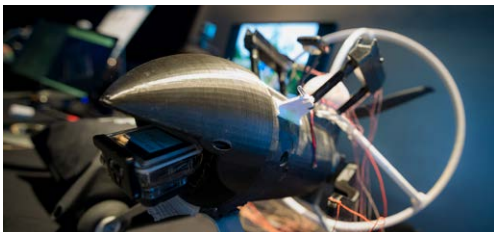
UC San Diego
JACOBS SCHOOL OF ENGINEERING

ENGINEERING MAJORS



AEROSPACE ENGINEERING

Curriculum emphasizes engineering fundamentals (materials, solid and fluid mechanics, thermodynamics, computer modeling, computer-aided design, numerical analysis, and controls); aerospace topics (aerodynamics, aerospace structures, flight mechanics, dynamics and control of aerospace vehicles, orbital mechanics, and propulsion); and lab courses that integrate these fundamentals and topics through design of an aerospace system.

BIOENGINEERING

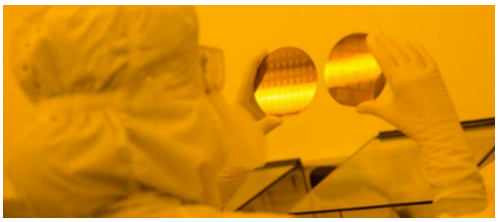
The use of scientific principles and classical engineering tools applied to biomedical problems. Topics include biomechanics, biotransport, bio-instrumentation, biomaterials, engineering design, and systems and organ physiology. The curriculum has some similarities to mechanical engineering. Graduates are prepared for jobs in the health care and medical device industries, or continue on to medical or graduate schools.

BIOENGINEERING: BIOTECHNOLOGY

The application of physicochemical principles and biochemical technologies to benefit human health. Courses include thermodynamics, chemical kinetics, bioreactors, biotransport, bioseparations, tissue engineering, biochemistry, metabolism and cellular physiology, and engineering design. Emphasis on technologies based on molecules, cells and tissues. The program prepares graduates for jobs in the biochemical and pharmaceutical industries or for further education in medical or graduate schools.

BIOENGINEERING: BIOINFORMATICS

An interdisciplinary program with Biology and Computer Science that emphasizes analysis, interpretation and integration of biological and bioinformatics data. Courses include molecular biology and genetics, evolutionary biology, models of disease processes, chemical systems, computer acquisition and management of big data, computational biology, and mathematical modeling and analysis. Graduates are prepared for employment in industries that manage and analyze biomedical data, and for advanced education in graduate and medical schools.



BIOENGINEERING: BIOSYSTEMS

Focuses on the organizational design and interaction of components of complex engineering and biological structures. Topics include analog and digital design, bioinstrumentation, signal processing, feedback control and regulation, imaging systems, biodynamics, and cellular and organ physiology. Emphasis is on the functional integration of multicomponent assemblages and their overall performance. Graduates are prepared for employment in the medical device industry and further study in graduate or medical schools.

CHEMICAL ENGINEERING

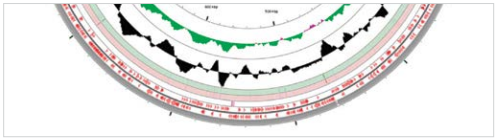
Prepares graduates for careers in a broad spectrum of areas in chemical, biochemical, environmental, and energy sectors. By specializing, students can prepare for careers in nanotechnology, environmental technology, microelectronic device fabrication, materials and polymer processing, pharmaceuticals and biotechnology, biomedical engineering, energy and thermal systems, and control and system engineering.

COMPUTER SCIENCE

Students gain core knowledge and skills in computational problem solving, algorithm design and analysis, and programming. They apply and deepen this core in courses taught by leading researchers in areas including artificial intelligence, computer security, computer systems, computer vision, cryptography, databases, graphics, human-computer interaction, machine learning, networking, robotics, software engineering, theory of computation, web development, and more.

ARTIFICIAL INTELLIGENCE

Prepares students to build the next generation of AI systems and improve the foundations of current AI systems. Students dive into the fundamentals in computer science, mathematics, and statistics while learning to address ethics and impacts on society of complex AI systems. Students in the major graduate with the ability to integrate software, hardware, and AI components into computing systems. Students choose AI electives in diverse areas such as music generation, biological data mining, natural language processing, robotics, and more. The major is housed in the Computer Science and Engineering department.



COMPUTER SCIENCE: BIOINFORMATICS

Prepares students for careers that involve the design of computational methods for understanding biological systems. Bioinformaticians deal with large and complex data sources arising from experiments that measure genomic variation, change in gene and protein expression, and other biochemical products, as well as the networks of interacting genes, proteins, DNA, RNA, and microbes that are active in a biological system. They use methods based on multiple strategies, including combinatorial algorithms, statistics, machine learning, and databases in their analyses, and help develop an integrated understanding of living systems.

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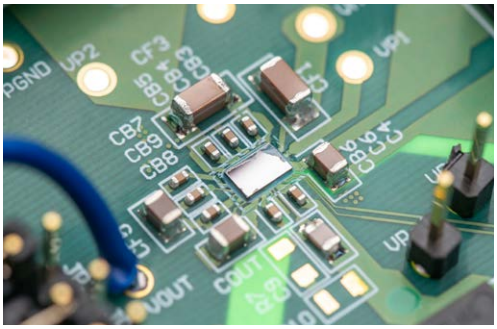
COMPUTER ENGINEERING

Gives students a strong understanding of both hardware and software systems. After developing a foundation in mathematics, physics, electrical engineering, and computing, students then learn advanced concepts in algorithms, computer architecture, electronic systems, embedded systems, and software. A strong peer tutoring program supports students with mentoring. (Jointly administered by the Computer Science and Engineering, and Electrical and Computer Engineering Departments)

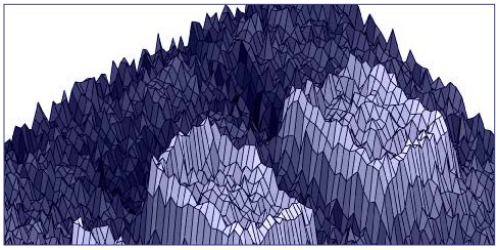


ELECTRICAL ENGINEERING

This major has a common lower division core structure followed by specialization in a depth sequence: Communication Systems; Electronic Circuits and Systems; Electronic Devices and Materials; Machine Learning and Controls; Photonics; Signal and Image Processing; or Computer System Design.

ELECTRICAL ENGINEERING & SOCIETY (B.A.)

In response to the globalization of engineering and technology, this major prepares engineering students in the areas of social sciences and the humanities. This major is broader than other engineering majors and may be of interest to students seeking non-engineering career paths such as in the law, finance, and public policy sectors.



ENGINEERING PHYSICS

Provides a strong background in physics and mathematics, and is intended for students interested in applying theory to applied problems in acoustics, optics, continuum mechanics, and materials science. This Electrical Engineering major is administered in cooperation with the Department of Physics.

MECHANICAL ENGINEERING

Curriculum is focused on science and engineering fundamentals (mechanics, vibrations, thermodynamics, fluid flow, heat transfer, materials, control theory); programming and CAD; and mechanical design. Mechanical design includes freshmen conceptual design and drafting with 3D CAD programs, as well as senior capstone design with stress, dynamics, heat transfer or fluid dynamics analyses, and the optimization of the total system for superior performance and customer satisfaction. Students can choose to specialize in Renewable Energy & Environmental Flows, Robotics & Controls, Mechanics & Materials, or Fluids & Thermal Systems through advanced courses with small enrollment.

NANOENGINEERING

This multidisciplinary major is centered on nanoscale science and technology including the remarkable changes in biological, chemical, physical, optical, and electrical properties that occur when matter is reduced to nanometer sizes. This major includes coursework from basic sciences and multiple engineering disciplines and prepares graduates for careers in a broad spectrum of industries.

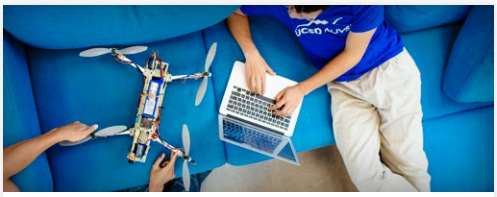
STRUCTURAL ENGINEERING

Undergraduates can specialize in civil structures, aerospace structures, structural health monitoring/non-destructive evaluation, or geotechnical engineering. This major includes study of the behavior of solids; fluid mechanics as it relates to structural loads; dynamics as it relates to structural response; mathematics for the generation of theoretical structural models and numerical analysis; and computer science for simulation purposes associated with computer-aided design, response analyses, and data acquisition.

PROFESSIONAL DEVELOPMENT

At the Jacobs School of Engineering, professional and personal development opportunities are everywhere:

- IDEA Engineering Student Center
- Team Internship Program
- Co-op program
- Research in world-class labs
- Institute for the Global Entrepreneur
- Envision Arts & Engineering Maker Studio
- Engineering teams and orgs
- STEM outreach to the next generation



MORE INFORMATION

Learn about Selective and Screened majors online:

bit.ly/ourmajors

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