

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 (<http://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 |
|----------|-----------------------------|

Research Experience

| | |
|----------|---|
| BENG 395 | RS: Mentored Research in Bioengineering (Research Experience) |
|----------|---|

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 | Robot Design |
| 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 | Systems Dynamics and Controls |

SYST courses

| | |
|----------|--------------------------------|
| OR 442 | Stochastic Operations Research |
| 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 |
| CHEM 314 | Organic Chemistry II |

2 Bioengineering Minor

| | | |
|---------------|------------------------|------|
| CHEM 463 | General Biochemistry I | |
| <hr/> | | |
| Total Credits | | 9-11 |