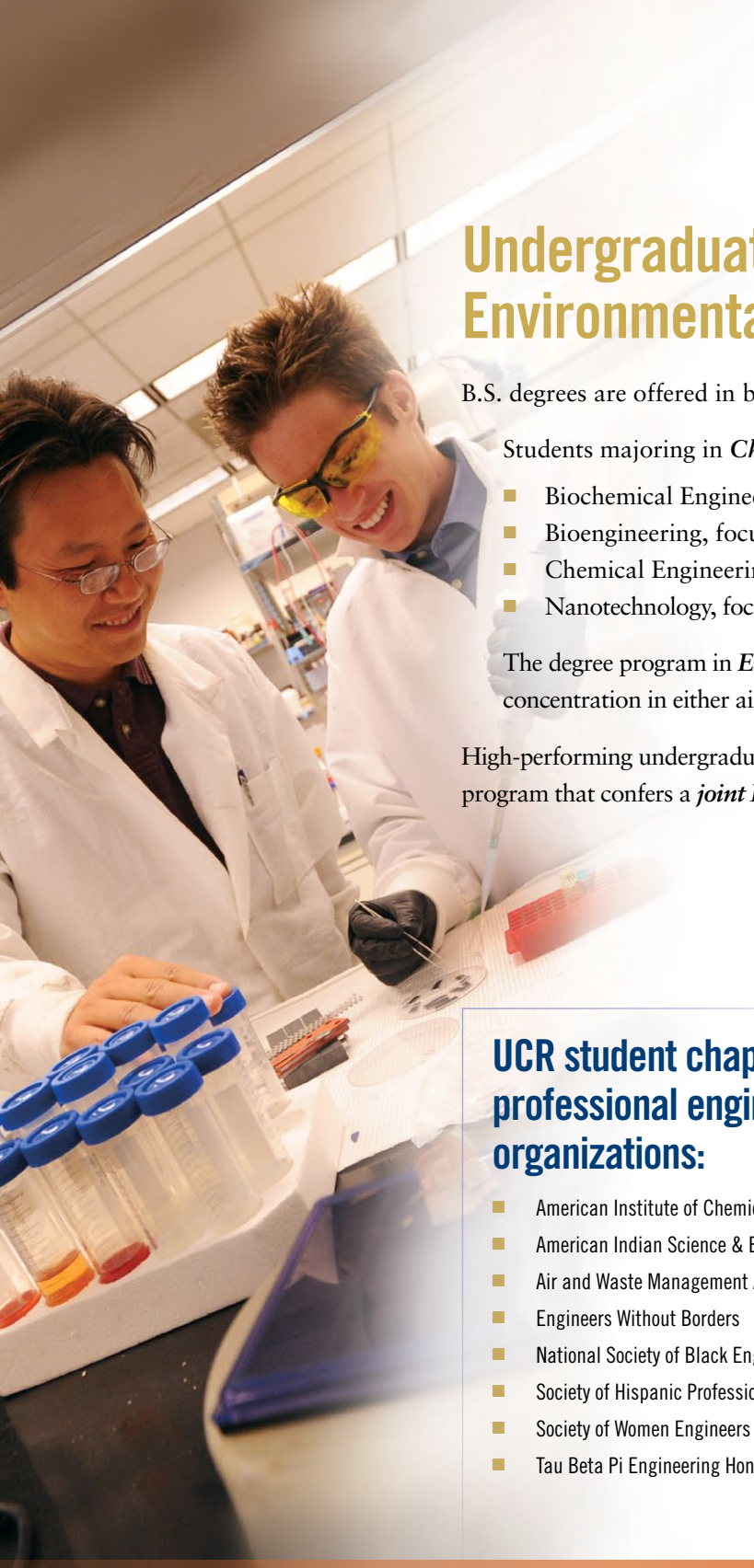
This group addresses fundamental issues in the development of novel chemical and biochemical processes, fabrication of multifunctional nanostructured materials, formulation of efficient therapeutic agents, production of renewable fuels, design of intelligent biosensors and improvement of water and air quality. Current research interests include molecular modeling of complex fluids and its implications for biological systems, systems biology, rational drug design, immunophysics and meteorological and air quality modeling.

Faculty: **Joseph Norbeck, Jianzhong Wu**



The College of Engineering Center for Environmental Research & Technology (CE-CERT) (www.cert.ucr.edu) is a model for partnerships among academia, government and industry, transitioning environmental research into real world technologies, including:

- Autonomous vehicles and transportation systems
- Alternative fuels, engines and vehicles
- Air pollutant measures and mitigation
- Clean and renewable energy sources



Undergraduate Programs in Chemical and Environmental Engineering

B.S. degrees are offered in both Chemical Engineering and Environmental Engineering.

Students majoring in ***Chemical Engineering*** have four options:

- Biochemical Engineering, focusing on biochemical processes
- Bioengineering, focusing on the biomedical industry
- Chemical Engineering, emphasizing traditional chemical engineering issues
- Nanotechnology, focusing on nanomaterial synthesis, characterization and applications.

The degree program in ***Environmental Engineering*** allows students to choose a concentration in either air or water quality.

High-performing undergraduate CEE students can gain accelerated entry into a 5-year program that confers a ***joint B.S.+M.S. degree*** in Chemical and Environmental Engineering.

UCR student chapters of professional engineering organizations:

- American Institute of Chemical Engineers
- American Indian Science & Engineering Society
- Air and Waste Management Association
- Engineers Without Borders
- National Society of Black Engineers
- Society of Hispanic Professional Engineers
- Society of Women Engineers
- Tau Beta Pi Engineering Honor Society

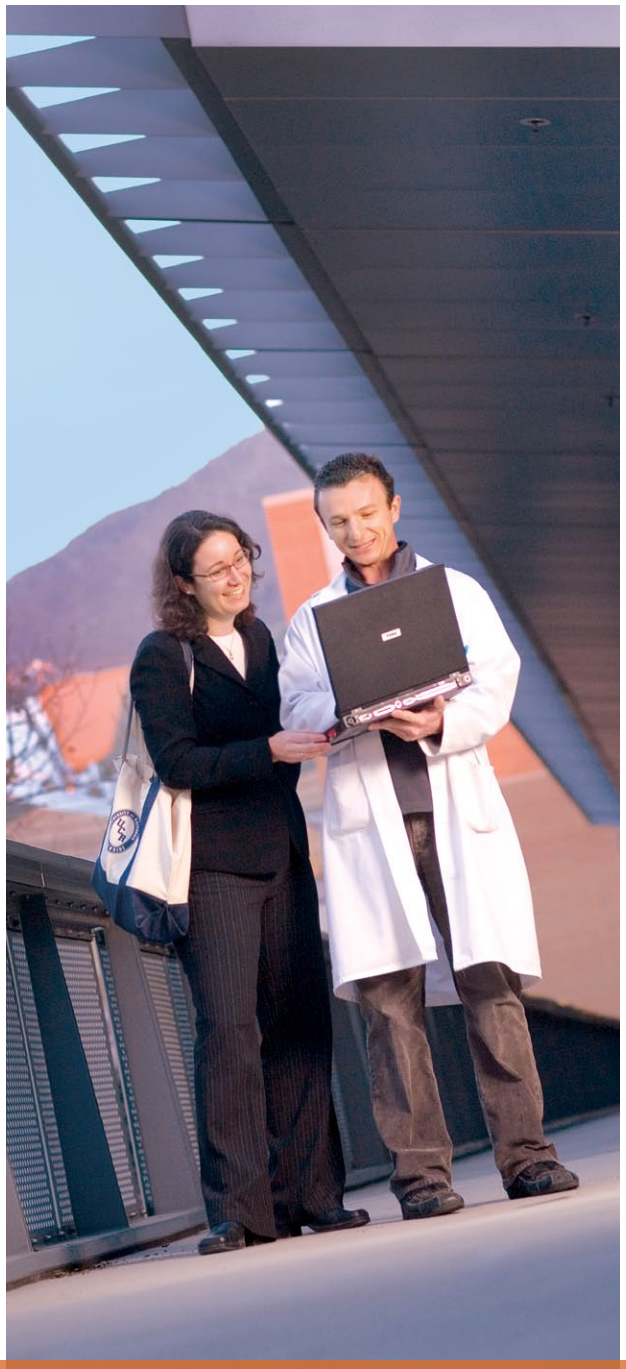
Advanced Technologies

Technologies from CEE Senior Design Projects, which are required for graduation, are winning national competitions. The workplace-like experience of producing a product from concept to prototype with manufacturing plan distills undergraduate training into practical application. Students have won:

- Four first-round EPA P3 awards, with two team projects advancing to the 2010 finals
- Both rounds of the Southern California World Water Forum competition
- Teamwork Award at the 2007 WERC student design competition
- The Outstanding Student awards for both 2007 and 2009 WERC competitions

UCR is a member of the Western Association of Schools and Colleges (WASC) and fully accredited by its Senior Commission. The B.S. degrees in Chemical & Environmental Engineering are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Graduate Program in Chemical and Environmental Engineering



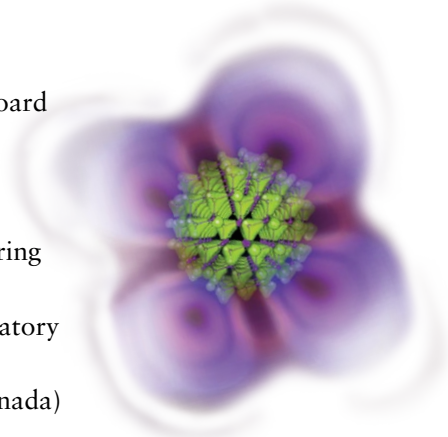
The Graduate Program offers the M.S. and Ph.D. degrees in Chemical and Environmental Engineering. Taking advantage of the complementary skills and expertise of the faculty, our graduate students pursue interdisciplinary and often collaborative research at the frontiers of chemical and environmental engineering. The main research areas include:

- Air quality systems engineering
- Water quality systems engineering
- Biotechnology
- Advanced materials and nanotechnology
- Energy Systems
- Theory and molecular modeling

In addition to a wide variety of exciting research opportunities with the faculty, most graduate students are supported by very competitive fellowship packages. Students conduct their research with state-of-the-art resources in new facilities and benefit from outstanding infrastructure.

Our graduates and postdoctoral fellows are faculty members at institutions all over the world, are continuing their education at the nation's top research universities, or are employed in a wide variety of corporate, government and non-profit organizations, including:

- British Petroleum
- California Air Resources Board
- DuPont
- Ford
- Intel
- Krieger & Stewart Engineering
- Proctor and Gamble
- U.S. Naval Research Laboratory
- University of Connecticut
- University of Waterloo (Canada)



ABET has awarded BCOE the prestigious Claire Felbinger Award for Diversity, one of only three awarded in 2009.

"My UCR education in nanotechnology and environmental engineering gave me an advantage in my job search."

—T. Zhang '07 (Ph.D. CEE)
Associate Professor,
International Lab, Suzhou Institute of Nano-Tech and Nano-bionics

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Faculty

Akua Asa-Awuku, Assistant Professor
Ph.D., Georgia Institute of Technology
Aerosol-cloud climate interactions and particulate hygroscopicity; droplet growth kinetics

Wilfred Chen, Professor
Ph.D., California Institute of Technology
Environmental biotechnology; microbial engineering

David Cocker, Associate Professor
Ph.D., California Institute of Technology
Air quality systems engineering; atmospheric chemistry

David Cwiertny, Assistant Professor
Ph.D. Johns Hopkins University
Environmental chemistry; pollutant fate and transport; ground water remediation

Robert Haddon, Distinguished Professor
Director, Center for Nanoscale Science and Engineering
Ph.D., Penn State University
Carbon nanotubes; applied materials

David Kisailus, Assistant Professor
Ph.D., University of California, Santa Barbara
Bio-mimetics; bio-inspired materials synthesis for nanomaterials; energy storage/conversion

Mark Matsumoto, Professor
Associate Dean for Research and Graduate Studies
Ph.D., University of California, Davis
Water and wastewater treatment; soil remediation; hazardous waste

Ashok Mulchandani, Professor
Ph.D., McGill University
Bioengineering; biomaterials; biosensors; environmental biotechnology

Nosang Myung, Associate Professor
Ph.D., University of California, Los Angeles
Material electrochemistry; MEMS/NEMS; sensors; nanowires; thermoelectric materials

Joseph Norbeck, Ruel Johnson Professor and Director of the Environmental Research Institute
Ph.D., University of Nebraska
Advanced vehicle technology; air pollution; renewable fuels

Sharon Walker, John Babbage Chair in Environmental Engineering and Assistant Professor
Ph.D., Yale University
Bacterial transport in natural and engineered systems; water quality engineering

Jianzhong Wu, Professor
Ph.D., University of California, Berkeley
Molecular simulation; nanomaterials; theory of complex fluids

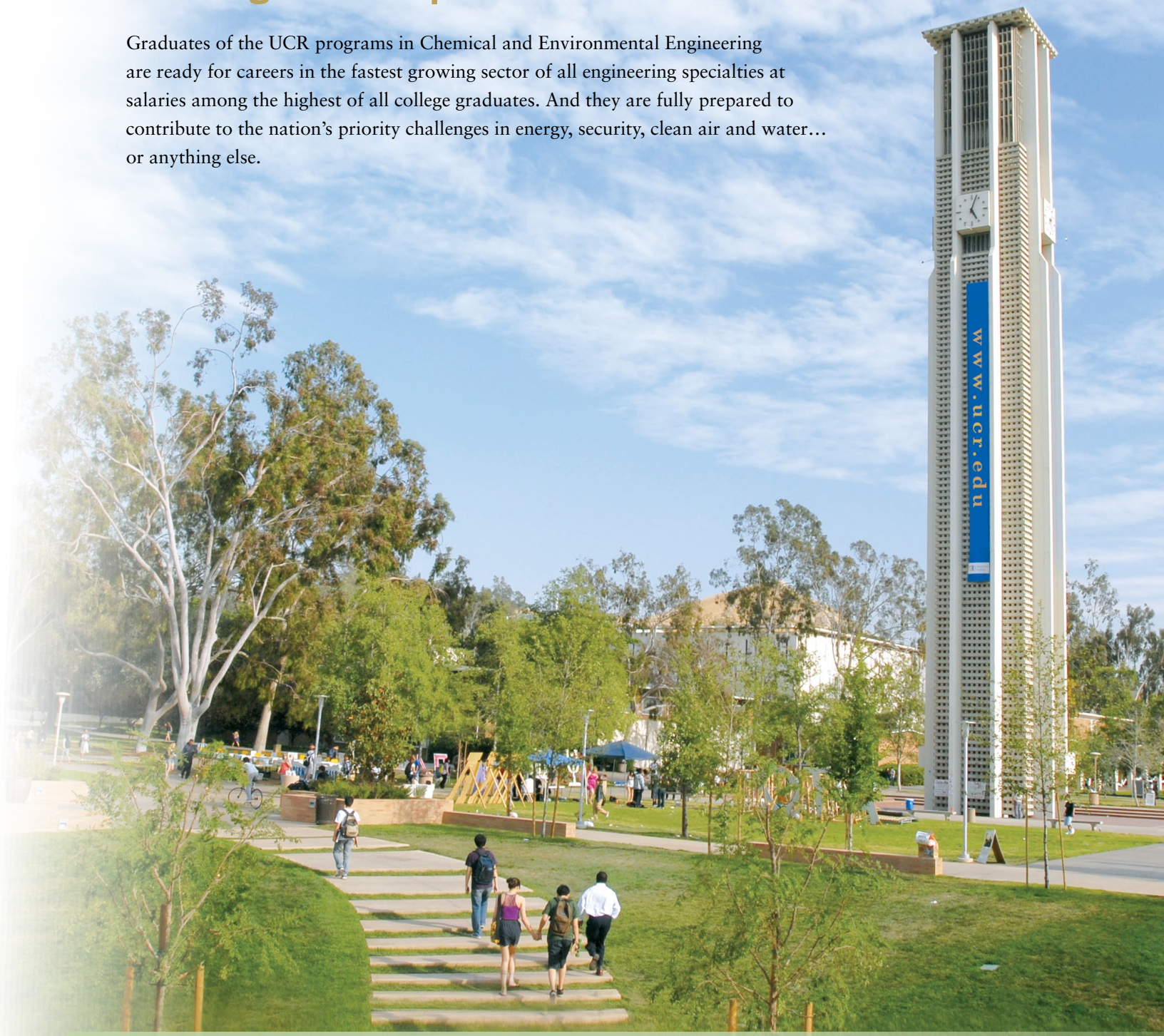
Charles Wyman, Ford Motor Company Distinguished Professor
Ph.D., Princeton University
Sustainable production of fuels and chemicals; pretreatment and conversion of celluloses

Yushan Yan, Professor and Chair
Ph.D., California Institute of Technology
Zeolite thin films; fuel cells; nanostructured materials

Our faculty are leaders in innovative methods of air and water pollution control, making breakthroughs in commercializable fuel cell technologies, applying nanoscientific principles to create new sensors of toxic substances, and advancing the development of economical and clean renewable fuels and energy.

What's green and productive?

Graduates of the UCR programs in Chemical and Environmental Engineering are ready for careers in the fastest growing sector of all engineering specialties at salaries among the highest of all college graduates. And they are fully prepared to contribute to the nation's priority challenges in energy, security, clean air and water… or anything else.



We Invite You to Join Us

Visit our Web site, call us with questions or schedule a visit to our campus.

E-mail: gradcee@engr.ucr.edu
Phone: (951) 827-2859

www.cee.ucr.edu

The 1,200-acre Riverside campus is located between Los Angeles, Palm Springs and San Diego. Ontario International Airport is 20 miles to the west. Desert resorts, snow-capped mountains and the Pacific Ocean can be reached in an hour's drive. The city is well-known for its Mediterranean climate, affordable housing and the landmark Mission Inn. Riverside has evolved from a turn-of-the-century agricultural colony into a hub of higher education, technology, commerce, law, finance, and cultural attractions including a symphony orchestra, a ballet company and a variety of museums. For more information go to www.ucr.edu.

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