

Biomedical Engineering, B.S.

Program Educational Objectives: Graduates of the Biomedical Engineering program will (1) promote continuous improvement in the field of biomedical engineering; (2) communicate effectively the relevant biomedical engineering problem to be solved across the engineering, life science, and medical disciplines; (3) apply critical reasoning as well as quantitative and design skills to identify and solve problems in biomedical engineering; and (4) lead and manage biomedical engineering projects in industry, government, or academia that involve multidisciplinary team members. (Program educational objectives are those aspects of engineering that help shape the curriculum; achievement of these objectives is a shared responsibility between the student and UCI.)

Biomedical Engineering students learn engineering and principles of biology, physiology, chemistry, and physics. They may go on to design devices to diagnose and treat disease, engineer tissues to repair wounds, develop cutting-edge genetic treatments, or create computer programs to understand how the human body works.

The curriculum emphasizes education in the fundamentals of engineering sciences that form the common basis of all engineering sub-specialties. Education with this focus is intended to provide students with a solid engineering foundation for a career in which engineering practice may change rapidly. In addition, elements of bioengineering design are incorporated at every level in the curriculum. This is accomplished by integration of laboratory experimentation, computer applications, and exposure to real bioengineering problems throughout the program. Students also work as teams in senior design project courses to solve multidisciplinary problems suggested by industrial and clinical experience.

NOTE: Students may complete only one of the following programs: the major in Biomedical Engineering, the major in Biomedical Engineering: Premedical, or the minor in Biomedical Engineering.

High School Students: See School admissions (<http://catalogue.uci.edu/thehenrysamuelischoolofengineering/#undergraduatetext>) information.

Transfer Students: Preference will be given to junior-level applicants with the highest grades overall, and who have satisfactorily completed the following **required** courses: two years of approved calculus, one year of calculus-based physics with laboratories (mechanics, electricity and magnetism), completion of lower-division writing, one year of general chemistry (with laboratory), and one course in introductory programming. For course equivalency specific to each college, visit <http://assist.org>.

Students are encouraged to complete as many of the lower-division degree requirements as possible prior to transfer. Students who enroll at UCI in need of completing lower-division coursework may find that it will take longer than two years to complete their degrees. For further information, contact The Henry Samueli School of Engineering at 949-824-4334.

All students must meet the University Requirements (<http://catalogue.uci.edu/informationforadmittedstudents/requirementsforabachelorsdegree/>).

All students must meet the School Requirements (<http://catalogue.uci.edu/thehenrysamuelischoolofengineering/#schoolrequirements>).

Major Requirements

Mathematics and Basic Science Courses:

Students must complete a minimum of 48 units of mathematics and basic sciences including:

Core Courses:

BIO SCI 194S	Safety and Ethics for Research
CHEM 1A- 1B- 1C	General Chemistry and General Chemistry and General Chemistry
CHEM 1LC	General Chemistry Laboratory
MATH 2A- 2B	Single-Variable Calculus and Single-Variable Calculus
MATH 2D	Multivariable Calculus
MATH 2E	Multivariable Calculus
MATH 3A	Introduction to Linear Algebra
MATH 3D	Elementary Differential Equations
PHYSICS 7C	Classical Physics
PHYSICS 7LC	Classical Physics Laboratory
PHYSICS 7D- 7E	Classical Physics and Classical Physics
PHYSICS 7LD	Classical Physics Laboratory
STATS 8	Introduction to Biological Statistics

Engineering Topics Courses:

Students must complete a minimum of 28 units of engineering design including:

Core Courses:

BME 1	Introduction to Biomedical Engineering
BME 50A- 50B	Cell and Molecular Engineering and Cell and Molecular Engineering
BME 60A- 60B- 60C	Engineering Analysis/Design: Data Acquisition and Engineering Analysis/Design: Data Analysis and Engineering Analysis/Design: Computer-Aided Design
BME 110A- 110B- 110C	Biomechanics I and Biomechanics II and Biomechanics III
BME 111	Design of Biomaterials
BME 120	Sensory Motor Systems
BME 121	Quantitative Physiology: Organ Transport Systems
BME 130	Biomedical Signals and Systems
BME 140	Design of Biomedical Electronics
BME 150	Biotransport Phenomena
BME 170	Biomedical Engineering Laboratory
BME 180A- 180B- 180C	Biomedical Engineering Design and Biomedical Engineering Design and Biomedical Engineering Design

Engineering Electives:

Students select, with the approval of a faculty advisor a minimum of 12 units of engineering topics needed to satisfy school and major requirements. (The nominal Biomedical Engineering program will require 182 units of courses to satisfy all university and major requirements. Because each student comes to UCI with a different level of preparation, the actual number of units will vary.)

Engineering Professional Topics Course:

ENGR 190W	Communications in the Professional World
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Optional Specialization in Biophotonics**Select three of the following:**

BME 135	Photomedicine
BME 136	Engineering Medical Optics
BME 137	Introduction to Biomedical Imaging
BME 138	Spectroscopy and Imaging of Biological Systems
EECS 180A	Engineering Electromagnetics I

These courses will also satisfy the Engineering Electives requirement.

Optional Specialization in Micro and Nano Biomedical Engineering**Select three of the following:**

BME 142	Microfabrication
BME 147	Microfluidics and Lab-on-a-Chip
BME 148	Microimplants
MSE 141	Nano-Scale Materials and Applications
ENGRMAE 153	Advanced BIOMEMS Manufacturing Techniques

These courses will also satisfy the Engineering Electives requirement.

The sample program of study chart shown is typical for the major in Biomedical Engineering. Students should keep in mind that this program is based upon a sequence of prerequisites, beginning with adequate preparation in high school mathematics, physics, and chemistry. Students who are not adequately prepared, or who wish to make changes in the sequence for other reasons, must have their program approved by their faculty advisor. Biomedical Engineering majors are encouraged to consult with academic counselors as needed, and students who are academically at risk are mandated to see a counselor as frequently as deemed necessary by the advising staff.

Freshman		
Fall	Winter	Spring
MATH 2A	MATH 2B	MATH 2D
CHEM 1A	CHEM 1B	CHEM 1C
BME 1	PHYSICS 7C	CHEM 1LC
General Education	PHYSICS 7LC	PHYSICS 7D
	General Education	PHYSICS 7LD
Sophomore		
Fall	Winter	Spring
MATH 3A	MATH 3D	MATH 2E
PHYSICS 7E	BME 50A	BME 50B
BME 60A	BME 60B	BME 60C
	General Education	STATS 8
Junior		
Fall	Winter	Spring
BME 110A	BME 110B	BME 110C
BME 120	BME 150	BME 111
BME 130	BME 140	BME 121
ENGR 190W	General Education	BIO SCI 194S
Senior		
Fall	Winter	Spring
BME 180A	BME 180B	BME 180C
Engineering Elective	Engineering Elective	BME 170
General Education	General Education	Engineering Elective
General Education	General Education	General Education