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This publication provides guidance to prospects, applicants, students, faculty and staff.

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## ***Publication Information***

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# 1 About the Faculty of Engineering

The Faculty currently includes six engineering departments and two schools, and houses three institutes:

## Departments

Bioengineering  
Chemical Engineering  
Civil Engineering  
Electrical and Computer Engineering  
Mechanical Engineering  
Mining and Materials Engineering

## Schools

The Peter Guo-hua Fu School of Architecture  
Urban Planning

## Institutes

Trottier Institute for Sustainability in Engineering and Design (TISED) (Website: [mcgill.ca/tised](http://mcgill.ca/tised))  
McGill Institute for Advanced Materials (MIAM) (Website: [mcgill.ca/miam](http://mcgill.ca/miam)) (established by the Faculties of Engineering and Science)  
McGill Institute for Aerospace Engineering (MIAE) (Website: [mcgill.ca/miae](http://mcgill.ca/miae))

The Faculty serves approximately 3,300 undergraduate students and 1,300 graduate students in a wide variety of academic programs.

**Undergraduate programs** leading to professional bachelor's degrees are offered in all Engineering departments. These programs are designed to qualify graduates for immediate employment in a wide range of industries and for membership in the appropriate professional bodies. Additionally, a non-professional undergraduate degree is offered in the School of Architecture for those who plan to work in related fields not requiring professional qualification.

The curricula are structured to provide suitable preparation for those who plan to continue their education in postgraduate studies either at McGill or elsewhere. The professional degrees in Architecture and Urban Planning are offered at the master's level and are described at [Faculty of Engineering > Graduate](#).

The academic programs are divided into required and complementary sections. The required courses emphasize basic principles which permit graduates to keep abreast of progress in technology throughout their careers. Exposure to current technology is provided by the wide variety of complementary courses which allow students to pursue a particular interest in depth. For program details and requirements, refer to [section 12: Browse Academic Units & Programs](#).

The **Engineering Internship Program** provides engineering students with the opportunity to participate in four-, eight-, twelve-, or sixteen-month paid work experiences. Details can be found at [mcgill.ca/care.52.398.975.Tm306.635.Tm\(vo.1.24714.1.0.ee296.91.93.1.306.635.Tm\(vo/vides.engin-cular5.Tm-duate.pr\)Tj1.0](http://mcgill.ca/care.52.398.975.Tm306.635.Tm(vo.1.24714.1.0.ee296.91.93.1.306.635.Tm(vo/vides.engin-cular5.Tm-duate.pr)Tj1.0)

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### 3 Engineering Microcomputing Facility

In addition to the services provided by McGill's Information Technology Services, the Faculty maintains computing resources in support of teaching and some research activities specific to Engineering (CAD/CAM, testing and simulation, etc). This includes workstations and software for undergraduate use and support for labs, workshops and administration. The goal is to make these resources as accessible as possible and constantly evolve to meet the demands of the program.

Individual departments also offer additional services designed around specialized roles such as software engineering, control systems and process design. They also provide additional support for graduate students and research activities.

Further information is available at [mcgill.ca/emf](http://mcgill.ca/emf).

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### 4 Schulich Library of Physical Sciences, Life Sciences, and Engineering

Schulich Library of Physical Sciences, Life Sciences, and Engineering  
Macdonald-Stewart Library Building (*closed for renovations*)

*Temporary Location:*

McLennan-Redpath Library Complex  
3459 McTavish Street  
Montreal QC H3A 0C9

Contact the Library:

[mcgill.ca/library/contact/askus](http://mcgill.ca/library/contact/askus)

Website: [mcgill.ca/library](http://mcgill.ca/library)



**Note:** Please note that the Macdonald-Stewart Library Building, which normally houses the collection and services, is temporarily closed for renovations. During the renovation project, most of the collections and services are available via the [McLennan-Redpath Library Complex](#). Eleven subject-specialised liaison librarians continue to offer one-on-one research consultations, as well as a range of tours and workshops designed to help users effectively find, assess, and use information.

More information on the renovation project: [mcgill.ca/library/about/renovation-schulich-library](http://mcgill.ca/library/about/renovation-schulich-library)

Find your librarian: [mcgill.ca/library/contact/askus/liaison](http://mcgill.ca/library/contact/askus/liaison)

The Schulich Library of Physical Sciences, Life Sciences, and Engineering provides resources and services to support research and teaching programs in engineering, physical sciences, health sciences, medicine, and dentistry. The collection provides access to thousands of electronic resources (books, journal, and databases), accessible anytime, anywhere through EZproxy, using a McGill username and password. The library's physical collection, including course reserves, is available in the McLennan-Redpath Library Complex.

The Schulich Library is one of several McGill library branches. The following other branch libraries will also be of interest to students in the Faculty of Engineering:

- [Blackader-Lauterman Library of Architecture and Art](#)
- [Macdonald Campus Library](#)

Contact us by phone or email or visit the website to learn more about the Library's services, collections, and facilities. We look forward to seeing you in the Library.

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### 5 About Engineering (Undergraduate)

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#### 5.1 Location

##### Faculty of Engineering

Macdonald Engineering Building  
817 Sherbrooke Street West

Montreal QC H3A 0C3

Canada

Telephone: 514-398-7250

Faculty website: [mcgill.ca/engineering](http://mcgill.ca/engineering)

The **McGill Engineering Student Centre** (Student Affairs Office, Career Centre, Peer

**Director, The Peter Guo-hua Fu School of Architecture**

David Theodore

**Director, School of Urban Planning**

Richard Shearmur

**Director of Administration**

Chidinma Offoh-Robert

**Associate Director, McGill Engineering Student Centre**

Kaila Folinsbee

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## 6 Degrees and Requirements for Professional Registration

**Non-Professional**

Bachelor of Science (Architecture)

The first professional degree in architecture is the Master of Architecture (Professional). Further information can be found in [Faculty of Engineering > Graduate](#).

## 9 Student Activities

The campus offers a wide variety of extracurricular activities for students. All are encouraged to participate. Many of these are organized within the Faculty under the auspices of the Engineering Undergraduate Society (EUS). EUS publishes a handbook describing their operations and the activities of various Faculty clubs and societies; you can also find these on their website (see below). All undergraduate students automatically become members of the EUS. Each department and school also has a student association.

- For more information about **EUS and links to department/school student association websites**, visit the EUS website at [mcgilleus.ca](http://mcgilleus.ca).
- For more information on **extra-curricular activities and organizations**, see [mcgill.ca/engineering/students/undergraduate/student-life](http://mcgill.ca/engineering/students/undergraduate/student-life).
- For more information on **student design teams and projects**, see [mcgill.ca/engineering/students/undergraduate/student-life/design-teams-projects](http://mcgill.ca/engineering/students/undergraduate/student-life/design-teams-projects).

## 10 Degrees and Programs Offered

### Internship Program

Engineering Internship Program

### Co-op Programs

Materials Engineering (B.Eng.)

Mining Engineering (B.Eng.)

Software Engineering (B.Eng.)

### Major Programs

Architecture (B.Sc.(Arch.))

Bioengineering (B.Eng.)

Chemical Engineering (B.Eng.)

Civil Engineering (B.Eng.)

Computer Engineering (B.Eng.)

Electrical Engineering (B.Eng.)

Materials Engineering (B.Eng.)

Mechanical Engineering (B.Eng.)

Mining Engineering (B.Eng.)

### Honours Programs

Electrical Engineering (B.Eng.)

Mechanical Engineering (B.Eng.)

### Minors

Aerospace Engineering

Applied Artificial Intelligence

Arts

Biomedical Engineering

Biotechnology

Chemistry

Computer Science

Construction Engineering and Management

## Minors

Economics

Environment

Environmental Engineering

Management Minors: Minor in Finance, Minor in Management, Minor in Marketing, Minor in Operations Management

Materials Engineering

Mathematics

Mining Engineering

Musical Science and

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## 12 Browse Academic Units & Programs

The programs and courses in the following sections have been approved for the 2022–2023 session as listed.

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### 12.1 Architecture

#### 12.1.1 Location

Macdonald-Harrington Building, Room 201  
815 Sherbrooke Street West  
Montreal QC H3A 0C2  
Telephone: 514-398-6700  
Fax: 514-398-7372  
Website: [mcgill.ca/architecture](http://mcgill.ca/architecture)

#### 12.1.2 About the Peter Guo-hua Fu School of Architecture

Founded in 1896, the Peter Guo-hua Fu School of Architecture at McGill University offers professional programs, including B.Sc. (Arch.) and M.Arch. (Professional), and post-professional research programs, including M.Arch. (Post-professional) and Ph.D.

##### **Vision**

To advance professional architectural education that flourishes through research, critical practice, and community engagement.

##### **Mission**

The Peter Guo-hua Fu School of Architecture educates professionals who contribute to the global community through the design, construction, and interpretation of the built environment. The School:

- encourages a diverse environment for teaching, learning, and research, supported by both traditional and state-of-the-art digital resources;
- develops professional and post-professional research-based Masters and Ph.D. programs that enable graduates to contribute responsibly to the profession, to research, and to careers in related fields;
- enriches multidisciplinary teaching and research within the University and in connection with other local and international universities;
- engages citizens' groups, local, provincial, and national governments, the private sector, and the profession toward the improvement of the built environment.

#### 12.1.3 Architectural Certification in Canada

In Canada, all provincial/territorial associations/institutes/orders recommend a degree from an accredited professional degree program as a prerequisite for licensure. The Canadian

#### **12.1.4.1 Student Exchanges**

A limited number of qualified students may participate in an exchange with schools of architecture at other universities that have agreements with the McGill School of Architecture, for a maximum of one term in the second year of the B.Sc.(Arch.) program. These include the following:

- Università Iuav di Venezia (Venice, Italy);
- Fakultät für Raumplanung und Architektur, Technische Universität Wien (Vienna, Austria);
- Université Catholique de Louvain (Louvain, Brussels, and Tournai, Belgium);
- Scuola di Architettura Civile Politecnico di Milano (Leonardo) (Milan, Italy);
- College of Architecture and Urban Planning, Tongji University (Shanghai, China);
- École Nationale Supérieure d'Architecture Paris-Belleville (Paris, France).
- École Nationale Supérieure d'Architecture Grenoble (Grenoble, France).

#### **5n Gupé Ancillary Academic Facilities**



**Adjunct Professor**

Conor Sampson

**Course Lecturers**

Vedanta Balbahadur, Evelyne Bouchard, Morgan Carter, Nancy Dunton, Tom Egli, Aniel Guxholli, Charles Gregoire, Olga Karpova, Shane Laptiste, Daniela Leon, Julia Manacas, Sybil McKenna, Ipek Mehmeto lu, Samiha Meem, Marc-André Plourde, Cailen Pybus, Sophie Robitaille, Rebecca Taylor, Jennifer Thorogood.

**12.1.7 Bachelor of Science (B.Sc.) (Architecture) - Architecture (126 credits)**

Program credit weight: 126 credits

Program credit weight for CEGEP students: 100 credits

The B.Sc.(Arch.) program provides conceptual, technical, and procedural foundations for the professional M.Arch. program, which is accredited by the Canadian Architectural Certification Board and recognized as accredited by the National Council of Architectural Registration Boards in the US. Students entering the B.Sc.(Arch.) program complete first-year courses in general studies (including sciences, humanities, and social sciences), for which individuals entering with the Québec Diploma of Collegial Studies in Arts and Science or Pure and Applied Science (or equivalent) are generally granted transfer credits. All students then complete six terms of immersion in architecture, centered in studio courses exploring principles of design, norms of representation, cultures of construction, and the human experience of architecture. Studio-based learning is complemented by lecture courses on foundational knowledge. Complementary courses provide further opportunities to learn about how culture intersects with technology in the work of architecture, and students select electives to customize their learning experience.

**Required Year 0 (Freshman) Courses**

26 credits

Generally, students admitted to the Architecture program from Quebec CEGEPs are granted transfer credit for the Year 0 (Freshman) courses and enter a 100-credit (six-term) program.

Course choices must be made through consultation with the Student Adviser for the Professional Programs.

All Year 0 students must successfully complete 10 credits from the following:

MATH 133	(3)	Linear Algebra and Geometry
MATH 140	(3)	Calculus I
PHYS 131	(4)	Mechanics and Waves

All Year 0 students must also successfully complete 16 credits as follows:

3 credits from among any 100- or 200-level courses with the subject codes of ATOC (Atmospheric and Oceanic Sciences), COMP (Computer Science), ENVR (Environment), and EPSC (Earth and Planetary Sciences).

13 credits from among any 100- or 200-level courses with the subject codes of AFRI (African Studies), ANTH (Anthropology), ARTH (Art History), CANS (Canadian Studies), CATH (Catholic Studies), CLAS (Classics), COMS (Communication Studies), EAST (East Asian Studies), ECON (Economics), ENGL (English), FREN (French), GEOG (Geography), GSFS (Gender, Sexuality, Feminist, and Social Justice), GERM (German), HISP (Hispanic Studies), HIST (History), INDG (Indigenous Studies), ISLA (Islamic Studies), ITAL (Italian), JWST (Jewish Studies), LING (Linguistics), LLCU (Languages, Literatures, and Cultures), MUAR (Music - Arts Faculty), PHIL (Philosophy), POLI (Political Science), PSYC (Psychology), RELG (Religious Studies), RUSS (Russian), SOCI (Sociology).

**Required Courses (88 credits)**

Non-Departmental

FACC 220	(3)	Law for Architects and Engineers
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Architectural Courses

Note: ARCH 250 and ARCH 378 should be taken in the first year of studies.

ARCH 201	(6)	Communication, Behaviour and Architecture
ARCH 202	(6)	Architectural Graphics and Elements of Design
ARCH 221	(2)	Architectural Drawing
ARCH 240	(3)	Organization of Materials in Buildings
ARCH 241	(3)	Architectural Structures 1

ARCH 250	(3)	Architectural History 1
ARCH 251	(3)	Architectural History 2
ARCH 303	(6)	Design and Construction 1
ARCH 304	(6)	Design and Construction 2
ARCH 325	(2)	Architectural Sketching Digital Representation

ARCH 564	(3)	Design for Development
ARCH 566	(3)	Cultural Landscapes Seminar

**Elective Courses (6 credits)**

6 credits of elective courses outside the School of Architecture must be completed, subject to approval

Students will acquire fundamental knowledge in bioengineering-related natural sciences and mathematics, as well as in the foundations of general engineering and bioengineering. Students will also acquire knowledge in one area of specialization of bioengineering: 1) biological materials and biomechanics; 2) biomolecular and cellular engineering; or 3) biological information and computation

### Required Year 0 (Freshman) Courses

29 credits

Generally, students admitted to Engineering from Quebec CEGEPs are granted transfer credits for Year 0 (Freshman) courses, except BIOL 112, and enter a 122-123-credit program. Students from Quebec CEGEPs who have successfully completed a course at CEGEP that is equivalent to BIOL 112 may obtain transfer credits for this course by passing the McGill Science Placement Exam for BIOL 112. For information on transfer credit for French Baccalaureate, International Baccalaureate exams, Advanced Placement exams, Advanced Levels and Science Placement Exams, see [www.mcgill.ca/engineering/student/sao/newstudents](http://www.mcgill.ca/engineering/student/sao/newstudents) and select your term of admission.

BIOL 112	(3)	Cell and Molecular Biology
CHEM 110	(4)	General Chemistry 1
CHEM 120	(4)	General Chemistry 2
MATH 133	(3)	Linear Algebra and Geometry
MATH 140	(3)	Calculus 1
MATH 141	(4)	Calculus 2
PHYS 131	(4)	Mechanics and Waves
PHYS 142	(4)	Electromagnetism and Optics

Note: FACC 100 (Introduction to the Engineering Profession) must be taken during the first year of study.

### Required Non-Departmental Courses

32 credits

CHEM 212**	(4)	Introductory Organic Chemistry 1
COMP 208	(3)	Computer Programming for Physical Sciences and Engineering
FACC 100*	(1)	Introduction to the Engineering Profession
FACC 250	(0)	Responsibilities of the Professional Engineer
FACC 300	(3)	Engineering Economy
FACC 400	(1)	Engineering Professional Practice
MATH 203	(3)	Principles of Statistics 1
MATH 262	(3)	Intermediate Calculus
MATH 263	(3)	Ordinary Differential Equations for Engineers
MATH 264	(3)	Advanced Calculus for Engineers
MECH 210	(2)	Mechanics 1
PHYS 319	(3)	Introduction to Biophysics
WCOM 206	(3)	Communication in Engineering

\* Note FACC 100 (Introduction to the Engineering Profession) must be taken during the first year of study.

\*\* Students from a CEGEP background who have completed a CEGEP course equivalent to CHEM 212 may obtain transfer credits for this course by passing the McGill Placement Exam before the start of their first term. For information on Science Placement Exams, see [www.mcgill.ca/exams/dates/science](http://www.mcgill.ca/exams/dates/science). CEGEP students who do not successfully complete the CHEM 212 Placement Exam must take CHEM 212 at McGill, as outlined in the program requirements.

### Required Bioengineering Courses

48 credits

BIEN 200	(2)	Introduction to Bioengineering
BIEN 210	(3)	Electrical and Optical Properties of Biological Systems
BIEN 219	(4)	Introduction to Physical Molecular and Cell Biology
BIEN 267	(3)	Bioanalytical Methods in Bioengineering.



BIEN 580	(3)	Synthetic Biology
BIEN 585	(3)	Metabolic Engineering
BMDE 503	(3)	Biomedical Instrumentation
BMDE 504	(3)	Biomaterials and Bioperformance
BMDE 505	(3)	Cell and Tissue Engineering
BMDE 512	(3)	Finite-Element Modelling in Biomedical Engineering
CHEE 563*	(3)	Biofluids and Cardiovascular Mechanics
CIVE 281	(3)	Analytical Mechanics
MECH 321	(3)	Mechanics of Deformable Solids
MECH 547	(3)	Mechanics of Biological Materials
MECH 561	(3)	Biomechanics of Musculoskeletal Systems
MECH 563*	(3)	Biofluids and Cardiovascular Mechanics
MECH 572	(3)	Mechanics and Control of Robotic Manipulators
MIME 470	(3)	Engineering Biomaterials
MIME 473	(3)	Introduction to Computational Materials Design
SEAD 515	(3)	Climate Change Adaptation and Engineering Infrastructure
SEAD 520	(3)	Life Cycle-Based Environmental Footprinting
SEAD 530	(3)	Economics for Sustainability in Engineering and Design
SEAD 540	(3)	Industrial Ecology and Systems
SEAD 550	(3)	Decision-Making for Sustainability in Engineering and Design

\*Note: Students may choose only one of CHEE 563 and MECH 563 Biofluids and Cardiovascular Mechanics

NOTE: Maximum 6 credits of SEAD courses are allowed.

### **Stream 2: Biomolecular and Cellular Engineering (24-25 credits)**

12 credits from List A

12-13 credits from List B

#### List A

BIEN 310	(3)	Introduction to Biomolecular Engineering
BIEN 320	(3)	Molecular, Cellular and Tissue Biomechanics
BIEN 550	(3)	Biomolecular Devices
BIEN 590	(3)	Cell Culture Engineering

#### List B

BIEN 330	(3)	Tissue Engineering and Regenerative Medicine
BIEN 410	(3)	Computational Methods in Biomolecular Engineering
BIEN 414	(3)	Fundamentals and Rheology of Biological Fluids
BIEN 462	(3)	Engineering Principles in Physiological Systems
BIEN 500	(3)	Special Topics in Bioengineering 1
BIEN 510	(3)	Engineered Nanomaterials for Biomedical Applications
BIEN 515	(3)	Special Topics in Bioengineering 2
BIEN 525	(3)	Special Topics in Bioengineering 3
BIEN 530	(3)	Imaging and Bioanalytical Instrumentation

BIEN 535	(3)	Electron Microscopy and 3D Imaging for Biological Materials
BIEN 540	(3)	Information Storage and Processing in Biological Systems
BIEN 545	(3)	Diagnostic Devices at the Point-of-Care
BIEN 570	(3)	Active Mechanics in Biology
BIEN 580	(3)	Synthetic Biology
BIEN 585	(3)	Metabolic Engineering
BMDE 503	(3)	Biomedical Instrumentation
BMDE 508	(3)	Introduction to Micro and Nano-Bioengineering
CIVE 281	(3)	Analytical Mechanics
CIVE 557	(3)	Microbiology for Environmental Engineering
PHYS 534	(3)	Nanoscience and Nanotechnology
SEAD 510	(4)	Energy Analysis
SEAD 515	(3)	Climate Change Adaptation and Engineering Infrastructure
SEAD 520	(3)	Life Cycle-Based Environmental Footprinting
SEAD 530	(3)	Economics for Sustainability in Engineering and Design
SEAD 540	(3)	Industrial Ecology and Systems
SEAD 550	(3)	Decision-Making for Sustainability in Engineering and Design

NOTE: Maximum 6 credits of SEAD courses are allowed.

### Stream 3: Biological Information and Computation (24-25 credits)

12 credits from List A

12-13 credits from List B

#### List A

BIEN 310	(3)	Introduction to Biomolecular Engineering
BIEN 410	(3)	Computational Methods in Biomolecular Engineering
BIEN 530	(3)	Imaging and Bioanalytical Instrumentation
BIEN 540	(3)	Information Storage and Processing in Biological Systems

#### List B

BIEN 414	(3)	Fundamentals and Rheology of Biological Fluids
BIEN 462	(3)	Engineering Principles in Physiological Systems
BIEN 515	(3)	Special Topics in Bioengineering 2
BIEN 525	(3)	Special Topics in Bioengineering 3
BIEN 535	(3)	Electron Microscopy and 3D Imaging for Biological Materials
BIEN 545	(3)	Diagnostic Devices at the Point-of-Care
BIEN 580	(3)	Synthetic Biology
BIEN 585	(3)	Metabolic Engineering
BMDE 502	(3)	BME Modelling and Identification
BMDE 503	(3)	Biomedical Instrumentation
BMDE 512	(3)	Finite-Element Modelling in Biomedical Engineering
BMDE 519	(3)	Biomedical Signals and Systems
CIVE 281	(3)	Analytical Mechanics

COMP 250	(3)	Introduction to Computer Science
COMP 251	(3)	Algorithms and Data Structures
COMP 462	(3)	Computational Biology Methods
COMP 551	(4)	Applied Machine Learning



History (HIST)

Philosophy (excluding PHIL 210 and PHIL 310)

Political Science (POLI)

Psychology (excluding PSYC 204 and PSYC 305, but including PSYC 100)

Religious Studies (RELG) (excluding courses that principally impart language skills, such as Sanskrit, Tibetan, Tamil, New Testament Greek, and Biblical Hebrew)\*\*\*

School of Social Work (SWRK)

Sociology (excluding SOCI 350)

OR from the following courses:

ARCH 528	(3)	History of Housing
BUSA 465*	(3)	Technological Entrepreneurship
CLAS 203	(3)	Greek Mythology
ENVR 203	(3)	Knowledge, Ethics and Environment
ENVR 400	(3)	Environmental Thought
FACC 220	(3)	Law for Architects and Engineers
FACC 500	(3)	Technology Business Plan Design
FACC 501	(3)	Technology Business Plan Project
HISP 225	(3)	Hispanic Civilization 1
HISP 226	(3)	Hispanic Civilization 2
INDR 294*	(3)	Introduction to Labour-Management Relations
INTG 201**	(3)	Integrated Management Essentials 1
INTG 202**	(3)	Integrated Management Essentials 2
MATH 338	(3)	History and Philosophy of Mathematics
MGCR 222*	(3)	Introduction to Organizational Behaviour
MGCR 352*	(3)	Principles of Marketing
ORGB 321*	(3)	Leadership
ORGB 423*	(3)	Human Resources Management

\* Note: Management courses have limited enrolment and registration dates. See Important Dates: [www.mcgill.ca/importantdates](http://www.mcgill.ca/importantdates).

\*\* INTG 201 and INTG 202 are not open to students who have taken certain Management courses. Please see the INTG 201 and INTG 202 course information for a list of these courses.

\*\*\* If you are uncertain whether or not a course principally imparts language skills, please see an adviser in the McGill Engineering Student Centre (Frank Dawson Adams Building, Room 22) or email an adviser.

Note regarding language courses: Language courses are not accepted to satisfy the Complementary Studies Group B requirement, effective for students who entered the program as of Fall 2017.

### Elective Courses

0-9 credits

Students from Quebec CEGEPs must take 9 credits of elective courses. These can be chosen from any course at the 200-level or higher offered by the University, subject to permission of the offering department.

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## 12.3 Chemical Engineering

### 12.3.1 Location

M.H. Wong Building, Room 3060  
3610 University Street

Montreal QC H3A 0C5  
Telephone: 514-398-4494  
Fax: 514-398-6678  
Email: [ugrad.chemeng@mcgill.ca](mailto:ugrad.chemeng@mcgill.ca)  
Website: [mcgill.ca/chemeng](http://mcgill.ca/chemeng)

### 12.3.2 About the Department of Chemical Engineering

The central purpose of engineering is to pursue solutions to technological problems in order to satisfy the needs and desires of society. Chemical engineers are trained to solve the kinds of problems that are typically found in the “**chemical process industries**”, which include:

- chemical manufacturing;
- plastics;
- water treatment;
- pulp and paper;
- petroleum refining;
- ceramics; and
- paint industries;

as well as substantial portions of the:

- food processing;
- textile;
- nuclear energy;
- alternative energy;
- biochemical;
- biomedical; and
- pharmaceutical industries.

The technological problems and opportunities in these industries are often closely linked to social, economic, and environmental concerns. For this reason, chemical engineers often deal with these questions while working in management, pollution abatement, product development, marketing, and equipment design.

### 12.3.5 Chemical Engineering Faculty

#### Chair

Viviane Yargeau

#### Emeritus Professors

David G. Cooper; John M. Dealy; Richard J. Munz; W.J. Murray Douglas; Juan H. Vera.

#### Professor (Post-Retirement)

Jean-Luc Meunier

#### Associate Professor (Post-Retirement)

Dimitrios Berk

#### Professors

Sylvain Coulombe; Richard L. Leask; Milan Maric; Sasha Omanovic; Alejandro D. Rey; Phillip Servio; Nathalie Tufenkji; Viviane Yargeau.

#### Associate Professors

Corinne Hoesli; Jan Kopyscinski; P.-Luc Girard-Lauriault; Reghan James Hill; Anne-Marie Kietzig; Christopher Moraes.

#### Assistant Professors

Noémie Dorval Courchesne; Samuel Huberman; Ali Seifitokaldani.

### 12.3.6 Bachelor of Engineering (B.Eng.) - Chemical Engineering (143 credits)

Program credit weight: 143 credits

Program credit weight for Quebec CEGEP students: 114 credits

Program credit weight for out-of-province students: 143 credits

The discipline of chemical engineering is distinctive in being based equally on physics, mathematics, and chemistry. Application of these three fundamental sciences is basic to a quantitative understanding of the process industries. Those with an interest in the fourth fundamental science, biology, will find several courses in the chemical engineering curriculum that integrate aspects of the biological sciences relevant to process industries such as food processing, fermentation, biomedical, and water pollution control. Courses on the technical operations and economics of the process industries are added to this foundation. The core curriculum concludes with process design courses taught by practising design engineers. Problem-solving, experimenting, planning, and communication skills are emphasized in courses throughout the core curriculum.

Certain students who take advantage of Summer session courses can complete the departmental program in three calendar years.

In some cases, students from university science disciplines have sufficient credits to complete the requirements for the B.Eng. (Chemical) program in two and a half years. Those concerned should discuss this with their adviser.

Students must obtain a grade of C or better in all core courses. For the Department of Chemical Engineering, core courses include all required courses (departmental and non-departmental) as well as technical complementary courses.

#### Note to CEGEP students

If you have successfully completed a course at CEGEP that is equivalent to CHEM 212 or CHEM 234, you may obtain transfer credits for either or both courses by passing the McGill Science Placement Exam for the course(s). You must complete an application form available on the Science Placement Exam website and an application fee will be charged to your student account. Science placement exams take place in August and September before classes begin. If you pass the exam(s), transfer credits for the course(s) will be reflected on your transcript and your program credit requirements will be decreased to reflect these transfer credits. For information on Science Placement Exams, including application deadlines, the application form, application fee, dates, times, and location of the exams, see [www.mcgill.ca/exams/dates/science](http://www.mcgill.ca/exams/dates/science). If you do not pass the placement exams, you must register for CHEM 212 and CHEM 234 during your studies at McGill as outlined in your program requirements.

#### Required Year 0 (Freshman) Courses

29 credits

Generally, students admitted to Engineering from Quebec CEGEPs are granted transfer credit for these Year 0 (Freshman) courses and enter a 114-credit program.

For information on transfer credit for French Baccalaureate, International Baccalaureate exams, Advanced Placement exams, Advanced Levels and Science Placement Exams, see <http://www.mcgill.ca/engineering/current-students/undergraduate/new-students> and select your term of admission.

CHEM 110	(4)	General Chemistry 1
CHEM 120	(4)	General Chemistry 2
MATH 133	(3)	Linear Algebra and Geometry
MATH 140	(3)	Calculus 1
MATH 141	(4)	Calculus 2
PHYS 131	(4)	Mechanics and Waves
PHYS 142	(4)	Electromagnetism and Optics

AND 3 credits selected from the approved list of courses in Humanities and Social Sciences, Management Studies and Law, listed below under Complementary Studies (Group B).

Note: FACC 100 (Introduction to the Engineering Profession) must be taken during the first year of study.

### Required Non-Departmental Courses

24 credits

CHEM 212	(4)	Introductory Organic Chemistry 1
CHEM 234	(3)	Topics in Organic Chemistry
COMP 208	(3)	Computer Programming for Physical Sciences and Engineering
FACC 100*	(1)	Introduction to the Engineering Profession
FACC 250	(0)	Responsibilities of the Professional Engineer
FACC 300	(3)	Engineering Economy
FACC 400	(1)	Engineering Professional Practice
MATH 262	(3)	Intermediate Calculus
MATH 263	(3)	Ordinary Differential Equations for Engineers
MATH 264	(3)	Advanced Calculus for Engineers

\* Note: FACC 100 (Introduction to the Engineering Profession) must be taken during the first year of study.

### Required Chemical Engineering Courses

75 credits

CHEE 200	(3)	Chemical Engineering Principles 1
CHEE 204	(3)	Chemical Engineering Principles 2
CHEE 220	(3)	Chemical Engineering Thermodynamics
CHEE 231	(3)	Data Analysis and Design of Experiments
CHEE 291	(4)	Instrumentation and Measurement 1
CHEE 310	(3)	Physical Chemistry for Engineers
CHEE 314	(3)	Fluid Mechanics
CHEE 315	(3)	Heat and Mass Transfer
CHEE 351	(3)	Separation Processes
CHEE 370	(3)	Elements of Biotechnology
CHEE 380	(3)	Materials Science
CHEE 390	(3)	Computational Methods in Chemical Engineering
CHEE 400	(3)	Principles of Energy Conversion
CHEE 401	(3)	Energy Systems Engineering
CHEE 423	(3)	Chemical Reaction Engineering
CHEE 440	(3)	Process Modelling

CHEE 453	(4)	Process Design
CHEE 455	(3)	Process Control
CHEE 456D1	(4.5)	Design Project
CHEE 456D2	(4.5)	Design Project
CHEE 474	(3)	Biochemical Engineering
CHEE 484	(3)	Materials Engineering
CHEE 491	(4)	Instrumentation and Measurement 2

### Technical Complementaries

9 credits

The purpose of this requirement is to provide students with an area of specialization within the broad field of chemical engineering. Alternatively, students use the technical complementaries to increase the breadth of their chemical engineering training.

List A

3-9 credits from the following:

CHEE 301	(3)	Resource Recovery and Circular Use
CHEE 511	(3)	Catalysis for Sustainable Fuels and Chemicals
CHEE 512	(3)	Stem Cell Bioprocess Engineering
CHEE 515	(3)	Interface Design: Biomimetic Approach
CHEE 521+	(3)	Nanomaterials and the Aquatic Environment
CHEE 541	(3)	Electrochemical Engineering
CHEE 543	(3)	Plasma Engineering
CHEE 563+	(3)	Biofluids and Cardiovascular Mechanics
CHEE 582	(3)	Polymer Science and Engineering
CHEE 584	(3)	Polymer Processing
CHEE 585	(3)	Foundations of Soft Matter
CHEE 587	(3)	Chemical Processing: Electronics Industry
CHEE 591	(3)	Environmental Bioremediation
CHEE 593+	(3)	Industrial Water Pollution Control
CIVE 430+	(3)	Water Treatment and Pollution Control
CIVE 521+	(3)	Nanomaterials and the Aquatic Environment
MECH 534+	(3)	Air Pollution Engineering
MECH 563+	(3)	Biofluids and Cardiovascular Mechanics

+ Students may choose only one course in each of the following sets:

- CHEE 521 or CIVE 521
- CHEE 563 or MECH 563
- CHEE 593 or CIVE 430

List B

0-6 credits from the following:

BIEN 550	(3)	Biomolecular Devices
BIOT 505*	(3)	Selected Topics in Biotechnology
BREE 325	(3)	Food Process Engineering
BREE 522	(3)	Bio-Based Polymers

CHEE 363**	(2)	Projects Chemical Engineering 1
CHEE 494**	(3)	Research Project and Seminar 1
CHEE 495**	(4)	Research Project and Seminar 2
CHEE 496**	(3)	Environmental Research Project
CIVE 557	(3)	Microbiology for Environmental Engineering
MIME 470	(3)	Engineering Biomaterials
MIME 515	(3)	(Bio)material Surface Analysis and Modification
MIME 558	(3)	Engineering Nanomaterials

\* BIOT 505 can only be chosen by students taking the Minor in Biotechnology.

Psychology (excluding PSYC 204 and PSYC 305, but including PSYC 100)

Religious Studies (RELG) (excluding courses that principally impart language skills, such as Sanskrit, Tibetan, Tamil, New Testament Greek, and Biblical Hebrew) \*\*\*

School of Social Work (SWRK)

Sociology (excluding SOCI 350)

OR 3 credits from the following:

ARCH 528	(3)	History of Housing
BUSA 465*	(3)	Technological Entrepreneurship
CLAS 203	(3)	Greek Mythology
ENVR 203	(3)	Knowledge, Ethics and Environment
ENVR 400	(3)	Environmental Thought
FACC 220	(3)	Law for Architects and Engineers
FACC 500	(3)	Technology Business Plan Design
FACC 501	(3)	Technology Business Plan Project
HISP 225	(3)	Hispanic Civilization 1
HISP 226	(3)	Hispanic Civilization 2
INDR 294*	(3)	Introduction to Labour-Management Relations
INTG 201**	(3)	Integrated Management Essentials 1
INTG 202**	(3)	Integrated Management Essentials 2
MATH 338	(3)	History and Philosophy of Mathematics
MGCR 222*3)	(3)	Introduction to Organizational Behaviour



**Note:** Many of the technical complementaries are offered only in alternate years. Students should, therefore, plan their complementaries as far ahead as possible. With the approval of the instructor and Academic Adviser, students may take graduate (600-level) CHEE courses as technical complementaries.

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## 12.4 Civil Engineering

### 12.4.1 Location

Macdonald Engineering Building, Room 492  
817 Sherbrooke Street West  
Montreal QC H3A 0C3  
Telephone: 514-398-6860  
Fax: 514-398-7361  
Email: [ugradinfo.civil@mcgill.ca](mailto:ugradinfo.civil@mcgill.ca)  
Website: [mcgill.ca/civil](http://mcgill.ca/civil)

### 12.4.2 About the Department of Civil Engineering

Civil engineers have traditionally applied scientific and engineering knowledge to the task of providing the built environment, from its conception and planning to its design, construction, maintenance, rehabilitation, and sustainability. Examples include buildings; bridges; roads; railways; dams; facilities for water supply and treatment; waste disposal; and transportation system.

With the aging and deterioration of an already vast infrastructure, maintenance and rehabilitation have become increasingly important roles of the civil engineering professional. Also, in the midst of worldwide concern about the detrimental impact of human activities on the environment, civil engineers are now in the forefront of developing and providing the means for both prevention and remediation of environmental pollution.

Students who wish to extend their knowledge in certain areas beyond the range that the program's complementary courses allow can also take a **minor**. Minors are available in fields such as:

- Arts;
- Economics;
- Management;
- Environmental Engineering;
- Construction Engineering and Management;
- and others.

These require additional credits to be taken from a specified list of topics relating to the chosen field. Further information on the various minors may be found in [section 12.10: Minor Programs](#). Details on how minors can be accommodated within the Civil Engineering program will be made available during preregistration counselling.

### 12.4.3 Academic Programs

Considerable freedom exists for students to influence the nature of the program of study which they follow in the Department of Civil Engineering. A variety of advanced **complementary courses** is offered in five main groupings:

- Environmental Engineering;
- Geotechnical and Geoenvironmental Engineering;
- Water Resources and Hydraulic Engineering;
- Structural Engineering;
- Transportation Engineering.

Guidance on the sequence in which required core courses should be taken is provided for students in the form of a sample program which covers the entire period of study. The technical complementary courses selected, usually in the last two terms of the program, will depend upon the student's interests. All students must [meet with their adviser](#) each term to confirm the courses for which they are registered.

Courses taken in Term 3 or later will depend on a student's interests and ability. Information and advice concerning different possibilities are made available in the Department prior to registration. All programs require the approval of a staff adviser. Programs for students transferring into the Department with Advanced Standing will be dependent upon the academic credit previously achieved, and such a program will be established only after consultation with a staff adviser.



#### 12.4.4 Civil Engineering Faculty

### Required Non-Departmental Courses

28 credits

COMP 208	(3)	Computer Programming for Physical Sciences and Engineering
EPSC 221	(3)	General Geology
FACC 100*	(1)	Introduction to the Engineering Profession
FACC 250	(0)	Responsibilities of the Professional Engineer
FACC 300	(3)	Engineering Economy
FACC 400	(1)	Engineering Professional Practice
MATH 262	(3)	Intermediate Calculus
MATH 263	(3)	Ordinary Differential Equations for Engineers
MATH 264	(3)	Advanced Calculus for Engineers
MECH 261	(2)	Measurement Laboratory
MECH 289	(3)	Design Graphics
WCOM 206	(3)	Communication in Engineering

\* Note: FACC 100 (Introduction to the Engineering Profession) must be taken during the first year of study.

### Required Civil Engineering Courses

61 credits

CIVE 202	(4)	Construction Materials
CIVE 205	(3)	Statics
CIVE 206	(3)	Dynamics
CIVE 207	(4)	Solid Mechanics
CIVE 208	(3)	Civil Engineering System Analysis
CIVE 210	(2)	Surveying
CIVE 225	(4)	Environmental Engineering
CIVE 290	(3)	Thermodynamics and Heat Transfer
CIVE 302	(3)	Probabilistic Systems
CIVE 311	(4)	Geotechnical Mechanics
CIVE 317	(3)	Structural Engineering 1
CIVE 318	(3)	Structural Engineering 2
CIVE 319	(3)	Transportation Engineering
CIVE 320	(4)	Numerical Methods
CIVE 323	(3)	Hydrology and Water Resources
CIVE 324	(3)	Sustainable Project Management
CIVE 327	(4)	Fluid Mechanics and Hydraulics
CIVE 418	(4)	Design Project
CIVE 432	(1)	Technical Paper

### Complementary Courses

21 credits

#### List A - Design Technical Complementaries

6-15 credits from the following:

CIVE 416	(3)	Geotechnical Engineering
CIVE 421	(3)	Municipal Systems
CIVE 428	(3)	Water Resources and Hydraulic Engineering
CIVE 430	(3)	Water Treatment and Pollution Control
CIVE 440	(3)	Traffic Engineering and Simulation
CIVE 462	(3)	Design of Steel Structures
CIVE 463	(3)	Design of Concrete Structures

### List B - General Technical Complementaries

0-9 credits from the following, or from other suitable undergraduate or 500-level courses:

CHEE 521*	(3)	Nanomaterials and the Aquatic Environment
CIVE 446	(3)	Construction Engineering
CIVE 451	(3)	Geoenvironmental Engineering
CIVE 460	(3)	Matrix Structural Analysis
CIVE 470	(3)	Undergraduate Research Project
CIVE 512	(3)	Advanced Civil Engineering Materials
CIVE 514	(3)	Structural Mechanics
CIVE 520	(3)	Groundwater Hydrology
CIVE 521*	(3)	Nanomaterials and the Aquatic Environment
CIVE 527	(3)	Renovation and Preservation: Infrastructure
CIVE 540	(3)	Urban Transportation Planning
CIVE 542	(3)	Transportation Network Analysis
CIVE 546	(3)	Selected Topics in Civil Engineering 1
CIVE 550	(3)	Water Resources Management
CIVE 551	(3)	Environmental Transport Processes
CIVE 555	(3)	Environmental Data Analysis
CIVE 557	(3)	Microbiology for Environmental Engineering
CIVE 558	(3)	Biomolecular Techniques for Environmental Engineering
CIVE 560	(3)	Transportation Safety and Design
CIVE 561	(3)	Greenhouse Gas Emissions
CIVE 572	(3)	Computational Hydraulics
CIVE 573	(3)	Hydraulic Structures
CIVE 574	(3)	Fluid Mechanics of Water Pollution
CIVE 577	(3)	River Engineering
CIVE 584	(3)	Mechanics of Groundwater Flow
URBP 551	(3)	Urban Design and Planning

\* Students may choose only one of CHEE 521 or CIVE 521.

### Complementary Studies

6 credits

### Group A - Impact of Technology on Society

3 credits from the following:

ANTH 212	(3)	Anthropology of Development
BTEC 502	(3)	Biotechnology Ethics and Society
ECON 225	(3)	Economics of the Environment
ECON 347	(3)	Economics of Climate Change
ENVR 201	(3)	Society, Environment and Sustainability
GEOG 200	(3)	Geographical Perspectives: World Environmental Problems
GEOG 203	(3)	Environmental Systems
GEOG 205	(3)	Global Change: Past, Present and Future
GEOG 302	(3)	Environmental Management 1
MGPO 440*	(3)	Strategies for Sustainability
PHIL 343	(3)	Biomedical Ethics
RELG 270	(3)	Religious Ethics and the Environment
SOCI 235	(3)	Technology and Society
SOCI 312	(3)	Sociology of Work and Industry
URBP 201	(3)	Planning the 21st Century City

\* Note: Management courses have limited enrolment and registration dates. See Important Dates at <http://www.mcgill.ca/importantdates>.

### **Group B - Humanities and Social Sciences, Management Studies, and Law**

3 credits at the 200 level or higher from the following departments:

Anthropology (ANTH)

Economics (any 200- or 300-level course excluding ECON 227 and ECON 337)

History (HIST)

Philosophy (excluding PHIL 210 and PHIL 310)

Political Science (POLI)

Psychology (excluding PSYC 204 and PSYC 305, but including PSYC 100)

Religious Studies (RELG) (excluding courses that principally impart language skills, such as Sanskrit, Tibetan, Tamil, New Testament Greek, and Biblical Hebrew) \*\*\*

School of Social Work (SWRK)

Sociology (exclg de:1 0 0 1 221.949 5052906 Tm(History (HtheH St de1 0 0 1 165.864 5052906 Tm(His))Tj1 0 0 1 70.52 5052906 Tm(HisARCH1.281 0 0 1 221.949

MGCR 222*	(3)	Introduction to Organizational Behaviour
MGCR 352*	(3)	Principles of Marketing
ORGB 321*	(3)	Leadership
ORGB 423*	(3)	Human Resources Management

\* Note: Management courses have limited enrolment and registration dates. See Important Dates at <http://www.mcgill.ca/importantdates>.

\*\* Note: INTG 201 and INTG 202 are not open to students who have taken certain Management courses. Please see the INTG 201 and INTG 202 course information for a list of these courses.

\*\*\* If you are uncertain whether or not a course principally imparts language skills, please see an adviser in the McGill Engineering Student Centre (Frank Dawson Adams Building, Room 22) or email an adviser.

Note regarding language courses: Language courses are not accepted to satisfy the Complementary Studies Group B requirement, effective for students who entered the program as of Fall 2017.

## 12.5 Electrical and Computer Engineering

### 12.5.1 Location

Department of Electrical and Computer Engineering  
 Undergraduate Programs Office  
 Lorne Trotter Building, Room 2060  
 3630 University Street  
 Montreal QC H3A 0C6  
 Telephone: 514-398-3943  
 Email: [undergrad.ece@mcgill.ca](mailto:undergrad.ece@mcgill.ca)  
 Website: [mcgill.ca/ece](http://mcgill.ca/ece)

### 12.5.2 About the Department of Electrical and Computer Engineering

The Department of Electrical and Computer Engineering offers undergraduate degree programs in:

- Electrical Engineering
- Electrical Engineering (Honours)
- Computer Engineering
- Software Engineering Co-op

All programs provide students with a strong background in mathematics, natural sciences, engineering science, engineering design, and complementary studies, in conformity with the requirements of the [Canadian Engineering Accreditation Board](#) (CEAB).

In addition to technical complementary courses, students in all three programs take general complementary courses in humanities and social sciences and/or management studies and law. These courses allow students to develop specific interests in areas such as psychology, economics, management, or political science.

### 12.5.3 Electrical and Computer Engineering Faculty

Chair1 0 0 1(under)Tj1 0 0 1nHfA0 1 91.256 592strong3 1569.48 204.23 1B7tudies Group B reE.4e0 1 22s1 0Ases an0 11(under)T92 285.262irj4E.4e0 1 22s1 0

#### **Associate Chair, Operations**

Dennis Giannacopoulos

#### **Emeritus Professors**

Pierre R. Bélanger; Maier L. Blostein; Peter Kabal; Martin D. Levine; Boon-Teck Ooi; Tomas J.F. Pavlasek; Nicholas C. Rumin; Jonathan P. Webb.

#### **Professors**

Tal Arbel; Benoit Boulet; Peter E. Caines; Benoit Champagne; Lawrence Chen; James Clark; Mark Coates; Jeremy R. Cooperstock; Frank Ferrie; Warren Gross; Geza Joos; Andrew G. Kirk; Fabrice Labeau; Harry Leib; Tho Le-Ngoc; David A. Lowther; David V. Plant; Gordon Roberts; Martin Rochette; Thomas Szkopek; Dániel Varró; Zeljko Zilic.

#### **Associate Professors**

François Bouffard; Christophe Dubach; Mourad El-Gamal; Dennis Giannacopoulos; Roni Khazaka; Odile Liboiron-Ladouceur; Aditya Mahajan; Muthucumaru Maheswaran; Brett Meyer; Hannah Michalska; Gunter Mussbacher; Derek Nowrouzezahrai; Milica Popovich; Ioannis Psaromiligkos.

#### **Assistant Professors**

Narges Armanfard; Sharmistha Bhadra; Amin Emad; Hsiu-Chin Lin; AJung Moon; Boris Vaisband; Xiaozhe Wang; Songrui Zhao; Wei Lili.

#### **Faculty Lecturer**

Marwan Kanaan

#### **Associate Members**

Maxime Cohen; Matthew Adam Dobbs; Gregory L. Dudek; Alan C. Evans; William R. Funnell; David Juncker; Paul Kry; Samira A. Rahimi.

#### **Adjunct Professors**

Rhys Allan Adams; Donald Davis; Tiago H. Falk; Innocent Kamwa; Marthe Kassouf; Shane McIntosh; Zetian Mi; Frédéric Nabki; Douglas O'Shaughnessy; Michael Rabbat; Joseph J. Schlesinger; Di Wu; Qunbi Zhuge.

### **12.5.4 Bachelor of Engineering (B.Eng.) - Electrical Engineering (134 credits)**

Program credit weight: 134-137 credits

Program credit weight for Quebec CEGEP students: 109-112 credits

This program gives students a broad understanding of the key principles that are responsible for the extraordinary advances in the technology of computers, micro-electronics, automation and robotics, telecommunications, and power systems. These areas are critical to the development of our industries and, more generally, to our economy. A graduate of this program is e

AND 3 credits selected from the approved list of courses in Humanities and Social Sciences, Management Studies, and Law, listed below under Complementary Studies (Group B)

Note: FACC 100 (Introduction to the Engineering Profession) must be taken during the first year of study.

### Required Non-Departmental Courses

26 credits

CIVE 281	(3)	Analytical Mechanics
COMP 202	(3)	Foundations of Programming
COMP 206	(3)	Introduction to Software Systems
COMP 250	(3)	Introduction to Computer Science
FACC 100*	(1)	Introduction to the Engineering Profession
FACC 250	(0)	Responsibilities of the Professional Engineer
FACC 300	(3)	Engineering Economy
FACC 400	(1)	Engineering Professional Practice
MATH 262	(3)	Intermediate Calculus
MATH 263	(3)	Ordinary Differential Equations for Engineers
MIME 262	(3)	Properties of Materials in Electrical Engineering
WCOM 206	(3)	Communication in Engineering

\* Note: FACC 100 (Introduction to the Engineering Profession) must be taken during the first year of study.

### Required Electrical Engineering Courses

57 credits

ECSE 200	(3)	Electric Circuits 1
ECSE 205	(3)	Probability and Statistics for Engineers
ECSE 206	(3)	Introduction to Signals and Systems
ECSE 210	(3)	Electric Circuits 2
ECSE 211	(3)	Design Principles and Methods
ECSE 222	(3)	Digital Logic
		Fundamentals of Softw

8 credits (2 courses) from List A

9-12 credits (3 courses) from List A or List B

**List A: Technical Complementaries with Laboratory Experience**

8-20 credits

ECSE 335	(4)	Microelectronics
ECSE 403	(4)	Control
ECSE 408	(4)	Communication Systems
ECSE 416	(4)	Telecommunication Networks
ECSE 433	(4)	Physical Basis of Transistor Devices
ECSE 444	(4)	Microprocessors
ECSE 470	(4)	Electromechanical Systems

**List B: Technical Complementaries**

0-12 credits

COMP 551^	(4)	Applied Machine Learning
COMP 559	(4)	Fundamentals of Computer Animation
ECSE 310	(3)	Thermodynamics of Computing
ECSE 325	(3)	Digital Systems
ECSE 405	(3)	Antennas
ECSE 412	(3)	Discrete Time Signal Processing
ECSE 415	(3)	Introduction to Computer Vision
ECSE 420	(3)	Parallel Computing
ECSE 421	(3)	Embedded Systems
ECSE 422	(3)	Fault Tolerant Computing
ECSE 423	(3)	Fundamentals of Photonics
ECSE 424	(3)	Human-Computer Interaction
ECSE 425	(3)	Computer Architecture
ECSE 427	(3)	Operating Systems
ECSE 430	(3)	Photonic Devices and Systems
ECSE 435	(3)	Mixed-Signal Test Techniques
ECSE 446	(3)	Realistic Image Synthesis
ECSE 451	(3)	EM Transmission and Radiation
ECSE 460*	(3)	Appareillage électrique (Electrical Power Equipment)
ECSE 463**	(3)	Electric Power Generation
ECSE 464	(3)	Power Systems Analysis
ECSE 465***	(3)	Power Electronic Systems
ECSE 466*	(3)	Réseaux de distribution
ECSE 467*	(3)	Comportement des réseaux électriques
ECSE 468*	(3)	Electricité industrielle (Industrial Power Systems)
ECSE 469*	(3)	Protection des réseaux électriques
ECSE 472	(3)	Fundamentals of Circuit Simulation and Modelling
ECSE 500	(3)	Mathematical Foundations of Systems



ECSE 501	(3)	Linear Systems
ECSE 507	(3)	Optimization and Optimal Control
ECSE 508	(3)	Multi-Agent Systems
ECSE 509	(3)	Probability and Random Signals 2
ECSE 510	(3)	Filtering and Prediction for Stochastic Systems
ECSE 516	(3)	Nonlinear and Hybrid Control Systems
ECSE 519	(3)	Semiconductor Nanostructures and Nanophotonic Devices
ECSE 521	(3)	Digital Communications 1
ECSE 526	(3)	Artificial Intelligence
ECSE 532	(4)	Computer Graphics
ECSE 543	(3)	Numerical Methods in Electrical Engineering
ECSE 544	(4)	Computational Photography
ECSE 551 <sup>^</sup>	(4)	Machine Learning for Engineers
ECSE 552	(4)	Deep Learning
ECSE 554	(4)	Applied Robotics
ECSE 557	(3)	Introduction to Ethics of Intelligent Systems
ECSE 562 <sup>**</sup>	(4)	Low-Carbon Power Generation Engineering
ECSE 563	(3)	Power Systems Operation and Planning
ECSE 565 <sup>***</sup>	(3)	Introduction to Power Electronics
ECSE 575	(3)	Heterogeneous Integration Systems
PHYS 434	(3)	Optics

\* Courses taught in French.

\*\* ECSE 463 and ECSE 562 cannot both be taken.

\*\*\* ECSE 465 and ECSE 565 cannot both be taken.

<sup>^</sup> ECSE 551 and COMP 551 cannot both be taken.

### Complementary Studies

6 credits

### Group A - Impact of Technology on Society

3 credits from the following:

ECSE 501, ECSE 507, ECSE 508, ECSE 509, ECSE 510, ECSE 516, ECSE 519, ECSE 521, ECSE 526, ECSE 532, ECSE 543, ECSE 544, ECSE 551<sup>^</sup>, ECSE 552, ECSE 554, ECSE 557, ECSE 562<sup>\*\*</sup>, ECSE 563, ECSE 565<sup>\*\*\*</sup>, ECSE 575, PHYS 434

SOCI 312	(3)	Sociology of Work and Industry
URBP 201	(3)	Planning the 21st Century City

\*Note: Management courses have limited enrolment and registration dates. See Important Dates at [www.mcgill.ca/importantdates](http://www.mcgill.ca/importantdates).

### Group B - Humanities and Social Sciences, Management Studies, and Law

3 credits at the 200 level or higher from the following departments:

Anthropology (ANTH)

Economics (any 200- or 300-level course excluding ECON 227 and ECON 337)

History (HIST)

Philosophy (excluding PHIL 210 and PHIL 310)

Political Science (POLI)

Psychology (excluding PSYC 204 and PSYC 305, but including PSYC 100)

Religious Studies (RELG) (excluding courses that principally impart language skills, such as Sanskrit, Tibetan, Tamil, New Testament Greek, and Biblical Hebrew) \*\*\*

School of Social Work (SWRK)

Sociology (excluding SOCI 350)

OR 3 credits from the following:

ARCH 528	(3)	History of Housing
BUSA 465*	(3)	Technological Entrepreneurship
CLAS 203	(3)	Greek Mythology
ENVR 203	(3)	Knowledge, Ethics and Environment
ENVR 400	(3)	Environmental Thought
FACC 220	(3)	Law for Architects and Engineers
FACC 500	(3)	Technology Business Plan Design
FACC 501	(3)	Technology Business Plan Project
HISP 225	(3)	Hispanic Civilization 1
HISP 226	(3)	Hispanic Civilization 2
INDR 294*	(3)	Introduction to Labour-Management Relations
INTG 201**	(3)	Integrated Management Essentials 1
INTG 202**	(3)	Integrated Management Essentials 2
MATH 338	(3)	History and Philosophy of Mathematics
MGCR 222*	(3)	Introduction to Organizational Behaviour
MGCR 352*	(3)	Principles of Marketing
ORGB 321*	(3)	Leadership
ORGB 423*	(3)	Human Resources Management

\* Note: Management courses have limited enrolment and registration dates. See Important Dates at <http://www.mcgill.ca/importantdates>.

\*\* Note: INTG 201 and INTG 202 are not open to students who have taken certain Management courses. Please see the INTG 201 and INTG 202 course information for a list of these courses.

\*\*\* If you are uncertain whether or not a course principally imparts language skills, please see an adviser in the McGill Engineering Student Centre (Frank Dawson Adams Building, Room 22) or email an adviser.

Note regarding language courses: Language courses are not accepted to satisfy the Complementary Studies Group B requirement, effective for students who entered the program as of Fall 2017.

### Elective Course

One 3-credit course at the 200-level or higher from any department at McGill, approved by the Undergraduate Programs Office in the Department of Electrical and Computer Engineering.

## **Enhanced Power Concentration**

Students following this program must complete 16-17 credits of technical complementary courses.

The Institute for Electrical Power Engineering was recently established as a province-wide centre for electrical power engineering education. It is funded by industry, mostly Hydro-Québec, and provides a comprehensive program, state-of-the-art laboratory facilities, and a point of contact between industry and universities involved in power engineering.

Note: This program is open to students in the regular Electrical Engineering program only.

Here are some benefits of the concentration:

A complete and up-to-date final-year program in electrical power engineering, with industry-sponsored and supported courses

Access to industry-sponsored projects, internships, and new employment opportunities

### **ELIGIBILITY CRITERIA**

Admission to the program is granted only in the Fall semester of every academic year. To be considered, the applicant must:

- be registered in the B.Eng. program (regular Electrical Engineering);
- have a cumulative GPA of at least 2.5;
- have completed or be registered in ECSE 362 (Fundamentals of Power Engineering);
- be able to complete the degree requirements within three semesters after initial registration in the concentration (excluding summer semesters);
- agree to follow

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## 12.5.5 Bachelor of Engineering (B.Eng.) - Honours Electrical Engineering (138 credits)

Program credit weight: 138-141 credits

Program credit weight for Quebec CEGEP students: 113-116 credits

### Entry into the Electrical Engineering Honours Program

The Honours program is a limited enrolment program and entry is highly competitive. There is no direct entry to the Honours program in the first year. Students may enter the Honours program in the following ways:

- Students from CEGEP will be admitted, on the basis of their grades, at the start of the third term.
- Students from outside Quebec will be admitted, on the basis of their grades, at the start of the fifth term.

To remain in the Honours program and to be awarded the Honours degree, a student must have completed at least 14 credits in each term since entering Electrical and Computer Engineering, except for the final two terms of their degree, and maintained a CGPA of at least 3.30 since entering Electrical and Computer Engineering. In either of their final two full terms (i.e., Fall and Winter, or Winter and Fall) students may drop below 14 credits, provided the combined load for the two terms is at least 16 credits. For more information, please contact the Departmental office at 514-398-3943.

### Required Year 0 (Freshman) Courses (25 credits)

Note: Students in the Honours Electrical Engineering program complete the Year 0 (Freshman) courses before entering the Honours program, as explained above.

Generally, students admitted to Engineering from Quebec CEGEPs are granted transfer credit for these Year 0 (Freshman) courses and enter a 113- to 116-credit program.

For information on transfer credit for French Baccalaureate, International Baccalaureate exams, Advanced Placement exams, Advanced Levels, and Science Placement Exams, see <http://www.mcgill.ca/engineering/current-students/undergraduate/new-students> and select your term of admission.

CHEM 120	(4)	General Chemistry 2
MATH 133	(3)	Linear Algebra and Geometry
MATH 140	(3)	Calculus 1
MATH 141	(4)	Calculus 2
PHYS 131	(4)	Mechanics and Waves
PHYS 142	(4)	Electromagnetism and Optics

AND 3 credits selected from the approved list of courses in Humanities and Social Sciences, Management Studies, and Law, listed below under Complementary Studies (Group B).

Note: FACC 100 (Introduction to the Engineering Profession) must be taken during the first year of study.

### Required Non-Departmental Courses

23 credits

CIVE 281	(3)	Analytical Mechanics
COMP 202	(3)	Foundations of Programming
COMP 206	(3)	Introduction to Software Systems
FACC 100*	(1)	Introduction to the Engineering Profession
FACC 250	(0)	Responsibilities of the Professional Engineer
FACC 300	(3)	Engineering Economy
FACC 400	(1)	Engineering Professional Practice
MATH 262	(3)	Intermediate Calculus
MATH 263	(3)	Ordinary Differential Equations for Engineers
MIME 262	(3)	Properties of Materials in Electrical Engineering
WCOM 206	(3)	Communication in Engineering

\* Note: FACC 100 (Introduction to the Engineering Profession) must be taken during the first year of study.

### Required Electrical Engineering Courses

61 credits

ECSE 200	(3)	Electric Circuits 1
ECSE 205	(3)	Probability and Statistics for Engineers
ECSE 206	(3)	Introduction to Signals and Systems
ECSE 210	(3)	Electric Circuits 2
ECSE 211	(3)	Design Principles and Methods
ECSE 222	(3)	Digital Logic
ECSE 250	(3)	Fundamentals of Software Development
ECSE 251	(3)	Electric and Magnetic Fields
ECSE 307	(4)	Linear Systems and Control
ECSE 308	(4)	Introduction to Communication Systems and Networks
ECSE 324	(4)	Computer Organization
ECSE 331	(4)	Electronics
ECSE 343	(3)	Numerical Methods in Engineering
ECSE 354	(4)	Electromagnetic Wave Propagation
ECSE 362	(4)	Fundamentals of Power Engineering
ECSE 396	(1)	Honours Research Laboratory Rotation 1
ECSE 397	(1)	Honours Research Laboratory Rotation 2
ECSE 478D1	(3)	Electrical Engineering Honours Thesis
ECSE 478D2	(3)	Electrical Engineering Honours Thesis
ECSE 496	(1)	Honours Research Laboratory Rotation 3
ECSE 497	(1)	Honours Research Laboratory Rotation 4

Note: ECSE 478N1 and ECSE 478N2 can be taken instead of ECSE 478D1 and ECSE 478D2.

### Complementary Courses (23-26 credits)

#### Technical Complementaries

17-20 credits (5 courses) must be taken, chosen as follows:

8 credits (2 courses) from List A

6-8 credits (2 courses) from 500-level ECSE courses

3-4 credits (1 course) from List A, List B, List C or from 500-level ECSE courses

#### List A: Technical Complementaries with Laboratory Experience

8-12 credits from the following:

ECSE 335	(4)	Microelectronics
ECSE 403	(4)	Control
ECSE 408*	(4)	Communication Systems
ECSE 416	(4)	Telecommunication Networks
ECSE 433	(4)	Physical Basis of Transistor Devices
ECSE 444	(4)	Microprocessors
ECSE 470	(4)	Electromechanical Systems

\* ECSE 408 and ECSE 511 cannot both be taken.

#### List B: Technical Complementaries

0-3 credits

ECSE 310	(3)	Thermodynamics of Computing
ECSE 325	(3)	Digital Systems
ECSE 415	(3)	Introduction to Computer Vision
ECSE 420	(3)	Parallel Computing
ECSE 421	(3)	Embedded Systems
ECSE 422	(3)	Fault Tolerant Computing
ECSE 424	(3)	Human-Computer Interaction
ECSE 425	(3)	Computer Architecture
ECSE 427	(3)	Operating Systems
ECSE 435	(3)	Mixed-Signal Test Techniques
ECSE 446	(3)	Realistic Image Synthesis
ECSE 451	(3)	EM Transmission and Radiation
ECSE 460*	(3)	Appareillage électrique (Electrical Power Equipment)
ECSE 464	(3)	Power Systems Analysis
ECSE 467*	(3)	Comportement des réseaux électriques
ECSE 468*	(3)	Electricité industrielle (Industrial Power Systems)
ECSE 469*	(3)	Protection des réseaux électriques
ECSE 554	(4)	Applied Robotics

\* Courses taught in French.

### Non-departmental Complementary Courses

0-4 credits

COMP 445	(3)	Computational Linguistics
COMP 550	(3)	Natural Language Processing
COMP 551	(4)	Applied Machine Learning
COMP 579	(4)	Reinforcement Learning
MATH 247	(3)	Honours Applied Linear Algebra
MATH 249	(3)	Honours Complex Variables
MATH 547	(4)	Stochastic Processes
PHYS 357	(3)	Honours Quantum Physics 1
PHYS 434	(3)	Optics
PHYS 457	(3)	Honours Quantum Physics 2
PHYS 558	(3)	Solid State Physics

### Complementary Studies

6 credits

#### Group A - Impact of Technology on Society

3 credits from the following:

ANTH 212	(3)	Anthropology of Development
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ENVR 201	(3)	Society, Environment and Sustainability
GEOG 200	(3)	Geographical Perspectives: World Environmental Problems
GEOG 203	(3)	Environmental Systems
GEOG 205	(3)	Global Change: Past, Present and Future
GEOG 302	(3)	Environmental Management 1
MGPO 440*	(3)	Strategies for Sustainability
PHIL 343	(3)	Biomedical Ethics
RELG 270	(3)	Religious Ethics and the Environment
SOCI 235	(3)	Technology and Society
SOCI 312	(3)	Sociology of Work and Industry
URBP 201	(3)	Planning the 21st Century City

\* Note: Management courses have limited enrolment and registration dates. See Important Dates at <http://www.mcgill.ca/importantdates>.

### Group B - Humanities and Social Sciences, Management Studies, and Law

3 credits at the 200 level or higher from the following departments:

Anthropology (ANTH)

Economics (any 200- or 300-level course excluding ECON 227 and ECON 337)

History (HIST)

Philosophy (excluding PHIL 210 and PHIL 310)

Political Science (POLI)

Psychology (excluding PSYC 204 and PSYC 305, but including PSYC 100)

Religious Studies (RELG) (excluding courses that principally impart language skills, such as Sanskrit, Tibetan, Tamil, New Testament Greek, and Biblical Hebrew) \*\*\*

School of Social Work (SWRK)

Sociology (excluding SOCI 350)

OR 3 credits from the following:

ARCH 528	(3)	History of Housing
BUSA 465*	(3)	Technological Entrepreneurship
CLAS 203	(3)	Greek Mythology
ENVR 203	(3)	Knowledge, Ethics and Environment
ENVR 400	(3)	Environmental Thought
FACC 220	(3)	Law for Architects and Engineers
FACC 500	(3)	Technology Business Plan Design
FACC 501	(3)	Technology Business Plan Project
HISP 225	(3)	Hispanic Civilization 1
HISP 226	(3)	Hispanic Civilization 2
INDR 294*	(3)	Introduction to Labour-Management Relations
INTG 201**	(3)	Integrated Management Essentials 1
INTG 202**	(3)	Integrated Management Essentials 2
MATH 338	(3)	History and Philosophy of Mathematics
MGCR 222*	(3)	Introduction to Organizational Behaviour
MGCR 352*	(3)	Principles of Marketing
ORGB 321*	(3)	Leadership
ORGB 423*	(3)	Human Resources Management

\* Note: Management courses have limited enrolment and re



MATH 262	(3)	Intermediate Calculus
MATH 263	(3)	Ordinary Differential Equations for Engineers
WCOM 206	(3)	Communication in Engineering

\* Note: FACC 100 (Introduction to the Engineering Profession) must be taken during the first year of study.

### Required Computer Engineering Courses

64 credits

ECSE 200	(3)	Electric Circuits 1
ECSE 205	(3)	Probability and Statistics for Engineers
ECSE 206	(3)	Introduction to Signals and Systems
ECSE 210	(3)	Electric Circuits 2
ECSE 211	(3)	Design Principles and Methods
ECSE 222	(3)	Digital Logic
ECSE 223	(3)	Model-Based Programming
ECSE 250	(3)	Fundamentals of Software Development
ECSE 308	(4)	Introduction to Communication Systems and Networks
ECSE 310	(3)	Thermodynamics of Computing
ECSE 321	(3)	Introduction to Software Engineering
ECSE 324	(4)	Computer Organization
ECSE 325	(3)	Digital Systems
ECSE 331	(4)	Electronics
ECSE 353	(3)	Electromagnetic Fields and Waves
ECSE 425	(3)	Computer Architecture
ECSE 427	(3)	Operating Systems
ECSE 444	(4)	Microprocessors
ECSE 458D1	(3)	Capstone Design Project
ECSE 458D2	(3)	Capstone Design Project

Note: ECSE 458N1 and ECSE 458N2 can be taken instead of ECSE 458D1 and ECSE 458D2.

### Complementar



### **Group A - Impact of Technology on Society**

3 credits from the following:

ANTH 212	(3)	Anthropology of Development
BTEC 502	(3)	Biotechnology Ethics and Society
ECON 225	(3)	Economics of the Environment
ECON 347	(3)	Economics of Climate Change
ENVR 201	(3)	Society, Environment and Sustainability
GEOG 200	(3)	Geographical Perspectives: World Environmental Problems
GEOG 203	(3)	Environmental Systems
GEOG 205	(3)	Global Change: Past, Present and Future
GEOG 302	(3)	Environmental Management 1
MGPO 440*	(3)	Strategies for Sustainability
PHIL 343	(3)	Biomedical Ethics
RELG 270	(3)	Religious Ethics and the Environment
SOCI 235	(3)	Technology and Society
SOCI 312	(3)	Sociology of Work and Industry
URBP 201	(3)	Planning the 21st Century City

\* Note: Management courses have limited enrolment and registration dates. See Important Dates at <http://www.mcgill.ca/importantdates>.

### **Group B - Humanities and Social Sciences, Management Studies, and Law**

3 credits at the 200 level or higher from the following departments:

Anthropology (ANTH)

Economics (any 200- or 300-level 70.52 li

INTG 201**	(3)	Integrated Management Essentials 1
INTG 202**	(3)	Integrated Management Essentials 2
MATH 338	(3)	History and Philosophy of Mathematics
MGCR 222*	(3)	Introduction to Organizational Behaviour
MGCR 352*	(3)	Principles of Marketing
ORGB 321*	(3)	Leadership
ORGB 423*	(3)	Human Resources Management

\* Note: Management courses have limited enrolment and registration dates. See Important Dates at <http://www.mcgill.ca/importantdates>.

\*\* Note: INTG 201 and INTG 202 are not open to students who have taken certain Management courses. Please see the INTG 201 and INTG 202 course information for a list of these courses.

\*\*\* If you are uncertain whether or not a course principally imparts language skills, please see an adviser in the McGill Engineering Student Centre (Frank Dawson Adams Building, Room 22) or email an adviser.

Note regarding language courses: Language courses are not accepted to satisfy the Complementary Studies Group B requirement, effective for students who entered the program as of Fall 2017.

### **Elective Course**

### **Required Non-Departmental Courses**

35 credits

COMP 202	(3)	Foundations of Programming
COMP 206	(3)	Introduction to Software Systems
COMP 251	(3)	Algorithms and Data Structures
COMP 302	(3)	Programming Languages and Paradigms
COMP 360	(3)	Algorithm Design
COMP 421	(3)	Database Systems
FA	(1)	Introduction to the Engineering Profession

Note: ECSE 458N1 and ECSE 458N2 can be taken instead of ECSE 458D1 and ECSE 458D2.

### Complementary Courses

15-18 credits

### Technical Complementaries

9-12 credits (3 courses) must be taken, chosen as follows:

3-4 credits (1 course) from List A

6-8 credits (2 courses) from List A or List B

\* COMP 350 and ECSE 343 cannot both be taken

\*\* ECSE 551 and COMP 551 cannot both be taken

\*\*\* COMP 424 and ECSE 526 cannot both be taken

### List A

3-12 credits from the following:

ECSE 325	(3)	Digital Systems
ECSE 415	(3)	Introduction to Computer Vision
ECSE 416	(4)	Telecommunication Networks
ECSE 422	(3)	Fault Tolerant Computing
ECSE 439	(3)	Software Language Engineering
ECSE 444	(4)	Microprocessors
ECSE 544	(4)	Computational Photography

### List B

0-8 credits from the following:

COMP 330	(3)	Theory of Computation
COMP 350*	(3)	Numerical Computing
COMP 409	(3)	Concurrent Programming
COMP 417	(3)	Introduction Robotics and Intelligent Systems
COMP 424***	(3)	Artificial Intelligence
COMP 512	(4)	Distributed Systems
COMP 520	(4)	Compiler Design
COMP 521	(4)	Modern Computer Games
COMP 525	(3)	Formal Verification
COMP 529	(4)	Software Architecture
COMP 533	(3)	Model-Driven Software Development
COMP 550	(3)	Natural Language Processing
COMP 551*	(4)	Applied Machine Learning
COMP 559	(4)	Fundamentals of Computer Animation
ECSE 343*	(3)	Numerical Methods in Engineering
ECSE 421	(3)	Embedded Systems
ECSE 424	(3)	Human-Computer Interaction
ECSE 425	(3)	Computer Architecture
ECSE 437	(3)	Software Delivery
ECSE 446	(3)	Realistic Image Synthesis



ARCH 528	(3)	History of Housing
BUSA 465*	(3)	Technological Entrepreneurship
CLAS 203	(3)	Greek Mythology
ENVR 203	(3)	Knowledge, Ethics and Environment Environmental



To prepare the mechanical engineer for a wide range of career possibilities, there is a heavy emphasis in our curriculum on the fundamental analytical disciplines. This is balanced by a sequence of experimental and design engineering courses, which include practice in design, manufacturing, and experimentation. In these courses, students learn how to apply their analytical groundwork to the solution of practical problems.

The Honours program has a greater emphasis on research and prepares students for future graduate studies. A Minor in **Aerospace Engineering** and a Concentration in **Design** are available for students in either the regular or Honours program who wish to specialize in these areas.

While the program is demanding, there is time for many extracurricular activities. Many students participate in extra-curricular design teams, such as Aerospace Design, Formula Electric, Racing, Rocketry, and Robotics. Student associations, including the McGill Association of Mechanical Engineers (MAME) and the Engineering Undergraduate Society (EUS), allow students to shape their community.

Relations between faculty and students are extremely close. Social functions, at which students and professors meet to exchange views and get to know each other, are organized frequently.

### **12.6.3 Mechanical Engineering Faculty**



MECH 262	(3)	Statistics and Measurement Laboratory
MECH 290	(3)	Design Graphics for Mechanical Engineering
MECH 292	(3)	Design 1: Conceptual Design
MECH 309	(3)	Numerical Methods in Mechanical Engineering
MECH 314	(3)	Dynamics of Mechanisms
MECH 315	(4)	Mechanics 3
MECH 321	(3)	Mechanics of Deformable Solids
MECH 331	(3)	Fluid Mechanics 1
MECH 341	(3)	Thermodynamics 2
MECH 346	(3)	Heat Transfer
MECH 360	(3)	Principles of Manufacturing
MECH 362	(2)	Mechanical Laboratory 1
MECH 383	(3)	Applied Electronics and Instrumentation
MECH 393	(3)	Design 2: Machine Element Design
MECH 412	(3)	System Dynamics and Control
MECH 430	(3)	Fluid Mechanics 2
MECH 463D1	(3)	Design 3: Mechanical Engineering Project
MECH 463D2	(3)	Design 3: Mechanical Engineering Project

### Technical Complementary Courses

9 credits

6 credits at the 300 level or higher, chosen from Mechanical Engineering courses (subject code MECH). One of these two courses (3 credits) must be from the following list:

CHEE 563*	(3)	Biofluids and Cardiovascular Mechanics
MECH 497	(3)	Value Engineering
MECH 498	(3)	Interdisciplinary Design Project 1
MECH 499	(3)	Interdisciplinary Design Project 2
MECH 513	(3)	Control Systems
MECH 530	(3)	Mechanics of Composite Materials
MECH 532	(3)	Aircraft Performance, Stability and Control
	ropulsion	Turbomachinery and Propulsion

3 credits chosen from courses at the 300 level or higher (approved by the Department) in the Faculty of Engineering (including MECH courses) or from courses in the Faculty of Science, including MATH courses.

**Complementary Studies**

6 credits

**Group A - Impact of Technology on Society**

3 credits from the following:

ANTH 212	(3)	Anthropology of Development
BTEC 502	(3)	Biotechnology Ethics and Society
ECON 225	(3)	Economics of the Environment
ECON 347	(3)	Economics of Climate Change
ENVR 201	(3)	Society, Environment and Sustainability
GEOG 200	(3)	Geographical Perspectives: World Environmental Problems
GEOG 203	(3)	Environmental Systems
GEOG 205	(3)	Global Change: Past, Present and Future
GEOG 302	(3)	Environmental Management 1
MGPO 440*	(3)	Strategies for Sustainability
PHIL 343	(3)	Biomedical Ethics
RELG 270	(3)	Religious Ethics and the Environment
SOCI 235	(3)	Technology and Society
SOCI 312	(3)	Sociology of Work and Industry
URBP 201	(3)	Planning the 21st Century City

\* Note: Management courses have limited enrolment and registration dates. See Important Dates at <http://www.mcgill.ca/importantdates>.

**Group B - Humanities and Social Sciences, Management Studies, and Law**

3 credits at the 200 level or higher from the following departments:

Anthropology (ANTH)

Economics (any 200- or 300-level course excluding ECON 227, and ECON 337)

History (HIST)

Philosophy (excluding PHIL 210 and PHIL 310)

Political Science (POLI)

Psychology (excluding PSYC 204 and PSYC 305, but including PSYC 100)

Religious Studies (RELG) (excluding courses that principally impart language skills, such as Sanskrit, Tibetan, Tamil, New Testament Greek, and Biblical Hebrew) \*\*\*

School of Social Work (SWRK)

Sociology (excluding SOCI 350)

OR one of the following:

ARCH 528	(3)	History of Housing
BUSA 465*	(3)	Technological Entrepreneurship
CLAS 203	(3)	Greek Mythology
ENVR 203	(3)	Knowledge, Ethics and Environment
ENVR 400	(3)	Environmental Thought
FACC 220	(3)	Law for Architects and Engineers
FACC 500	(3)	Technology Business Plan Design

FACC 501

(3)

Technology Business Plan Project  
Hispanic Ci

MATH 141	(4)	Calculus 2
PHYS 131	(4)	Mechanics and Waves
PHYS 142	(4)	Electromagnetism and Optics

AND 3 credits selected from the approved list of courses in Humanities and Social Sciences, Management Studies and Law, listed below under Complementary Studies (Group B).

Note: FACC 100 (Introduction to the Engineering Profession) must be taken during the first year of study.

### Required Non-Departmental Courses

27 credits

CIVE 207	(4)	Solid Mechanics
COMP 208	(3)	Computer Programming for Physical Sciences and Engineering
FACC 100*	(1)	Introduction to the Engineering Profession
FACC 250	(0)	Responsibilities of the Professional Engineer
FACC 300	(3)	Engineering Economy
FACC 400	(1)	Engineering Professional Practice
MATH 262	(3)	Intermediate Calculus
MATH 263	(3)	Ordinary Differential Equations for Engineers
MATH 264	(3)	Advanced Calculus for Engineers
MATH 271	(3)	Linear Algebra and Partial Differential Equations
WCOM 206	(3)	Communication in Engineering

\* Note: FACC 100 (Introduction to the Engineering Profession) must be taken during the first year of study.

### Required Mechanical Engineering Courses

62 credits

MECH 201	(2)	Introduction to Mechanical Engineering
MECH 210	(2)	Mechanics 1
MECH 220	(4)	Mechanics 2
	(3)	Thermodynamics 1

MECH 430	(3)	Fluid Mechanics 2
MECH 494	(3)	Honours Design Project

### Technical Complementary Courses

18 credits

3 credits from the following, chosen with the approval of either the thesis supervisor or the coordinator of the Honours program, when a thesis supervisor has not yet been secured:

MATH 323	(3)	Probability
MATH 326	(3)	Nonlinear Dyn3foepaEnd Chaos
MATH 327	(3)	Matrix Numerical Analysis
MATH 417	(3)	Linear Optimization
MATH 478	(3)	Computational Methods in Applied Mathematics

6 credits from the following:

MECH 513	(3)	Control Systems
MECH 546	(3)	Finite Element Methods in Solid Mechanics
MECH 559*	(3)	Engineering Systems Optimization
MECH 562	(3)	Advanced Fluid Mechanics
MECH 578	(3)	Advanced Thermodyn3foep
MECH 579*	(3)	Multidisciplinary Design Optimization

\*Note: Students select either MECH 559 or MECH 579.

6 credits at the 300 level or higher, chosen from Mechanical Engineering courses (subject code MECH). One of these two courses (3 credits) must be from the following list:

CHEE 563*	(3)	BiofluidpaEnd Cardiovascular Mechanics
MECH 497	(3)	Value Engineering
MECH 498	(3)	Interdisciplinary Design Project 1
MECH 499	(3)	Interdisciplinary Design Project 2
MECH 513	(3)	Control Systems
MECH 530	(3)	Mechanics of Composite Materials
MECH 532	(3)	Aircraft Performance, StabilityaEnd Control
MECH 535	(3)	TurbomachineryaEnd Propulsion
MECH 536	(3)	Aerospace Structures
MECH 543	(3)	Design with Composite Materials
MECH 544	(3)	Processing of Composite Materials
MECH 553	(3)	Design End Manufacture of Microdevices
MECH 559	(3)	Engineering Systems Optimization
MECH 560	(3)	Eco-design End Product Life CycleAssessment
MECH 563*	(3)	BiofluidpaEnd Cardiovascular Mechanics
MECH 564	(3)	Thermal RadiationaEnd Solar Energy Systems
MECH 565	(3)	Fluid FlowaEnd HeatTransfer Equipment
MECH 573	(3)	Mechanics of Robotic Systems

\*Students choose either CHEE 563 or MECH 563

3 credits chosen from courses at the 300-level or higher (approved by the Department) in the Faculty of Engineering (including MECH courses) or from MIME 260 or from courses at the 300 level or higher in the Faculty of Science, including MATH courses.

### Complementary Studies

6 credits

#### Group A - Impact of Technology on Society

3 credits from the following:

ANTH 212	(3)	Anthropology of Development
BTEC 502	(3)	Biotechnology Ethics and Society
ECON 225	(3)	Economics of the Environment
ECON 347	(3)	Economics of Climate Change
ENVR 201	(3)	Society, Environment and Sustainability
GEOG 200	(3)	Geographical Perspectives: World Environmental Problems
GEOG 203	(3)	Environmental Systems
GEOG 205	(3)	Global Change: Past, Present and Future
GEOG 302	(3)	Environmental Management 1
MGPO 440*	(3)	Strategies for Sustainability
PHIL 343	(3)	Biomedical Ethics
RELG 270	(3)	Religious Ethics and the Environment
SOCI 235	(3)	Technology and Society
SOCI 312	(3)	Sociology of Work and Industry
URBP 201	(3)	Planning the 21st Century City

\* Note: Management courses have limited enrolment and registration dates. See Important Dates at <http://www.mcgill.ca/importantdates>.

#### Group B: Humanities and Social Sciences, Management Studies and Law

3 credits at the 200 level or higher from the following departments:

Anthropology (ANTH)

Economics (any 200- or 300-level course excluding ECON 227 and ECON 337)

History (HIST)

Philosophy (excluding PHIL 210 and PHIL 310)

Political Science (POLI)

Psychology (excluding PSYC 204 and PSYC 305, but including PSYC 100)

Religious Studies (RELG) (excluding courses that principally impart language skills, such as Sanskrit, Tibetan, Tamil, New Testament Greek, and Biblical Hebrew) \*\*\*

School of Social Work (SWRK)

Sociology (excluding SOCI 350)

OR one of the following:

ARCH 528	(3)	History of Housing
BUSA 465*	(3)	Technological Entrepreneurship
CLAS 203	(3)	Greek Mythology
ENVR 203	(3)	Knowledge, Ethics and Environment
ENVR 400	(3)	Environmental Thought
FACC 220	(3)	Law for Architects and Engineers
FACC 500	(3)	Technology Business Plan Design



FACC 501	(3)	Technology Business Plan Project
HISP 225	(3)	Hispanic Civilization 1
HISP 226	(3)	Hispanic Civilization 2
INDR 294*	(3)	Introduction to Labour-Management Relations
	(3)	Integrated Management Essentials 1

MECH 565	(3)	Fluid Flow and Heat Transfer Equipment
MECH 579	(3)	Multidisciplinary Design Optimization

### 12.6.7 Bachelor of Engineering (B.Eng.) - Honours Mechanical Engineering - Design (15 credits)

Students in this concentration take five courses in the area of design, including the completion of an interdisciplinary project.

Students should complete a Course Authorization Form, available from the McGill Engineering Student Centre (Student Affairs Office) (Frank Dawson Adams Building, Room 22) or from the Undergraduate Program Coordinator, indicating their intention to take the concentration.

Total concentration credit weight: 15-16 credits

#### Required Courses

6 credits

MECH 498	(3)	Interdisciplinary Design Project 1
MECH 499	(3)	Interdisciplinary Design Project 2

#### Complementary Courses

9-10 credits from the following:

ARCH 515	(3)	Sustainable Design
CHEE 453	(4)	Process Design
MECH 497	(3)	Value Engineering
MECH 528	(3)	Product Design
MECH 530	(3)	Mechanics of Composite Materials
MECH 543	(3)	Design with Composite Materials
MECH 565	(3)	Fluid Flow and Heat Transfer Equipment
MECH 579	(3)	Multidisciplinary Design Optimization

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## 12.7 Mining and Materials Engineering

### 12.7.1 Location

#### General Office:

Wong Building, Room 2140  
3610 University Street  
Montreal QC H3A 0C5  
Website: [mcgill.ca/minmat](http://mcgill.ca/minmat)

#### Materials:

Wong Building, Room 2140  
3610 University Street  
Montreal QC H3A 0C5  
Telephone: 514-398-1040  
Fax: 514-398-4492  
Email: [coordinator.minmat@mcgill.ca](mailto:coordinator.minmat@mcgill.ca)  
Website: [mcgill.ca/materials](http://mcgill.ca/materials)

#### Mining:

Frank Dawson Adams Building, Room 125  
3450 University Street  
Montreal QC H3A 0E8  
Telephone: 514-398-2215

Fax: 514-398-7099  
 Email: [admin.mining@mcgill.ca](mailto:admin.mining@mcgill.ca)  
 Website: [mcgill.ca/mining](http://mcgill.ca/mining)

### 12.7.2 About the Department of Mining and Materials Engineering

The Department of Mining and Materials Engineering offers programs leading to the Bachelor of Engineering degree in Materials Engineering or Mining Engineering. In addition to regular courses and laboratories, the curriculum includes seminars, colloquia, and student projects reinforced by field trips to industrial operations.

For more information, refer to:

- Materials Engineering – [section 12.7.4.3: Bachelor of Engineering \(B.Eng.\) - Materials Engineering \(148 credits\)](#) and [section 12.7.4.4: Bachelor of Engineering \(B.Eng.\) - Co-op in Materials Engineering \(148 credits\)](#)
- Mining Engineering – and [section 12.7.5.3: Bachelor of Engineering \(B.Eng.\) - Mining Engineering \(144 credits\)](#) and [section 12.7.5.4: Bachelor of Engineering \(B.Eng.\) - Co-op in Mining Engineering \(150 credits\)](#)

#### 12.7.2.1 Scholarships

The Department offers renewable Entrance Scholarships every year. A substantial number of other scholarships and bursaries are also awarded by the Department, as well as by the Canadian Mineral Industry Education Foundation, Canadian Institute of Mining Foundation, Quebec Mining Association, and others.

Please refer to the Faculty of Engineering website's [Scholarships and Financial Aid](#) section for more information.

### 12.7.3 Mining and Materials Engineering Faculty

#### Department Chair

Richard Chromik

#### Associate Chair, Materials Engineering

Jun Song

#### Associate Chair & Graduate Program Director

Mathieu Brochu

#### Graduate Program Coordinator

Barbara Hanley

#### Emeritus Professors

James A. Finch; John E. Gruzleski; John J. Jonas; Gordon W. Smith.

#### Professors

Marta Cerruti; Richard Chromik; George P. Demopoulos; Roussos Dimitrakopoulos; Raynald Gauvin; Roderick I.L. Guthrie; Faramarz (Ferri) P. Hassani; Hani S. Mitri; Mihriban Pegguleryuz; Stephen Yue.

#### Associate Professors

Kirk Bevan; Mathieu Brochu; Mainul Hasan; Mustafa Kumral; Showan Nazhat; Sidney Omelon; Nathaniel Quitoriano; Agus Pulung Sasmito; Jun Song; Kristian Waters.

#### Assistant Professor

Jinhyuk Lee; Alessandro Navarra; Philippe Ouzilleau.

#### Adjunct Professors

Behnam Ashrafi; Salim Brahim; Alexandros Charitos; Michel Gamache; Tassos Grammatikopoulos; Ahmad Hemami; Alice Jarry; Luis Javier Montiel Petro; Amina Lamghari; Jan Nessel; Jimi Sauw-Yoeng Tjong; Michel Trudeau; Priti Wanjara, Karim Zaghib.

#### Senior Faculty Lecturer

Florence Paray

### Faculty Lecturer – Mining

Shahe Shnorhokian

### Co-op Program Liaison Officers

Genevieve Snider (*Materials*); Lisa Thiess (*Mining*).

## 12.7.4 About Materials Engineering

### 12.7.4.1 Co-op in Materials Engineering

The Materials Engineering degree is a cooperative program leading to a **B.Eng.** and includes formal industrial work periods. It is built on a strong background of mathematics, basic sciences, computer skills and applications, and specific engineering and design courses to provide up-to-date training in materials engineering. Students take core courses covering processing, fabrication, applications, and performance of materials.

The program is fully accredited by the Canadian Engineering Accreditation Board (CEAB) and is designed to offer students exceptional training for employment in the field.

The core courses are supplemented by complementary courses, which provide a diverse selection of specialties for the graduating engineer. The course structure is reinforced with laboratory exercises. Graduates find employment in a wide range of industries, including the resource and manufacturing sectors. Students in the Co-op program benefit from practical learning experience gained from work-term employment in meaningful engineering jobs, as well as non-tangible learning experiences arising from the responsibilities required to obtain and successfully complete the work terms.

Regarding the Co-op **program fees**, an amount of \$251.41 will be billed during ten consecutiv

MATH 141	(4)	Calculus 2
PHYS 131	(4)	Mechanics and Waves
PHYS 142	(4)	Electromagnetism and Optics

AND 3 credits selected from the approved list of courses in Humanities and Social Sciences, Management Studies, and Law, listed below under Complementary Studies (Group B).

Note: FACC 100 (Introduction to the Engineering Profession) must be taken during the first year of study.

### Required Non-Departmental Courses

36 credits

CHEM 233	(3)	Topics in Physical Chemistry
CIVE 205	(3)	Statics
CIVE 207	(4)	Solid Mechanics
COMP 208	(3)	Computer Programming for Physical Sciences and Engineering
ECSE 209	(3)	Electrotechnology
FACC 100*	(1)	Introduction to the Engineering Profession
FACC 250	(0)	Responsibilities of the Professional Engineer
FACC 300	(3)	Engineering Economy
FACC 400	(1)	Engineering Professional Practice
MATH 262	(3)	Intermediate Calculus
MATH 263	(3)	Ordinary Differential Equations for Engineers
MATH 264	(3)	Advanced Calculus for Engineers
MECH 289	(3)	Design Graphics
WCOM 206	(3)	Communication in Engineering

\* Note: FACC 100 (Introduction to the Engineering Profession) must be taken during the first year of study.

### Required Materials Engineering Courses

62 credits

MIME 209	(3)	Mathematical Applications
MIME 212	(3)	Engineering Thermodynamics
MIME 250	(3)	Introduction to Extractive Metallurgy
MIME 261	(3)	Structure of Materials
MIME 311	(3)	Modelling and Automatic Control
MIME 317	(3)	Analytical and Characterization Techniques
MIME 341	(3)	Introduction to Mineral Processing
MIME 345	(3)	Applications of Polymers
MIME 350	(3)	Extractive Metallurgical Engineering
MIME 352	(3)	Hydrochemical Processing
MIME 356	(4)	Heat, Mass and Fluid Flow
MIME 360	(3)	Phase Transformations: Solids
MIME 362	(3)	Mechanical Properties
MIME 452	(4)	Process and Materials Design

MIME 465	(3)	Metallic and Ceramic Powders Processing
MIME 467	(3)	Electronic Properties of Materials
MIME 470	(3)	Engineering Biomaterials
MIME 473	(3)	Introduction to Computational Materials Design

### Complementary Courses (21 credits)

#### Technical Complementaries

15 credits

9-15 credits from the following:

CHEE 515*	(3)	Interface Design: Biomimetic Approach
CIVE 512	(3)	Advanced Civil Engineering Materials
MECH 530	(3)	Mechanics of Composite Materials
MIME 410	(3)	Materials Research Project
MIME 442	(3)	Analysis, Modelling and Optimization in Mineral Processing
MIME 512	(3)	Corrosion and Degradation of Materials
MIME 515*	(3)	(Bio)material Surface Analysis and Modification
MIME 526	(3)	Mineral Economics
MIME 542	(3)	Transmission Electron Microscopy
MIME 544	(3)	Analysis: Mineral Processing Systems 1
MIME 545	(3)	Analysis: Mineral Processing Systems 2
MIME 551	(3)	Electrochemical Processing
MIME 556	(3)	Sustainable Materials Processing
MIME 558	(3)	Engineering Nanomaterials
MIME 559	(3)	Aluminum Physical Metallurgy
MIME 560	(3)	Joining Processes
MIME 561	(3)	Advanced Materials Design
MIME 563	(3)	Hot Deformation of Metals
MIME 565	(3)	Aerospace Metallic-Materials and Manufacturing Processes
MIME 568	(3)	Topics in Advanced Materials
MIME 569	(3)	Electron Beam Analysis of Materials
MIME 570	(3)	Micro- and Nano-Fabrication Fundamentals
MIME 571	(3)	Surface Engineering
MIME 572	(3)	Computational Thermodynamics
MIME 580	(3)	Additive Manufacturing Using Metallic and Ceramic Materials

\* Students choose either CHEE 515 or MIME 515, offered in alternate years.

6 credits may be taken from courses outside of the Department of Mining and Materials Engineering, with department approval.

#### Complementary Studies

6 credits

#### Group A - Impact of Technology on Society

3 credits from the following:

ANTH 212	(3)	Anthropology of Development
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BTEC 502	(3)	Biotechnology Ethics and Society
ECON 225	(3)	Economics of the Environment
ECON 347	(3)	Economics of Climate Change
ENVR 201	(3)	Society, Environment and Sustainability
GEOG 200	(3)	Geographical Perspectives: World Environmental Problems
GEOG 203	(3)	Environmental Systems
GEOG 205	(3)	Global Change: Past, Present and Future
GEOG 302	(3)	Environmental Management 1
MGPO 440*	(3)	Strategies for Sustainability
PHIL 343	(3)	Biomedical Ethics
RELG 270	(3)	Religious Ethics and the Environment
SOCI 235	(3)	Technology and Society
SOCI 312	(3)	Sociology of Work and Industry
URBP 201	(3)	Planning the 21st Century City

\* Management courses have limited enrolment and registration dates. See Important Dates at <http://www.mcgill.ca/importantdates>.

### Group B - Humanities and Social Sciences, Management Studies, and Law

3 credits at the 200 level or higher from the following departments:

Anthropology (ANTH)

Economics (any 200- or 300-level course excluding ECON 227 and ECON 337)

History (HIST)

Philosophy (excluding PHIL 210 and PHIL 310)

Political Science (POLI)

Psychology (excluding PSYC 204 and PSYC 305, but including PSYC 100)

Religious Studies (RELG) (excluding courses that principally impart language skills, such as Sanskrit, Tibetan, Tamil, New Testament Greek, and Biblical Hebrew) \*\*\*

School of Social Work (SWRK)

Sociology (excluding SOCI 350)

OR 3 credits from the following:

ARCH 528	(3)	History of Housing
BUSA 465*	(3)	Technological Entrepreneurship
CLAS 203	(3)	Greek Mythology
ENVR 203	(3)	Knowledge, Ethics and Environment
ENVR 400	(3)	Environmental Thought
FACC 220	(3)	Law for Architects and Engineers
FACC 500	(3)	Technology Business Plan Design
FACC 501	(3)	Technology Business Plan Project
HISP 225	(3)	Hispanic Civilization 1
HISP 226	(3)	Hispanic Civilization 2
INDR 294*	(3)	Introduction to Labour-Management Relations
INTG 201**	(3)	Integrated Management Essentials 1
INTG 202**	(3)	Integrated Management Essentials 2
MATH 338	(3)	History and Philosophy of Mathematics
MGCR 222*	(3)	Introduction to Organizational Behaviour

MGCR 352*	(3)	Principles of Marketing
ORGB 321*	(3)	Leadership
ORGB 423*	(3)	Human Resources Management

\* Management courses have limited enrolment and registration dates. See Important Dates at <http://www.mcgill.ca/importantdates>.

\*\* Note: INTG 201 and INTG 202 are not open to students who have taken certain Management courses. Please see the INTG 201 and INTG 202 course information for a list of these courses.

\*\*\* If you are uncertain whether or not a course principally imparts language skills, please see an adviser in the McGill Engineering Student Centre (Frank Dawson Adams building, Room 22) or email an adviser.

Note regarding language courses: Language courses are not accepted to satisfy the Complementary Studies Group B requirement, effective for students who entered the program as of Fall 2017.

#### 12.7.4.4 Bachelor of Engineering (B.Eng.) - Co-op in Materials Engineering (148 credits)

Program credit weight: 148 credits

Program credit weight for Quebec CEGEP students: 119 credits

The Department offers a Co-op in Materials Engineering program leading to an accredited B.Eng. degree in Materials Engineering. Materials are used to enact every human technology and have shaped key areas of history. In the Co-op in Materials Engineering, students will have the opportunity to learn the fundamental science and engineering of materials and complete three work-term semesters. The program spans the materials processing pipeline, teaching students how to enrich mineral-poor ore, then to process the materials into the desired microstructures and compositions and finally how to use these materials in various applications (aerospace, electronics and biological systems). With the choice of technical complementary courses, students have an opportunity to specialize and strengthen key materials technologies or broaden their horizons and take courses from several interdisciplinary areas.

Students entering this program must plan their schedule of studies in consultation with a departmental adviser.

#### Required Year 0 (Freshman) Courses

29 credits

Generally, students admitted to Engineering from Quebec CEGEPs are granted transfer credit for these Year 0 (Freshman) courses and enter a 119-credit program.

For information on transfer credit for French Baccalaureate, International Baccalaureate exams, Advanced Placement exams, Advanced Levels, and Science Placement Exams, see <http://www.mcgill.ca/engineering/current-students/undergraduate/new-students> and select your term of admission.

CHEM 110	(4)	General Chemistry 1
CHEM 120	(4)	General Chemistry 2
MATH 133	(3)	Linear Algebra and Geometry
MATH 140	(3)	Calculus 1
MATH 141	(4)	Calculus 2
PHYS 131	(4)	Mechanics and Waves
PHYS 142	(4)	Electromagnetism and Optics

AND 3 credits selected from the approved list of courses in Humanities and Social Sciences, Management Studies, and Law, listed below under Complementary Studies (Group B).

Note: FACC 100 (Introduction to the Engineering Profession) must be taken during the first year of study.

#### Required Non-Departmental Courses

36 credits

CHEM 233	(3)	Topics in Physical Chemistry
CIVE 205Mechanion-Depar	(3)	Statics



FACC 300	(3)	Engineering Economy
FACC 400	(1)	Engineering Professional Practice
MATH 262	(3)	Intermediate Calculus
MATH 263	(3)	Ordinary Differential Equations for Engineers
MATH 264	(3)	Advanced Calculus for Engineers
MECH 289	(3)	Design Graphics
WCOM 206	(3)	Communication in Engineering

\* Note: FACC 100 (Introduction to the Engineering Profession) must be taken during the first year of study.

### Required Materials Engineering Courses

68 credits

MIME 209	(3)	Mathematical Applications
MIME 212	(3)	Engineering Thermodynamics
MIME 250	(3)	Introduction to Extractive Metallurgy
MIME 261	(3)	Structure of Materials
MIME 280	(2)	Industrial Training 1
MIME 311	(3)	Modelling and Automatic Control
MIME 317	(3)	Analytical and Characterization Techniques
MIME 341	(3)	Introduction to Mineral Processing
MIME 345	(3)	Applications of Polymers
MIME 350	(3)	Extractive Metallurgical Engineering
MIME 352	(3)	Hydrochemical Processing
MIME 356	(4)	Heat, Mass and Fluid Flow
MIME 360	(3)	Phase Transformations: Solids
MIME 362	(3)	Mechanical Properties
MIME 380	(2)	Industrial Training 2
MIME 452	(4)	Process and Materials Design
MIME 455	(3)	Advanced Process Engineering
MIME 456	(3)	Steelmaking and Steel Processing
MIME 465	(3)	Metallic and Ceramic Powders Processing
MIME 467	(3)	Electronic Properties of Materials
MIME 470	(3)	Engineering Biomaterials
MIME 473	(3)	Introduction to Computational Materials Design
MIME 480	(2)	Industrial Training 3

### Complementary Courses

15 credits

#### Technical Complementaries

9 credits

6-9 credits from the following:

CHEE 515*	(3)	Interface Design: Biomimetic Approach
CIVE 512	(3)	Advanced Civil Engineering Materials



RELG 270	(3)	Religious Ethics and the Environment
SOCI 235	(3)	Technology and Society
SOCI 312	(3)	Sociology of Work and Industry
URBP 201	(3)	Planning the 21st Century City

\* Management courses have limited enrolment and registration dates. See Important Dates at <http://www.mcgill.ca/importantdates>.

### Group B - Humanities and Social Sciences, Management Studies, and Law

3 credits at the 200 level or higher from the following departments:

Anthropology (ANTH)

Economics (any 200- or 300-level course excluding ECON 227 and ECON 337)

History (HIST)

Philosophy (excluding PHIL 210 and PHIL 310)

Political Science (POLI)

Psychology (excluding PSYC 204 and PSYC 305, but including PSYC 100)

Religious Studies (RELG) (excluding courses that principally impart language skills, such as Sanskrit, Tibetan, Tamil, New Testament Greek, and Biblical Hebrew) \*\*\*

School of Social Work (SWRK)

Sociology (excluding SOCI 350)

OR 3 credits from the following:

ARCH 528	(3)	History of Housing
BUSA 465*	(3)	Technological Entrepreneurship
CLAS 203	(3)	Greek Mythology
ENVR 203	(3)	Knowledge, Ethics and Environment
ENVR 400	(3)	Environmental Thought
FACC 220	(3)	Law for Architects and Engineers
FACC 500	(3)	Technology Business Plan Design
FACC 501	(3)	Technology Business Plan Project
HISP 225	(3)	Hispanic Civilization 1
HISP 226	(3)	Hispanic Civilization 2
INDR 294*	(3)	Introduction to Labour-Management Relations
INTG 201**	(3)	Integrated Management Essentials 1
INTG 202**	(3)	Integrated Management Essentials 2
MATH 338	(3)	History and Philosophy of Mathematics
MGCR 222*	(3)	Introduction to Organizational Behaviour
MGCR 352*	(3)	Principles of Marketing
ORGB 321*	(3)	Leadership
ORGB 423*	(3)	Human Resources Management

\* Management courses have limited enrolment and registration dates. See Important Dates at <http://www.mcgill.ca/importantdates>.

\*\* Note: INTG 201 and INTG 202 are not open to students who have taken certain Management courses. Please see the INTG 201 and INTG 202 course information for a list of these courses.

\*\*\* If you are uncertain whether or not a course principally imparts language skills, please see an adviser in the McGill Engineering Student Centre (Frank Dawson Adams building, Room 22) or email an adviser.

Note regarding language courses: Language course are not accepted to satisfy the Complementary Studies Group B requirement, effective for students who entered the program as of Fall 2017.

## 12.7.5 About Mining Engineering

### 12.7.5.1 Co-op in Mining Engineering

McGill is proud to be the host of the oldest mining engineering program in Canada, which started in 1871. The program is known for the excellence of its courses as well as the training it provides in mining science and technology, mineral economics, mine planning, rock mechanics, renewable energy, and mine design. Mining offers excellent career opportunities in Canada and around the world. There have been rapid technological developments in recent years, presenting numerous challenges to students with strong interest in engineering and a taste for innovation.

The Department offers a co-operative program leading to an accredited **B.Eng.** degree in Mining Engineering. It includes three paid industrial work terms. The Department has a dedicated Mining Co-op Liaison Officer to help the students find jobs in industry. The program is offered in one of two streams: English Stream for high school students and Bilingual Stream for CEGEP students, in collaboration with the mining engineering program at *Polytechnique Montréal* in Montreal. Students in the Bilingual Stream take six mining courses at Polytechnique Montréal at the latter part of the program. The teaching and learning style in mining courses is one that permits the students to sharpen their communication skills - both written and oral and develop their team working skills.

A wide range of scholarships are available to new and continuing students from the Department, Faculty of Engineering, as well as from industry. The Department provides financial support to students who are willing to participate in mining competitions, such as the Canadian Mining Games and World Mining Competition.

When taking a Co-op work term, students must register for MIs11 001 118.b0 .fop wm

PHYS 131	(4)	Mechanics and Waves
PHYS 142	(4)	Electromagnetism and Optics

AND 3 credits selected from the approved list of courses in Humanities and Social Sciences, Management Studies and Law, listed below under Complementary Studies (Group B).

Note: FACC 100 (Introduction to the Engineering Profession) must be taken during the first year of study.

#### Required Non-Departmental Courses (37 credits)

CIVE 205	(3)	Statics
CIVE 207	(4)	Solid Mechanics
COMP 208	(3)	Computer Programming for Physical Sciences and Engineering
ECSE 209	(3)	Electrotechnology
EPSC 221	(3)	General Geology
EPSC 225	(1)	Properties of Minerals
FACC 100*	(1)	Introduction to the Engineering Profession
FACC 250	(0)	Responsibilities of the Professional Engineer
FACC 300	(3)	Engineering Economy
FACC 400	(1)	Engineering Professional Practice
MATH 262	(3)	Intermediate Calculus
MATH 263	(3)	Ordinary Differential Equations for Engineers
MATH 264	(3)	Advanced Calculus for Engineers
MECH 289	(3)	Design Graphics
WCOM 206	(3)	Communication in Engineering

\* Note: FACC (Introduction to the Engineering Profession) must be taken during the first year of study.

#### Required Mining Engineering Courses (47 credits)

MIME 200	(3)	Introduction to the Minerals Industry
MIME 203	(2)	Mine Surveying
MIME 209	(3)	Mathematical Applications
MIME 260	(3)	Materials Science and Engineering
MIME 322	(3)	Rock Fragmentation
MIME 323	(3)	Rock and Soil Mass Characterization
MIME 325	(3)	Mineral Industry Economics
MIME 333	(3)	Materials Handling
MIME 340	(3)	Applied Fluid Dynamics
MIME 341	(3)	Introduction to Mineral Processing
MIME 413	(3)	Strategic Mine Planning With Uncertainty
MIME 419	(3)	Surface Mining
MIME 422	(3)	Mine Ventilation
MIME 425	(3)	Applied Stochastic Orebody Modelling
MIME 426	(6)	Mine Design and Prefeasibility Study

#### Complementary Courses

31-32 credits

17 credits from one of Stream A or Stream B

**Stream A - CEGEP Students**

CEGEP students must take the following courses:

MPMC 321*	(3)	Mécanique des roches et contrôle des terrains
MPMC 326*	(3)	Recherche opérationnelle I
MPMC 328*	(3)	Environnement et gestion des rejets miniers
MPMC 329*	(2)	Géologie minière
MPMC 330*	(3)	Géotechnique minière
MPMC 421*	(3)	Exploitation en souterrain

\* Mining courses taken at Polytechnique Montréal

**Stream B - Non-CEGEP Students**

Non-CEGEP students must take the following courses:

CIVE 208	(3)	Civil Engineering System Analysis
MIME 329	(2)	Mining Geology
MIME 330	(3)	Mining Geotechnics
MIME 421	(3)	Rock Mechanics
MIME 424	(3)	Underground Mining Methods
MIME 428	(3)	Environmental Mining Engineering

**Technical Complementaries**

8-9 credits can be chosen from the following or from any other approved technical courses in Engineering, Management or Science.

Note: Not all course are given annually; see the "Courses" section of this publication to know if a course is offered.

CFIN 410	(3)	Investment and Portfolio Management
CIVE 416	(3)	Geotechnical Engineering
CIVE 421	(3)	Municipal Systems
CIVE 514	(3)	Structural Mechanics
CIVE 584	(3)	Mechanics of Groundwater Flow
EPSC 320	(3)	Elementary Earth Physics
EPSC 549	(3)	Hydrogeology
FINE 482	(3)	International Finance 1
MIME 290	(2)	Industrial Work Period 1
MIME 320	(3)	Extraction of Energy Resources
MIME 442	(3)	Analysis, Modelling and Optimization in Mineral Processing
MIME 484	(3)	Mining Project
MIME 511	(3)	Advanced Subsurface Ventilation and Air Conditioning
MIME 514	(3)	Sustainability Analysis of Mining Systems
MIME 520	(3)	Stability of Rock Slopes
MIME 527	(3)	Selected Topics in Mineral Resource Engineering
MIME 544	(3)	Analysis: Mineral Processing Systems 1
MIME 545	(3)	Analysis: Mineral Processing Systems 2
MIME 588	(3)	Reliability Analysis of Mining Systems

MPMC 320\* (3) CAO et informatique pour les mines

\* Mining courses taken at Polytechnique Montréal

### Complementary Studies (6 credits)

#### Group A - Impact of Technology on Society

3 credits from the following:

ANTH 212	(3)	Anthropology of Development
BTEC 502	(3)	Biotechnology Ethics and Society
ECON 225	(3)	Economics of the Environment
ECON 347	(3)	Economics of Climate Change
ENVR 201	(3)	Society, Environment and Sustainability
GEOG 200	(3)	Geographical Perspectives: World Environmental Problems
GEOG 203	(3)	Environmental Systems
GEOG 205	(3)	Global Change: Past, Present and Future
GEOG 302	(3)	Environmental Management 1
MGPO 440*	(3)	Strategies for Sustainability
PHIL 343	(3)	Biomedical Ethics
RELG 270	(3)	Religious Ethics and the Environment
SOCI 235	(3)	Technology and Society
SOCI 312	(3)	Sociology of Work and Industry
URBP 201	(3)	Planning the 21st Century City

\* Note: Management courses have limited enrolment and registration dates. See Important Dates at <http://www.mcgill.ca/importantdates>.

#### Group B - Humanities and Social Sciences, Management Studies and Law

3 credits at the 200-level or higher from the following departments:

Anthropology (ANTH)

Economics (any 200- or 300-level course excluding ECON 227 and ECON 337)

History (HIST)

Philosophy (excluding PHIL 210 and PHIL 310)

Political Science (POLI)

Psychology (excluding PSYC 204 and PSYC 305, but including PSYC 100)

Religious Studies (RELG) (excluding courses that principally impart language skills, such as Sanskrit, Tibetan, Tamil, New Testament Greek, and Biblical Hebrew) \*\*\*

School of Social Work (SWRK)

Sociology (excluding SOCI 350)

OR

3 credits from the following:

ARCH 528	(3)	History of Housing
BUSA 465*	(3)	Technological Entrepreneurship
CLAS 203	(3)	Greek Mythology
ENVR 203	(3)	Knowledge, Ethics and Environment
ENVR 400	(3)	Environmental Thought
FACC 220	(3)	Law for Architects and Engineers

FACC 500	(3)	Technology Business Plan Design
FACC 501	(3)	Technology Business Plan Project
HISP 225	(3)	Hispanic Civilization 1
HISP 226	(3)	Hispanic Civilization 2
INDR 294*	(3)	Introduction to Labour-Management Relations
INTG 201**	(3)	Integrated Management Essentials 1
INTG 202**	(3)	Integrated Management Essentials 2
MATH 338	(3)	History and Philosophy of Mathematics
MGCR 222*	(3)	Introduction to Organizational Behaviour
MGCR 352*	(3)	Principles of Marketing
ORGB 321*	(3)	Leadership
ORGB 423*	(3)	Human Resources Management

\* Note: Management courses have limited enrolment and registration dates. See Important Dates at <http://www.mcgill.ca/importantdates>.

\*\* Note: INTG 201 and INTG 202 are not open to students who have taken certain Management courses. Please see the INTG 201 and INTG 202 course information for a list of these courses.

\*\*\* If you are uncertain whether or not a course principally imparts language skills, please see an adviser in the McGill Engineering Student Centre (Frank Dawson Adams Building, Room 22) or email an adviser.

Note regarding language courses: Language courses are not accepted to satisfy the Complementary Studies Group B requirement, effective for students who entered the program as of Fall 2017.

#### **12.7.5.4 Bachelor of Engineering (B.Eng.) - Co-op in Mining Engineering (150 credits)**

Program credit weight: 150-151 credits

Program credit weight for Quebec CEGEP students: 121-122 credits

The Department offers a Co-op in Mining Engineering Program leading to an accredited B.Eng. degree in Mining Engineering. The program focuses on the science and engineering of sustainable extraction of mineral resources. It contains two streams: English for non-CEGEP students and Bilingual (six courses in French) for CEGEP students, in collaboration with the mining engineering program at Polytechnique Montreal. The program includes projects that are reinforced by field trips to industrial operations as well as three industrial work terms. Students must register for each work term (MIME 290, MIME 291, MIME 392) and pay associated fees by the Course Change (add/drop) registration deadline. Before registering for any work term course, students must contact the Mining Co-op Liaison Officer for approval.

#### **Required Year 0 (Freshman) Courses**

29 credits

Generally, students admitted to Engineering from Quebec CEGEPs are granted transfer credit for these Year 0 (Freshman) courses and enter a 121- to 123-credit program.

F



37 credits

CIVE 205	(3)	Statics
CIVE 207	(4)	Solid Mechanics
COMP 208	(3)	Computer Programming for Physical Sciences and Engineering
ECSE 209	(3)	Electrotechnology
EPSC 221	(3)	General Geology
EPSC 225	(1)	Properties of Minerals
FACC 100*	(1)	Introduction to the Engineering Profession
FACC 250	(0)	Responsibilities of the Professional Engineer
FACC 300	(3)	Engineering Economy
FACC 400	(1)	Engineering Professional Practice
MATH 262	(3)	Intermediate Calculus
MATH 263	(3)	Ordinary Differential Equations for Engineers
MATH 264	(3)	Advanced Calculus for Engineers
MECH 289	(3)	Design Graphics
WCOM 206	(3)	Communication in Engineering

\* Note: FACC 100 (Introduction to the Engineering Profession) must be taken during the first year of study.

### Required Mining Engineering Courses

53 credits

MIME 200	(3)	Introduction to the Minerals Industry
MIME 203	(2)	Mine Surveying
MIME 209	(3)	Mathematical Applications
MIME 260	(3)	Materials Science and Engineering
MIME 290	(2)	Industrial Work Period 1
MIME 291	(2)	Industrial Work Period 2
MIME 322	(3)	Rock Fragmentation
MIME 323	(3)	Rock and Soil Mass Characterization
MIME 325	(3)	Mineral Industry Economics
MIME 333	(3)	Materials Handling
MIME 340	(3)	Applied Fluid Dynamics
MIME 341	(3)	Introduction to Mineral Processing
MIME 392	(2)	Industrial Work Period 3
MIME 413	(3)	Strategic Mine Planning With Uncertainty
MIME 419	(3)	Surface Mining
MIME 422	(3)	Mine Ventilation
MIME 425	(3)	Applied Stochastic Orebody Modelling
MIME 426	(6)	Mine Design and Prefeasibility Study

### Complementary Courses

31-32 credits

17 credits from one of Stream A or Stream B

### Stream A - CEGEP Students

CEGEP students must take the following courses:

Mécanique des roches et contrôle des terrains



HISP 226	(3)	Hispanic Civilization 2
INDR 294*	(3)	Introduction to Labour-Management Relations
INTG 201**	(3)	Integrated Management Essentials 1
INTG 202**	(3)	Integrated Management Essentials 2
MATH 338	(3)	History and Philosophy of Mathematics
MGCR 222*	(3)	Introduction to Organizational Behaviour
MGCR 352*	(3)	Principles of Marketing
ORGB 321*	(3)	Leadership
ORGB 423*	(3)	Human Resources Management

\* Note: Management courses have limited enrolment and registration dates. See Important Dates at <http://www.mcgill.ca/importantdates>.

\*\* Note: INTG 201 and INTG 202 are not open to students who have taken certain Management courses. Please see the INTG 201 and INTG 202 course information for a list of these courses.

\*\*\* If you are uncertain whether or not a course principally imparts language skills, please see an adviser in the McGill Engineering Student Centre (Frank Dawson Adams Building, Room 22) or email an adviser.

Note regarding language courses: Language courses are not accepted to satisfy the Complementary Studies Group B requirement, effective for students who entered the program as of Fall 2017.

## 12.8 Urban Planning

### 12.8.1 Location

Macdonald-Harrington Building, Room 400  
 815 Sherbrooke Street West  
 Montreal QC H3A 0C2  
 Telephone: 514-398-4075  
 Fax: 514-398-8376  
 Email: [admissions.planning@mcgill.ca](mailto:admissions.planning@mcgill.ca)  
 Website: [mcgill.ca/urbanplanning](http://mcgill.ca/urbanplanning)

### 12.8.2 About the School of Urban Planning

Urban planning can be described as the collective management of urban growth and development. It is concerned with the welfare of communities, control of how land is accessed and used by private parties, design of the built environment (including transportation and communication networks), and conservation and enhancement of healthy ecosystems. Contemporary preoccupations include addressing the climate emergency, embracing interculturalism in planning and governance, enhancing public health, and striving for just sustainabilities. It is at once a technical and a political process that brings together actors from the public, private, and community spheres. Planners participate in that process in a variety of ways, as designers and analysts, advocates and mediators, facilitating the search for equitable and efficient solutions to problems of urban change and development.

The 19th-century origins of modern urban planning as a profession were largely in response to the appalling sanitary, social, and economic conditions of rapidly-developing industrial cities. Initially, the disciplines of architecture, landscape architecture, civil engineering, and public health provided a nucleus of concerned professionals; beautification schemes and infrastructure works marked the early stages of public intervention in the 19th century. Architects, engineers, and public health specialists were joined by economists, sociologists, lawyers, and geographers as the complexities of the city's problems came to be more fully understood and public pressure mounted for their solution. Contemporary urban and regional planning techniques for survey, analysis, design, and implementation developed from an interdisciplinary synthesis of these various fields. This multidisciplinaryity is still a hallmark of planning practice and of planning education. In recent decades, important transformations have included bringing the critical 'cultural turn' of social sciences to bear on planning, increased emphasis on social justice, and enhancing the strategic roles of planners as interdisciplinary actors working with peers in other professions on the challenges and opportunities of human settlements in the Global North and South.

McGill was the first uni

the use of big data in public policy. Cross-disciplinary work in urban design and landscape planning continues apace and increasing emphasis is now placed on resilience, social equity, and redistributive justice.

The objective of the School is to enable urban planners to exercise leadership in the public, private, and community sectors. Training is provided at the graduate level. The main degree offered is the **Master of Urban Planning (M.U.P.)**. Many specializations are possible within the program, including two formal concentrations in Transportation Planning and in Urban Development and Urban Design. Details concerning these concentrations can be found at [mcgill.ca/urbanplanning/programs/mup-transportation-planning](http://mcgill.ca/urbanplanning/programs/mup-transportation-planning) (see also [tram.mcgill.ca](http://tram.mcgill.ca)), and at [mcgill.ca/urbanplanning/programs/mup-urban-development-and-urban-design](http://mcgill.ca/urbanplanning/programs/mup-urban-development-and-urban-design), respectively. Upon completion of the two-year program of studies, graduates are expected to have acquired basic planning skills, a broad understanding of urban issues, and specialized knowledge in a field of their own choice.

The professional program of study offered by the School is fully recognized by the *Ordre des Urbanistes du Québec* (O.U.Q.) and the Canadian Institute of Planners (C.I.P.). Graduates may become full members of the O.U.Q. and other provincial planning associations, and therefore of C.I.P., by completing their respective internship and examination requirements. For details concerning the M.U.P. admission requirements and curriculum, consult the School's [website](#).

Although the M.U.P. program is primarily a professional degree program, it does have an independent research component. The work done on the Supervised Research Project in the course of the second year of study qualifies for funding from federal agencies such as SSHRC and NSERC. Some students enter the M.U.P. program with fellowships from these agencies; others obtain them after joining the School, for their second year of study.

The School of Urban Planning hosts a number of events that are open to undergraduate students and to the public: the Brenda and Samuel Gewurz Lectures in Urban Design bring speakers of international calibre to McGill; and the Friday seminar series (held occasionally) brings speakers from academia, the profession, and the community to talk about contemporary urban issues.

For details of the M.U.P. admission requirements and curriculum, consult the [Faculty of Engineering](#) section for Graduate and Postdoctoral Studies. The School also offers a PhD program in Urban Planning, Policy and Design; information and admission requirements for this program can also be found on the Faculty website and on the School website.

### 12.8.3 Undergraduate Courses in Urban Planning

The following courses taught by faculty in the School of Urban Planning are open to undergraduate students:

Undergraduate Courses in Urban Planning		
ARCH 520	(3)	Montreal: Urban Morphology
URBP 201	(3)	Planning the 21st Century City
URBP 501	(2)	Principles and Practice 1
URBP 504	(3)	Planning for Active Transportation
URBP 505	(3)	Geographic Information Systems
URBP 506	(3)	Environmental Policy and Planning
URBP 507	(3)	Planning and Infrastructure
URBP 514	(4)	Community Design Workshop
URBP 519	(6)	Sustainable Development Plans
URBP 520	(3)	Globalization: Planning and Change
URBP 530	(3)	Urban Environmental Planning
URBP 536	(2)	Current Issues in Transportation 1
URBP 537	(2)	Current Issues in Transportation 2
URBP 541	(1)	Selected Topics in Planning
URBP 542	(1)	Selected Topics in Visual Analysis
URBP 551	(3)	Urban Design and Planning
URBP 553	(3)	Urban Governance
URBP 555	(3)	Real Estate and Planning
URBP 556	(3)	Urban Economy: A Spatial Perspective
URBP 557	(3)	Rethinking Zoning

### 12.8.4 Urban Planning Faculty

Director
Richard Shearmur

#### **Emeritus Professor**

Jane Matthews-Glenn

#### **Professor (Post-Retirement)**

David Brown

#### **Professors**

Ahmed El-Geneidy; Richard Shearmur.

#### **Associate Professors**

Madhav G. Badami.; Lisa Bornstein; Nik Luka; David Wachsmuth.

#### **Assistant Professor**

Anna Kramer

#### **Adjunct Professors**

Suzanne Doucet; Jayne Engle; Gorka Espiau; Nilson Espino; Murtaza Haider; Marc-André LeChasseur; Mario Polèse; Ray Tomalty.

#### **Associate Members**

Kevin Manaugh; Sarah Moser.

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## **12.9 Other Engineering Programs**

### **12.9.1 Bioresource Engineering**

The Faculty of Engineering cooperates with the Faculty of Agricultural and Environmental Sciences in providing courses of instruction for a fully accredited curriculum in bioresource engineering to meet requirements for a professional engineering degree awarded in the Faculty of Agricultural and Environmental Sciences. For details, refer to the B.Eng.(Bioresource) program requirements in [Faculty of Agricultural & Environmental Sciences > Undergraduate > Browse Academic Programs > Bachelor of Engineering \(Bioresource\) – B.Eng.\(Bioresource\)](#).

Some of the courses offered by the Department of Bioresource Engineering (subject code BREE) may be of interest to students in the Faculty of Engineering.

The Department of Bioresource Engineering is located in the Faculty of Agricultural and Environmental Sciences on the Macdonald Campus:

Department of Bioresource Engineering  
Macdonald-Stewart Building, Room MS1-028  
21,111 Lakeshore Road  
Sainte-Anne-de-Bellevue QC H9X 3V9  
Telephone: 514-398-7773  
Fax: 514-398-7990  
Website: [mcgill.ca/bioeng](http://mcgill.ca/bioeng)

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## **12.10 Minor Programs**

This section includes general information concerning minors that are designed for students in the Faculty of Engineering.

Minors are coherent sequences of courses taken in addition to the courses required for the B.Eng. or B.Sc.(Arch.) degree. Minors normally consist of 18–24 credits, allowing 6–12 credits of overlap with the degree program (see individual minor program requirements for specific information regarding course requirements of 9–18 for Arch.)

**Minor Programs:**

- *section 12.10.1: Bachelor of Engineering (B.Eng.) - Minor Aerospace Engineering (24 credits)*
- *section 12.10.2: Bachelor of Engineering (B.Eng.) - Minor Applied Artificial Intelligence (22-25 credits) (25 credits)*
- *section 12.10.3: Bachelor of Engineering (B.Eng.) - Minor Arts (24 credits)*
- *section 12.10.4: Bachelor of Engineering (B.Eng.) - Minor Biomedical Engineering (21 credits)*
- *section 12.10.5: Bachelor of Engineering (B.Eng.) - Minor Biotechnology (for Engineering Students) (24 credits)*
- *section 12.10.6: Bachelor of Engineering (B.Eng.) - Minor Chemistry (25 credits)*
- *section 12.10.7: Computer Science Courses and Minor Program*
- *section 12.10.8: Bachelor of Engineering (B.Eng.) - Minor Construction Engineering and Management (24 credits)*
- *section 12.10.9: Bachelor of Engineering (B.Eng.) - Minor Economics (18 credits)*
- *section 12.10.10: Minor in Environment*
- *section 12.10.11: Bachelor of Engineering (B.Eng.) - Minor Environmental Engineering (21 credits)*
- *section 12.10.12: Minor Programs in Finance, Management, Marketing, and Oper*

And

12 credits from one of the following streams:

Students may take one complementary course outside of their stream, but their selection must be approved by the Minor Adviser prior to the registration for the course.

**Aerodynamics and Propulsion Stream**

MECH 447	(3)	Combustion
MECH 516	(3)	Computational Gasdynamics
MECH 532	(3)	Aircraft Performance, Stability and Control
MECH 533	(3)	Subsonic Aerodynamics
MECH 535	(3)	Turbomachinery and Propulsion
MECH 539	(3)	Computational Aerodynamics
MECH 562	(3)	Advanced Fluid Mechanics
MECH 566	(3)	Fluid-Structure Interactions
MECH 579	(3)	Multidisciplinary Design Optimization

**Aircraft Structures Stream**

MECH 530	(3)	Mechanics of Composite Materials
MECH 536	(3)	Aerospace Structures
MECH 543	(3)	Design with Composite Materials
MECH 544	(3)	Processing of Composite Materials
MECH 546	(3)	Finite Element Methods in Solid Mechanics
MECH 550	(3)	Vibrations of Continuous Systems
MECH 551	(3)	Nonlinear Dynamics of Shell Structures
MECH 567	(3)	Structural Dynamics of Turbomachines
MIME 560	(3)	Joining Processes
MIME 565	(3)	Aerospace Metallic-Materials and Manufacturing Processes

**Spacecraft and Systems Stream**

GEOG 308	(3)	Remote Sensing for Earth Observation
MECH 513	(3)	Control Systems
MECH 536	(3)	Aerospace Structures
MECH 542	(3)	Spacecraft Dynamics
MECH 546	(3)	Finite Element Methods in Solid Mechanics
MECH 550	(3)	Vibrations of Continuous Systems
MECH 559	(3)	Engineering Systems Optimization
MIME 565	(3)	Aerospace Metallic-Materials and Manufacturing Processes
PHYS 320	(3)	Introductory Astrophysics

**Material and Processes Stream**

CHEE 515*	(3)	Interface Design: Biomimetic Approach
CHEE 541	(3)	Electrochemical Engineering
CHEE 543	(3)	Plasma Engineering



MECH 544	(3)	Processing of Composite Materials
MIME 512	(3)	Corrosion and Degradation of Materials
MIME 515*	(3)	(Bio)material Surface Analysis and Modification
MIME 559	(3)	Aluminum Physical Metallurgy
MIME 560	(3)	Joining Processes
MIME 563	(3)	Hot Deformation of Metals
MIME 565	(3)	Aerospace Metallic-Materials and Manufacturing Processes
MIME 571	(3)	Surface Engineering
MIME 580	(3)	Additive Manufacturing Using Metallic and Ceramic Materials

\* Students may choose only one of CHEE 515 or MIME 515.

### Avionics Stream

ECSE 403	(4)	Control
ECSE 408	(4)	Communication Systems
ECSE 412	(3)	Discrete Time Signal Processing
ECSE 420	(3)	Parallel Computing
ECSE 421	(3)	Embedded Systems
ECSE 422	(3)	Fault Tolerant Computing
ECSE 425	(3)	Computer Architecture
ECSE 427	(3)	Operating Systems
ECSE 429	(3)	Software Validation
ECSE 444	(4)	Microprocessors
ECSE 465	(3)	Power Electronic Systems
ECSE 501	(3)	Linear Systems
ECSE 507	(3)	Optimization and Optimal Control
ECSE 511	(3)	Introduction to Digital Communication
ECSE 512	(3)	Digital Signal Processing 1
ECSE 513	(3)	Robust Control Systems
ECSE 516	(3)	Nonlinear and Hybrid Control Systems
ECSE 524	(3)	Interconnects and Signal Integrity
ECSE 565	(3)	Introduction to Power Electronics
ECSE 593	(3)	Antennas and Propagation

### 12.10.2 Bachelor of Engineering (B.Eng.) - Minor Applied Artificial Intelligence (22-25 credits) (25 credits)

The B.Eng.; Minor in Applied Artificial Intelligence, open to all engineering students, is designed to provide the foundation for applications of AI techniques in various fields of interest.

Students must complete 7 courses as follows. Up to three courses can be double counted with the major.

#### Complementary Courses (22-25)

Group A

3 credits from the following:

COMP 250*	(3)	Introduction to Computer Science
ECSE 250*	(3)	Fundamentals of Software Development

\* COMP 250 and ECSE 250 cannot both be taken.

Group B

4 credits from the following:

COMP 551*	(4)	Applied Machine Learning
ECSE 551*	(4)	Machine Learning for Engineers

\* ECSE 551 and COMP 551 cannot both be taken

Group C

3 credits from the following:

ECSE 343	(3)	Numerical Methods in Engineering
MATH 223	(3)	Linear Algebra
MATH 247	(3)	Honours Applied Linear Algebra
MATH 271	(3)	Linear Algebra and Partial Differential Equations

Group D

3 credits from the following:

AEMA 310	(3)	Statistical Methods 1
CIVE 302	(3)	Probabilistic Systems
ECSE 205	(3)	Probability and Statistics for Engineers
MATH 203	(3)	Principles of Statistics 1
	(3)	Probability

Or any 400 or 500 level special topics courses in the area of artificial intelligence with the approval of the Electrical and Computer Engineering department.

### **12.10.3 Bachelor of Engineering (B.Eng.) - Minor Arts (24 credits)**

Minor Adviser: Faculty Student Adviser in the Engineering Student Centre (Frank Dawson Adams Building, Room 22)

B.Sc.(Arch.), and B.Eng., students may obtain the Arts Minor as part of their B.Eng., or B.Sc.(Arch.) degree by completing 24 credits, as described below.

Students must select courses for this Minor in consultation with one of the Advisers indicated above.

All courses in the Minor must be passed with a grade of C or better.

#### **Requirements**

24 credits as follows:

- a) At least two areas of concentration in the Faculty of Arts must be chosen, with a minimum of 6 credits in any one area.
- b) At least 12 credits must be at the 300 level or higher.

In general, B.Eng. students may use courses from the Complementary Studies lists (Group A and Group B) in their program that are offered by the Faculty of

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**

BIEN 340	(3)	Transport Phenomena in Biological Systems 2
		Ph

MIME 362	(3)	Mechanical Properties
MIME 470	(3)	Engineering Biomaterials
PHYS 534	(3)	Nanoscience and Nanotechnology

### Biomechanics and Prosthetics

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

\* Students choose either CHEE 563 or MECH 563.

### Medical Physics and Imaging

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

\* Students choose either BIEN 350 or ECSE 206.

### Neural Systems and Biosignal Processing

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

\* Students choose either BIEN 350 or ECSE 206.

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

#### **12.10.5 Bachelor of Engineering (B.Eng.) - Minor Biotechnology (for Engineering Students) (24 credits)**

Minor Adviser: Faculty Student Adviser in the McGill Engineering Student Centre (Student Affairs Office) (Frank Dawson Adams Building, Room 22).  
For advising regarding Science courses, contact Nancy Nelson, Undergraduate Adviser, Department of Biology, Faculty of Science.

This Minor is offered by the Faculty of Engineering and the Faculty of Science for students who wish to take biotechnology courses that are complementary to their area. It has been designed specifically for Chemical Engineering students; other Engineering students who are interested in the Minor should contact a Faculty Student Adviser in the McGill Engineering Student Centre (Student Affairs Office) (Frank Dawson Adams Building, Room 22).

To obtain the Biotechnology Minor

## **Immunology**

ANAT 261	(4)	Introduction to Dynamic Histology
BIOC 503	(3)	Biochemistry of Immune Diseases
MIMM 214	(3)	Introductory Immunology: Elements of Immunity
MIMM 414	(3)	Advanced Immunology
PHGY 513	(3)	Translational Immunology

## **Management**

Note: Engineering students may not use these courses to count toward a Management minor, nor toward the Complementary Studies requirement.

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PHAR 563	(3)	Endocrine Pharmacology
PHGY 518	(3)	Artificial Cells

### Pollution

Note: Engineering students may not use these courses to count toward the Environmental Engineering Minor.

CIVE 225	(4)	Environmental Engineering
CIVE 430	(3)	Water Treatment and Pollution Control
CIVE 557	(3)	Microbiology for Environmental Engineering

## 12.10.6 Bachelor of Engineering (B.Eng.) - Minor Chemistry (25 credits)

Minor Adviser (program coordinator): Dr. Samuel Sewall (Director of Undergraduate Studies, Chemistry)

Program credit weight: 25 credits

A passing grade for courses in the Minor is a C.

### Required Courses

10 credits

CHEE 310*	(3)	Physical Chemistry for Engineers
CHEM 212	(4)	Introductory Organic Chemistry 1
CHEM 233*	(3)	Topics in Physical Chemistry
CHEM 234**	(3)	Topics in Organic Chemistry

\* Students choose either CHEM 233 or CHEE 310

\*\* or CEGEP equivalent

### Complementary Courses

15 credits from the following lists, two courses of which must be laboratory courses (\* indicates lab).

Note that CHEM 212 is a prerequisite for most of the courses listed below, and CHEM 213 (Introductory Physical Chemistry 1) and CHEM 273 (Introductory Physical Chemistry 2) or their equivalents are prerequisites for the Physical Chemistry courses. If students take CHEM 222 (Introductory Organic Chemistry 2), which includes a lab, instead of CHEM 234, they will receive 21.949 423aE41 0 004 TmR TmR T35 0 13274.047 318.80 r9 Tm (Reust be laboratory , bnts tak)Tj1 5



**Physical Chemistry**

CHEM 345	(3)	Introduction to Quantum Chemistry
CHEM 355	(3)	Applications of Quantum Chemistry
CHEM 493*	(2)	Advanced Physical Chemistry Laboratory
CHEM 574	(3)	Introductory Polymer Chemistry

**12.10.7 Computer Science Courses and Minor Program**

### Complementary Courses

18-19 credits

3 credits from the following:

COMP 302	(3)	Programming Languages and Paradigms
COMP 303	(3)	Software Design

3 credits from the following:

COMP 273	(3)	Introduction to Computer Systems
ECSE 222*	(3)	Digital Logic

3-4 credits from the following:

CHEE 390	(3)	Computational Methods in Chemical Engineering
CIVE 320	(4)	Numerical Methods
COMP 350	(3)	Numerical Computing
ECSE 343	(3)	Numerical Methods in Engineering
MATH 317	(3)	Numerical Analysis
MECH 309	(3)	Numerical Methods in Mechanical Engineering

9 credits from:

COMP 251	(3)	Algorithms and Data Structures
MATH 240	(3)	Discrete Structures

COMP courses at the 300 level or above except COMP 396, COMP 400.

It is strongly recommended that students take COMP 251, as it is a prerequisite of many later computer science courses.

\* Students who have taken ECSE 221 may use it instead of ECSE 222 or COMP 273.

### 12.10.8 Bachelor of Engineering (B.Eng.) - Minor Construction Engineering and Management (24 credits)

This Minor covers construction project management, law related to construction, labour-management relations, financial accounting and project finance, in addition to topics in other construction-related fields, architecture or mining engineering.

All courses in the Minor must be passed with a grade of C or better.

A maximum of 12 credits of coursework in the student's major may double-count with the Minor.

Minor Adviser: Prof. L. Chouinard, Macdonald Engineering Building, Room 491 (Telephone: 514-398-6446)

Minor program credit weight: 24 credits

Note: This Minor is particularly designed for Civil Engineering students, but is open to all B.Eng. and B.Sc.(Arch.) students.

All courses in the Minor must be passed with a grade of C or better.

### Prerequisites

CIVE 208	(3)	Civil Engineering System Analysis
CIVE 302	(3)	Probabilistic Systems
COMP 208	(3)	Computer Programming for Physical Sciences and Engineering
FACC 300	(3)	Engineering Economy

**Required Courses: Management and Law (15 credits)**

## Complementary Courses

9 credits from:

ECON 225	(3)	Economics of the Environment
ECON 303	(3)	Canadian Economic Policy
ECON 304	(3)	Financial Instruments and Institutions
ECON 305	(3)	Industrial Organization
ECON 306	(3)	Labour Markets and Wages
ECON 308	(3)	Governmental Policy Towards Business
ECON 313	(3)	Economic Development 1
ECON 314	(3)	Economic Development 2
ECON 316	(3)	The Underground Economy
ECON 326	(3)	Ecological Economics
ECON 330D1	(3)	Macroeconomic Theory
ECON 330D2	(3)	Macroeconomic Theory
ECON 335	(3)	The Japanese Economy
ECON 336	(3)	The Chinese Economy
ECON 337	(3)	Introductory Econometrics 1
ECON 344	(3)	Industrial Revolution and Economic Development
ECON 345	(3)	The International Economy since 1914
ECON 347	(3)	Economics of Climate Change
ECON 405	(3)	Natural Resource Economics
ECON 406	(3)	Topics in Economic Policy
ECON 408	(3)	Public Sector Economics 1
ECON 409	(3)	Public Sector Economics 2
ECON 411	(3)	Economic Development: A World Area
ECON 416	(3)	Topics in Economic Development 2
ECON 420	(3)	Topics in Economic Theory
ECON 426	(3)	Labour Economics
ECON 434	(3)	Current Economic Problems
ECON 440	(3)	Health Economics
ECON 468	(3)	Econometrics 1 - Honours
ECON 469	(3)	Econometrics 2 - Honours
ECON 525	(3)	Project Analysis
ECON 546	(3)	Game Theory

Note: Mining Engineering students are permitted to include MIME 526 Mineral Economics among the Complementary Courses.

### 12.10.10 Minor in Environment

Environmental studies focus on the interactions between humans and their natural and technological environments. Environmental problems are complex, and their satisfactory solutions require the synthesis of social, scientific, and institutional knowledge.

The Minor in Environment is offered and administered by the Bieler School of Environment.

Since the program comprises a total of 18 credits for the Minor, additional credits beyond those needed for the B.Eng. degree are required. Students wishing to complete the Minor should prepare a program and have it approved by both their regular Engineering departmental adviser and the Minor program adviser. For program details, see [Bieler School of Environment > Undergraduate > Browse Academic Programs > : Minor in Environment](#).



**Note:** Engineering students interested in this Minor must submit a completed Course Authorisation Form to the [McGill Engineering Student Centre](#) (Student Affairs Office; Frank Dawson Adams Building, Room 22).

**Minor Adviser:** Students interested in this Minor should contact:

Kathy Roulet  
Bieler School of Environment Program Adviser  
Telephone: 514-398-4306  
Email: [kathy.roulet@mcgill.ca](mailto:kathy.roulet@mcgill.ca)

### **12.10.11 Bachelor of Engineering (B.Eng.) - Minor Environmental Engineering (21 credits)**

Minor Adviser: Prof. S. Ghoshal, Prof. D. Frigon Macdonald Engineering Building, Room 569C

Minor program credit weight: 21-22 credits

The Environmental Engineering Minor is administered by the Department of Civil Engineering and is offered for all students in Engineering and in the Department of Bioresource Engineering wishing to pursue studies in this area.

A maximum of 12 credits of coursework in the student's major may double-count with the artmep7sfitmajorPble-count wit.2(Minor 12 credij1 1.693 655.23 Tm(T)71.8

CIVE 452                   (3)                   Water Resources in Barbados

AND

One of the following cross-listed project courses (6 credits):

AGRI 519                   (6)                   Sustainable Development Plans  
CIVE 519                   (6)                   Sustainable Development Plans  
URBP 519                   (6)                   Sustainable Development Plans

**Stream C**

9 credits of courses specified from the "Barbados Interdisciplinary Tropical Studies (BITS)" field semester below, provided the project has sufficient environmental engineering content (project requires approval of the Coordinator of the Minor):

AEBI 425                   (3)                   Tropical Energy and Food  
AEBI 427                   (6)                   Barbados Interdisciplinary Project

AND

9 credits chosen from the Engineering Course List below, excluding CHEE 496.

**Engineering Course List**

CIVE 572	(3)	Computational Hydraulics
CIVE 573	(3)	Hydraulic Structures
CIVE 574	(3)	Fluid Mechanics of Water Pollution
CIVE 577	(3)	River Engineering
CIVE 584	(3)	Mechanics of Groundwater Flow
MECH 447	(3)	Combustion
MECH 534	(3)	Air Pollution Engineering
MECH 535	(3)	Turbomachinery and Propulsion
MIME 422	(3)	Mine Ventilation
MIME 512	(3)	Corrosion and Degradation of Materials
MPMC 328	(3)	Environnement et gestion des rejets miniers
URBP 506	(3)	Environmental Policy and Planning

\*\* Not open to students who have passed BREE 217.

### Non-Engineering Course List

Courses offered at the Macdonald campus:

LSCI 230+ (3) Introductory Microbiology

MICR 331.949 458.941 Tm(MicroTj1 0 0 1 75MICR 331.949 458.331 0 0 1 298.3sm96 Tmj1 0 0 1 70crg1 0 0 1 165j1 0 0 1 14.3sm96 Tmj1 athogeer it1 70.52 458

### 12.10.12 Minor Programs in Finance, Management, Marketing, and Operations Management

**Prerequisite: None**

Minors for Non-Management Students: Students considering one of these Minor programs should consult a Faculty Student Adviser in the [McGill Engineering Student Centre](#) (Student Affairs Office; Frank Dawson Adams Building, Room 22) before applying to the Desautels Faculty of Management.

Many engineers begin to assume management functions within a few years of graduation. They can, at this stage, take up the study of economics, behavioural science, and other management subjects. Students wishing to include such studies in their undergraduate program can take suitable courses from Engineering and Management.

Each Minor comprises 18 credits of courses available from the core program of the Desautels Faculty of Management (subject to timetable requirements). Some courses from the Management core program have considerable overlap with Engineering courses and thus are not available to Engineering students.

Students embarking on a minor must be prepared to take credits additional to their Engineering program. Students in a B.Eng. program may be able to count up to 6 credits of Complementary Studies Group B courses (Humanities and Social Sciences, Management Studies, and Law courses) toward both their Engineering major program and a Management minor where applicable. More information about Complementary Studies is given in each individual academic program listing for the B.Eng. degree (see [section 12: Browse Academic Units & Programs](#)).

Admission requirements for the Management Minors change annually. Please consult the [Desautels Faculty of Management website](#) for more details.

Students planning to take any course with statistics as a prerequisite must have completed MGCR 271 (Business Statistics) or an equivalent course approved by the BCom Student Affairs Office.

**Application and Program Requirements**

Detailed information on the following Minor programs can be found in [Desautels Faculty of Management > Undergraduate > Overview of Programs Offered by the Desautels Faculty of Management > : Minory can, at tTj0 0 1 rg0 0 1 RG/F2 80 1 5m\(ement\)Tj0206.689 467.541 Tmogram. Stm\(ams\)Tj0 G0 g/F1 8.1 Tj](#)



MIME 512	(3)	Corrosion and Degradation of Materials
MIME 560	(3)	Joining Processes
MIME 561	(3)	Advanced Materials Design
MIME 563	(3)	Hot Deformation of Metals
MIME 569	(3)	Electron Beam Analysis of Materials

### 12.10.14 Bachelor of Engineering (B.Eng.) - Minor Mathematics (18 credits)

The B.Eng.; Minor in Mathematics provides students with an even stronger foundation in mathematics to further develop their knowledge of this subject. Students enrolled in the B.Eng.; Minor in Mathematics complete a series of mathematics courses offered by the Department of Mathematics and Statistics, or other units offering mathematics courses.

Minor Adviser: Faculty Student Adviser in the McGill Engineering Student Centre (Student Affairs Office) (Frank Dawson Adams Building, Room 22) AND an adviser designated by the Department of Mathematics and Statistics. (Please consult the Department of Mathematics and Statistics for the name of this adviser.) Selection of courses must be undertaken in conjunction with the Minor Advisers, normally beginning in the U2 year.

Note: The B.Eng.; Minor in Mathematics is open to all students in the Faculty of Engineering (including students registered in the B.Sc.(Arch.)). A maximum of 9 credits of overlap (double-counting) with the degree program is allowed.

Engineering students must obtain a grade of C or better in courses approved for this Minor.

#### Required Course (3 credits)

MATH 242	(3)	Analysis 1
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#### Complementary Courses (15 credits)

3 credits selected from:

MATH 223	(3)	Linear Algebra
MATH 247	(3)	Honours Applied Linear Algebra

6-12 credits selected from:

ECSE 205*	(3)	Probability and Statistics for Engineers
MATH 204	(3)	Principles of Statistics 2
MATH 240	(3)	Discrete Structures
MATH 243	(3)	Analysis 2
MATH 264	(3)	Advanced Calculus for Engineers
MATH 271**	(3)	Linear Algebra and Partial Differential Equations
MATH 316	(3)	Complex Variables
MATH 319**	(3)	Partial Differential Equations
MATH 323*	(3)	Probability
MATH 324*	(3)	Statistics
MATH 326	(3)	Nonlinear Dynamics and Chaos
MATH 340	(3)	Discrete Mathematics
MATH 378	(3)	Nonlinear Optimization
MATH 417	(3)	Linear Optimization
MATH 427	(3)	Statistical Quality Control
MATH 447	(3)	Introduction to Stochastic Processes
MATH 463	(0)	
MATH 475	(3)	Honours Partial Differential Equations

MATH 478	(3)	Computational Methods in Applied Mathematics
MATH 563	(0)	

\* Students who take ECSE 205 may not take MATH 323 or MATH 324.

\*\* Students may take MATH 271 or MATH 319 but not both.

0-6 credits chosen from (200- to 500-level) Mathematics and Statistics courses approved for the B.Sc. Major Mathematics or B.Sc. Honours Mathematics programs, or from mathematics courses offered in other units. The courses in this category must be chosen in consultation with, and approved by, the Minor Adviser from the Department of Mathematics and Statistics.

Note: MATH 262, MATH 263 (or any course with substantial overlap in content with these two courses) and/or MATH 338 cannot be credited towards this minor.

### 12.10.15 Bachelor of Engineering (B.Eng.) - Minor Mining Engineering (23 credits)

Minor Adviser: Prof. Mustafa Kumral (Minor Coordinator)

Frank Dawson Adams Building, Room 119

Program credit weight: 23 credits

One of the required courses is a work term for which enrolment may be limited.

#### Required Courses

14 credits

MIME 200	(3)	Introduction to the Minerals Industry
MIME 291	(2)	Industrial Work Period 2
MIME 322	(3)	Rock Fragmentation
MIME 325	(3)	Mineral Industry Economics
MIME 333	(3)	Materials Handling

#### Complementary Courses

9 credits

#### List A: Mining Engineering

3-9 credits from the following:

MIME 320	(3)	Extraction of Energy Resources
MIME 323	(3)	Rock and Soil Mass Characterization
MIME 341	(3)	Introduction to Mineral Processing
MIME 419	(3)	Surface Mining
MIME 422	(3)	Mine Ventilation
MIME 520	(3)	Stability of Rock Slopes
MIME 521	(3)	Stability of Underground Openings

### List C: Civil Engineering

0-6 credits from the following:

CIVE 416	(3)	Geotechnical Engineering
CIVE 451	(3)	Geoenvironmental Engineering
CIVE 462	(3)	Design of Steel Structures
CIVE 463	(3)	Design of Concrete Structures
CIVE 527	(3)	Renovation and Preservation: Infrastructure

### List D: Chemical Engineering

0-6 credits from the following:

CHEE 453	(4)	Process Design
CHEE 455	(3)	Process Control
CHEE 484	(3)	Materials Engineering

### List E: Electrical Engineering

0-6 credits from the following:

ECSE 404	(3)	Control Systems
ECSE 426	(3)	Microprocessor Systems
ECSE 436	(3)	Signal Processing Hardware
ECSE 451	(3)	EM Transmission and Radiation
ECSE 464	(3)	Power Systems Analysis

## 12.10.16 Minor in Musical Science and Technology

The Musical Science and Technology Minor focuses on interdisciplinary topics in science and technology applied to music. The goal of the program is to help prepare students for commercial jobs in the audio technology sector and/or for subsequent graduate research study. Enrolment in the MST Minor is limited to students with existing scientific backgrounds from all faculties at McGill University. Selection is based on prior experience in math, computer programming, and related sciences; expressed interest in the program; and Cumulative Grade Point Average (CGPA).

Engineering students may apply for admission to the **Minor in Musical Science and**

- 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.

**Complementary Courses (21-22 credits)**

Group A

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

BIEN 510	(3)	Engineered Nanomaterials for Biomedical Applications
BMDE 508	(3)	Introduction to Micro and Nano-Bioengineering
CHEE 521*	(3)	Nanomaterials and the Aquatic Environment

ECSE 423	(3)	Fundamentals of Photonics
ECSE 430	(3)	Photonic Devices and Systems
ECSE 433	(4)	Physical Basis of Transistor Devices
ECSE 519**	(3)	Semiconductor Nanostructures and Nanophotonic Devices
ECSE 536**	(3)	RF Microelectronics
ECSE 571**	(3)	Optoelectronic Devices
ECSE 596**	(3)	Optical Waveguides
MIME 262*	(3)	Properties of Materials in Electrical Engineering

#### Mechanical Engineering

MECH 500***	(3)	Selected Topics in Mechanical Engineering
MECH 553	(3)	Design and Manufacture of Microdevices
MECH 556	(3)	Microfluidics and BioMEMS
MIME 260*	(3)	Materials Science and Engineering

#### Materials Engineering

MIME 261*	(3)	Structure of Materials
MIME 467	(3)	Electronic Properties of Materials
MIME 515*	(3)	(Bio)material Surface Analysis and Modification
MIME 542	(3)	Transmission Electron Microscopy
MIME 558	(3)	Engineering Nanomaterials
MIME 569	(3)	Electron Beam Analysis of Materials
MIME 571	(3)	Surface Engineering

#### Pharmacology

PHAR 504	(3)	Drug Discovery and Development 2
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#### Physics

BIOL 319*	(3)	Introduction to Biophysics
PHYS 319*	(3)	Introduction to Biophysics
PHYS 346	(3)	Majors Quantum Physics
PHYS 558	(3)	Solid State Physics

\* Students can take only one course from each set of the following courses:

- MIME 260, MIME 261, MIME 262 or CHEE 380
- CHEE 515 or MIME 515
- CHEE 521 or CIVE 521
- CHEM 534 or PHYS 534
- BIOL 319 or PHYS 319

^ 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.



6 credits from the following:

COMP 302	(3)	Programming Languages and Paradigms
COMP 409	(3)	Concurrent Programming
COMP 421	(3)	Database Systems
COMP 424*	(3)	Artificial Intelligence
COMP 527	(3)	Logic and Computation
ECSE 326	(3)	Software Requirements Engineering
ECSE 420	(3)	Parallel Computing
ECSE 421	(3)	Embedded Systems
ECSE 422	(3)	Fault Tolerant Computing
ECSE 424	(3)	Human-Computer Interaction
ECSE 425	(3)	Computer Architecture
ECSE 427	(3)	Operating Systems
ECSE 429	(3)	Software Validation
ECSE 437	(3)	Software Delivery
ECSE 439*	(3)	Software Language Engineering
ECSE 446*+	(3)	Realistic Image Synthesis
ECSE 526*+	(3)	Artificial Intelligence
ECSE 539*+	(4)	Advanced Software Language Engineering
ECSE 546*+	(4)	Advanced Image Synthesis

\*Students may choose only one course in each of the following sets:

- COMP 250 and ECSE 250
- COMP 424 and ECSE 526
- ECSE 439 and ECSE 539
- ECSE 446 and ECSE 546

+ Restricted to Honours students or Computer Engineering or

Electrical Engineering students with CGPA of at least 3.0 and B+ or better in prerequisites

### 12.10.20 Bachelor of Engineering (B.Eng.) - Minor Technological Entrepreneurship (18 credits)

Minor Adviser: Faculty Student Adviser in the McGill Engineering Student Centre (Student Affairs Office) (Frank Dawson Adams Building, Room 22).

This Minor is a collaboration of the Faculty of Engineering and Desautels Faculty of Management and is designed to provide Engineering (B.Eng. and B.Sc. (Arch.)) students with an understanding of how to conceptualize, develop, and manage successful new ventures – including for-profit private companies, social enterprises, and cooperatives as well as intrapreneurship initiatives. The program covers the essentials of management and is multidisciplinary and integrative. Many courses in the Minor will address a mix of students from across multiple McGill faculties.

B.Eng. students may double-count up to two courses (6 credits) of Complementary Studies (Group B., Humanities, and Social Science courses) toward the Minor. B.Eng. Mechanical Engineering students may double-count up to 6 credits of Complementary Studies Group B courses and/or Elective courses (for Mechanical Engineering students from a CEGEP background) toward the Minor.

This Minor is restricted to students in Year 2 or higher. Students in this Minor are not permitted to take the Desautels Minors in Management, Marketing, Finance or Operations Management (for non-Management students).

#### Required Courses (12 credits)

FACC 500	(3)	Technology Business Plan Design
INTG 201	(3)	Integrated Management Essentials 1
INTG 202	(3)	Integrated Management Essentials 2
MGPO 362	(3)	Fundamentals of Entrepreneurship

**Complementary Courses (6 credits)**

3-6 credits from the following:

FACC 501	(3)	Technology Business Plan Project
MGPO 364	(3)	Entrepreneurship in Practice

0-3 credits from the following:

BUSA 465	(3)	Technological Entrepreneurship Innovation for Non-La
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