

## Environmental

**Environmental Biotechnology:** This research explores the kinetics of the microbial transformation of persistent environmental contaminants, including metal ions, chlorinated solvents and PAH compounds and devises mathematical models to enable site remediation.

**Biofilm Engineering:** Studies explore the fundamental nature of biofilms and how microbes interact with their environment through the formation of such biofilms.

## Engineering Education

Our education programs facilitate rigorous research into innovative and effective educational practices that advance engineering education. ChEBE encourages graduate students who are interested in teaching to try their hand at classroom instruction by occasionally lecturing as TAs or preparing classes in our K-12 program.



## Facilities

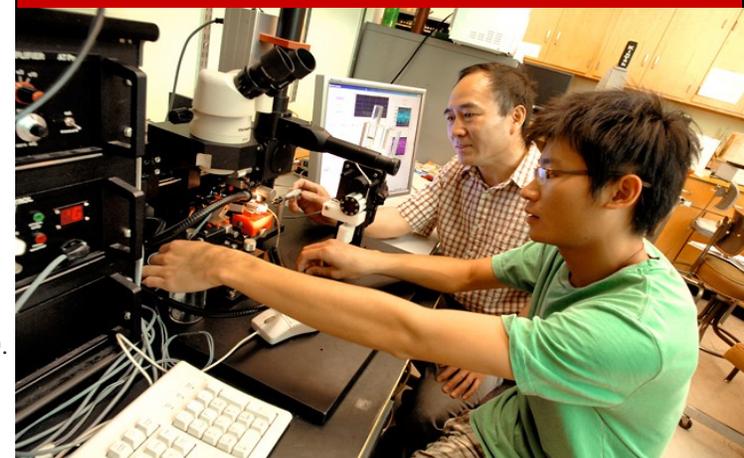
The School is located in 87,827 square feet of state-of-the-art facilities in Wegner Hall on the Pullman campus. Some students work at the Bioproducts, Sciences, and Engineering Laboratory (BSEL) WSU Tri-Cities campus. Other students spend a portion of their educational time working with advanced, state-of-the-art instruments at the Pacific Northwest National Laboratory.

## School Faculty

- Nehal Abu-Lail**, Associate Professor, 2003 Ph.D. Chemical Engineering, Worcester Polytechnic Institute.
- Birgitte Ahring**, Professor, 1986 Ph.D. Microbiology, University of Copenhagen.
- Haluk Beyenal**, Associate Professor, 1997 Ph.D. Chemical Engineering, Hacettepe University..
- Wenji Dong**, Associate Professor, 1992 Ph.D. Physical Chemistry, University of London, England.
- Su Ha**, Associate Professor, 2005 Ph.D. Chemical Engineering, University of Illinois Urbana-Champaign.
- Cornelius Ivory**, Paul Hohenschuh Distinguished Professor, 1980 Ph.D. Chemical Engineering, Princeton University.
- Alla Kostyukova**, Assistant Professor, 1989 Ph.D. Molecular Biology, Russian Academy of Sciences
- Norbert Kruse**, Voiland Distinguished Professor, 1980 Ph.D. Technical University of Berlin.
- David Lin**, Associate Professor, 1997 Ph.D. Biomedical Engineering, Northwestern University.
- Jean-Sabin McEwen**, Assistant Professor, 2005 Ph.D. Physics, Dalhousie University.
- Ed Pate**, Professor, 1976 Ph.D. Mathematical Sciences, Rensselaer Polytechnic Institute
- James Petersen**, Professor and Director, 1979 Ph.D. Chemical Engineering, Iowa State University.
- Haluk Resat**, Associate Professor, 1992 Ph.D. Physics, State University of New York at Stony Brook.
- Steven Saunders**, Assistant Professor, 2011 Ph.D., Chemical and Petroleum Engineering, Auburn University.
- Bernard Van Wie**, Professor, 1982 Ph.D. Chemical Engineering Oklahoma University.
- Anita Vasavada**, Associate Professor, 1999 Ph.D. Biomedical Engineering, Northwestern University.
- Yong Wang**, Voiland Distinguished Professor, and PNNL Laboratory Fellow, 1993 Ph.D. Chemical Engineering, Washington State University.
- Richard Zollars**, Professor, 1974 Ph.D. Chemical Engineer, University of Colorado.

For more information on current faculty research in the Voiland School, please visit our Web site at [www.voiland.wsu.edu](http://www.voiland.wsu.edu). For application information please visit the Washington State University Graduate School Web site at <http://www.gradschool.wsu.edu>.

# Graduate Studies in the Gene and Linda Voiland School of Chemical Engineering and Bioengineering



Devising innovative solutions  
to today's most pressing  
challenges

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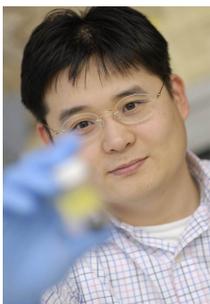
[www.voiland.wsu.edu](http://www.voiland.wsu.edu)

## Graduate Studies

The graduate programs offered in the school lead either to a Master of Science (MS) or a Doctor of Philosophy (PhD) in Chemical Engineering. Faculty also mentor students to advanced degrees in Mechanical Engineering and Engineering Science. Cutting edge research in focused areas enables the training of the next generation of engineering leaders. Students may receive chemical engineering degrees working with faculty in Pullman or on the Tri-Cities campus.

### Unique opportunities include:

- NIH Sponsored Training Program in Protein Biotechnology. This long-standing interdisciplinary program provides hands-on, collaborative training and education in modern biotechnology with an emphasis on protein science. Engineers and scientists combine their talents and energy to address challenges relevant to this emerging industry. The Program Includes an industrial internship, laboratory rotations, and a cross-disciplinary curriculum. See <http://sciences.wsu.edu/biotech/home.html>.
- Graduate internships at the Pacific Northwest National Laboratory or in industry.
  - Competitive stipends.
  - Access to the state-of-the art advanced science instruments.
  - ARCS Fellowships—highly qualified U.S. citizens will be considered for a prestigious fellowship funded by the ARCS Foundation.



## Current Research

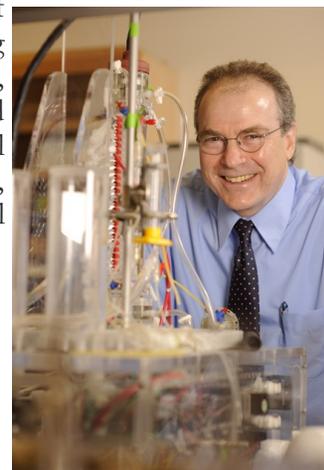
Our research is focused on devising solutions to society's most pressing problems—our needs for clean, sustainable energy, the development and implementation of systems that maintain and remediate the environment, and the creation of knowledge and devices that enable improved health for people everywhere.

### Energy

Society's need for clean, sustainable energy must be addressed through the innovative development of renewable energy sources. These materials must then be transformed into fuels and chemicals which can be delivered with existing infrastructure. Our energy research is therefore focused on the development of renewable energy and catalysts.

**Renewable Energy:** Renewable energy research is focused on bioenergy derived from recently living organisms or their metabolic byproducts, and the conversion of renewable or waste materials to fuels and chemicals through chemical or biological systems.

**Catalysis:** With five faculty working in various aspects of fundamental and applied catalysis, WSU is one of the Nation's leaders in this research area. Research is focused on catalysts for fuel cells, and catalytic processing of chemicals containing oxygen or nitrogen, compounds that would poison conventional catalysts, bimetallics, catalysts, computational catalysis and other areas.



2014-2015

## Health

Research focuses on developing devices and knowledge that enable a healthy population. Our research ranges from the application of engineering principles to molecular and cellular systems, organs, or organisms.

**Biomechanics of the Cell Nucleus:** The interplay between chromatin remodeling and the structural elements of the cell nucleus is studied on single DNA molecules using laser tweezers and microfluidic flow cells.

**Cell-Surface Interactions:** This research explores how microbes interact with surfaces, forming biopolymers and biofilms. Unique techniques such as Atomic Force Microscopy and micro-sensors are used to explore these systems.

**Biosensor Design:** Biosensor design research focuses on an integrated device consisting of a biological recognition element and a transducer capable of detecting the biological reaction and converting it into a signal that can be processed.

**Bioseparations:** From industrial scale processing down to nanochip separations, the intricate interaction between biomolecules, surfaces, buffers, and external fields determines how proteins can be purified or how complex biological fluids are analyzed.

**Cardiovascular:** Cardiovascular research can be multi-disciplinary, involving cardiac muscle biology and mechanics, protein chemistry and engineering, fluorescence techniques, computer modeling, nanoscale biosensor design and engineering.

**Musculoskeletal:** This research explores all facets of musculoskeletal disorders, with emphasis on both the clinical and basic aspects of the study.

**Biomechanics:** A combination of biology and engineering mechanics that utilizes the tools of physics, mathematics, and engineering to quantitatively describe the properties of biological materials.