BIOLOGICAL AND ENVIRONMENTAL SCIENCES AND ENGINEERING DIVISION FACULTY

Salim Al-Babli, *Associate Professor, Bioscience; Center for Desert Agriculture*
Research interests: combined enzymology-based and genetic approach to shed light on isoprenoid-derived signaling molecules with focus on phyto-compounds related to abiotic stress and development. Elucidation of metabolic pathways and networks, metabolic engineering and identification of traits, towards generation and breeding of improved crop varieties. (PhD, Albert-Ludwigs University of Freiburg, Germany)

Gary L. Amy, *Named Professor, Environmental Science and Engineering; Director, Water Desalination and Reuse Research Center*
Research interests: membrane technology; innovative adsorbents; ozone/advanced oxidation; riverbank filtration and soil aquifer treatment; natural organic matter and disinfection by-products and micropollutants. (PhD, University of California at Berkeley, US)

Manuel Aranda, *Assistant Professor, Marine Science; Red Sea Research Center*
Research interests: functional genomics, symbiosis, ecological genomics, transcriptomics, RNAi, gene knockdown, epigenetics, corals, cnidarians, and dinoflagellates. (PhD, University of Cologne, Germany)

Stefan Arold, *Associate Professor, Bioscience; Computational Bioscience Research Center*
Research interests: integrative structural biology based on hybrid approaches, to infer structure and function of macromolecular assemblies, to enhance computational methods for functional annotation of genes (system-wide or focused), and to design and engineer molecules with desired properties (switches, genetic/epigenetic regulators, markers and sensors). (PhD, University of Montpellier, France)

Michael Berumen, *Assistant Professor, Marine Science; Red Sea Research Center*
Research interests: life history studies of reef fishes; feeding and nutritional ecology of corallivores; larval connectivity and dispersal of reef fishes; movement ecology of reef fishes and sharks; population ecology and biology of Red Sea sharks; evolutionary biology of Red Sea fishes; ecology and population dynamics of coral communities. (PhD, James Cook University, Australia)

Jean-Philippe Croué, *Professor, Environmental Science and Engineering; Water Desalination and Reuse Research Center*
Research interests: drinking water and wastewater reclamation treatments; isolation and characterization of natural organic matter and effluent organic matter; removal of dissolved organic matter by physical-chemical treatments; characterization of organic membrane foulants; impact of chemical or physical treatments prior to high pressure membrane filtration; evaluation of disinfection byproducts. (PhD, University of Poitiers, France)

Nina Fedoroff, *Distinguished Professor, Bioscience; Director, Center for Desert Agriculture*
Research interests: regulation of gene expression by small RNAs; mechanism of microRNA precursor processing; molecular mechanisms of transposition; molecular modification of plants; halophyte domestication. (PhD, Rockefeller University, US)

Christoph Gehring, *Professor, Bioscience*
Research interests: plant responses to environmental stimuli; underlying molecular structures and modes of downstream signal transduction; systemic responses at the level of transcription and translation. (PhD, University of London, UK)

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Satoshi Habuchi, *Associate Professor, Bioscience*
Research interests: single-molecule microscopy; organic/polymeric materials; DNA-protein interactions; conjugated polymers; fluorescent proteins. (PhD, Hokkaido University, Japan)

Samir Hamdan, *Assistant Professor, Bioscience*
Research interests: combining biochemical, biophysical, and structural tools with single molecule techniques to understand the molecular mechanisms underlying the multi-protein DNA replication machinery; the replisome, and its interplay with DNA repair and recombination. (PhD, Australian National University, Canberra, Australia)

Peiying Hong, *Assistant Professor, Environmental Science and Engineering; Water Desalination and Reuse Research Center*
Research interests: the role of microorganisms in the environment and human health; water quality and reuse; waterborne pathogens and contaminant source tracking; health-related environmental microbiology. (PhD, National University of Singapore, Singapore)

Xabier Irigoien, *Professor, Marine Science; Director, Red Sea Research Center*
Research interests: pelagic marine ecosystems; biological oceanography; biodiversity; habitat modeling; plankton ecology; physics-plankton-fish interactions. (PhD, University of Bordeaux, France)

Burton Jones, *Professor, Marine Science; Red Sea Research Center*
Research interests: biological oceanography; interactions between marine phytoplankton and their physical environment; coupling of phytoplankton with physical and chemical processes in the ocean. (PhD, Duke University, US)

Stein Kaartvedt, *Professor, Marine Science; Associate Director, Red Sea Research Center*
Research interests: marine pelagic ecology; distribution and behavior of zooplankton and fish and their predator-prey relationships; the use of submerged, stationary echo sounders in novel ways for in situ studies of individuals, populations, and marine communities. (PhD, University of Bergen, Norway)

Pierre Magistretti, *Dean, Biological and Environmental Sciences and Engineering; Distinguished Professor, Bioscience*
Research interests: cellular and molecular bases of brain energy metabolism and brain imaging; behavioral, cellular, and molecular determinants of neuronal and glial plasticity; biomolecular imaging. (MD, University of Geneva, Switzerland; PhD, University of California San Diego, US)

Magdy Mahfouz, *Assistant Professor, Bioscience; Center for Desert Agriculture*
Research interests: targeted genome modification, TAL effectors, TAL-based genome engineering reagents, engineering plants for improved agricultural traits, and studying basic biological mechanisms including DNA repair and recombination. (PhD, Ohio State University, US)

Matthew McCabe, *Associate Professor, Environmental Science and Engineering; Water Desalination and Reuse Center*
Research interests: hydrological modeling; satellite remote sensing of the hydrological cycle; hydrological- and process-based modeling; hydrometeorological monitoring with advanced instrumentation; innovative techniques for model-data integration and calibration. (PhD, University of Newcastle, Australia)

Jasmeen Merzaban, *Assistant Professor, Bioscience*
Research interests: using biochemical, biophysical, and imaging techniques to understand and optimize the mechanism by which immune and stem cells exit the blood circulation system to "home" to specific sites within the body; understanding how the body responds to inflammation, stem cell-based tissue engineering and other adoptive cell therapies. (PhD, University of British Columbia, Canada)

Suzana Nunes, *Associate Dean, Biological and Environmental Sciences and Engineering; Associate Professor, Environmental Science and Engineering; Water Desalination and Reuse Center*
Research interests: Polymeric materials and membranes, synthesis and morphology control, copolymers, nanofiller functionalization, nanofiltration, forward osmosis, and membrane reactors. (PhD, University of Campinas, Brazil)

Valerio Orlando, *Professor, Bioscience; Epigenetics Research Focus*
Research interests: functional relationship between Genome-Environment and in particular the epigenetic mechanisms that control cell identity, reprogramming, and adaptation, particularly in stress conditions. These include the study of specific classes of epigenetic regulators and chromatin associated noncoding RNA and their role in global control of transcriptional output and inheritance. Other research interests include the investigation of the dynamics, epigenetic regulation, and adaptive role of Transposable Elements in cell identity specification and biodiversity. (PhD, University of Rome, Italy)

Arnab Pain, *Associate Professor, Bioscience; Computational Bioscience Research Center*
Research interests: high-throughput sequencing and comparative genomics of human and animal pathogens; host-pathogen interactions; non-protein-coding RNAs; regulation of gene expression in apicomplexan parasites; deep sequencing of microbial populations to study natural and experimental genome and phenotypic diversity. (PhD, University of Cambridge, UK)

Timothy Ravasi, *Associate Professor, Bioscience; Computational Bioscience Research Center*
Research interests: large-scale computer-aided modeling of biological signaling, transcription regulatory networks, and regulatory pathways, to integrate, model, and visualize data from biological experiments; metagenomic approaches for identified microbial bioactive molecules in the Red Sea. (PhD, University of Milan, Italy)

Pascal Saikaly, *Assistant Professor, Environmental Science and Engineering; Water Desalination and Reuse Research Center*
Research interests: microbial ecology; microbial fuel cells; bioelectrochemical systems; membrane bioreactors; biofouling; aerobic granular sludge; and anammox processes. (PhD, University of Cincinnati, US)

Ulrich Stingl, *Assistant Professor, Marine Science; Red Sea Research Center*
Research interests: molecular evolution of oceanic and freshwater bacterioplankton; cultivation of oligotrophic marine bacterioplankton; environmental and comparative genomics; symbiosis and invertebrate intestinal microbiota; microbially enhanced hydrocarbon recovery; plant-growth promoting bacteria; and microbial biofuels. (PhD, University of Konstanz, Germany)

Mark Tester, *Professor, Bioscience*
Research interests: plant adaptations to salinity – from gene to field; using forward genetics and physiology to discover alleles conferring salinity tolerance in cereals and other crops; ion transport, from the cell to the whole plant. (PhD, University of Cambridge, UK)

Christian Voolstra, *Assistant Professor, Marine Science; Red Sea Research Center*
Research interests: evolutionary genomics and systems biology of coral reefs; adaptive evolution and coral-specific genes in mechanisms of bleaching and stress; the machinery of mutualism between corals and algae; the role of prokaryotes in these processes. (PhD, University of Cologne, Germany)

Peng Wang, *Assistant Professor, Environmental Science and Engineering; Water Desalination and Reuse Research Center*
Research interests: development of novel and highly efficient nanomaterials for environmental decontamination; development of lab-on-a-chip sensors for fast water contaminant analysis by fluorescent, colorimetric, or electrochemical detection; nanotechnology for oil recovery. (PhD, University of California, Santa Barbara, US)

Liming Xiong, *Associate Professor, Bioscience*
Research interests: mechanisms of plant response and adaptation to adverse environmental conditions; development of stress-resistant crop plants. (PhD, University of Arizona, US)

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جامعة الملك عبدالله للعلوم والتقنية
King Abdullah University of Science and Technology

BIOLOGICAL AND ENVIRONMENTAL SCIENCES AND ENGINEERING DIVISION

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KAUST – *Through inspiration, discovery*

King Abdullah University of Science and Technology (KAUST) attracts top international faculty, scientists, engineers, and postgraduate students to conduct fundamental and goal-oriented research to address the world's pressing scientific and technological problems. The University is committed to cutting-edge research in the areas of water, food, energy, and the environment (including the Red Sea) with a strong emphasis on computational science.

The University engages students, researchers, and faculty in advancing science and technology through collaborative inquiry of regional and global significance. The University's unique matrix structure supports both basic and goal-oriented research to benefit Saudi Arabia and beyond.

KAUST offers its students rich opportunities for learning, discovery, and research. With a student body representing over 70 nations, the University is committed to attracting and educating the world's most gifted and inspired scholars. Students, faculty, and researchers cultivate a dynamic and collaborative environment of bold scientific research and innovation. KAUST is where adventurous and imaginative individuals engage in a journey of intellectual and cultural discovery.

WHY CHOOSE KAUST?

KAUST is a graduate-level research university located on the shores of the Red Sea in Saudi Arabia. The University offers master's (MS) and doctoral (PhD) degrees in three academic divisions: Biological and Environmental Sciences and Engineering; Computer, Electrical, and Mathematical Sciences and Engineering; and Physical Sciences and Engineering. The University's new facilities with state-of-the-art technology offer an ideal setting to study and to conduct high-impact research.

- World-class faculty directs the University's talented postgraduate students, researchers, and postdocs
- Research Centers provide an environment that promotes targeted goal-oriented research
- Guaranteed funding ensures continuity and the highest quality research in water, food, energy, and the environment
- Core facilities include Advanced Nanofabrication, Imaging, and Characterization (microscopy, NMR, thin films); Bioscience (genomics, proteomics, bioinformatics); Supercomputing (Shaheen-IBM Blue Gene); and Visualization (3D display environment, virtual reality)
- Extensive collaboration with industrial partners encourages internships that lead to job opportunities for graduates
- Attractive residential campus enhances research and quality of life

KAUST FELLOWSHIP

All students receive the benefits of the KAUST Fellowship (the University's scholarship program):

- Full tuition support
- Competitive monthly living allowance
- Housing
- Private medical and dental coverage
- Relocation support

BIOLOGICAL AND ENVIRONMENTAL SCIENCES AND ENGINEERING DIVISION

The Biological and Environmental Sciences and Engineering Division (BESE) includes programs in Bioscience, Environmental Science and Engineering, and Marine Science. Some of these programs have specific academic tracks, and a student may choose the track that best suits his/her goals. Students are offered modules consisting of lectures, seminars, and laboratory classes and they are expected to conduct independent research. BESE boasts state-of-the-art facilities and resources, including some of the most advanced equipment in the world for genomics, proteomics, microscopy, nanofabrication, and nuclear magnetic resonance studies.

DEGREE PROGRAMS

BIOSCIENCE (B)

The Bioscience program plays a key role in addressing many of the global challenges being addressed by KAUST, with a general focus on what we term Adaptive Biology, or the study of the mechanisms that allow organisms to adapt to their environment. Research is conducted in several focal areas, including Epigenetics, Genomics, Functional Biology, Imaging, and Environmental Systems, with an emphasis on both basic science and applied research in close collaboration with our affiliated Research Centers. An important example is the interdisciplinary study of stress-tolerant plants and how their physiology and metabolism allow them to thrive under conditions of high salinity, low water, and/or high temperatures. This research will impact our ability to grow food in arid lands and in areas of water scarcity. We address the worldwide energy crisis through research on biofuels and other renewable energy sources. Another major focus of the Bioscience program is high-performance computing to create new methods for information extraction, allowing analysis and understanding of the voluminous data produced from cutting-edge biological experiments. Finally, the unique location of KAUST on the shores of the Red Sea makes comprehensive exploration of the biodiversity of this unique ecosystem and its potential biotechnology applications possible.

The Bioscience curriculum provides a strong introduction to the fundamentals of living matter. Each course is a self-contained module providing a complete review of the subject concerned, including Cell Biology, Biochemistry, Biophysics, Molecular Genetics, Protein Structure and Function, Synthetic Biology, Genomics, Stem Cells, and Physiology and Metabolic Engineering. Advanced courses, such as Computational Biology, Bioinformatics, and the Visualization of Biological Systems, are also offered.

A PhD student extracts DNA to research the targeting of genome modifications in crop plants.

ENVIRONMENTAL SCIENCE AND ENGINEERING (ENSE)

The Environmental Science and Engineering program focuses directly on many of KAUST's research challenges. There is worldwide concern with the availability of clean water, and Environmental Engineering examines methods to purify and reuse water, as well as to reduce contamination of existing reserves. Research in environmental engineering allows examination of the impact of humans on our environment through resource exploitation, including over-consumption, land degradation, and pollution of air and water. The results of such research may offer solutions to cleaning up excessive carbon dioxide levels, addressing ozone depletion, decontaminating the soil, and tackling some of the issues associated with climate change. KAUST is uniquely positioned to utilize high-performance computational technologies to confront these issues efficiently and effectively.

This program comprises three tracks: Water Quality, Chemistry, and Treatment; Environmental Microbiology and Biotechnology; Environmental Hydrology and Fluid Mechanics; and a tailored track.

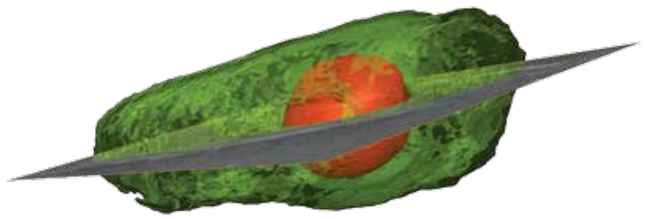
Students entering the program enroll in a set of core courses and then take specialty courses in one of the three major tracks. The remaining courses are technical electives. The three tracks together cover the most important areas in Environmental Science and Engineering, and the core plus specialty courses and electives will equip a student for a successful and productive career in these fields.

MARINE SCIENCE (MARSE)

The Marine Science program focuses on the specific environment of KAUST – the Red Sea, one of the most complex and diverse ecosystems in the world, making KAUST a marine science field lab. The Red Sea is not only economically important for fisheries and tourism, but crucial for coastal protection as well.

The Red Sea is extremely fragile and endangered by human exploitation, pollution and climate change. The reefs in the Red Sea are some of the most northern coral reefs in the world. High temperatures and salinity, which would cause coral diseases in other places, have prompted adaptations, which could lead to cures for those diseases (e.g., coral bleaching). Our goal is to develop an integrated understanding of this ecosystem, including fundamental biology at the molecular and genomic levels, symbiosis with algae and prokaryotes (Bacteria and Archaea), associated communities of fish, and the physical and chemical environment that impacts and shapes them. This understanding could have an impact on global carbon cycling, endangered species, and how we manage the harvesting of food from the oceans.

The Marine Science program takes advantage of KAUST's location on the Red Sea, a living laboratory with great potential. There are two primary academic tracks, one focused on the study of the biology and ecology of the multitude of marine life forms, the second focused on the interactions of the physical marine environment with atmospheric and climatic conditions. There is an intentional focus on the local Red Sea system, both as a primary study system and as a system with which general concepts from other marine systems can be compared.



▲ TEM tomography 3D rendering of a bacteria with a visible metallic particle
Research conducted by Pascal Saikaly, Graciela Gonzalez Gil, and Rachid Sougrat

The Proteomics Laboratory provides research support and services for protein identification and characterization.

Faculty members in the program have a wide range of interests, reflected in the program's course offerings. These include marine microbiology, molecular ecology and genomics, coral reef biology and ecology, pelagic ecology, and conservation of marine resources. Other faculty members associated with the program have interests in large-scale data assimilation, geophysical fluid dynamics, and modeling air-sea interactions.

ENGLISH LANGUAGE REQUIREMENT

All courses are taught in English and students must meet the minimum language requirement: 79 on the TOEFL iBT (internet based test) or 6.0 on the IELTS test.

FOR APPLICATIONS OR INQUIRIES OFFICE OF ADMISSIONS

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