

## Biomedical Engineering Degree

Students must also complete the Undergraduate Registration Requirement (https://catalogs.northwestern.edu/undergraduate/requirements-policies/undergraduate-registration-requirement) and the degree requirements of their home school.

### Course Requirements (48 units)

**Core Courses (32 units)**

- 4 mathematics courses
- 4 engineering analysis and computer proficiency courses
- 4 units of basic science

**5 unrestricted electives**

**7 social sciences/humanities courses**

**3 design and communications courses**

### Requirements (48 units)

#### 10 Core Courses:

- BMD_ENG 101-0: Introduction to Biomedical Engineering (noncredit)
- BMD_ENG 250-0: Thermodynamics
- BMD_ENG 259-0: Modern Chemical Engineering
- BMD_ENG 270-0: Transport Fundamentals
- BMD_ENG 271-0: Thermodynamics
- BMD_ENG 272-0: Modern Chemical Engineering
- BMD_ENG 353-0: Introduction to Biomedical Engineering
- BMD_ENG 354-0: Introduction to Biomedical Engineering
- BMD_ENG 355-0: Introduction to Biomedical Engineering
- BMD_ENG 356-0: Introduction to Biomedical Engineering

#### 5 basic engineering courses:

- BMD_ENG 250-0: Thermodynamics
- BMD_ENG 270-0: Transport Fundamentals
- BMD_ENG 271-0: Thermodynamics
- BMD_ENG 272-0: Modern Chemical Engineering
- BMD_ENG 353-0: Introduction to Biomedical Engineering

#### 5 basic science courses:

- CHEM 131-0: General Chemistry 1
- CHEM 132-0: General Chemistry 2
- CHEM 151-0: Accelerated General Chemistry 1
- CHEM 152-0: Accelerated General Chemistry 2
- CHEM 171-0: Advanced General Inorganic Chemistry
- CHEM 172-0: Advanced General Physical Chemistry

#### 3 design and communications courses:

- COMP_SCI 211-0: Introduction to Computer Programming II
- COMP_SCI 230-0: Programming for Engineers
- MECH_ENG 240-0: Intro to Mechanical Design & Manufacturing

### Biomedical Engineering Electives

#### Category A Courses

- BMD_ENG 317-0: Intro to Mechanical Design & Manufacturing
- BMD_ENG 325-0: Introduction to Medical Imaging
- BMD_ENG 327-0: Magnetic Resonance Imaging
- BMD_ENG 330-0: Modern Optical Microscopy & Imaging
- BMD_ENG 343-0: Biomedical Instruments and Medical Devices
- or MAT_SCI 370-0: Biocatalysis
- or BMD_ENG 344-0: Biomedical Sensors
- or BMD_ENG 346-0: Biological Performance of Materials
- or BMD_ENG 347-0: Tissue Engineering
- or BMD_ENG 355-0: Foundations of Regenerative Engineering
- or BMD_ENG 356-0: Biomechanics of Movement
- or BMD_ENG 371-0: Mechanics of Biological Tissue
- or BMD_ENG 377-0: Intermediate Fluid Mechanics

#### Category B Courses

- BMD_ENG 319-0: Cell Biology
- BMD_ENG 320-0: Introduction to Medical Imaging
- BMD_ENG 327-0: Magnetic Resonance Imaging
- BMD_ENG 333-0: Modern Optical Microscopy & Imaging

2 technical electives, preferably with an emphasis on engineering design, may include:

- BIOL_SCI 219-0: Cell Biology
- CHEM 210-0: Organic Chemistry
- CHEM 210-3: Organic Chemistry
- DSGN 240-0: Introduction to Solid Modeling: Solidworks
- DSGN 245-0: Introduction to Computer Aided Design I: NX
- DSGN 246-0: Introduction to Computer Aided Design II: NX
- COMP_SCI 211-0: Fundamentals of Computer Programming II
- COMP_SCI 230-0: Programming for Engineers
- MECH_ENG 240-0: Intro to Mechanical Design & Manufacturing
### Biomedical Engineering Degree

**BMD_ENG 343-0** Biomaterials and Medical Devices (BMD_ENG 343-0 and MAT_SCI 370-0 are duplicate courses and only 1 may be taken)

or **MAT_SCI 370-0** Biomaterials

**BMD_ENG 344-0** Biological Performance of Materials

**BMD_ENG 346-0** Tissue Engineering

**BMD_ENG 347-0** Foundations of Regenerative Engineering

**BMD_ENG 348-0** Applications of Regenerative Engineering

**BMD_ENG 353-0** Bioelectronics

**BMD_ENG 365-0** Control of Human Limbs and Their Artificial Replacements

**BMD_ENG 366-0** Biomechanics of Movement

**BMD_ENG 371-0** Mechanics of Biological Tissue

**BMD_ENG 377-0** Intermediate Fluid Mechanics

**BMD_ENG 380-0** Medical Devices, Disease & Global Health

**BMD_ENG 395-0** Topics in Biomedical Engineering (Check with UG Program Chair)

**CIV_ENV 327-0** Finite Element Methods in Mechanics

**CHEM_ENG 361-0** Introduction to Polymers

**CHEM_ENG 379-0** Computational Biology: Principles & Applications

**DSGN 360-0** Design Competition

**COMP_SCI 211-0** Fundamentals of Computer Programming II

or **COMP_SCI 230-0** Programming for Engineers

**ELEC_ENG 302-0** Probabilistic Systems

**ELEC_ENG 332-0** Introduction to Computer Vision

**ELEC_ENG 360-0** Introduction to Feedback Systems

**ELEC_ENG 379-0** Lasers and Coherent Optics

**ELEC_ENG 382-0** Photonic Information Processing

**ELEC_ENG 395-0** Special Topics in Electrical Engineering (Please consult BME UG Program Chair)

**ES_APPM 346-0** Modeling and Computation in Science & Engineering

**ES_APPM 370-1** Introduction to Computational Neuroscience

**IEMS 385-0** Introduction to Health Systems Management

**MECH_ENG 314-0** Machine Dynamics

**MECH_ENG 315-0** Theory of Machines - Design of Elements

**MECH_ENG 333-0** Introduction to Mechatronics

**MECH_ENG 341-0** Computational Methods for Engineering Design

**MECH_ENG 362-0** Stress Analysis

**MECH_ENG 385-0** Nanotechnology

**MECH_ENG 389-0** Molecular Machines in Biology

**MECH_ENG 390-0** Intro to Dynamic Systems

**MAT_SCI 318-0** Materials Selection

**MAT_SCI 360-0** Introduction to Electron Microscopy

**MAT_SCI 376-0** Nanomaterials

**PHYSICS 357-0** Optics Laboratory

* Only one course that is less than 1 engineering unit can be counted toward the BME electives.