

BIOENGINEERING MINOR

Banner Code: BIOE

Website: bioengineering.gmu.edu/

The minor in Bioengineering is available to both engineering and non-engineering majors. It provides considerable opportunities in a highly cross-disciplinary field involving the application of engineering concepts and tools to solve problems in biomedicine. The minor in Bioengineering prepares students to gain and reinforce their knowledge of biology and engineering fundamentals, and develop and apply skills to clinically-relevant challenges.

Admissions & Policies

Admissions

Students must have completed MATH 114 Analytic Geometry and Calculus II with a grade of B- or better to be admitted to the minor.

Policies

Eight credits of coursework must be unique to the minor and students must complete all coursework with a minimum GPA of 2.00. For policies governing all minors, see AP.5.3.4 Minors (<https://catalog.gmu.edu/policies/academic/undergraduate-policies/#ap-5-3-4>).

Requirements

Minor Requirements

Total credits: 19-21

Required Courses

Code	Title	Credits
BENG 101	Introduction to Bioengineering	3
BIOL 213	Cell Structure and Function ¹	4
BENG 214	Physiology for Engineers	3
Total Credits		10

¹ All students in the Bioengineering minor program are recommended to register for the specific section of BIOL 213 Cell Structure and Function.

Technical Electives

Code	Title	Credits
Select at least nine credits from the following list:		9-11

Computational Biomedicine

BENG 230	Continuum Biomechanics and Transport I
BENG 420	Biomedical Data Analytics
BENG 430	Continuum Biomechanics and Biotransport II
BENG 435	Multi-scale Modeling and Simulation in Biomedicine

Biomedical Imaging & Devices

BENG 437	Medical Image Processing
BENG 438	Advanced Biomedical Imaging
BENG 470	Bioinstrumentation and Devices II

Biomaterials & Nanomedicine

BENG 240	Biomaterials
BENG 413	Molecular Engineering Laboratory
BENG 421	Cell and Tissue Engineering
BENG 440	Advanced Biomaterials and Biomimetic Devices for Nanomedicine

Neurotechnology & Computational Neuroscience

BENG 426	Neural Engineering
BENG 434	Computational Modelling of Neurons and Networks
BENG 487	Neuroinformatics

Study Abroad

BENG 417	Bioengineering World Health
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Research Experience

BENG 395	RS: Mentored Research in Bioengineering (Research Experience)
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Students may choose to substitute two of the technical electives (up to 6 credits) from the following:

BENG courses

BENG 327	Cellular, Neurophysiological, and Pharmacological Neuroscience
BENG 350	Neural System Designs

ECE courses

ECE 370	Introduction to Robotics
ECE 410	Applications of Discrete-Time Signal Processing
ECE 431	Digital Circuit Design
ECE 470	Introduction to Humanoid Robotics

ME courses

ME 221	Thermodynamics
ME 322	Fluid Mechanics
ME 313	Material Science
ME 432	System Dynamics and Controls

SYST courses

OR 442	Stochastic Models
SYST 468	Applied Predictive Analytics
SYST 470	Human Factors Engineering

NEUR courses

NEUR 327	Cellular Neuroscience
NEUR 461	Special Topics in Neuroscience

BIOL courses

BIOL 311	General Genetics
BIOL 385	Biotechnology and Genetic Engineering
BIOL 484	Cell Signaling and Disease
BIOL 486	Molecular Biology and Biotechnology Laboratory

CHEM courses

CHEM 313	Organic Chemistry I
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CHEM 314	Organic Chemistry II
CHEM 463	General Biochemistry I
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Total Credits	9-11