

BS in Biomedical Engineering Technical Electives

In addition to the required courses, BME students can design their upper-division curriculum to match their interests. Students select a minimum of 9 units of BME technical electives and up to 12 units of general technical electives from the following courses.

BME Technical Electives

BME 302: Applications of Numerical Methods in Biomedical Engineering (3 units)

Prerequisites: MATH 223, MATH 254

This course introduces numerical methods for solving mathematical problems from various fields of engineering especially biomedical engineering. We will cover the concepts of numerical interpolation, linear algebra, numerical differentiation and integration, and numerical solution of differential equations. We will use computer programming to solve problems in science and engineering with a theme of biomechanics and mechanobiology..

BME 416: Biomedical Imaging (Spring, 3 units)

Prerequisites: None

Introduction to the mathematical, physical, engineering and biological principles important to a variety of biomedical imaging methods including optical imaging, x-ray imaging, CT, PET, SPECT and MRI.

BME 417: Measurement & Data Analysis (Spring, 3 units)

Prerequisites: Senior standing.

Biomedical instrumentation, sensors, physiological measurements, analog and digital signal processing, data acquisition, data reduction, statistical treatment of data, and safety issues.

BME 420: Biophotonics (Spring, 3 units)

Prerequisites: BME330 or OPTI210 or OPTI310

Interaction of light with biological material. Use of photonics in medical diagnostics. Introductory biological concepts such as DNA, proteins, cells, and tissues. Principles and applications of bioimaging, spectroscopy, and biosensors, as well as summarized recently published progress in the field.

BME 461: Biologic & Synthetic Materials (Fall, 3 units)

Prerequisites: None

Structure and properties of biological materials and composites, such as bone, teeth and elastin. Synthetic materials as substitutes for biological materials, biocompatibility.

BME 466: Biomechanical Engineering (Fall)

Prerequisites: None

Biosolids, biofluids, biotransport; physiological systems; bioheat transfer.

BME 477: Introduction Biomedical Informatics



Prerequisites: ECE 175 or CSC 127A or CSC 110

Topics at the intersection of people, health information, and technology.

BME 481A: Innovation, Translation and Entrepreneurship

Prerequisites: None

Innovation in the medical arena.

BME 481B: Cell and Tissue Engineering (Spring, 3 units)

Prerequisites: MATH 254

Applied genetics, metabolic regulation, and bioreactors employed in industrial processes for manufacture of pharmaceuticals and in the design of tissue engineered devices to replace normal physiological function.

BME 483: Micro Biomechanics (Spring, 3 units)

Prerequisites: AME 230 or ABE 284 and MATH 223 and (AME 324A or CE 215).

Thermodynamics, mechanics, and structures of biomolecules (e.g., proteins and DNA) and cells. Deformation mechanisms and theories for both flexible and semi-rigid chains, and the applications in biomolecules and cells. Experimental micro biomechanics techniques for both biomolecules and cells.

BME 485: Nanoscience and Nanotechnology for Biomedical Engineers (Fall, 3 units)

Prerequisites: BME Majors

Fundamental concepts underlying nano technological advances, such as quantum mechanics, chemical kinetics, and materials science.

BME 486: Biomaterial-Tissue Interactions (Spring)

Prerequisites: None

Biomaterials and their applications; protein-surface and blood-biomaterial interactions, inflammation, wound healing, biocompatibility, implants, and tissue engineering.

BME 492: Directed Research (Spring, Fall, Summer)

Prerequisites: None

Please submit Directed Research Form to the BME adviser.

General Technical Electives

- All BME technical electives
- BME 493B: Clinical and Translational Research Experience
- BME 499: Independent Study
- AME 324A: Mechanical Behavior of Engineering Materials
- AME/ABE 489A: Fabrication Techniques for Micro and Nano Technology
- BE 487: Bioinformatics





- BIOC 385: Metabolic Chemistry
- CHEM 241A & 243B: Organic Chemistry 1 ++
- CHEM 241B & 243B: Organic Chemistry 2 ++
- ECE 330B: Computational Techniques
- ECE 381A: Introductory Electromagnetics
- ECE 429: Digital Signal Processing
- ECE 459: Fundamental Optics for Electrical Engineers
- ECOL 346: Bioinformatics
- ESOC: 414 Computational Social Sciences
- ISTA 422: Applied Cyberinfrastructure Concepts
- LIS 471: Introduction to Information Technology
- MSE 331R: Fundamentals of Materials for Manufacturing

Most upper division engineering courses qualify but require approval by the academic adviser.

Many non-engineering courses qualify also but require approval by Undergraduate Studies Committee.

