NANOTECHNOLOGY MINOR (B.ENG.) (21 CREDITS)

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

Program Description

Through courses already offered in the Faculties of Science, Engineering, and Medicine and Health Sciences, depending on the courses completed, undergraduate students will acquire knowledge in some of the following areas related to nanotechnology:

- Nanomaterial synthesis and processing approaches
- Physicochemistry and quantum behavior of nanomaterials
- State-of-the-art techniques for nanomaterial characterization and detection
- Applications of nanomaterials in engineered solutions
- Nanomaterials in medicine and pharmacology
- Nanomaterials in electronics and energy
- Environmental, health, and social impacts of nanomaterials

Minor program credit weight: 21-22 credits

Students must complete 21 credits of courses as indicated below. A maximum of 12 credits of courses in the student's major may double-count with the Minor.

Students who have not taken the listed prerequisites for any of these courses should ensure that they have the adequate background and/or meet with the instructor before registering for the course. Permission from the instructor and/or department may be required.

The program is open to undergraduate students that are in Year 2 or higher.

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 (21-22 credits)

Group A

Students must complete a minimum of 3 credits from the following list of courses:

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Course	Title	Credits
BIEN 510	Engineered Nanomaterials for Biomedical Applications.	3
BMDE 508	Introduction to Micro and Nano-Bioengineering.	3
CHEE 521	Nanomaterials and the Aquatic Environment.[1]	3
CHEM 534	Nanoscience and Nanotechnology.[1]	3
CIVE 521	Nanomaterials and the Aquatic Environment.[1]	3
ECSE 535	Nanoelectronic Devices.[2]	3
MIME 570	Micro- and Nano-Fabrication Fundamentals.	3
PHYS 534	Nanoscience and Nanotechnology.[1]	3

1 Students can take only one course from each set of the following courses:
- MIME 260 Materials Science and Engineering., MIME 261 Structure of Materials., MIME 262 Properties of Materials in Electrical Engineering. or CHEE 380 Materials Science.
- CHEE 515 Interface Design: Biomimetic Approach. or MIME 515 (Bio)material Surface Analysis and Modification.
- CHEE 521 Nanomaterials and the Aquatic Environment. or CIVE 521 Nanomaterials and the Aquatic Environment.
- CHEM 534 Nanoscience and Nanotechnology. or PHYS 534 Nanoscience and Nanotechnology.
- BIOL 319 Introduction to Biophysics. or PHYS 319 Introduction to Biophysics.

2 A 3.0 or higher CGPA is required in order to take these courses.

Group B

Students will be required to take up to 18-19 credits of courses from Group B, depending on how many courses from Group A were taken.[1]

1 A research-based course (maximum 4cr) with the focus on nanotechnology taken at McGill University may be considered for credits towards this Minor; students must obtain the approval of the research project from the Minor adviser prior to taking the course in order for the course to be counted as part of the Minor credits.

Bioengineering

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Course	Title	Credits
BIEN 420	Biodevices Design for Diagnostics and Screening.	3
BIEN 550	Biomolecular Devices.	3

Chemical Engineering

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Course	Title	Credits
CHEE 380	Materials Science.[1]	3
CHEE 515	Interface Design: Biomimetic Approach.[1]	3
CHEE 543	Plasma Engineering.	3
CHEE 582	Polymer Science and Engineering.	3
CHEE 585	Foundations of Soft Matter.	3

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- CHEE 521 Nanomaterials and the Aquatic Environment. or CIVE 521 Nanomaterials and the Aquatic Environment.

- CHEM 534 Nanoscience and Nanotechnology. or PHYS 534 Nanoscience and Nanotechnology.
- BIOL 319 Introduction to Biophysics. or PHYS 319 Introduction to Biophysics.

Chemistry

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Course	Title	Credits
CHEM 334	Advanced Materials.	3
CHEM 531	Chemistry of Inorganic Materials.	3
CHEM 582	Supramolecular Chemistry.	3
CHEM 585	Colloid Chemistry.	3

Electrical Engineering

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Course	Title	Credits
ECSE 423	Fundamentals of Photonics.	3
ECSE 430	Photonic Devices and Systems.	3
ECSE 433	Physical Basis of Transistor Devices.	4
ECSE 519	Semiconductor Nanostructures and Nanophotonic Devices.[1]	3
ECSE 536	RF Microelectronics.[1]	3
ECSE 571	Optoelectronic Devices.[1]	3
ECSE 596	Optical Waveguides.[1]	3
MIME 262	Properties of Materials in Electrical Engineering.[2]	3

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Mechanical Engineering

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Course	Title	Credits
MECH 500	Selected Topics in Mechanical Engineering.[1]	3
MECH 553	Design and Manufacture of Microdevices.	3
MECH 556	Microfluidics and BioMEMS.	3
MIME 260	Materials Science and Engineering.[2]	3

1 2 When topic is appropriate, with approval from the Minor Adviser. Students can take only one course from each set of the following courses:

- MIME 260 Materials Science and Engineering., MIME 261 Structure of Materials., MIME 262 Properties of Materials in Electrical Engineering. or CHEE 380 Materials Science.
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Materials Engineering

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Course	Title	Credits
MIME 261	Structure of Materials.[1]	3
MIME 467	Electronic Properties of Materials.	3
MIME 515	(Bio)material Surface Analysis and Modification.[1]	3
MIME 542	Transmission Electron Microscopy.	3
MIME 569	Electron Beam Analysis of Materials.	3
MIME 571	Surface Engineering.	3

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Pharmacology

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Course	Title	Credits
PHAR 504	Drug Discovery and Development 2.	3

Physics

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Course	Title	Credits
BIOL 319	Introduction to Biophysics.[1]	3
PHYS 319	Introduction to Biophysics.[1]	3
PHYS 346	Majors Quantum Physics.	3
PHYS 558	Solid State Physics.	3

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