KAUST Academic Programs by Division

Biological and Environmental Science and Engineering Division

To accomplish its mission and establish a knowledge and advanced technology platform, research in the Biological and Environment Science and Engineering Division (BESE) is developed around the following six focal areas: environmental systems; epigenetics; functional biology; genomics; imaging/structural biology; and marine science.

These research areas bring to KAUST interdisciplinary competences that are essential for studying the mechanisms through which living organisms and their environments interact, providing opportunities for new technological developments to optimize such interactions to improve the quality of life.

[Explore Division](https://bese.kaust.edu.sa/)
For Course List & Syllabi [Click here](https://courses.kaust.edu.sa/).

Bioscience (B)

The Bioscience (B) program plays a key role in tackling many of the global challenges being addressed by KAUST, with a general emphasis on ‘adaptive biology’, i.e. the study of the mechanisms that allow organisms to adapt to their environment. Understanding and engineering these complex mechanisms is critical in areas such as global food security or health care, and requires combining in-depth knowledge with advanced methodology and out-of-the-box thinking.

To prepare students to be innovative contributors to life sciences, the Bioscience program comprises courses in cell and molecular biology, biophysics and computer science. Moreover, it interfaces smoothly with bioengineering as well as plant and marine sciences, and allows the choice of electives across all divisions.

The program is comprised of two tracks of self- contained courses consisting of lectures, seminars and laboratory classes. Each course provides an in-depth review of the subject and examples of current research in the field. In addition, the Bioscience program provides substantial and versatile hands-on research experience.

Bioengineering (BioE)

​ A bioengineer develops and applies engineering principles to life sciences. The field focuses on the development and application of engineering concepts, principles, and methods to biological systems. We aim to model, monitor, and treat disorders and disabilities that affect living organisms, to develop algorithms which aid understanding biological systems and to engineer living systems in order to enhance their performance. The technologies that are generated in this area might include synthetic tissues or organs, sensors that are wired to human body and prosthetics that mimic the natural function of a limb, smart algorithms and end-to-end data analytical engines, bioreactors that improve the quality of treated wastewater and bacteria engineered to produce resources. Bioengineering integrates elements of electrical and mechanical engineering, biochemistry, chemistry, computer science and materials science with biology. Thanks to this multidisciplinary nature, the field of bioengineering often creates out-of-the-box solutions addressing and solving challenges in effect augmenting the well-being of living systems.

The program comprises four tracks: Biosensors and Bioelectronics, Bioinformatics and Machine Learning, Biomaterials and Tissue Engineering and Synthetic Biology.

Environmental Science and Engineering (EnSE)

​ The Environmental Science and Engineering Program (EnSE) prepares students to work on many of the world’s most pressing challenges related to water security and the environment, focusing around the intersection of water, energy and food nexus, and sustainable processes.

This program comprises four focus areas: Water Quality, Chemistry, and Treatment; Environmental Microbiology and Biotechnology; Environmental Systems and Analysis; and Materials for Environmental Science and Engineering.

Students entering the program enroll in a set of core courses and then take technical elective courses that cover important areas in water and wastewater treatment technologies, water desalination, biotechnologies for resource recovery from waste streams, microbiological safety of water reuse, sustainability and management, surface science and materials for water, energy and environment. The core- plus elective courses will equip a student for a successful and productive career in these fields.

Marine Science (MarS)

​ The Marine Science (MarS) program takes advantage of KAUST’s location on the Red Sea, a living laboratory with great potential for exciting science. The program addresses the biology and ecology of the multitude of marine life forms. 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.

The goal of the Marine Science program is to develop an integrated understanding of the Red Sea’s ecosystem as well as marine ecosystems in general, including fundamental biology at the molecular and genomic levels, symbiosis with algae and prokaryotes (bacteria and archaea), associated communities of fish and corals 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 resources from the oceans.

Plant Science (PS)

​ The goal of the Plant Science (PS) program is to develop a thorough understanding of plant growth and function under challenging environmental conditions, such as those found in Saudi Arabia. The fundamental biology of plants is studied at a range of levels (e.g. genomic, proteomic, metabolomics), and the interactions of plants with their environment, both abiotic (heat, salt and drought) and biotic (pathogens and symbionts) are investigated. Application of this knowledge will allow development of plants with enhanced tolerance to environmental stresses and help to establish sustainable agriculture systems in arid regions of the world.

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Computer, Electrical and Mathematical Science and Engineering Division

Research in the CEMSE Division groups into four main areas:

* Electrical engineering, including the development of communication networks; CMOS integrated circuits; electronic and optics/photonics devices; micro-electro-mechanical systems (MEMS); various types of sensors, measurement and detection devices; as well as functional- and nano-materials.
* Mathematical analysis, including modeling and simulations with applications to physical, chemical, biological and environmental processes; materials science; oil exploration and reservoir management.
* Computer science and big data, including bioinformatics; visual and extreme computing.
* Statistics, including Bayesian Statistics; Big Data; Biostatistics; Computational Statistics; Data Visualization; Environmental Statistics; Extreme Events; Spatial Statistics; Statistical Data Science; and Time Series Analysis.

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Applied Mathematics and Computational Science (AMCS)

​ The Applied Mathematics and Computational Sciences (AMCS) program provides students with conceptual and practical knowledge for dealing with challenges of modern science. The Program is a passport for interdisciplinary research, living at the crossroads of a wide range of scientific disciplines and offering tools to understand phenomena that are either too complex, expensive, unethical or difficult to investigate with practical experiments.

Computer Science (CS)

​ The Computer Science (CS) program trains students to create computational infrastructure and apply computational methods to a variety of areas. CS offers six tracks, each of which leads to a frontier of computing: Artificial Intelligence, Computer Systems, High Performance Computing, Theoretical Computer Science, Visual Computing, and Computational Biosciences.

Electrical and Computer Engineering (ECE)

The ​Electrical and Computer Engineering (ECE) program plays an important role in the fields of engineering, applied physics, and computational sciences. A significant portion of advancement in technology originates from cutting edge research performed in the field of ECE. At KAUST, the ECE program is bound to this tradition: It aims for preparing students for a multitude of professional paths and advancing world-class research and research based education through interdisciplinary partnering within engineering and science.

Statistics (STAT)

​ ​The Statistics (STAT) program educates students to analyze and model complex real-world problems arising in modern Statistical Data Science. The Statistics Program boasts superb facilities and resources. In particular, students have access to the latest supercomputing and visualization facilities. This combined with the superbly equipped experimental laboratories, experimental studies at KAUST will be almost unconstrained by physical resources. **NEW:** Two tracks in M.Sc.: **Statistical Science** track or **Data Science** track; see [here](https://registrar-programguide.kaust.edu.sa/2022-2023/Program-Guide/Division-of-Computer-Electrical-and-Mathematical-Science-and-Engineering-CEMSE/Statistics-STAT/Statistics-M-Sc-Program).

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Physical Science and Engineering Division

The mission of the Physical Sciences and Engineering Division is to create knowledge pertaining to matter at all scales – nano, meso, macro –, in all forms – from bulk, to divided colloids and fluids – as well as the interaction of matter with external stimuli in order to design new materials/technologies addressing the issues of our times.
Research in the Division includes areas such as theoretical physics and physical chemistry; catalysis and bioengineering; polymers and composites; energy production, storage and conversion; water purification and environmental protection; novel materials, nanodevices and systems; sensors and smart devices for the detection of pollutants and the purification of air, water, and food; earth sciences, mechanics and geomechanics; oil exploration and recovery; and CO2 sequestration.

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Applied Physics (AP)

The Applied Physics Program is a new interdisciplinary degree program at KAUST which​ started in Fall 2019. Courses in the Applied Physics program are selected and designed to provide students with the knowledge-base and intellectual foundation required to advance scientific research and engineering solutions in applied physics.​

Chemical Engineering (CE)

​ The Chemical Engineering Program offers students opportunities to develop real-world solutions to global challenges by performing rigorous coursework studies and cutting-edge research in chemical engineering. These include the development of new materials and processes for gas and liquid separations, for water desalination, catalysis, sustainable energy and nanotechnology as well as the advancement of new ideas in process design and control and reactor design.

Chemistry

The KAUST Chemistry (Chem) Program was established in 2010 to provide a modern, research-oriented education in chemistry. It is one of the top internationally ranked programs at KAUST. Leveraging the outstanding facilities at KAUST, the program distinguishes itself by a clear focus and strong emphasis on current research challenges related to polymers, catalysis, and nanotechnology.

The Chemistry Program at KAUST is home to world class professors that are conducting cutting edge research on the forefronts of polymers, catalysis, and nanotechnology. Our mission is to graduate highly knowledgeable and trained chemists that can excel in academic, industrial, and managerial settings. We aim to publish highly impactful research papers and patents that will strengthen the Chemistry Program international ranking among the top worldwide and empower immediate industrial translation to support the Kingdom’s 2030 Vision.

Earth Science and Engineering (ErSE)

​ We are faced with unprecedented challenges related to climate change, the energy transition, natural resources, pollution and degredation of the natural environment. Future earth scientists will play an important role in addressing and finding solutions to these pressing problems. In the Earth Science and Engineering program we offer a range of courses and scientific projects that help students to acquire useful knowledge and skills to take on these challenges. Our M.S. and Ph.D. level courses cover many subjects in geophysics and geology as well as providing training in different data acquisition, data analysis and computational methods. Research within the program focuses on atmospheric and ocean processes, subsurface imaging, reservoir simulations, natural hazards and on the Red Sea rift, among many other topics. If you join us, you can select one of following four study tracks: Geophysics, Geology, Machine Learning in Geosciences, or Geophysical Fluids and Climate Systems.

Energy Resources and Petroleum Engineering (ERPE)

The Energy Resources and Petroleum Engineering Academic Program, for both M.S. and Ph.D. students, focuses on modern reservoir description, engineering, and management.  Students in this program receive advanced knowledge and training in geology, geophysical characterization, thermodynamics, geomechanics, fluid flow, and reservoir engineering.  Our students participate in scientific research activities that may include mathematical analyses, computational modeling, experimental research, and field studies.  Ph.D. candidates focus on original research-driven to advance the boundaries of knowledge, including challenging topics in energy and environment, such as enhanced oil recovery (EOR), geothermal, and carbon capture, utilization, and storage (CCUS).

Material Science and Engineering (MSE)

​ The Material Science and Engineering Program is designed to equip students with fundamental and applied knowledge of materials. We prepare students to tackle grand challenges in sustainability and renewable energy, nanotechnology and nano electronics, biomaterials, materials characterization and low-power computing.

Mechanical Engineering (ME)

​ The Mechanical Engineering Program course curriculum is modern and rigorous. The courses in the program provide a solid foundation in subjects such as mechanical behavior of engineering materials, continuum mechanics, thermodynamics, conventional and renewable energy, experimental and numerical combustion, computational fluid dynamics, robotics, control, and dynamics. Our graduates are technically well trained to be productive members of the modern world society at large and specifically suited for research careers in academia, industry, and government research laboratories. We place a strong emphasis on in-class learning coupled with innovative research in a variety of areas.