

Biomedical Engineering

The Sc.B. program in Biomedical Engineering is accredited by the Engineering Accreditation Commission of ABET <http://www.abet.org/>. It is jointly offered by the School of Engineering and the Division of Biology and Medicine as an interdisciplinary concentration designed for students interested in applying the methods and tools of engineering to the subject matter of biology and the life sciences. Alumni of the Biomedical Engineering (BME) program will achieve one or more of these program educational objectives (PEOs) within five (5) years of graduation: (1) Serve society through work or advanced study in a broad range of fields including, but not limited to, medicine, healthcare, industry, government, and academia; (2) Apply their deeply creative and versatile biomedical engineering education to solve a broad spectrum of engineering and societal challenges; and (3) Contribute as role models, mentors, or leaders in their fields. The student outcomes of this program are the ABET (1) - (7) Student Outcomes as defined by the ABET Criteria for Accrediting Engineering Programs (available online at <http://www.abet.org/accreditation-criteria-policies-documents/>). The Biomedical Engineering concentration shares much of the core with the other engineering programs, but is structured to include more courses in biology and chemistry, and a somewhat different emphasis in mathematics.

The requirements regarding Mathematics, Advanced Placement, Transfer Credit, Substitutions for Required Courses, and Humanities and Social Science Courses are identical to those of the Sc.B. degree programs in Engineering. Please refer to the Engineering section of the University Bulletin for explicit guidelines.

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Standard program for the Sc.B. degree

1. Core Courses

ENGN 0030	Introduction to Engineering	1
or ENGN 0031	Honors Introduction to Engineering	
ENGN 0040	Dynamics and Vibrations	1
ENGN 0510	Electricity and Magnetism	1
or ENGN 0520	Electrical Circuits and Signals	
ENGN 0720	Thermodynamics	1
ENGN 0810	Fluid Mechanics	1
CHEM 0330	Equilibrium, Rate, and Structure	1
CHEM 0350	Organic Chemistry	1
MATH 0190	Advanced Placement Calculus (Physics/Engineering)	1
or MATH 0170	Advanced Placement Calculus	
or MATH 0100	Introductory Calculus, Part II	
MATH 0200	Intermediate Calculus (Physics/Engineering)	1
or MATH 0180	Intermediate Calculus	
or MATH 0350	Honors Calculus	
APMA 0330	Methods of Applied Mathematics I	1
or APMA 0350	Applied Ordinary Differential Equations	
APMA 1650	Statistical Inference I	1
or BIOL 0495	Statistical Analysis of Biological Data	
or PHP 1510	Principles of Biostatistics and Data Analysis	
or APMA 1655	Honors Statistical Inference I	

2. Upper Level Biomedical Engineering Curriculum

ENGN 1110	Transport and Biotransport Processes	1
ENGN 1210	Biomechanics	1
ENGN 1230	Instrumentation Design	1
ENGN 1490	Biomaterials	1

BIOL 0800	Principles of Physiology	1
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3. Additional Biomedical Engineering Electives (Complete at least 3 courses from the following groups):

Select one or two of the following:		
ENGN 1220	Neuroengineering	
ENGN 1510	Nanoengineering and Nanomedicine	
ENGN 1520	Cardiovascular Engineering	
ENGN 1930B	Biomedical Optics	
ENGN 2910S	Cancer Nanotechnology	
ENGN 2912R	Implantable Devices	
BIOL 1140	Tissue Engineering	
CSCI 1810	Computational Molecular Biology	
or CSCI 1820	Algorithmic Foundations of Computational Biology	
ENGN 0500	Digital Computing Systems	
ENGN 1740	Computer Aided Visualization and Design	
ENGN 2911R	Analytical Modeling for Biomechanical and Biomedical Systems	
ENGN 2625	Optical Microscopy: Fundamentals and Applications	
BIOL 1150	Stem Cell Engineering	
BIOL 2110	Drug and Gene Delivery	

At least one or two more courses from:

BIOL 0280	Biochemistry	
BIOL 0470	Genetics	
BIOL 0500	Cell and Molecular Biology	
BIOL 0510	Introductory Microbiology	
BIOL 0530	Principles of Immunology	
BIOL 1100	Cell Physiology and Biophysics	
BIOL 1555	Methods in Informatics and Data Science for Health	
BIOL 2010	Quantitative Approaches to Biology	
APMA 1070	Quantitative Models of Biological Systems	
CHEM 0360	Organic Chemistry	
CLPS 1520	Computational Vision	
or CLPS 1590	Visualizing Vision	
ENGN 2910G	Topics in Translational Research and Technologies	
NEUR 1020	Principles of Neurobiology	
NEUR 1440	Mechanisms and Meaning of Neural Dynamics	
PHYS 1610	Biological Physics	
BIOL 1810	21st Century Applications in Cell and Molecular Biology	

4. Capstone Design¹

ENGN 1930L	Biomedical Engineering Design and Innovation ¹	1
ENGN 1931L	Biomedical Engineering Design and Innovation II ¹	1

5. General Education Requirement: At least four approved courses must be taken in the humanities and social sciences.

Total Credits 21

¹ In some cases, Independent Study may be substituted subject to Concentration Advisor approval

Font Notice

This document should contain certain fonts with restrictive licenses. For this draft, substitutions were made using less legally restrictive fonts. Specifically:

Helvetica was used instead of Arial.

The editor may contact Leepfrog for a draft with the correct fonts in place.