BIOMEDICAL ENGINEERING MINOR (B.ENG.) (21 CREDITS)

Offered by: Biomedical Engineering (Faculty of Engineering)
Degree: Bachelor of Engineering
Program credit weight: 21

Program Description

Biomedical engineering can be defined as the application of engineering principles to medicine and the life sciences. Students in the Biomedical Engineering Minor take courses in life sciences (anatomy, biology, chemistry, and physiology) and choose courses form area(s) within the field of biomedicine (artificial cells and organs; bioinformatics, genomics, and proteomics; biomaterials, biosensors, and nanotechnology; biomechanics and prosthetics; medical physics and imagine; neural systems and biosignal processesing).

Note: Open to students in the Faculty of Engineering and the Department of Bioresource Engineering.

The Biomedical Engineering Minor allows access to courses in basic life sciences and it intended to expose students to the interdisciplinary tools used in biomedicine.

To complete this Minor, students must obtain a grade of C or better in all approved courses and satisfy the requirements of both the major program and the Minor. By careful selection of courses, the Minor can be satisfied with 9 additional credits in the student's major program or a maximum of 12 credits overlap with the major program.

Students considering this Minor should contact the Minor Advisers listed above.

Minor Advisers: Prof. R. Leask (Wong Building, Room 4120), Prof. R. Mongrain (Macdonald Engineering Building, Room 369) or Prof. G. Mitsis (McConnell Engineering Building, Room 361).

Note: For information about Fall 2025 and Winter 2026 course offerings, please check back on May 8, 2025. Until then, the "Terms offered" field will appear blank for most courses while the class schedule is being finalized.

Complementary Courses (21-25 credits)

Introductory Life Sciences

Minimum of 3 credits from the courses below:

Expand allContract all

Course	Title	Credits
ANAT 212	Molecular Mechanisms of Cell Function.[1]	3
BIEN 219	Introduction to Physical Molecular and Cell Biology.[2]	4
BIOC 212	Molecular Mechanisms of Cell Function.[1]	3
BIOL 200	Molecular Biology.	3
BIOL 201	Cell Biology and Metabolism.[1]	3
BIOL 219	Introduction to Physical Molecular and Cell Biology.[2]	4
CHEM 212	Introductory Organic Chemistry 1.[3]	4
PHGY 209	Mammalian Physiology 1.	3
PHGY 210	Mammalian Physiology 2.	3

1 Students can choose one of ANAT 212 Molecular Mechanisms of Cell Function. BIOC 212 Molecular Mechanisms of Cell Function. or BIOL 201 Cell Biology and Metabolism..

2 Students can choose one of ANAT 212 Molecular Mechanisms of Cell Function., BIEN 219 Introduction to Physical Molecular and Cell Biology., BIOC 212 Molecular Mechanisms of Cell Function., BIOL 200 Molecular Biology.,BIOL 201 Cell Biology and Metabolism. or BIOL 219 Introduction to Physical Molecular and Cell Biology..

3 Cannot be taken by Chemical Engineering students.

Specialization Courses

Minimum of 12 credits from courses below:

Students must select 6 credits from courses outside their department and at least one BMDE course. BMDE courses are best taken near the end of the program, when prerequisites are satisfied.

Physiological Systems, Artificial Cells and Organs

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Course	Title	Credits
BIEN 340	Transport Phenomena in Biological Systems 2.	3
BIEN 360	Physical Chemistry in Bioengineering.	3
BIEN 462	Engineering Principles in Physiological Systems.	3
BIEN 540	Information Storage and Processing in Biological Systems.	3
BMDE 505	Cell and Tissue Engineering.	3
PHGY 311	Channels, Synapses and Hormones.	3
PHGY 312	Respiratory, Renal, and Cardiovascular Physiology.	3
PHGY 313	Blood, Gastrointestinal, and Immune Systems Physiology.	3
PHGY 518	Artificial Cells.	3

Bioinformatics, Genomics and Proteomics

Expand allContract all

Course	Title	Credits
ANAT 365	Cellular Trafficking.	3
ANAT 458	Membranes and Cellular Signaling.[1]	3
BIEN 310	Introduction to Biomolecular Engineering.	3
BIEN 410	Computational Methods in Biomolecular Engineering.	3
BIEN 420	Biodevices Design for Diagnostics and Screening.	3
BIEN 540	Information Storage and Processing in Biological Systems.	3
BIEN 590	Cell Culture Engineering.	3
BIOC 311	Metabolic Biochemistry.	3
BIOC 312	Biochemistry of Macromolecules.	3

BIOC 458	Membranes and Cellular Signaling.[1]	3
BMDE 508	Introduction to Micro and Nano-Bioengineering.	3
COMP 424	Artificial Intelligence.	3
COMP 462	Computational Biology Methods.	3

[1] Students select either ANAT 458 Membranes and Cellular Signaling. or BIOC 458 Membranes and Cellular Signaling..

Biomaterials, Biosensors and Nanotechnology

Expand allContract all

Course	Title	Credits
BIEN 330	Tissue Engineering and Regenerative Medicine.	3
BIEN 510	Engineered Nanomaterials for Biomedical Applications.	3
BIEN 550	Biomolecular Devices.	3
BIEN 560	Design of Biosensors.	3
BMDE 504	Biomaterials and Bioperformance.	3
BMDE 505	Cell and Tissue Engineering.	3
BMDE 508	Introduction to Micro and Nano-Bioengineering.	3
CHEE 380	Materials Science.	3
ECSE 424	Human-Computer Interaction.	3
MECH 553	Design and Manufacture of Microdevices.	3
MIME 360	Phase Transformations: Solids.	3
MIME 362	Mechanical Properties.	3
MIME 470	Engineering Biomaterials.	3
PHYS 534	Nanoscience and Nanotechnology.	3

Biomechanics and Prosthetics

Expand allContract all

Course	Title	Credits
BIEN 320	Molecular, Cellular and Tissue Biomechanics.	3
BIEN 570	Active Mechanics in Biology.	3
BMDE 512	Finite-Element Modelling in Biomedical Engineering.	3
CHEE 563	Biofluids and Cardiovascular Mechanics.[1]	3
MECH 315	Mechanics 3.	4
MECH 321	Mechanics of Deformable Solids.	3
MECH 530	Mechanics of Composite Materials.	3
MECH 561	Biomechanics of Musculoskeletal Systems.	3
MECH 563	Biofluids and Cardiovascular Mechanics.[1]	3
MIME 360	Phase Transformations: Solids.	3
MIME 362	Mechanical Properties.	3

[1] Students choose either CHEE 563 Biofluids and Cardiovascular Mechanics. or MECH 563 Biofluids and Cardiovascular Mechanics..

Medical Physics and Imaging

Expand allContract all

Course	Title	Credits
BIEN 350	Biosignals, Systems and Control.[1]	4
BIEN 530	Imaging and Bioanalytical Instrumentation.	3
BMDE 512	Finite-Element Modelling in Biomedical Engineering.	3
BMDE 519	Biomedical Signals and Systems.	3
COMP 424	Artificial Intelligence.	3
COMP 558	Fundamentals of Computer Vision.	4
ECSE 206	Introduction to Signals and Systems.[1]	3
ECSE 412	Discrete Time Signal Processing.	3
PHYS 557	Nuclear Physics.	3

[1] Students choose either BIEN 350 Biosignals, Systems and Control. or ECSE 206 Introduction to Signals and Systems..

Neural Systems and Biosignal Processing

Expand allContract all

Course	Title	Credits
BIEN 350	Biosignals, Systems and Control.[1]	4
BIEN 462	Engineering Principles in Physiological Systems.	3
BMDE 501	Selected Topics in Biomedical Engineering.	3
BMDE 502	BME Modelling and Identification.	3
BMDE 503	Biomedical Instrumentation.	3
BMDE 519	Biomedical Signals and Systems.	3
ECSE 206	Introduction to Signals and Systems.[1]	3
ECSE 517	Neural Prosthetic Systems.	3
ECSE 526	Artificial Intelligence.	3
PHYS 413	Physical Basis of Physiology.	3

[1] Students choose either BIEN 350 Biosignals, Systems and Control. or ECSE 206 Introduction to Signals and Systems..

0-6 credits can be taken by permission of the Departmental Adviser and approval of the Minor Adviser.