BIOMEDICAL ENGINEERING

Biomedical engineering is an exciting, multidisciplinary field that lies at the interface of medicine, biology and engineering. Biomedical engineers use engineering principles to analyze and solve problems in biology and medicine, providing an overall enhancement to healthcare. Biomedical engineers create technology to save lives and improve the quality of life. Much of the equipment in hospitals and clinics across the globe was designed, built and tested by biomedical engineers. At the same time, biomedical engineers employ concepts learned from biology and medicine to generate new (biomimetic) engineering designs in fields such as robotics and artificial intelligence.

Course code for this program is BMEN.

Bachelor's Degree

- Biomedical Engineering - Bachelor of Science (BSBM) (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/biomedical-engineering/biomedical-engineering-bachelor-science-bsbm/)

Minor

- Biomedical Engineering - Minor (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/biomedical-engineering/biomedical-engineering-minor/)

Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ahmed, Alaa A. (https://experts.colorado.edu/display/fisid_144736/)  
Associate Professor; PhD, University of Michigan

Alistar, Mirela  
Assistant Professor; PhD, Danmarks Tekniske Universitet (Denmark)

Borden, Mark A. (https://experts.colorado.edu/display/fisid_148514/)  
Associate Professor; PhD, University of California, Davis

Bottenus, Nick  
Assistant Professor; PhD, Duke University

Calve, Sarah  
Associate Professor; PhD, University of Michigan

Chatterjee, Anushree (https://experts.colorado.edu/display/fisid_151712/)  
Associate Professor; PhD, University of Minnesota

Clark, Torin K. (https://experts.colorado.edu/display/fisid_155959/)  
Assistant Professor; PhD, Massachusetts Institute of Technology

Davis, Robert H.  
Associate Faculty Director; PhD, Stanford University

Ding, Xiaoyun (https://experts.colorado.edu/display/fisid_158563/)  
Assistant Professor; PhD, Pennsylvania State University

Ferguson, Virginia L. (https://experts.colorado.edu/display/fisid_110131/)  
Associate Professor; PhD, University of Colorado Boulder

Fitzgerald, Jessica  
Instructor; PhD, Northeastern University

Fox, Jerome Michael (https://experts.colorado.edu/display/fisid_156682/)  
Assistant Professor; PhD, University of California, Berkeley

Gopinath, Juliet T. (https://experts.colorado.edu/display/fisid_147075/)  
Associate Professor; PhD, Massachusetts Institute of Technology

Hind, Laurel  
Assistant Professor; PhD, University of Pennsylvania

Huang, Shu-Wei (https://experts.colorado.edu/display/fisid_159847/)  
Assistant Professor; PhD, MIT, Cambridge

Lynch, Maureen Ellen (https://experts.colorado.edu/display/fisid_163404/)  
Assistant Professor; PhD, Cornell University

McLeod, Robert R. (https://experts.colorado.edu/display/fisid_107547/)  
Professor; PhD, University of Colorado Boulder

Mukherjee, Debanjan  
Assistant Professor

Murray, Todd W. (https://experts.colorado.edu/display/fisid_146549/)  
Professor; PhD, Johns Hopkins University

Myers, Chris  
Professor; PhD, Stanford University

Neu, Corey P. (https://experts.colorado.edu/display/fisid_156210/)  
Associate Professor; PhD, University of California, Davis

Park, Won (https://experts.colorado.edu/display/fisid_122676/)  
Associate Professor, Associate Chair; PhD, Georgia Institute of Technology

Piestun, Rafael (https://experts.colorado.edu/display/fisid_118538/)  
Professor; PhD, Israel Instit of Tech (Israel)

Rentschler, Mark E. (https://experts.colorado.edu/display/fisid_146091/)  
Associate Professor; PhD, University of Nebraska-Lincoln

Sankaranarayanan, Srim (https://experts.colorado.edu/display/fisid_147413/)  
Associate Professor; PhD, Stanford University

Shields, C. Wyatt IV  
Assistant Professor; PhD, Duke University

Sprenger, Kayla  
Assistant Professor; PhD, University of Washington

Stansbury, Jeffrey W.  
Professor; PhD, University of Maryland

Tan, Wei (https://experts.colorado.edu/display/fisid_141464/)  
Associate Professor; PhD, University of Illinois at Chicago
Yeh, Tom (https://experts.colorado.edu/display/fisid_151584/)
Assistant Professor; PhD, Massachusetts Institute of Technology

Courses

BMEN 1000 (1) Exploring Biomedical Engineering
Introduces the biomedical engineering profession, curriculum, career pathways, ethics and responsibilities, and research opportunities. Academic and industry speakers are invited to address various biomedical engineering topics.
Requisites: Restricted to Biomedical Engineering (BMEN) majors only.
Recommended: Students in second semester of Biomedical Engineering curriculum or higher.

BMEN 1025 (4) Computer-Aided Design & Fabrication
Introduces engineering drawing techniques through an modern computer aided design (CAD) software, and fabrication of some of these designs. The course will begin with an introduction of spatial visualization skills, then an in-depth introduction to Solidworks, an industry standard CAD software tool, along with introduction to fabrication processes including laser cutting, 3D printing, casting and injection molding, and 3D scanning will be completed. Additional topics include geometric design and tolerancing techniques and design for manufacturing.
Requisites: Restricted to Biomedical Engineering (BMEN) majors only.

BMEN 2000 (3) Introduction to Biomedical Engineering
Reviews concepts from molecular and cellular biology. Establishes important aspects of human physiology and engineering principles to develop a basic understanding of the biomedical engineering field. Introduces topics such as biomechanics, bioinstrumentation, bioimaging and biotechnology.
Requisites: Restricted to Biomedical Engineering (BMEN) majors and minors only. Requires prerequisite or corequisite course(s) of MCDB 1150 or CHEN 2810 or EBION 1210 EBIO 1220 (minimum grade C-).

BMEN 2010 (3) Biomaterials
Introduces the science and engineering of biomaterials, with an emphasis on biomechanical aspects. Addresses the design, fabrication, testing, applications and performance of synthetic and natural materials that are used in a wide variety of biomedical prosthetics, implants and devices. In addition to attending lectures, students will conduct a laboratory experiment and a case study.
Requisites: Requires prerequisite course of CHEN 1201 or CHEN 1211 (minimum grade C). Restricted to Biomedical Engineering (BMEN) majors only.
Recommended: Students in fourth semester of Biomedical Engineering curriculum or higher.

BMEN 3010 (3) Biotransport
An introduction to the modeling of complex biological systems using principles of transport phenomena and biochemical kinetics. Includes the conservation of mass and momentum; rheology of Newtonian and non-Newtonian fluids; steady and transient diffusion in reacting systems; dimensional analysis; homogeneous versus heterogeneous reaction systems; and physiological transport systems, including oxygen and drug transport.
Requisites: Requires prerequisite of BMEN 2000 and CHEN 1310 or CSCI 1300 or ECEN 1310 and PHYS 1110, and pre or corequisite of APPM 2360 or MATH 2130 and 3430 (all minimum grade C-). Restricted to Biomedical Engineering (BMEN) major students.
Recommended: for students in fifth semester of Biomedical Engineering curriculum or higher.

BMEN 4840 (1-3) Independent Study
Provides opportunities for independent study at the undergraduate level. Subject and/or project agreed upon by the student and instructor to fit the needs of the student.
Repeatable: Repeatable for up to 6.00 total credit hours.
Requisites: Restricted to Biomedical Engineering (BMEN) majors only.

BMEN 5840 (1-6) Independent Study
Provides opportunities for independent study at the graduate level. Subject and/or project agreed upon by the student and instructor to fit the needs of the student.
Repeatable: Repeatable for up to 30.00 total credit hours.
Requisites: Restricted to Biomedical Engineering (BMEN-MS) graduate students only.

BMEN 6950 (1-6) Master's Thesis
Work with a faculty advisor on a masters thesis.
Repeatable: Repeatable for up to 6.00 total credit hours.
Requisites: Restricted to Biomedical Engineering (BMEN-MS) graduate students only.

BMEN 8990 (1-10) Doctoral Dissertation
Work with a faculty advisor on a doctoral dissertation.
Repeatable: Repeatable for up to 60.00 total credit hours.
Requisites: Restricted to Biomedical Engineering (BMEN) Ph.D. graduate students only.