



**Faculty of Engineering, including Schools of
Architecture and Urban Planning
Programs, Courses and University Regulations
2014-2015**

This PDF excerpt of *Programs, Courses and University Regulations* is an archived snapshot of the web content on the date that appears in the footer of the PDF.

Archival copies are available at www.mcgill.ca/study.

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

- 1 . McGill University reserves the right to make changes to the information contained in this online publication - including correcting errors, altering fees, schedules of admission, and credit requirements, and revising or cancelling particular courses or programs - without prior notice.
- 2 . In the interpretation of academic regulations, the Senate is the final authority.
- 3 . Students are responsible for informing themselves of the University's procedures, policies and regulations, and the specific requirements associated with the degree, diploma, or certificate sought.
- 4 . All students registered at McGill University are considered to have agreed to act in accordance with the University procedures, policies and regulations.
- 5 . Although advice is readily available on request, the responsibility of selecting the appropriate courses for graduation must ultimately rest with the student.
- 6 . Not all courses are offered every year and changes can be made after publication. Always check the Minerva Class Schedule link at https://horizon.mcgill.ca/pban1/bwckschd.p_disp_dyn_sched for the most up-to-date information on whether a course is offered.
- 7 . The academic publication year begins at the start of the Fall semester and extends through to the end of the Winter semester of any given year. Students who begin study at any point within this period are governed by the regulations in the publication which came into effect at the start of the Fall semester.
- 8 . Notwithstanding any other provision of the publication, it is expressly understood by all students that McGill University accepts no responsibility to provide any course of instruction, program or class, residential or other services including the normal range of academic, residential and/or other services in circumstances of utility interruptions, fire, flood, strikes, work stoppages, labour disputes, war, insurrection, the operation of law or acts of God or any other cause (whether similar or dissimilar to those enumerated) which reasonably prevent their provision.

Note: Throughout this publication, "you" refers to students newly admitted, readmitted or returning to McGill.

Publication Information

Published by

Enrolment Services

McGill University
3415 McTavish Street
Montreal, Quebec, H3A 0C8
Canada

All contents copyright © 2014 by McGill University. All rights reserved, including the right to reproduce this publication, or portions thereof, in any form.

McGill University reserves the right to make changes to the information contained in this publication - including correcting errors, altering fees, schedules of admission and credit requirements, and revising or cancelling particular courses or programs - without prior notification.

Not all courses are offered every year and changes can be made after publication. Always check the Minerva Class Schedule link at https://horizon.mcgill.ca/pban1/bwckschd.p_disp_dyn_sched for the most up-to-date information on whether a course is offered.

- 1 About the Faculty of Engineering, page 9
- 2 History of the Faculty, page 9
- 3 Engineering Microcomputing Facility, page 10
- 4 Schulich Library of Science and Engineering, page 10
- 5 About the Faculty of Engineering (Undergraduate), page 10
 - 5.1 Location, page 11
 - 5.2 Administrative Officers, page 11
- 6 Degrees and Requirements for Professional Registration, page 12
- 7 Admission Requirements, page 12
- 8 Student Progress, page 12
- 9 Student Activities, page 13
- 10 Degrees and Programs Offered, page 13
- 11 Engineering Internship Program, page 14
 - 11.1 Student Eligibility, page 14
- 12 Academic Programs, page 15
 - 12.1 General Engineering Program, page 15
 - 12.1.1 Bachelor of Engineering (B.Eng.) - General Engineering - Undeclared (30 credits) , page 15
 - 12.2 School of Architecture, page 16
 - 12.2.1 Location, page 16
 - 12.2.2 About the School of Architecture, page 16
 - 12.2.3 Architectural Certification in Canada, page 17
 - 12.2.4 Programs of Study, page 17
 - 12.2.4.1 Student Exchanges, page 17
 - 12.2.5 Ancillary Academic Facilities, page 17
 - 12.2.6 School of Architecture Faculty, page 17
 - 12.2.7 Bachelor of Science (B.Sc.) (Architecture) - Architecture (126 credits) , page 19
 - 12.3 Department of Bioengineering, page 21
 - 12.3.1 Location, page 21
 - 12.3.2 About the Department of Bioengineering, page 21
 - 12.3.3 Courses in Bioengineering, page 21
 - 12.3.4 Department of Bioengineering Faculty, page 21
 - 12.4 Department of Chemical Engineering, page 22
 - 12.4.1 Location, page 22
 - 12.4.2 About the Department of Chemical Engineering, page 22
 - 12.4.3 Academic Program, page 22
 - 12.4.4 Canadian Society for Chemical Engineering, page 23
 - 12.4.5 Department of Chemical Engineering Faculty, page 23
 - 12.4.6 Bachelor of Engineering (B.Eng.) - Chemical Engineering (142 credits) , page 23
 - 12.4.6.1 More about the B.Eng. Degree in Chemical Engineering, page 28
 - 12.5 Department of Civil Engineering and Applied Mechanics, page 28

-
- 12.5.1 Location, page 28
 - 12.5.2 About the Department of Civil Engineering and Applied Mechanics, page 28
 - 12.5.3 Academic Programs, page 28
 - 12.5.4 Department of Civil Engineering and Applied Mechanics Faculty, page 29
 - 12.5.5 Bachelor of Engineering (B.Eng.) - Civil Engineering (139 credits) , page 30
 - 12.6 Department of Electrical and Computer Engineering, page 34
 - 12.6.1 Location, page 34
 - 12.6.2 About the Department of Electrical and Computer Engineering, page 34
 - 12.6.3 Department of Electrical and Computer Engineering Faculty, page 34
 - 12.6.4 Bachelor of Engineering (B.Eng.) - Electrical Engineering (138 credits) , page 36
 - 12.6.5 Bachelor of Engineering (B.Eng.) - Honours Electrical Engineering (138 credits) , page 42
 - 12.6.6 Bachelor of Engineering (B.Eng.) - Computer Engineering (139 credits) , page 45
 - 12.6.7 Bachelor of Software Engineering (B.S.E.) - Software Engineering (137 credits) , page 49
 - 12.7 Department of Mechanical Engineering, page 53
 - 12.7.1 Location, page 53
 - 12.7.2 About the Department of Mechanical Engineering, page 53
 - 12.7.3 Department of Mechanical Engineering Faculty, page 53
 - 12.7.4 Bachelor of Engineering (B.Eng.) - Mechanical Engineering (142 credits) , page 55
 - 12.7.5 Bachelor of Engineering (B.Eng.) - Honours Mechanical Engineering (142 credits) , page 59
 - 12.7.6 Bachelor of Engineering (B.Eng.) - Mechanical Engineering - Aeronautical Engineering (15 credits) , page 63
 - 12.7.7 Bachelor of Engineering (B.Eng.) - Honours Mechanical Engineering - Aeronautical Engineering (15 credits) , page 63
 - 12.7.8 Bachelor of Engineering (B.Eng.) - Mechanical Engineering - Design (15 credits) , page 64
 - 12.7.9 Bachelor of Engineering (B.Eng.) - Honours Mechanical Engineering - Design (15 credits) , page 65
 - 12.7.10 Bachelor of Engineering (B.Eng.) - Mechanical Engineering - Mechatronics (18 credits) , page 65
 - 12.7.11 Bachelor of Engineering (B.Eng.) - Honours Mechanical Engineering - Mechatronics (18 credits) , page 66
 - 12.8 Department of Mining and Materials Engineering, page 66
 - 12.8.1 Location, page 66
 - 12.8.2 About the Department of Mining and Materials Engineering, page 67
 - 12.8.2.1 Scholarships, page 67
 - 12.8.3 Department of Mining and Materials Engineering Faculty, page 67
 - 12.8.4 About Materials Engineering, page 69
 - 12.8.4.1 Materials Engineering (Co-op), page 69
 - 12.8.4.2 Student Advising , page 69
 - 12.8.4.3 Bachelor of Engineering (B.Eng.) - Materials Engineering CO-OP (148 credits) , page 69
 - 12.8.5 About Mining Engineering, page 73
 - 12.8.5.1 Mining Engineering (Co-op), page 73
 - 12.8.5.2 Student Advising , page 73
 - 12.8.5.3 Bachelor of Engineering (B.Eng.) - Mining Engineering CO-OP (150 credits) , page 73
 - 12.9 School of Urban Planning, page 77

-
- 12.9.1 Location, page 77
 - 12.9.2 About the School of Urban Planning, page 77
 - 12.9.3 Undergraduate Courses in Urban Planning, page 78
 - 12.9.4 School of Urban Planning Faculty, page 78
 - 12.10 Other Engineering Related Programs, page 79
 - 12.10.1 Bioresource Engineering, page 79
 - 12.10.2 Biomedical Engineering, page 80
 - 12.11 Minor Programs, page 80
 - 12.11.1 Arts Minor, page 80
 - 12.11.1.1 Bachelor of Engineering (B.Eng.) - Minor Arts (24 credits) , page 81
 - 12.11.2 Biomedical Engineering Minor, page 81
 - 12.11.2.1 Bachelor of Engineering (B.Eng.) - Minor Biomedical Engineering (21 credits) , page 81
 - 12.11.3 Biotechnology Minor, page 83
 - 12.11.3.1 Bachelor of Engineering (B.Eng.) - Minor Biotechnology (for Engineering Students) (24 credits) , page 84
 - 12.11.4 Chemistry Minor, page 86
 - 12.11.4.1 Bachelor of Engineering (B.Eng.) - Minor Chemistry (25 credits) , page 86
 - 12.11.5 Computer Science Courses and Minor Program, page 87
 - 12.11.5.1 Computer Science Courses in Engineering Programs, page 87
 - 12.11.5.2 Bachelor of Engineering (B.Eng.) - Minor Computer Science (24 credits) , page 87
 - 12.11.6 Construction Engineering and Management Minor, page 88
 - 12.11.6.1 Bachelor of Engineering (B.Eng.) - Minor Construction Engineering and Management (24 credits) , page 89
 - 12.11.7 Economics Minor, page 90
 - 12.11.7.1 Bachelor of Engineering (B.Eng.) - Minor Economics (18 credits) , page 90
 - 12.11.8 Minor in Environment, page 91
 - 12.11.9 Environmental Engineering Minor, page 91
 - 12.11.9.1 Bachelor of Engineering (B.Eng.) - Minor Environmental Engineering (21 credits) , page 91
 - 12.11.10 Minor Programs in Finance, Management, Marketing, and Operations Management, page 94
 - 12.11.10.1 Minor Finance (For Non-Management Students) (18 credits) , page 95
 - 12.11.10.2 Minor Management (For Non-Management Students) (18 credits) , page 96
 - 12.11.10.3 Minor Marketing (For Non-Management Students) (18 credits) , page 96
 - 12.11.10.4 Minor Operations Management (For Non-Management Students) (18 credits) , page 97
 - 12.11.11 Materials Engineering Minor, page 98
 - 12.11.11.1 Bachelor of Engineering (B.Eng.) - Minor Materials Engineering (24 credits) , page 98
 - 12.11.12 Mathematics Minor, page 98
 - 12.11.12.1 Bachelor of Engineering (B.Eng.) - Minor Mathematics (24 credits) , page 99
 - 12.11.13 Mining Engineering Minor, page 99
 - 12.11.13.1 Bachelor of Engineering (B.Eng.) - Minor Mining Engineering (23 credits) , page 99
 - 12.11.14 Minor in Musical Science and Technology, page 101
 - 12.11.15 Physics Minor, page 101

-
- 12.11.15.1 Bachelor of Engineering (B.Eng.) - Minor Physics (18 credits) , page 101
 - 12.11.16 Software Engineering Minor, page 102
 - 12.11.16.1 Bachelor of Engineering (B.Eng.) - Minor Software Engineering (24 credits) , page 102
 - 12.11.17 Technological Entrepreneurship Minor, page 103
 - 12.11.17.1 Bachelor of Engineering (B.Eng.) - Minor Technological Entrepreneurship (18 credits) , page 103

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 and Applied Mechanics
 Electrical and Computer Engineering
 Mechanical Engineering
 Mining and Materials Engineering

Schools

Architecture
 Urban Planning

Institutes

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

The Faculty serves approximately 3,200 undergraduate students and 1,150 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 in the [eCalendar](#) under *Faculties & Schools > Faculty of Engineering > Graduate*.

The academic programs are divided into required and complementary sections. The required courses emphasize those 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 in depth a particular interest. For program details and requirements, refer to [section 12: Academic 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 www.mcgill.ca/careers4engineers/engineering-internship-program/students. In addition, co-op programs are offered in Mining Engineering and in Materials Engineering.

Postgraduate programs leading to master's and doctoral degrees are offered in all sectors of the Faculty. Numerous areas of specialization are available in each of the departments and schools. All postgraduate programs, including the professional degree programs in Architecture and in Urban Planning, are described in the [eCalendar](#) under *Faculties & Schools > Faculty of Engineering > Graduate*.

2 History of the Faculty

The Faculty of Engineering began in 1871 as the Department of Practical and Applied Science in the Faculty of Arts with degree programs in Civil Engineering and Surveying; Mining Engineering and Assaying; and Practical Chemistry. Diploma courses had been offered from 1859, and by 1871 the staff and enrolments had increased sufficiently to justify the creation of the Department. Continued growth led to the formation of the Faculty of Applied Science in 1878. By 1910 there were ten degree programs offered, including Architecture and Railroad Engineering. Subsequent changes in the overall pattern of the University led to the creation of the Faculty of Engineering in 1931 with a departmental structure very similar to that which exists at present.

For a detailed history of the Faculty from 1811 to 2003, see www.mcgill.ca/engineering/about/history.

3 Engineering Microcomputing Facility

In addition to the services provided by McGill's Information Technology Services, the Faculty, in conjunction with its departments and schools, maintains specialized computing and information resources in support of teaching and research. These vary from desktop computers distributed throughout the Engineering complex to very high-performance scientific workstations found in the research laboratories. Each unit organizes and maintains facilities that are designed around specific roles, e.g., CAD/CAM, microelectronic design, software engineering, circuit simulation, process control, polymers, structural mechanics, metal processing, etc., in addition to systems dedicated to administrative support.

The role of the Faculty is to provide access to computing resources on a 24-hour basis and to provide services that are not covered by individual units. Further information is available at www.mcgill.ca/emf.

4 Schulich Library of Science and Engineering

Second largest of the 13 branches of the McGill Library, the Schulich Library of Science and Engineering has historically provided resources and services to support research and teaching programs in engineering and the physical sciences. In the summer of 2013, the bulk of the collection formerly housed in the Life Sciences Library was moved to the Schulich Library such that it now also supports research and teaching in medicine, dentistry, and the natural sciences. The Library holds more than 300,000 books, journals, and other materials and provides access to an extensive collection of online resources, with thousands of electronic journals, e-books, and databases. The following other branch libraries will be of interest to students in the Faculty of Engineering: Blackader-Lauterman Library of Architecture and Art; Life Sciences Library; Macdonald Campus Library; Walter Hirschfeld Geographic Information Centre; and the Edward Rosenthal Mathematics and Statistics Library.

The Schulich Library of Science and Engineering has over 100 networked computer workstations, and the entire building is a McGill wireless zone. Within the library's six floors are many options for both quiet and group study, and there are numerous uPrint machines on site for copying, printing, and scanning. The Library provides support for users with disabilities, including wheelchair access and an adaptive workstation. The Schulich Library staff includes ten subject-specialized liaison librarians who 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.

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.

Telephone: 514-398-4769

Email: schulich.library@mcgill.ca

Website: www.mcgill.ca/library/branches/schulich

5 About the Faculty of Engineering (Undergraduate)

Welcome to the undergraduate Faculty of Engineering section of the Undergraduate [eCalendar](#).

The mission of the Faculty of Engineering is to contribute to the advancement of learning and to the socio-economic development of Quebec and Canada, through teaching and research activities at the highest international standards of quality.

Goals:

- To prepare graduates for productive professional careers through the provision of accredited bachelor's programs
- To train students through focused professional programs to attain the forefront of their fields
- To perform research and other scholarly activities which achieve international recognition
- To ensure that technological innovations developed through research are transferred to industry
- To provide a stimulating environment for teaching, learning, and research

In this section, you will find up-to-date information about the Faculty and about the undergraduate programs and courses it offers. For information about graduate studies in the Faculty of Engineering, see the [eCalendar](#) under *Faculties & Schools > Faculty of Engineering > Graduate*.

You will find information on the following topics (and others):

- [section 1: About the Faculty of Engineering](#)
- [section 2: History of the Faculty](#)
- [section 3: Engineering Microcomputing Facility](#)
- [section 4: Schulich Library of Science and Engineering](#)
- [section 6: Degrees and Requirements for Professional Registration](#)
- [section 9: Student Activities](#)

- [section 11: Engineering Internship Program](#) (EIP)
- Undergraduate [Programs](#) and [Courses](#)
- [section 12.11: Minor Programs](#) for students in the Faculty of Engineering

For regulations that are specific to undergraduate studies in the Faculty of Engineering, see [University Regulations and Resources \(Undergraduate\)](#) and watch for sections and notes that are specific to the Faculty of Engineering.

5.1 Location

Macdonald Engineering Building
817 Sherbrooke Street West
Montreal QC H3A 0C3
Canada

Telephone: 514-398-7250
Faculty website: www.mcgill.ca/engineering

The McGill Engineering Student Centre (Student Affairs Office, Career Centre, Peer Tutoring Services) and the Office of the Associate Dean (Undergraduate Education) are located at the following address:

3450 University Street
Montreal QC H3A 0E8
Frank Dawson Adams Building, Suite 22

Telephone: 514-398-7257
McGill Engineering Student Centre website: www.mcgill.ca/engineering/current-students

5.2 Administrative Officers

Dean

James Nicell; B.A.Sc., M.A.Sc., Ph.D.(Windsor), P.Eng. (*James McGill Professor*)

Associate Deans

Lawrence Chen; B.Eng.(McG.), M.A.Sc., Ph.D.(Tor.), P.Eng. (*Academic Affairs*)

Mohamed A. Meguid; B.Sc.(Azhar, Cairo), M.Sc., Ph.D.(W. Ont.), P.Eng. (*Undergraduate Education*)

Showan Nazhat; B.Eng., M.Sc., Ph.D.(Lond.) (*Gerald Hatch Faculty Fellow*) (*Research and Graduate Education*)

Department Chairs

Sylvain Coloumbe; B.Sc., M.Sc.A.(Sher.), Ph.D.(McG.), ing. (*Chemical Engineering*)

Andrew Kirk; B.Sc.(Brist.), Ph.D.(Lond.) (*William Dawson Scholar*) (*Electrical and Computer Engineering*)

Arun Misra; B.Tech.(Indian IT, Kharagpur), Ph.D.(Br. Col.), P.Eng., F.A.A.S., A.F.A.I.A.A. (*Mechanical Engineering*)

Van Thanh Van Nguyen; B.M.E.(Vietnam), M.C. Eng.(A.I.T.), D.A.Sc.(Montr.), Eng. (*Civil Engineering and Applied Mechanics*)

Dan V. Nicolau; B.Eng., M.Eng.(Polytechnic Univ. of Bucharest), M.S.(Acad. of Economic Studies at Bucharest), Ph.D.(Polytechnic Univ. of Bucharest) (*Bioengineering*)

Steve Yue; B.Sc., Ph.D.(Leeds) (*James McGill Professor*) (*Lorne Trotter Chair in Aerospace Engineering*) (*Mining and Materials Engineering*)

Director, School of Architecture

Annamarie Adams; B.A.(McG.), M.Arch., Ph.D.(Calif., Berk.)

Director, School of Urban Planning

Raphaël Fischler; B.Eng.(U. Tech. Eindhoven), M.Sc., M.C.P.(MIT), Ph.D.(Calif., Berk.)

Secretary of Faculty

Nathaniel Quitarano; B.Sc.(Calif., Berk.), Ph.D.(MIT)

Director of Administration

Teena Fazio

Operations Manager

Debbie Morzajew

Human Resources Adviser

Susanne Baumann-Moroy

Finance Manager

Sonia Nardini

Director, Engineering Student Centre

Chidinma Offoh-Robert

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 the [eCalendar](#) under *Faculties & Schools > Faculty of Engineering > Graduate*.

Professional

Bachelor of Engineering

Bachelor of Software Engineering

The B.Eng. and B.S.E. programs are accredited by the Canadian Engineering Accreditation Board (CEAB) of Engineers Canada and fulfil the academic requirements for admission to the provincial engineering professional organizations. Engineers Canada has also negotiated agreements with engineering organizations in other countries to grant Canadian licensed engineers the same privileges accorded to professional engineers in those countries. For more information, visit the Engineers Canada website at www.engineerscanada.ca. All students are expected to seek professional registration after graduation.

To become a professional engineer in Canada, a graduate must pass an examination on legal aspects and on the principles of professional practice, and acquire two to four years of engineering experience, depending on the province. Only persons duly registered may use the title “engineer” and perform the professional activities reserved for engineers by provincial laws and regulations.

In Quebec, the professional engineering body is the *Ordre des ingénieurs du Québec* (OIQ). In order to better prepare new graduates for the practice of their profession, McGill organizes seminars in cooperation with the OIQ on various aspects of the profession. The OIQ also has a student section. As soon as you have accumulated 60 credits in a B.Eng. or B.S.E. program, you can join the student section of the OIQ. Registration is free. For more information, visit the OIQ website at www.oiq.qc.ca.

7 Admission Requirements

The Faculty of Engineering offers programs leading to the degrees of B.Eng., B.S.E., and B.Sc.(Arch.). Enrolment in Engineering programs is limited.

For detailed information on admissions requirements, see the *Undergraduate Admissions Guide* at www.mcgill.ca/applying.

8 Student Progress

The length of the B.Eng., B.S.E., and B.Sc.(Arch.) programs varies depending on the program and basis of admission. You can find the curriculum for your program on the website of your department/school. See www.mcgill.ca/engineering/about/departments-schools-institutes for links to department/school websites.

You must successfully complete the B.Eng., B.S.E., or B.Sc.(Arch.) program within six years of entry. Candidates admitted to a lengthened program, or to a shortened program because of advanced standing, or who are participating in a work term or in the Engineering Internship Program (EIP), will have a correspondingly greater or lesser period in which to complete their program.

Extensions may be granted by the Committee on Standing in cases of serious medical problems or where other similarly uncontrollable factors have affected your progress.

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 www.mcgilleus.ca.

For more information on extra-curricular activities and organizations, see www.mcgill.ca/engineering/current-students/undergraduate/student-life.

For more information on student design teams and projects, see www.mcgill.ca/engineering/student/sao/studentdesign.

10 Degrees and Programs Offered

Internship Programs

Engineering Internship Program

Co-op Programs

Materials Engineering (B.Eng.)

Mining Engineering (B.Eng.)

General Engineering Program

General Engineering – Undeclared major (Freshman year)

Major Programs

Architecture (B.Sc.(Arch.))

Chemical Engineering (B.Eng.)

Civil Engineering (B.Eng.)

Computer Engineering (B.Eng.)

Electrical Engineering (B.Eng.)

Mechanical Engineering (B.Eng.)

Software Engineering (B.S.E.)

Honours Programs

Electrical Engineering (B.Eng.)

Mechanical Engineering (B.Eng.)

Minors

Arts

Biomedical Engineering

Biotechnology

Chemistry

Computer Science

Minors

Construction Engineering and Management

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 Technology

Physics

Software Engineering

Technological Entrepreneurship

11 Engineering Internship Program

Employers value experience. Internships (four, eight, twelve, or sixteen months) allow you to gain professional work experience during the course of your undergraduate studies while earning a salary within the average range for entry-level professional positions. Other benefits include the following:

- Improved employment prospects upon graduation, often at a higher starting salary
- The opportunity to explore career options prior to graduation
- The opportunity to develop communication skills and to acquire a business perspective that cannot be learned in school

An internship may begin in January, May, or September. Employers choose the most suitable students for their organization through an application and interview process. While employed by the participating companies, you work on assignments related to your field of study. Internships will be recognized on your transcript as one or more non-credit courses entitled "Industrial Practicum." Successful completion of an internship of eight months or more qualifies you to graduate with the Internship Program designation on your transcript.

11.1 Student Eligibility

To participate in the Engineering Internship Program, you must:

- have a CGPA of 2.00 or higher;
- be in good financial standing with the University;
- obtain approval from the Engineering Career Centre before registering for or starting your internship;
- be registered full-time in your program before and after your internship;
- remain a degree candidate while on internship;
- return to complete your undergraduate degree at McGill, with a minimum of 15 credits remaining in your program after your internship (i.e., you are not allowed to complete your degree during your internship).

Internship students will receive an automatic extension for the completion of their studies.

International students are eligible (a few restrictions may apply).

For more information, see www.mcgill.ca/careers4engineers or send an email to careers4engineers@mcgill.ca.

**Important Information:**

- While on internship, you are expected to complete any deferrals you may have been granted, regardless of the location of the internship. If you do not write a deferred exam as scheduled, you will receive a final grade of J. The J grade will calculate as a failure in both the TGPA and CGPA.
- International students must ensure that their health coverage remains in force during their internship.
- During your time as an intern, you are not considered to be in full-time status. Your government loans will become due and payable within the prescribed grace period (usually six months).

12 Academic Programs

The programs and courses in the following sections have been approved for the 2014–2015 session as listed, but the Faculty reserves the right to introduce changes as may be deemed necessary or desirable.

12.1 General Engineering Program

The General Engineering Program (GEP) is offered in addition to the Faculty of Engineering's majors (Chemical, Civil, Computer, Electrical, Materials, Mechanical, Mining, and Software Engineering). The GEP permits students with strong mathematics, physics, and chemistry results in high school to pursue a common first-year curriculum without declaring a particular major program at the time of application. The GEP spans one academic year only (Year 0). Students then apply for placement and continue in an Engineering major program.

The GEP is not open to students with more than 6 transfer credits toward their engineering major (e.g., transfer credits from Advanced Placement (AP) exams or from courses taken at other universities).

Applicants who already know which major(s) they wish to study should apply directly for the major(s) rather than select the General Engineering Program option.

For more information about the General Engineering Program, see www.mcgill.ca/engineering/student/undergrad/general.

12.1.1 Bachelor of Engineering (B.Eng.) - General Engineering - Undeclared (30 credits)

The General Engineering Program (GEP) is a 30-credit course of study for the first year of a Bachelor of Engineering degree for students who have not completed a Quebec CEGEP diploma. Upon successful completion of these requirements, students must apply for placement and continue in a B.Eng. or B.S.E. program.

The GEP is not open to students with more than 6 transfer credits toward their engineering major (e.g., transfer credits from Advanced Placement (AP) exams or from courses taken at other universities).

Year 0 (Freshman) Courses

(30 credits)

CHEM 110	(4)	General Chemistry 1
CHEM 120	(4)	General Chemistry 2
FACC 100	(1)	Introduction to the Engineering Profession
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.

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)

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
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
INDR 294*	(3)	Introduction to Labour-Management Relations
MATH 338	(3)	History and Philosophy of Mathematics
MGCR 222*	(3)	Introduction to Organizational Behaviour
MGCR 352*	(3)	Marketing Management 1
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/>.

Students who successfully complete one or more Science Placement Exams will obtain credit(s) for the equivalent(s), i.e., CHEM 110, CHEM 120, MATH 140, MATH 141, MATH 133, PHYS 131, PHYS 142. Please see <http://www.mcgill.ca/students/exams/science> for information on Science Placement Exams.

Language Courses

If you are not proficient in a certain language, no more than 3 credits will be given for 6 credits of courses at the 100 level or higher in that language. A maximum of 3 credits of language courses will be counted toward the B.Eng./B.S.E. Complementary Studies requirement.

However, 3 credits may be given for any language course at the 200 level or higher that has a sufficient cultural component. This course must be approved by the McGill Engineering Student Centre (Student Affairs Office) (Frank Dawson Adams Building, Room 22).

12.2 School of Architecture

12.2.1 Location

Macdonald-Harrington Building, Room 201
815 Sherbrooke Street West
Montreal QC H3A 0C2

Telephone: 514-398-6700

Fax: 514-398-7372

Website: www.mcgill.ca/architecture

12.2.2 About the School of Architecture

The School of Architecture at McGill University was founded in 1896. Our mission is to educate professionals who will contribute to the socio-economic and cultural development of Quebec, Canada, and the broader global community through responsible participation in the process of the design, construction, and interpretation of the built environment.

The School offers the non-professional B.Sc.(Arch.) program, the M.Arch. (Professional) program, and post-professional research programs, including the M.Arch. (Post-professional) and Ph.D.

12.2.3 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 Architectural Certification Board (CACB), which is the sole agency authorized to accredit Canadian professional degree programs in architecture, recognizes two types of accredited degrees: the Master of Architecture and the Bachelor of Architecture (B.Arch.). A program may be granted a two-year, three-year, or six-year term of accreditation, depending on its degree of conformance with established educational standards.

Master's degree programs may consist of a preprofessional undergraduate degree and a professional graduate degree, which, when earned sequentially, comprise an accredited professional education. However, the preprofessional degree is not, by itself, recognized as an accredited degree.

The M.Arch. (Professional) degree is accredited by the Canadian Architectural Certification Board (CACB), and is recognized as accredited by the National Council of Architectural Registration Boards (NCARB) in the United States.

12.2.4 Programs of Study

Students in the B.Sc.(Arch.) program who intend to proceed to the professional degree must satisfy certain minimum requirements. Students must:

- complete the B.Sc.(Arch.) degree, including the series of required and complementary courses stipulated for professional studies, with a minimum CGPA of 3.00;
- submit a portfolio of work executed in the sequence of six design studios, as well as samples of professional and personal work;
- complete the minimum period of relevant work experience according to the current Work Experience Guidelines (see www.mcgill.ca/architecture/bboard/bscmai/workexperience).

Further information on the M.Arch. (Professional) program and application procedures is available at www.mcgill.ca/architecture.

12.2.4.1 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 (Brussels, Belgium); École Nationale Supérieure d'architecture de Grenoble (Grenoble, France); École Nationale Supérieure d'architecture de Clermont-Ferrand (Clermont-Ferrand, France); Scuola di Architettura Civile Politecnico di Milano (Boviso) (Milan, Italy); The Royal Danish Academy of Fine Arts, School of Architecture (Copenhagen, Denmark) (graduate level only).

12.2.5 Ancillary Academic Facilities

Laboratories and Workshops

Facility for Architectural Research in Media Mediation (FARMM) – Professor Michael Jemtrud

Laboratory for Integrated Prototyping and Hybrid Environments (LIPHE) – Professor Aaron Sprecher

Media Centre – Juan Osorio, Media Technician

Workshop Facilities – David Speller, Technician

Library

Blackader-Lauterman Library of Architecture and Art, located in the Redpath Library – Jennifer Garland, Liaison Librarian

Collections

Architecture Slide Library – Professor Annmarie Adams

The John Bland Canadian Architecture Collection, housed in the Blackader-Lauterman Library – Ann Marie Holland, Liaison Librarian

Orson Wheeler Architectural Model Collection – Professor Pieter Sijpkens

12.2.6 School of Architecture Faculty

Director

Annmarie Adams

Emeritus Professors

Bruce Anderson; B.Arch.(McG.), M.Arch.(Harv.), F.R.A.I.C., O.A.Q.

Derek Drummond; B.Arch.(McG.), F.R.A.I.C., O.A.A. (*William C. Macdonald Emeritus Professor of Architecture*)

Emeritus Professors

Adrian Sheppard; B.Arch.(McG.), M.Arch.(Yale), F.R.A.I.C., O.A.Q., A.A.P.P.Q.

Radoslav Zuk; B.Arch.(McG.), M.Arch.(MIT), D.Sc.(Ukr. Acad. Art), F.R.A.I.C., F.R.S.A., F.A.R.C., O.A.Q., O.A.A.

Professors

Annamarie Adams; B.A.(McG.), M.Arch., Ph.D.(Calif., Berk.), M.R.A.I.C. (*William C. Macdonald Professor of Architecture*)

Vikram Bhatt; N.Dip.Arch.(Ahmedabad), M.Arch.(McG.), M.R.A.I.C.

Avi Friedman; B.Arch.(Technion), M.Arch.(McG.), Ph.D.(Montr.), O.A.Q., I.A.A.

Alberto Pérez-Gómez; Dipl.Eng.Arch.(Nat. Pol. Inst., Mexico), M.A., Ph.D.(Essex), M.R.A.I.C. (*Saidye Rosner Bronfman Professor of Architectural History*)

Associate Professors

Martin Bressani; B.Sc.(Arch.), B.Arch.(McG.), M.Sc.(Arch.)(MIT), D.E.A., Docteur(Paris IV), O.A.Q.

Ricardo L. Castro; B.Arch.(Los Andes, Col.), M.Arch., M.A.(Ore.), F.R.A.I.C.

David Covo; B.Sc.(Arch.), B.Arch.(McG.), F.R.A.I.C., O.A.Q.

Michael Jemtrud; B.Sc., B.A., B.Arch.(Penn. St.), M.Arch.(McG.), M.R.A.I.C.

Nik Luka; B.A.A.(Ryerson), M.Arch.(Laval), Ph.D.(Tor.), M.C.I.P.

Robert Mellin; B.Arch., M.Sc.(Arch.)(Penn. St.), M.Arch.(McG.), M.Sc., Ph.D.(Penn.), M.R.A.I.C., N.A.A.

Assistant Professors

David W. Newton; B.Sc.Design(Ariz. St.), M.Arch.(Rice)

Aaron Sprecher; B.Arch.(Bezalel), M.Arch.(Calif.-LA)

Ipek Tureli; B.Arch.(Istanbul), Dip.(A.A.), Ph.D.(Calif., Berk.)

Adjunct Professors

Sinisha Brdar

Howard Davies

Talia Dorsey

Julia Gersovitz

Phyllis Lambert

Mark Poddubiuk

Pierina Saia

Conor Sampson

Course Lecturers

Thierry Beaudoin

Nancy Dunton

Eric Gauthier

Marc Hallé

Andrew King

Matthew Lella

Leslie Lok

Marc-André Plourde

Sevag Pogharian

Pieter Sijpkens

Victor Simion

Visiting Critics and Guest Lecturers

Each year, visitors are involved in the teaching of certain courses as critics and lecturers. These visitors change from year to year. The following were visitors in 2013:

Ronnie Araya, Manon Asselin, Tom Balaban, Vedanta Balbahadur, Dinu Barbarese, Denis Bilodeau, Frederic Caplette, Justine Chibuk, Laurie Damme-Gonneville, Tom Egli, Wade Eide, Paul Emmons, François Émond, Maude Francoeur, Fabrizio Gallenti, Gene Gibbons, Frederica Goffi, Fanis Grammenos, Bob Hamilton, Cynthia Hammond, Dan Hanganu, Melinda Hart, Paul Holmquist, Lynne Horiuchi, Elizabeth Kahn, Stephan Kowal, Anick La Bissonnière, Valerie Lamontagne, Katherine Lapierre, Carla Leitão, Louis-Paul Lemieux, Mathieu Lemieux-Blanchard, Carole Lévesque, David Letherbarrow, Marie-Paule Macdonald, Sophie Mayes, Paula Meijerink, Mélanie Mignault, Neil Minuk, Eric Mongerson, David Moreaux, Shawn Moscovitch, Masa Noguchi, Hubert Pelletier, Alessandra Ponte, Inderbir Riar, Owen Rose, Witold Rybczynski, Julie St-Arnaud, Angeliki Sioli, Thomas Strickland, David Theodore, Paul Yachnin, Sybil Wa, Sasa Zivkovic

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

Program credit weight: 126 credits

Program credit weight for CEGEP students: 100 credits

McGill's professional program in Architecture is divided into two parts. The first part is an eight-term design-based program (six-term program for students entering with the Quebec Diploma of Collegial Studies in Pure and Applied Science or the equivalent) leading to a non-professional degree, Bachelor of Science (Architecture). Applicants whose background includes a university degree in an area not related to architecture should apply to the B.Sc.(Arch.) program. For detailed information about admission procedures and requirements, please see the Undergraduate Admissions Guide at <http://www.mcgill.ca/applying>.

The second part, for students with the McGill B.Sc.(Arch.) degree or equivalent non-professional undergraduate architecture degree, is either a three-term or a two-year program leading to the Master of Architecture (Professional) degree. There are two options for the completion of the M.Arch. (Professional) program: Design Studio (45 credits) and Design Studio-Directed Research (60 credits). The M.Arch. (Professional) degree is accredited by the Canadian Architectural Certification Board (CACB), and is recognized as accredited by the National Council of Architectural Registration Boards (NCARB) in the U.S.

For more information on program structure and courses, visit the School of Architecture website at <http://www.mcgill.ca/architecture>.

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.

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

Required Non-Departmental Courses

Revision, May 2014. Start of revision.

15 credits

CIVE 284	(4)	Structural Engineering Basics
CIVE 385	(3)	Structural Steel and Timber Design
CIVE 388	(3)	Foundation and Concrete Design
CIVE 492	(2)	Structures
FACC 220	(3)	Law for Architects and Engineers

Revision, May 2014. End of revision.

Required Architectural Courses

73 credits

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
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
ARCH 342	(3)	Digital Representation
ARCH 354	(3)	Architectural History 3
ARCH 355	(3)	Architectural History 4
ARCH 375	(2)	Landscape
ARCH 377	(3)	Energy, Environment and Buildings
ARCH 405	(6)	Design and Construction 3
ARCH 406	(6)	Design and Construction 4
ARCH 447	(2)	Lighting
ARCH 451	(2)	Building Regulations and Safety
ARCH 512	(3)	Architectural Modelling

Complementary Courses

6 credits from the following:

ARCH 378	(3)	Site Usage
ARCH 379	(3)	Summer Course Abroad
ARCH 383	(3)	Geometry and Architecture
ARCH 461	(1)	Freehand Drawing and Sketching
ARCH 490	(2)	Selected Topics in Design
ARCH 514	(4)	Community Design Workshop
ARCH 515	(3)	Sustainable Design
ARCH 517	(3)	Sustainable Residential Development
ARCH 520	(3)	Montreal: Urban Morphology
ARCH 521	(3)	Structure of Cities
ARCH 523	(3)	Significant Texts and Buildings
ARCH 525	(3)	Seminar on Analysis and Theory
ARCH 526	(3)	Philosophy of Structure
ARCH 527	(3)	Civic Design
ARCH 528	(3)	History of Housing
ARCH 529	(3)	Housing Theory
ARCH 531	(3)	Architectural Intentions Vitruvius - Renaissance

ARCH 532	(3)	Origins of Modern Architecture
ARCH 533	(3)	New Approaches to Architectural History
ARCH 534	(3)	Architectural Archives
ARCH 535	(3)	History of Architecture in Canada
ARCH 536	(3)	Heritage Conservation
ARCH 540	(3)	Selected Topics in Architecture 1
ARCH 541	(3)	Selected Topics in Architecture 2
ARCH 554	(2)	Mechanical Services
ARCH 564	(3)	Design for Development
ARCH 566	(3)	Cultural Landscapes Seminar
OCC1 442	(2)	Environments for the Disabled

Electives

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

12.3 Department of Bioengineering

12.3.1 Location

Macdonald Engineering Building, Room 270
817 Sherbrooke Street West
Montreal QC H3A 0C3

Telephone: 514-398-7138

Fax: 514-398-7379

Email: adminoffice.bioeng@mcgill.ca

Website: www.mcgill.ca/bioengineering

12.3.2 About the Department of Bioengineering

The Department of Bioengineering was established in 2012, and is the newest department to join McGill University's renowned Faculty of Engineering. McGill researchers from nearly all the Faculty units, seven Canada Research Chairs, many McGill hospitals, and colleagues in the Faculty of Medicine are actively involved in bioengineering. Within the Department, our faculty members study the active mechanics of biology, reverse-engineer these properties for biomimetic solutions, and provide new biomedical techniques. Bioengineering uses analytical methods to quantitatively describe biology, but also draws upon the sophistication of living systems as a tool to design and create. This rapidly growing research area covers a broad range of topics such as materials science, biomedical applications, biophysics, molecular biology, and environmental engineering.

The Department is currently developing its undergraduate program. Please see our website for updates and contact information: www.mcgill.ca/bioengineering.

12.3.3 Courses in Bioengineering

The following courses are offered by the Department of Bioengineering:

- BIEN 320
- BIEN 340
- BIEN 350

12.3.4 Department of Bioengineering Faculty

Chair

Dan V. Nicolau

Professor

Dan V. Nicolau; B.Eng., M.Eng.(Poly. Univ. Bucharest), M.S.(Acad. Economic Studies, Bucharest), Ph.D.(Poly. Univ. Bucharest)

Amine Kamen; Ph.D.(Mines ParisTech), Ph.D.(École Poly., Montr.)

Associate Professor

Yu (Brandon) Xia; B.Sc.(Peking), Ph.D.(Stan.)

Assistant Professors

Allen Ehrlicher; B.Sc., B.A.(Texas-Austin), M.Sc., Ph.D.(Leipzig)

Adam Hendricks; B.S., M.S.(Virg. Poly. Inst. & State Univ.), Ph.D.(Mich.)

J. Matt Kinsella; B.Sc.(SXU, Chicago), M.S., Ph.D.(Purd.)

Georgios Mitsis; M.S., Ph.D.(USC)

12.4 Department of Chemical Engineering**12.4.1 Location**

M.H. Wong Building, Room 3060
3610 University Street
Montreal QC H3A 0C5

Telephone: 514-398-4494

Fax: 514-398-6678

Website: www.mcgill.ca/chemeng

12.4.2 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 the 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.

By means of complementary courses, students can also obtain further depth in technical areas and breadth in non-technical subjects. Some students elect to complete a minor in biotechnology, management, materials engineering, computer science, environmental engineering, chemistry, or another minor (see [section 12.11: Minor Programs](#) for minors available to engineering students).

The solution to many environmental problems requires an understanding of technological principles; a Chemical Engineering degree provides an ideal background. In addition to relevant material learned in the core program, a selection of environmental complementary courses and minor programs is available. The involvement of many Chemical Engineering faculty members in environmental research provides the opportunity for undergraduate students to carry out research projects in this area.

The curriculum also provides the preparation necessary to undertake postgraduate studies leading to the M.Eng. or Ph.D. degrees in Chemical Engineering. Students completing this curriculum acquire a broad, balanced education in the natural sciences with the accent on application. Thus, for those who do not continue in Chemical Engineering, it provides an exceptionally balanced education in applied science. For others, it will form the basis of an educational program that may continue with a variety of studies such as business administration, medicine, or law. Versatility is, therefore, one of the most valuable characteristics of Chemical Engineering program graduates.

12.4.3 Academic Program

The Chemical Engineering program comprises 142 credits (116 credits for those who completed the Quebec CEGEP program in Pure and Applied Sciences). Certain students who take advantage of Summer session courses can complete the 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.

12.4.4 Canadian Society for Chemical Engineering

The Chemical Engineering Student Society has for many years been affiliated both with the CSChE (Canadian Society for Chemical Engineering) and with the AIChE (American Institute of Chemical Engineers). For a nominal fee, students receive *Canadian Chemical News*, a monthly publication, and the *AIChE Student Members Bulletin*, as well as other privileges of student membership in the two societies. The student chapter also organizes a series of local social, educational, and sporting events. Recent events have included student-professor banquets and Christmas parties, dances, speakers, broomball games, and joint meetings with the Montreal Section of the CSChE which gives students a chance to mix with practising chemical engineers.

12.4.5 Department of Chemical Engineering Faculty

Chair

Sylvain Coulombe

Emeritus Professors

David G. Cooper; B.Sc., Ph.D.(Tor.)

John M. Dealy; B.S.(Kansas), M.S.E., Ph.D.(Mich.), Eng.

Musa R. Kamal; B.S.(Ill.), M.S., Ph.D.(Carn. Mell), Eng.

Richard J. Munz; B.A.Sc., M.A.Sc.(Wat.), Ph.D.(McG.), Eng.

Juan H. Vera; B.Mat.(Chile), Ing.Quim.(U.T.E.), M.S.(Calif., Berk.), Dr.Ing.(Santa Maria), Eng.

Professor

Sylvain Coulombe; B.Sc., M.Sc.A.(Sher.), Ph.D.(McG.), ing.

Sasha Omanovic; Dipl.Ing., Ph.D.(Zagreb), P.Eng

Alejandro D. Rey; B.Ch.Eng.(CCNY), Ph.D.(Calif., Berk.) (*James McGill Professor*)

Associate Professors

Dimitrios Berk; B.Sc.(Bosphorus), M.E.Sc.(W. Ont.), Ph.D.(Calg.), P.Eng.

Reghan James Hill; B.Eng.(Auck.), Ph.D.(Cornell)

Richard L. Leask; B.A.Sc., M.A.Sc.(Wat.), Ph.D.(Tor.), P.Eng.

Milan Maric; B.Sc., B.Eng. & Mgmt.(McM.), Ph.D.(Minn.), P.Eng.

Jean-Luc Meunier; Dipl.Ing., EPFL(Lausanne), M.Sc., Ph.D., INRS(Varennes), ing.

Phillip Servio; B.Sc., Ph.D.(Br. Col.)

Nathalie Tufenkji; B.Eng.(McG.), M.Sc., Ph.D.(Yale)

Viviane Yargeau; B.Eng., M.Sc.A., Ph.D.(Sher.), ing.

Assistant Professors

P.-Luc Girard-Lauriault; B.Sc.(Montr.), Ph.D.(École Poly., Montr.)

Jeff Gostick; B.Eng.(Ryerson), M.A.Sc., Ph.D.(Wat.), P.Eng.

Corinne Hoesli; B.Sc., B.A.Sc.(Ott.), Ph.D.(Br. Col.)

Anne-Marie Kietzig; B.Eng.(T.U. Berlin), Ph.D.(Br. Col.)

Jan Kopyscinski; Dipl.Ing., M.Sc.(BTU Germ.), Ph.D.(ETH Zurich)

Christopher Moraes; B.A.Sc., Ph.D.(Tor.)

Post-Retirement

W.J. Murray Douglas; B.Sc.(Qu.), M.S.E., Ph.D.(Mich.)

12.4.6 Bachelor of Engineering (B.Eng.) - Chemical Engineering (142 credits)

Revision, May 2014. Start of revision.

Program credit weight: 142-145 credits

Program credit weight for Quebec CEGEP students: 116 credits

Program credit weight for out-of-province students: 142 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 <http://www.mcgill.ca/students/exams/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 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 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)	Computers in Engineering
FACC 100*	(1)	Introduction to the Engineering Profession
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

74 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 360	(1)	Technical Paper
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 456	(2)	Design Project 1
CHEE 457	(5)	Design Project 2
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, some students use the technical complementaries to increase the breadth of their chemical engineering training.

At least two courses (5-7 credits) must be chosen from the list below. The remaining course(s) (2-4 credits) may be taken from other suitable undergraduate courses in the Faculty of Engineering, with departmental permission.

BIEN 462	(3)	Engineering Principles in Physiological Systems
BIOT 505*	(3)	Selected Topics in Biotechnology
CHEE 363**	(2)	Projects Chemical Engineering 1
CHEE 438	(3)	Engineering Principles in Pulp and Paper Processes
CHEE 494**	(3)	Research Project and Seminar 1
CHEE 495**	(4)	Research Project and Seminar 2
CHEE 496**	(3)	Environmental Research Project
CHEE 510	(3)	Advanced Separation Processes
CHEE 515+	(3)	Material Surfaces: A Biomimetic Approach

CHEE 521+	(3)	Nanomaterials and the Aquatic Environment
CHEE 541	(3)	Electrochemical Engineering
CHEE 543	(3)	Plasma Engineering
CHEE 561	(3)	Introduction to Soft Tissue Biophysics
CHEE 563+	(3)	Biofluids and Cardiovascular Mechanics
CHEE 571	(3)	Small Computer Applications: Chemical Engineering
CHEE 582	(3)	Polymer Science & 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 592+	(3)	Industrial Air Pollution Control
CHEE 593+	(3)	Industrial Water Pollution Control
CHEE 594	(3)	Biocolloids in Environmental Systems
CIVE 430+	(3)	Water Treatment and Pollution Control
CIVE 521+	(3)	Nanomaterials and the Aquatic Environment
CIVE 557	(3)	Microbiology for Environmental Engineering
MECH 534+	(3)	Air Pollution Engineering
MECH 563+	(3)	Biofluids and Cardiovascular Mechanics
MIME 515+	(3)	Material Surfaces: A Biomimetic Approach

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

** Students may choose only one project course: CHEE 363, CHEE 495, or CHEE 496.

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

- CHEE 515 or MIME 515
- CHEE 521 or CIVE 521
- CHEE 563 or MECH 563
- CHEE 592 or MECH 534
- CHEE 593 or CIVE 430

Complementary Studies

6 credits (9 credits for students from Quebec CEGEPs)

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
CIVE 469	(3)	Infrastructure 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

MECH 526	(3)	Manufacturing and the Environment
MGPO 440*	(3)	Strategies for Sustainability
MIME 308	(3)	Social Impact of Technology
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 (6 credits for students from Quebec CEGEPs) 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)

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
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
INDR 294*	(3)	Introduction to Labour-Management Relations
MATH 338	(3)	History and Philosophy of Mathematics
MGCR 222*	(3)	Introduction to Organizational Behaviour
MGCR 352*	(3)	Marketing Management I
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>.

Language Courses

If you are not proficient in a certain language, no more than 3 credits will be given for 6 credits of courses at the 100 level or higher in that language. A maximum of 3 credits of language courses will be counted toward the Complementary Studies requirement.

However, 3-6 credits may be given for language courses at the 200 level or higher that have a sufficient cultural component. These courses must be approved by the McGill Engineering Student Centre (Student Affairs Office) (Frank Dawson Adams Building, Room 22).

Revision, May 2014. End of revision.

12.4.6.1 More about the B.Eng. Degree in Chemical Engineering

Courses CHEE 582 and CHEE 584 comprise a Polymeric Materials sequence. Additional courses in this area are available in the Chemistry Department (e.g., CHEM 574) or at the graduate level (CHEE 681). The Department has considerable expertise in the polymer area.

Courses CHEE 370 and CHEE 474 make up a sequence in Biochemical Engineering-Biotechnology. Students interested in this area may take additional courses, particularly those offered by the Department of Food Science and Agricultural Chemistry; Faculty of Agricultural and Environmental Sciences; and courses in biochemistry and microbiology. The food, beverage, and pharmaceutical industries are large industries in the Montreal area, and these courses are relevant to these industries and to the new high-technology applications of biotechnology.

The third area in which there is a sequence of courses is Pollution Control. The Department offers three courses in this area: CHEE 591, CHEE 592, and CHEE 593. As some water pollution control problems are solved by microbial processes, course CHEE 474 is also relevant to the pollution control area. Additional courses in this area are listed in the [section 12.11.9: Environmental Engineering Minor](#).

A Minor in Biotechnology is also offered by the Faculties of Engineering and Science with emphasis on molecular biology and chemical engineering processes. A full description of the program appears in the [section 12.11.3: Biotechnology Minor](#).

Note that 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 (500-level) CHEE courses as technical complementaries.

12.5 Department of Civil Engineering and Applied Mechanics

12.5.1 Location

Macdonald Engineering Building, Room 492
817 Sherbrooke Street West
Montreal QC H3A 0C3

Telephone: 514-398-6860
Fax: 514-398-7361
Website: www.mcgill.ca/civil

12.5.2 About the Department of Civil Engineering and Applied Mechanics

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, and rehabilitation. Examples include buildings; bridges; roads; railways; dams; facilities for water supply and treatment; and waste disposal. With the aging and deterioration of an already vast infrastructure, its maintenance and rehabilitation has become an increasingly important role of the civil engineering profession. Also, with 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 many aspects of environmental pollution.

Students who wish to extend their knowledge in certain areas beyond the range that the program 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 12.11: Minor Programs](#). Details on how minors can be accommodated within the Civil Engineering program will be made available during preregistration counselling.

12.5.3 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 and Applied Mechanics. 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; and 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.

12.5.4 Department of Civil Engineering and Applied Mechanics Faculty

Chair

Van-Thanh-Van Nguyen

Associate Chair

Yixin Shao

Emeritus Professors

Philip J. Harris; B.Sc.(Manit.), M.Eng., Ph.D.(McG.), F.E.I.C., F.C.S.C.E., Eng.

M. Saeed Mirza; B.Eng.(Karachi), M.Eng., Ph.D.(McG.), F.A.C.I., F.E.I.C., F.C.S.C.E., Hon. F.I.E.P., Eng.

Stuart B. Savage; B.Eng.(McG.), M.S.Eng.(Cal. Tech.), Ph.D.(McG.), F.R.S.C.

Professors

Vincent H. Chu; B.S.Eng.(Taiwan), M.A.Sc.(Tor.), Ph.D.(MIT), Eng.

Ghyslaine McClure; B.Eng.(Montr.), S.M.C.E.(MIT), Ph.D.(Montr.), Eng.; Associate Provost, Academic Staff & Priority Initiatives

Denis Mitchell; B.A.Sc., M.A.Sc., Ph.D.(Tor.), F.A.C.I., F.C.A.E., F.C.S.C.E., Eng. (*James McGill Professor*)

Van-Thanh-Van Nguyen; B.M.E.(Vietnam), M.C.E.(A.I.T.), D.A.Sc.(Montr.), Eng.

James Nicell; B.A.Sc., M.A.Sc., Ph.D.(Windsor), P.Eng. (*James McGill Professor*); Dean, Faculty of Engineering

A. Patrick S. Selvadurai; M.S.(Stan.), Ph.D., D.Sc.(Nott.), F.E.I.C., F.I.M.A., F.C.S.C.E., P.Eng. (*William Scott Professor of Civil Engineering, James McGill Professor*)

Suresh C. Shrivastava; B.Sc.(Eng.)(Vikram), M.C.E.(Delhi), Sc.D.(Col.), Eng.

Associate Professors

Andrew J. Boyd; B.Sc.Eng.(New Br.), M.A.Sc.(Tor.), Ph.D.(Br. Col.), P.Eng., F.A.C.I.

Luc E. Chouinard; B.Eng., M.Eng.(Montr.), B.C.L.(McG.), Sc.D.(MIT), Eng.; Graduate Program Director

Susan J. Gaskin; B.Sc.(Qu.), Ph.D.(Cant.), P.Eng.

Ronald Gehr; B.Sc.(Eng.)(Rand), M.A.Sc., Ph.D.(Tor.), P.Eng.

Subhasis Ghoshal; B.C.E.(Jad.), M.S.(Missouri), Ph.D.(Carn. Mell), P.Eng. (*William Dawson Scholar*)

Mohamed A. Meguid; B.Sc.(Cairo, Azhar), M.Sc., Ph.D.(W. Ont.), P.Eng.; Associate Dean, Undergraduate Education

Colin Rogers; B.A.Sc., M.A.Sc.(Wat.), Ph.D.(Syd.), P.Eng.

Yixin Shao; B.Sc., M.S.(Tongji), Ph.D.(N'western), P.Eng., F.A.C.I.; Undergraduate Program Director

Assistant Professors

Naveen Eluru; B.Sc.(Indian IT), M.Sc., Ph.D.(Texas-Austin)

Dominic Frigon; B.Sc.(Agr.Sci.), M.Sc.(McG.), Ph.D.(Env.Sci.)(Ill.)

Tom Gleeson; B.Sc.(Vic., BC), M.Sc.(S. Fraser), Ph.D.(Qu.)

Marianne Hatzopoulou; B.Sc., M.Sc.(Beirut), Ph.D.(Tor.)

Dimitrios G. Lignos; B.Sc.(Nat. Tech., Athens), M.Sc., Ph.D.(Stan.)

Jinxia Liu; B.Eng., M.Eng.(Tianjin), M.Eng.(Rensselaer Poly.), Ph.D.(Purd.)

Luis Miranda-Moreno; B.Sc., M.Eng.(Mexico), M.Sc., Ph.D.(Wat.)

Adjunct Professors

Sofia Babarutsi

Richard Edwards

John Hadjinicolaou

Jalal Hawari

Adjunct Professors

Zoubir Lounis

Charles Manatakos

Paul Rodrigue

Sandro Scola

William Taylor

Marc Villeneuve

Jan Vrana

12.5.5 Bachelor of Engineering (B.Eng.) - Civil Engineering (139 credits)

Program credit weight: 139 credits

Program credit weight for Quebec CEGEP students: 110 credits

The Civil Engineering program is comprehensive in providing the fundamentals in mechanics and engineering associated with the diverse fields of the profession, in offering choices of specialization, and in fully reflecting the advances in science, mathematics, engineering, and computing that have transformed all fields of engineering in recent years. The resulting knowledge and training enables graduates to not only enter the profession thoroughly well prepared, but also to adapt to further change.

The required courses ensure a sound scientific and analytical basis for professional studies through courses in solid mechanics, fluid mechanics, soil mechanics, environmental engineering, water resources management, structural analysis, systems analysis, and mathematics. Fundamental concepts are applied to various fields of practice in both required and complementary courses.

By a suitable choice of complementary courses, students can attain advanced levels of technical knowledge in the specialized areas mentioned above. Alternatively, students may choose to develop their interests in a more general way by combining complementary courses within the Department with several from other departments or faculties.

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 110-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

28 credits

CCOM 206	(3)	Communication in Engineering
COMP 208	(3)	Computers in Engineering
EPSC 221	(3)	General Geology
FACC 100*	(1)	Introduction to the Engineering Profession
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

* 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 433	(3)	Urban Planning
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)	Urban Activity, Air Pollution, and Health
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)	Groundwater Engineering

* 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
CIVE 469	(3)	Infrastructure 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
MECH 526	(3)	Manufacturing and the Environment
MGPO 440*	(3)	Strategies for Sustainability
MIME 308	(3)	Social Impact of Technology
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)

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
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
INDR 294*	(3)	Introduction to Labour-Management Relations
MATH 338	(3)	History and Philosophy of Mathematics
MGCR 222*	(3)	Introduction to Organizational Behaviour
MGCR 352*	(3)	Marketing Management 1
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>.

Language Courses

If you are not proficient in a certain language, no more than 3 credits will be given for 6 credits of courses at the 100 level or higher in that language. A maximum of 3 credits of language courses will be counted toward the Complementary Studies requirement.

However, 3-6 credits may be given for language courses at the 200 level or higher that have a sufficient cultural component. These courses must be approved by the McGill Engineering Student Centre (Student Affairs Office) (Frank Dawson Adams Building, Room 22).

12.6 Department of Electrical and Computer Engineering

12.6.1 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

Fax: 514-398-4653

Website: www.mcgill.ca/ece

12.6.2 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, and Software Engineering. 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.

12.6.3 Department of Electrical and Computer Engineering Faculty

Chair

Andrew Kirk

Associate Chair, Academic

Roni Khazaka

Associate Chair, Undergraduate Studies

Jonathan P. Webb

Associate Chair, Graduate Studies

Richard Rose

Emeritus Professors

Eric L. Adler; B.Sc.(Lond.), M.A.Sc.(Tor.), Ph.D.(McG.), F.I.E.E.E., Eng.

Pierre R. Bélanger; B.Eng.(McG.), S.M., Ph.D.(MIT), F.I.E.E.E., Eng.

Maier L. Blostein; B.Eng., M.Eng.(McG.), Ph.D.(Ill.), F.I.E.E.E., Eng.

Clifford H. Champness; M.Sc.(Lond.), Ph.D.(McG.)

Gerry W. Farnell; B.A.Sc.(Tor.), S.M.(MIT), Ph.D.(McG.), F.I.E.E.E., Eng.

Francisco D. Galiana; B.Eng.(McG.), S.M., Ph.D.(MIT), F.I.E.E.E., Eng.

Peter Kabal; B.A.Sc., M.A.Sc., Ph.D.(Tor.)

Lorne Mason; B.Eng., Ph.D.(Sask.)

Boon-Teck Ooi; B.E.(Adel.), S.M.(MIT), Ph.D.(McG.), Eng.

Tomas J.F. Pavlasek; B.Eng., M.Eng., Ph.D.(McG.), Eng.

Nicholas C. Rumin; B.Eng., M.Sc., Ph.D.(McG.), Eng.

Professors

Peter E. Caines; B.A.(Oxf.), D.I.C., Ph.D.(Lond.), F.R.S.C., F.I.E.E.E., F.C.I.A.R. (*James McGill Professor*) (*Macdonald Professor*)

Professors

Benoit Champagne; B.Eng., M.Eng.(Montr.), Ph.D.(Tor.)
 Lawrence Chen; B.Eng.(McG.), M.A.Sc., Ph.D.(Tor.), *Associate Dean, Academic Affairs*
 James Clark; B.A.Sc., Ph.D.(Br. Col.)
 Frank Ferrie; B.Eng., Ph.D.(McG.)
 Geza Joos; B.Sc.(C'dia), M.Eng., Ph.D.(McG.) (*CRC Chair*)
 Andrew Kirk; B.Sc.(Brist.), Ph.D.(Lond.) (*William Dawson Scholar*)
 Harry Leib; B.Sc.(Technion), Ph.D.(Tor.)
 Tho Le-Ngoc; M.Eng.(McG.), Ph.D.(Ott.), F.I.E.E.E.
 Martin D. Levine; B.Eng., M.Eng.(McG.), Ph.D.(Lond.), F.C.I.A.R., F.I.E.E.E., Eng.
 David A. Lowther; B.Sc.(Lond.), Ph.D.(C.N.A.A.), F.C.A.E., Eng. (*James McGill Professor*)
 David V. Plant; M.S., Ph.D.(Brown), P.Eng., F.I.E.E.E., F.O.S.A., F.C.A.E. (*James McGill Professor*)
 Gordon Roberts; B.A.Sc.(Wat.), M.A.Sc., Ph.D.(Tor.), F.I.E.E.E., Eng. (*James McGill Professor*)
 Jonathan P. Webb; B.A., Ph.D.(Cant.)

Associate Professors

Tal Arbel; M.Eng., Ph.D.(McG.)
 Jan Bajcsy; B.Sc.(Harv.), M.Eng., Ph.D.(Princ.)
 Benoit Boulet; B.Sc.(Laval), M.Eng.(McG.), Ph.D.(Tor.) (*William Dawson Scholar*)
 Vamsy Chodavarapu; B.Eng.(Osmania), M.S., Ph.D.(NYU)
 Mark Coates; B.Eng.(Adel.), Ph.D.(Camb.)
 Jeremy R. Cooperstock; B.Ap.Sc.(Br. Col.), M.Sc., Ph.D.(Tor.)
 Mourad El-Gamal; B.Sc.(Cairo), M.Sc.(Nashville), Ph.D.(McG.) (*William Dawson Scholar*)
 Dennis Giannacopoulos; M.Eng., Ph.D.(McG.)
 Warren Gross; B.A.Sc.(Wat.), M.A.Sc., Ph.D.(Tor.)
 Roni Khazaka; M.Eng., Ph.D.(Car.)
 Fabrice Labeau; M.S., Ph.D.(Louvain)
 Steve McFee; B.Eng., Ph.D.(McG.)
 Zetian Mi; B.A.Sc.(Beijing), M.Sc.(Iowa), Ph.D.(Mich.)
 Hannah Michalska; B.Sc., M.Sc.(Warsaw), Ph.D.(Lond.)
 Sam Musallam; B.Sc., M.Sc., Ph.D.(Tor.)
 Milica Popovich; B.Sc.(Colo.), M.Sc., Ph.D.(N'western)
 Ioannis Psaromiligkos; B.Sc.(Patras), M.Sc., Ph.D.(Buffalo)
 Michael Rabbat; B.S.(Ill.), M.S.(Texas), Ph.D.(Wisc.)
 Martin Rochette; B.A., M.Eng., Ph.D.(Laval)
 Richard Rose; B.Sc., M.S.(Ill.), Ph.D.(GIT)
 Ishiang Shih; M.Eng., Ph.D.(McG.)
 Thomas Szkopek; B.A.Sc., M.A.Sc.(Tor.), Ph.D.(Calif.-LA)
 Zeljko Zilic; B.Eng.(Zagreb), M.Sc., Ph.D.(Tor.)

Assistant Professors

Francois Bouffard; Ph.D.(McG.)
 Odile Liboiron-Ladouceur; M.Sc., Ph.D.(Col.)
 Aditya Mahajan; B.Tech.(Indian IT), M.S., Ph.D.(Mich.)

Assistant Professors

Brett Meyer; Ph.D.(Carn. Mell)

Gunter Mussbacher; Ph.D.(Ott.)

Haibo Zeng; Ph.D.(Calif., Berk.)

Associate Members

Matthew Adam Dobbs; Ph.D.(Vic., BC)

Gregory Dudek; B.Sc.(Qu.), M.Sc., Ph.D.(Tor.)

Alan C. Evans; M.Sc.(Surrey), Ph.D.(Leeds)

William R. Funnell; M.Eng., Ph.D.(McG.)

Henrietta L. Galiana; M.Eng., Ph.D.(McG.)

David Juncker; Ph.D.(Neuchatel)

Robert E. Kearney; M.Eng., Ph.D.(McG.)

Nathaniel J. Quitoriano; B.S.(Calif.), Ph.D.(MIT)

Adjunct Professors

Rhys Allan Adams

Robert Diraddo

Danny Grant

Cedric Guss

Vincent Hayward

Ricardo Izquierdo

Cheng K. Jen

Innocent Kamwa

George Kesidis

Irene Leszkowicz

Martin Maier

Shie Mannor

Frederic Nabki

Douglas O'Shaughnessy

Katarzyna Radecka

Robert Sabourin

Joshua D. Schwartz

Andraws Swidan

Leszek Szczecinski

Claude Thibeault

Kenneth D. Wagner

12.6.4 Bachelor of Engineering (B.Eng.) - Electrical Engineering (138 credits)

Revision, May 2014. Start of revision.

Program credit weight: 138-139 credits

Program credit weight for Quebec CEGEP students: 109-110 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 exposed to all basic elements of electrical engineering and can function in any of our client industries. This breadth is what distinguishes an engineer from, for example, a computer scientist or physicist.

In addition to technical complementary courses, students in the Electrical Engineering program take general complementary courses in social sciences, administrative studies, and humanities. These courses allow students to develop specific interests in areas such as psychology, economics, management, or political science.

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 109- to 110-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

35 credits

CCOM 206	(3)	Communication in Engineering
CIVE 281	(3)	Analytical Mechanics
COMP 202	(3)	Foundations of Programming
FACC 100*	(1)	Introduction to the Engineering Profession
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 270	(3)	Applied Linear Algebra
MATH 381	(3)	Complex Variables and Transforms
MIME 262	(3)	Properties of Materials in Electrical Engineering
PHYS 271	(3)	Introduction to Quantum Physics

* 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 210	(3)	Electric Circuits 2
ECSE 211	(3)	Design Principles and Methods
ECSE 221	(3)	Introduction to Computer Engineering

ECSE 291	(2)	Electrical Measurements Laboratory
ECSE 303	(3)	Signals and Systems 1
ECSE 304	(3)	Signals and Systems 2
ECSE 305	(3)	Probability and Random Signals 1
ECSE 322	(3)	Computer Engineering
ECSE 323	(5)	Digital System Design
ECSE 330	(3)	Introduction to Electronics
ECSE 334	(3)	Introduction to Microelectronics
ECSE 351	(3)	Electromagnetic Fields
ECSE 352	(3)	Electromagnetic Waves
ECSE 361	(3)	Power Engineering
ECSE 434	(2)	Microelectronics Laboratory
ECSE 443	(3)	Introduction to Numerical Methods in Electrical Engineering
ECSE 456	(3)	ECSE Design Project 1
ECSE 457	(3)	ECSE Design Project 2

Complementary Courses

17-18 credits

Technical Complementaries

9 credits from the following:

ECSE 404	(3)	Control Systems
ECSE 405	(3)	Antennas
ECSE 411	(3)	Communications Systems 1
ECSE 412	(3)	Discrete Time Signal Processing
ECSE 413	(3)	Communications Systems 2
ECSE 414	(3)	Introduction to Telecommunication Networks
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 Organization and Architecture
ECSE 426	(3)	Microprocessor Systems
ECSE 427	(3)	Operating Systems
ECSE 430	(3)	Photonic Devices and Systems
ECSE 431	(3)	Introduction to VLSI CAD
ECSE 432	(3)	Physical Basis: Transistor Devices
ECSE 435	(3)	Mixed-Signal Test Techniques
ECSE 436	(3)	Signal Processing Hardware
ECSE 450	(3)	Electromagnetic Compatibility
ECSE 451	(3)	EM Transmission and Radiation
ECSE 460*	(3)	Appareillage électrique (Electrical Power Equipment)

ECSE 462	(3)	Electromechanical Energy Conversion
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

* Courses taught in French.

Laboratory Complementaries

2-3 credits from the following:

ECSE 426	(3)	Microprocessor Systems
ECSE 431	(3)	Introduction to VLSI CAD
ECSE 435	(3)	Mixed-Signal Test Techniques
ECSE 436	(3)	Signal Processing Hardware
ECSE 450	(3)	Electromagnetic Compatibility
ECSE 485	(2)	IC Fabrication Laboratory
ECSE 486	(2)	Power Laboratory
ECSE 487	(2)	Computer Architecture Laboratory
ECSE 488	(2)	High Frequency Laboratory
ECSE 489	(2)	Telecommunication Network Laboratory
ECSE 490	(2)	Digital Signal Processing Laboratory
ECSE 491	(2)	Communication Systems Laboratory
ECSE 492	(2)	Optical Communications Laboratory
ECSE 493	(2)	Control and Robotics Laboratory

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
CIVE 469	(3)	Infrastructure 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
MECH 526	(3)	Manufacturing and the Environment

MGPO 440*	(3)	Strategies for Sustainability
MIME 308	(3)	Social Impact of Technology
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)

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
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
INDR 294*	(3)	Introduction to Labour-Management Relations
MATH 338	(3)	History and Philosophy of Mathematics
MGCR 222*	(3)	Introduction to Organizational Behaviour
MGCR 352*	(3)	Marketing Management 1
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>.

Language Courses

If you are not proficient in a certain language, no more than 3 credits will be given for 6 credits of courses at the 100 level or higher in that language. A maximum of 3 credits of language courses will be counted toward the Complementary Studies requirement.

However, 3-6 credits may be given for language courses at the 200 level or higher that have a sufficient cultural component. These courses must be approved by the McGill Engineering Student Centre (Student Affairs Office) (Frank Dawson Adams Building, Room 22).

Enhanced Power Concentration

Students following this program must complete 15 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

To be considered in September 2014, 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 361 (Power Engineering);
- be able to complete the degree requirements by December 2015;
- agree to follow the curriculum requirements set out below.

SELECTION CRITERIA

The number of students selected, expected to be between five and ten, will be subject to a specific agreement between the University and the Institute. Selection criteria for admission to the Institute will be based on the CGPA and on the curriculum vitae. The selection process for the scholarship may involve an interview with the committee presided by Hydro-Québec and the industrial partners. There is a possibility of an internship with Hydro-Québec.

CURRICULUM REQUIREMENTS FOR SELECTED STUDENTS

Generally, unless the University has authorized specific substitutions, students must complete the degree requirements set out in this eCalendar with the following specifications:

Technical Complementaries and Laboratories (15 credits)

All students must take (or have taken) five courses from the following:

Required Courses

9 credits

ECSE 462	(3)	Electromechanical Energy Conversion
ECSE 464	(3)	Power Systems Analysis
ECSE 465	(3)	Power Electronic Systems

Students must also complete ECSE 456 and 457 (Electrical Engineering Design Projects 1 and 2) on a practical project in power engineering, preferably at the Institute or with a company sponsoring the Institute.

Complementary Courses

6 credits from the following:

ECSE 404	(3)	Control Systems
ECSE 460*	(3)	Appareillage électrique (Electrical Power Equipment)
ECSE 463	(3)	Electric Power Generation
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

* Courses taught in French.

Note: ECSE 460, ECSE 464 (Fall semester), ECSE 465, ECSE 467, ECSE 468, and ECSE 469 are courses sponsored by the Institute and taught at École Polytechnique de Montréal.

Revision, May 2014. End of revision.

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

Program credit weight: 138-139 credits

Program credit weight for Quebec CEGEP students: 109-110 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 (29 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 109- to 110-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

35 credits

CCOM 206	(3)	Communication in Engineering
CIVE 281	(3)	Analytical Mechanics
COMP 202	(3)	Foundations of Programming
FACC 100*	(1)	Introduction to the Engineering Profession
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 270	(3)	Applied Linear Algebra
MATH 381	(3)	Complex Variables and Transforms
MIME 262	(3)	Properties of Materials in Electrical Engineering
PHYS 271	(3)	Introduction to Quantum Physics

* 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 210	(3)	Electric Circuits 2
ECSE 211	(3)	Design Principles and Methods
ECSE 221	(3)	Introduction to Computer Engineering
ECSE 291	(2)	Electrical Measurements Laboratory
ECSE 303	(3)	Signals and Systems 1
ECSE 304	(3)	Signals and Systems 2
ECSE 305	(3)	Probability and Random Signals 1
ECSE 322	(3)	Computer Engineering
ECSE 323	(5)	Digital System Design
ECSE 330	(3)	Introduction to Electronics
ECSE 334	(3)	Introduction to Microelectronics
ECSE 351	(3)	Electromagnetic Fields
ECSE 352	(3)	Electromagnetic Waves
ECSE 361	(3)	Power Engineering
ECSE 434	(2)	Microelectronics Laboratory
ECSE 498	(3)	Honours Thesis 1
ECSE 499	(3)	Honours Thesis 2
ECSE 543	(3)	Numerical Methods in Electrical Engineering

Complementary Courses

17-18 credits

Technical Complementaries

9 credits chosen from 500-level ECSE courses OR 6 credits chosen from 500-level ECSE courses and 3 credits chosen from the following list of 400-level courses (no more than one 400-level course can be chosen as a technical complementary):

ECSE 425	(3)	Computer Organization and Architecture
ECSE 427	(3)	Operating Systems
ECSE 451	(3)	EM Transmission and Radiation

Laboratory Complementaries

2-3 credits from the following:

ECSE 426	(3)	Microprocessor Systems
ECSE 431	(3)	Introduction to VLSI CAD
ECSE 435	(3)	Mixed-Signal Test Techniques
ECSE 436	(3)	Signal Processing Hardware
ECSE 450	(3)	Electromagnetic Compatibility
ECSE 485	(2)	IC Fabrication Laboratory
ECSE 486	(2)	Power Laboratory
ECSE 487	(2)	Computer Architecture Laboratory

ECSE 488	(2)	High Frequency Laboratory
ECSE 489	(2)	Telecommunication Network Laboratory
ECSE 490	(2)	Digital Signal Processing Laboratory
ECSE 491	(2)	Communication Systems Laboratory
ECSE 492	(2)	Optical Communications Laboratory
ECSE 493	(2)	Control and Robotics Laboratory

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
CIVE 469	(3)	Infrastructure 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
MECH 526	(3)	Manufacturing and the Environment
MGPO 440*	(3)	Strategies for Sustainability
MIME 308	(3)	Social Impact of Technology
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)

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
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
INDR 294*	(3)	Introduction to Labour-Management Relations
MATH 338	(3)	History and Philosophy of Mathematics
MGCR 222*	(3)	Introduction to Organizational Behaviour
MGCR 352*	(3)	Marketing Management 1
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>.

Language Courses

If you are not proficient in a certain language, no more than 3 credits will be given for 6 credits of courses at the 100 level or higher in that language. A maximum of 3 credits of language courses will be counted toward the Complementary Studies requirements.

However, 3-6 credits may be given for language courses at the 200 level or higher that have a sufficient cultural component. These courses must be approved by the McGill Engineering Student Centre (Student Affairs Office) (Frank Dawson Adams Building, Room 22).

12.6.6 Bachelor of Engineering (B.Eng.) - Computer Engineering (139 credits)

Program credit weight: 139-143 credits

Program credit weight for Quebec CEGEP students: 113-114 credits

Program credit weight for out-of-province students: 139-140 credits

The Computer Engineering program provides students with greater depth and breadth of knowledge in the hardware and software aspects of computers. Students are exposed to both theoretical and practical issues of both hardware and software in well-equipped laboratories. Although the program is designed to meet the growing demands by industry for engineers with a strong background in modern computer technology, it also provides the underlying depth for graduate studies in all fields of Computer Engineering.

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

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 113- to 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 Administrative 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

35 credits

CCOM 206	(3)	Communication in Engineering
CIVE 281	(3)	Analytical Mechanics
COMP 202	(3)	Foundations of Programming
COMP 250	(3)	Introduction to Computer Science
COMP 251	(3)	Algorithms and Data Structures
FACC 100*	(1)	Introduction to the Engineering Profession
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 270	(3)	Applied Linear Algebra
MATH 363	(3)	Discrete Mathematics

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

Required Computer Engineering Courses

58 credits

ECSE 200	(3)	Electric Circuits 1
ECSE 210	(3)	Electric Circuits 2
ECSE 211	(3)	Design Principles and Methods
ECSE 221	(3)	Introduction to Computer Engineering
ECSE 291	(2)	Electrical Measurements Laboratory
ECSE 305	(3)	Probability and Random Signals 1
ECSE 306	(3)	Fundamentals of Signals and Systems
ECSE 321	(3)	Introduction to Software Engineering
ECSE 322	(3)	Computer Engineering
ECSE 323	(5)	Digital System Design
ECSE 330	(3)	Introduction to Electronics
ECSE 334	(3)	Introduction to Microelectronics
ECSE 353	(3)	Electromagnetic Fields and Waves
ECSE 414	(3)	Introduction to Telecommunication Networks
ECSE 425	(3)	Computer Organization and Architecture
ECSE 426	(3)	Microprocessor Systems
ECSE 427	(3)	Operating Systems
ECSE 456	(3)	ECSE Design Project 1
ECSE 457	(3)	ECSE Design Project 2

Complementary Courses

17-21 credits

Natural Science Complementary Courses (for CEGEP students only)

0-3 credits

Students from CEGEP are required to complete one 3-credit course at the 200 level or higher, chosen from the following science departments, approved by the Undergraduate Programs Office in the Department of Electrical and Computer Engineering:

Atmospheric and Oceanic Sciences (ATOC)

Biology (BIOL)

Chemistry (CHEM)

Earth and Planetary Sciences (EPSC)

Earth System Science (ESYS)

Physics (PHYS)

Technical Complementaries

9 credits from the following:

500-level ECSE courses are restricted to students with a minimum CGPA of 3.0 and B+ or better in prerequisite courses.

COMP 424	(3)	Artificial Intelligence
ECSE 404	(3)	Control Systems
ECSE 411	(3)	Communications Systems 1
ECSE 412	(3)	Discrete Time Signal Processing
ECSE 420	(3)	Parallel Computing
ECSE 421	(3)	Embedded Systems
ECSE 422	(3)	Fault Tolerant Computing
ECSE 424	(3)	Human-Computer Interaction
ECSE 428	(3)	Software Engineering Practice
ECSE 429	(3)	Software Validation
ECSE 431	(3)	Introduction to VLSI CAD
ECSE 436	(3)	Signal Processing Hardware
ECSE 443	(3)	Introduction to Numerical Methods in Electrical Engineering
ECSE 450	(3)	Electromagnetic Compatibility
ECSE 530	(3)	Logic Synthesis
ECSE 532	(3)	Computer Graphics
ECSE 537	(3)	Advanced Digital Integrated Circuits
ECSE 548	(3)	Introduction to VLSI Systems

Laboratory Complementaries

2-3 credits from the following:

ECSE 434	(2)	Microelectronics Laboratory
ECSE 436	(3)	Signal Processing Hardware
ECSE 487	(2)	Computer Architecture Laboratory
ECSE 489	(2)	Telecommunication Network Laboratory
ECSE 490	(2)	Digital Signal Processing Laboratory
ECSE 491	(2)	Communication Systems Laboratory
ECSE 493	(2)	Control and Robotics Laboratory

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
CIVE 469	(3)	Infrastructure 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
MECH 526	(3)	Manufacturing and the Environment
MGPO 440*	(3)	Strategies for Sustainability
MIME 308	(3)	Social Impact of Technology
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)

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
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
INDR 294*	(3)	Introduction to Labour-Management Relations

MATH 338	(3)	History and Philosophy of Mathematics
MGCR 222*	(3)	Introduction to Organizational Behaviour
MGCR 352*	(3)	Marketing Management 1
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>.

Language Courses

If you are not proficient in a certain language, no more than 3 credits will be given for 6 credits of courses at the 100 level or higher in that language. A maximum of 3 credits of language courses will be counted toward the Complementary Studies requirement.

However, 3-6 credits may be given for language courses at the 200 level or higher that have a sufficient cultural component. These courses must be approved by the McGill Engineering Student Centre (Student Affairs Office) (Frank Dawson Adams Building, Room 22).

12.6.7 Bachelor of Software Engineering (B.S.E.) - Software Engineering (137 credits)

Program credit weight: 137-144 credits

Program credit weight for Quebec CEGEP students: 114-115 credits

Program credit weight for out-of-province students: 137-140 credits

This program offers students the opportunity to focus their studies on the skills needed to design and develop complex software systems. This emerging field of engineering is a major component of the growing Information Technology (IT) sector of the economy, in which the demand for qualified personnel continues to outstrip supply. Graduates of this program will have a solid foundation for careers in the software industry.

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

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 112- to 115-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 Courses

76 credits

COMP 202	(3)	Foundations of Programming
COMP 206	(3)	Introduction to Software Systems
COMP 250	(3)	Introduction to Computer Science
COMP 251	(3)	Algorithms and Data Structures
COMP 302	(3)	Programming Languages and Paradigms

COMP 360	(3)	Algorithm Design
COMP 421	(3)	Database Systems
ECSE 211	(3)	Design Principles and Methods
ECSE 221	(3)	Introduction to Computer Engineering
ECSE 321	(3)	Introduction to Software Engineering
ECSE 322	(3)	Computer Engineering
ECSE 323	(5)	Digital System Design
ECSE 414	(3)	Introduction to Telecommunication Networks
ECSE 420	(3)	Parallel Computing
ECSE 427	(3)	Operating Systems
ECSE 428	(3)	Software Engineering Practice
ECSE 429	(3)	Software Validation
ECSE 456	(3)	ECSE Design Project 1
ECSE 457	(3)	ECSE Design Project 2
FACC 100*	(1)	Introduction to the Engineering Profession
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 270	(3)	Applied Linear Algebra
MATH 363	(3)	Discrete Mathematics

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

Engineering Breadth Required Courses

20 credits

CCOM 206	(3)	Communication in Engineering
ECSE 200	(3)	Electric Circuits 1
ECSE 210	(3)	Electric Circuits 2
ECSE 291	(2)	Electrical Measurements Laboratory
ECSE 305	(3)	Probability and Random Signals 1
ECSE 306	(3)	Fundamentals of Signals and Systems
FACC 300	(3)	Engineering Economy

Complementary Courses

12-19 credits

Natural Science Complementary Courses (for CEGEP students only)

0-6 credits

Students from CEGEP are required to complete two 3-credit courses at the 200 level or higher, chosen from the following science departments, approved by the Undergraduate Programs Office in the Department of Electrical and Computer Engineering:

Atmospheric and Oceanic Sciences (ATOC)

Biology (BIOL)

Chemistry (CHEM)

Earth and Planetary Sciences (EPSC)

Earth System Science (ESYS)

Physics (PHYS)

Technical Complementaries

6-7 credits from the following:

500-level ECSE courses are restricted to students with a minimum CGPA of 3.0 and B+ or better in prerequisite courses.

Not all courses listed are offered in a given year. See the "Courses" section of this eCalendar to know if a course is offered.

Revision, May 2014. Start of revision.

COMP 330	(3)	Theory of Computation
COMP 350	(3)	Numerical Computing
COMP 409	(3)	Concurrent Programming
COMP 424	(3)	Artificial Intelligence
COMP 520	(4)	Compiler Design
COMP 557*	(3)	Fundamentals of Computer Graphics
COMP 566	(3)	Discrete Optimization 1
COMP 575	(3)	Fundamentals of Distributed Algorithms
ECSE 404	(3)	Control Systems
ECSE 411	(3)	Communications Systems 1
ECSE 412	(3)	Discrete Time Signal Processing
ECSE 413	(3)	Communications Systems 2
ECSE 421	(3)	Embedded Systems
ECSE 422	(3)	Fault Tolerant Computing
ECSE 424	(3)	Human-Computer Interaction
ECSE 425	(3)	Computer Organization and Architecture
ECSE 426	(3)	Microprocessor Systems
ECSE 504	(3)	Sampled Data Control
ECSE 507	(3)	Optimization and Optimal Control
ECSE 523	(3)	Speech Communications
ECSE 529	(3)	Computer and Biological Vision
ECSE 530	(3)	Logic Synthesis
ECSE 532*	(3)	Computer Graphics
ECSE 539	(3)	Software Language Engineering
ECSE 570	(3)	Automatic Speech Recognition

* Students choose either COMP 557 or ECSE 532.

Revision, May 2014. End of revision.

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
CIVE 469	(3)	Infrastructure 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
MECH 526	(3)	Manufacturing and the Environment
MGPO 440*	(3)	Strategies for Sustainability
MIME 308	(3)	Social Impact of Technology
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)

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
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
INDR 294*	(3)	Introduction to Labour-Management Relations
MATH 338	(3)	History and Philosophy of Mathematics
MGCR 222*	(3)	Introduction to Organizational Behaviour
MGCR 352*	(3)	Marketing Management 1
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>.

Language Courses

If you are not proficient in a certain language, no more than 3 credits will be given for 6 credits of courses at the 100 level or higher in that language. A maximum of 3 credits of language courses will be counted toward the Complementary Studies requirement.

However, 3-6 credits may be given for language courses at the 200 level or higher that have a sufficient cultural component. These courses must be approved by the McGill Engineering Student Centre (Student Affairs Office) (Frank Dawson Adams Building, Room 22).

12.7 Department of Mechanical Engineering

12.7.1 Location

Macdonald Engineering Building, Room 270
817 Sherbrooke Street West
Montreal QC H3A 0C3

Telephone: 514-398-6296

Fax: 514-398-7365

Website: www.mcgill.ca/mecheng

12.7.2 About the Department of Mechanical Engineering

Mechanical engineers are traditionally concerned with the conception, design, implementation, and operation of mechanical systems. Typical fields of work are aerospace, energy, manufacturing, machinery, and transportation. Because of the very broad nature of the discipline, there is usually a high demand for mechanical engineers.

Many mechanical engineers follow other career paths. Graduate studies are useful for the specialists working in research establishments, consulting firms, or in corporate research and development.

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.

Concentrations in Aeronautical Engineering, Mechatronics*, and 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. Students are active in such professional societies as CASI (Canadian Aeronautics and Space Institute), SAE (Society of Automotive Engineers), and ASME (American Society of Mechanical Engineers), and in various campus organizations.

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 better, are organized frequently.



Note: * The Mechatronics Concentration will not be offered until further notice.

12.7.3 Department of Mechanical Engineering Faculty

Chair

Arun K. Misra

Emeritus Professors

Abdul M. Ahmed; B.Sc.(Dhaka), M.Eng., Ph.D.(McG.), Eng. (*Thomas Workman Emeritus Professor of Mechanical Engineering*)

Romuald Knystautas; B.Eng., M.Eng., Ph.D.(McG.), ing.

Dan Mateescu; M.Eng.(Poli. U. Buch.), Ph.D.(Rom. Acad. Sci.), Doctor Honoris Causa(Poli. U. Buch.), F.C.A.S.I., A.F.A.I.A.A., Erskine Fellow(Cant.)

Michael P. Pa doussis; B.Eng.(McG.), Ph.D.(Camb.), ing., F.I.Mech.E., F.A.S.M.E., F.A.A.M., F.C.S.M.E., F.R.S.C., F.C.A.E. (*Thomas Workman Emeritus Professor of Mechanical Engineering*)

Stuart J. Price; B.Sc., Ph.D.(Brist.), P.Eng.

Post-Retirement

Lucjan Kops; B.Eng., M.Eng., D.Sc.Eng.(Krakow Tech.), ing., F.C.I.R.P., F.A.S.M.E., F.C.S.M.E., M.S.M.E.

Vince Thomson; B.Sc.(Windsor), Ph.D.(McM.)

Paul J. Zsombor-Murray; B.Eng., M.Eng., Ph.D.(McG.), ing., F.C.S.M.E.

Professors

Marco Amabili; M.Eng.(Ancona), Ph.D.(Bologna); F.A.S.M.E. (*Tier 1 Canada Research Chair*)

Jorge Angeles; B.Eng., M.Eng.(UNAM Mexico), Ph.D.(Stan.), Eng., F.A.S.M.E., F.I.E.E.E., F.C.S.M.E., F.R.S.C., F.C.A.E., Doctor Honoris Causa(U. Guanajuato, Mexico) (*James McGill Professor*)

Bantwal R. Baliga; B.Tech.(IIT, Kanpur), M.Sc.(Case West.), Ph.D.(Minn.), P.Eng.

Wagdi G. Habashi; B.Eng., M.Eng.(McG.), Ph.D.(Cornell), ing., C.Q., F.R.S.C., F.C.A.E., F.A.I.A.A., F.A.S.M.E. (*NSERC-J. Armand Bombardier-Bell-Helicopter-CAE Industrial Research Chair*)

Pascal Hubert; B.Eng., M.Sc.(École Poly., Montr.), Ph.D.(Br. Col.), ing. (*William Dawson Scholar*)

John H.S. Lee; B.Eng.(McG.), M.Sc.(MIT), Ph.D.(McG.), ing., F.R.S.C., F.C.A.E.

Arun K. Misra; B.Tech.(IIT, Kharagpur), Ph.D.(Br. Col.), P.Eng., F.A.A.S., F.A.I.A.A., F.C.A.E. (*Thomas Workman Professor of Mechanical Engineering*)

Luc Mongeau; B.Sc., M.Sc.(École Poly., Montr.), Ph.D.(Penn. St.), ing., A.S.A., S.A.E., A.S.M.E., A.I.A.A. (*Tier 1 Canada Research Chair*)

Meyer Nahon; B.Sc.(Qu.), M.Sc.(Tor.), Ph.D.(McG.), ing., A.F.A.I.A.A.

Associate Professors

Francois Barthelat; M.Sc.(Roch.), Ph.D.(N'western), ing.

Jeffrey M. Bergthorson; B.Sc.(Manit.), M.Sc., Ph.D.(Calif. Tech.), P.Eng.

Luca Cortelezzi; M.Sc., Ph.D.(Calif. Tech.)

David L. Frost; B.A.Sc.(Br. Col.), M.S., Ph.D.(Calif. Tech.), P.Eng.; *Graduate Program Director*

Andrew J. Higgins; B.Sc.(Ill.), M.S., Ph.D.(Wash.)

Michael Kokkolaras; Dipl. Aerospace Eng.(Tech. Univ. Munich), Ph.D.(Rice)

Jozsef Kövecses; M.Sc.(U. Miskolc), Ph.D.(Hung. Acad. Sci.), ing.

Tim Lee; M.S.(Port. St.), Ph.D.(Idaho)

Larry B. Lessard; B.Eng.(McG.), M.Sc., Ph.D.(Stan.), ing.

Rosaire Mongrain; B.Sc., M.Sc.(Montr.), Ph.D.(École Poly., Montr.), ing. (*William Dawson Scholar*)

Laurent Mydlarski; B.A.Sc.(Wat.), Ph.D.(Cornell), ing.

Siva Nadarajah; B.Sc.(Math), B.Sc.(Aero.Eng.)(Kansas), M.Sc., Ph.D.(Stan.); *Director, Graduate Admissions and Scholarships*

Damiano Pasini; M.Sc.(Pavia), Ph.D.(Brist.), ing.

Peter Radziszewski; B.A.Sc.(Br. Col.), M.Sc., Ph.D.(Laval), ing.

Inna Sharf; B.A.Sc., Ph.D.(Tor.), P.Eng.

Evgeny V. Timofeev; M.Sc., Ph.D.(STU, St. Peters.), Eng., A.F.A.I.A.A.

Srikar T. Vengallatore; B.Tech.(BHU), Ph.D.(MIT) (*Tier 2 Canada Research Chair*)

Assistant Professors

Mathias Legrand; M.Sc., Ph.D.(École Centrale, Nantes); *Aerospace Program Director*

Xinyu Liu; B.Eng., M.Eng.(Harbin Inst. Tech.), Ph.D.(Tor.) (*Chwang-Seto Faculty Scholar*)

Yaoyao Fiona Zhao; B.Sc.(BIT), M.Sc., Ph.D.(Auck.)

Adjunct Professors

Olivier Bertrand

Farhang Daneshmand

James R. Forbes

Adjunct Professors

Eliot Fried

George Haller

Course Lecturers

Richard Klopp

Casey Lambert

Sudarshan Martins

Josef Slanik

12.7.4 Bachelor of Engineering (B.Eng.) - Mechanical Engineering (142 credits)

Program credit weight: 142-148 credits

Program credit weight for Quebec CEGEP students: 119 credits

Program credit weight for out-of-province students: 142 credits

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.

Special interests are satisfied by selecting appropriate complementary courses from among those offered with a specific subject concentration, such as management, industrial engineering, computer science, controls and robotics, bio-engineering, aeronautics, combustion, systems engineering, etc.

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 118-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

33 credits

CCOM 206	(3)	Communication in Engineering
CIVE 207	(4)	Solid Mechanics
COMP 208	(3)	Computers in Engineering
ECSE 461	(3)	Electric Machinery
FACC 100	(1)	Introduction to the Engineering Profession
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
MIME 260	(3)	Materials Science and Engineering

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

Required Mechanical Engineering Courses

65 credits

MECH 201	(2)	Introduction to Mechanical Engineering
MECH 210	(2)	Mechanics 1
MECH 220	(4)	Mechanics 2
MECH 240	(3)	Thermodynamics 1
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 529	(3)	Discrete Manufacturing Systems

MECH 530	(3)	Mechanics of Composite Materials
MECH 532	(3)	Aircraft Performance, Stability and Control
MECH 535	(3)	Turbomachinery and Propulsion
MECH 536	(3)	Aircraft Structures
MECH 541	(3)	Kinematic Synthesis
MECH 543	(3)	Design with Composite Materials
MECH 544	(3)	Processing of Composite Materials
MECH 553	(3)	Design and Manufacture of Microdevices
MECH 557	(3)	Mechatronic Design
MECH 563*	(3)	Biofluids and Cardiovascular Mechanics
MECH 565	(3)	Fluid Flow and Heat Transfer Equipment
MECH 573	(3)	Mechanics of Robotic Systems
MECH 577	(3)	Optimum Design
MECH 593	(3)	Design Theory and Methodology

* Students select 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 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
CIVE 469	(3)	Infrastructure 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
MECH 526	(3)	Manufacturing and the Environment
MGPO 440*	(3)	Strategies for Sustainability
MIME 308	(3)	Social Impact of Technology
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)

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
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
INDR 294*	(3)	Introduction to Labour-Management Relations
MATH 338	(3)	History and Philosophy of Mathematics
MGCR 222*	(3)	Introduction to Organizational Behaviour
MGCR 352*	(3)	Marketing Management 1
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>.

Language Courses

If you are not proficient in a certain language, no more than 3 credits will be given for 6 credits of courses at the 100 level or higher in that language. A maximum of 3 credits of language courses will be counted toward the Complementary Studies requirement.

However, 3-6 credits may be given for language courses at the 200 level or higher that have a sufficient cultural component. These courses must be approved by the McGill Engineering Student Centre (Student Affairs Office) (Frank Dawson Adams Building, Room 22).

Elective Courses

0-6 credits

Students from Quebec CEGEPs must take 6 credits of courses at the 200 level or higher from the following faculties/schools:

Desautels Faculty of Management

Faculty of Agricultural and Environmental Sciences

Faculty of Arts

Faculty of Engineering

Faculty of Religious Studies

Faculty of Science

Schulich School of Music

Typical Program of Study

Students entering the program from Quebec CEGEPs follow a different curriculum from those entering from outside the province. Students will be advised by the Department as to which courses they should select from the course lists above.

For a detailed curriculum, please see <http://www.mcgill.ca/mecheng/undergrad/curriculum>.

For all minors and concentrations, 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 minor or concentration.

12.7.5 Bachelor of Engineering (B.Eng.) - Honours Mechanical Engineering (142 credits)

Program credit weight: 142-148 credits

Program credit weight for Quebec CEGEP students: 119 credits

Program credit weight for out-of-province students: 142 credits

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 is particularly suitable for those with a high aptitude in mathematics and physics and gives a thorough grounding in the basic engineering sciences.

Special interests are satisfied by selecting appropriate complementary courses from among those offered with a specific subject concentration, such as management, industrial engineering, computer science, controls and robotics, bio-engineering, aeronautics, combustion, systems engineering, etc.

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

27 credits

CCOM 206	(3)	Communication in Engineering
CIVE 207	(4)	Solid Mechanics
COMP 208	(3)	Computers in Engineering
FACC 100*	(1)	Introduction to the Engineering Profession
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

* 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
MECH 240	(3)	Thermodynamics 1
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 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 403D1	(3)	Thesis (Honours)
MECH 403D2	(3)	Thesis (Honours)
MECH 404	(3)	Honours Thesis 2
MECH 419	(4)	Advanced Mechanics of Systems
MECH 430	(3)	Fluid Mechanics 2
MECH 494	(3)	Honours Design Project

Technical Complementary Courses

Revision, May 2014. Start of revision.

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 Dynamics and Chaos
MATH 327	(3)	Matrix Numerical Analysis
MATH 363	(3)	Discrete Mathematics
MATH 381	(3)	Complex Variables and Transforms
MATH 407	(3)	Dynamic Programming
MATH 417	(3)	Mathematical Programming

Revision, May 2014. End of revision.

6 credits from the following:

MECH 513	(3)	Control Systems
MECH 546	(3)	Finite Element Methods in Solid Mechanics
MECH 562	(3)	Advanced Fluid Mechanics
MECH 577	(3)	Optimum Design
MECH 578	(3)	Advanced Thermodynamics

MECH 579* (3) Multidisciplinary Design Optimization

* Note: Students select either MECH 577 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)	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 529	(3)	Discrete Manufacturing Systems
MECH 530	(3)	Mechanics of Composite Materials
MECH 532	(3)	Aircraft Performance, Stability and Control
MECH 535	(3)	Turbomachinery and Propulsion
MECH 536	(3)	Aircraft Structures
MECH 541	(3)	Kinematic Synthesis
MECH 543	(3)	Design with Composite Materials
MECH 544	(3)	Processing of Composite Materials
MECH 553	(3)	Design and Manufacture of Microdevices
MECH 557	(3)	Mechatronic Design
MECH 563*	(3)	Biofluids and Cardiovascular Mechanics
MECH 565	(3)	Fluid Flow and Heat Transfer Equipment
MECH 573	(3)	Mechanics of Robotic Systems
MECH 577	(3)	Optimum Design
MECH 593	(3)	Design Theory and Methodology

*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
CIVE 469	(3)	Infrastructure 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

MECH 526	(3)	Manufacturing and the Environment
MGPO 440*	(3)	Strategies for Sustainability
MIME 308	(3)	Social Impact of Technology
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)

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
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
INDR 294*	(3)	Introduction to Labour-Management Relations
MATH 338	(3)	History and Philosophy of Mathematics
MGCR 222*	(3)	Introduction to Organizational Behaviour
MGCR 352*	(3)	Marketing Management I
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>.

Language Courses

If you are not proficient in a certain language, no more than 3 credits will be given for 6 credits of courses at the 100 level or higher in that language. A maximum of 3 credits of language courses will be counted toward the Complementary Studies requirement.

However, 3-6 credits may be given for language courses at the 200 level or higher that have a sufficient cultural component. These courses must be approved by the McGill Engineering Student Centre (Student Affairs Office) (Frank Dawson Adams Building, Room 22).

Elective Courses

0-6 credits

Students from Quebec CEGEPs must take 6 credits of courses at the 200 level or higher from the following faculties/schools:

Desautels Faculty of Management

Faculty of Agricultural and Environmental Sciences

Faculty of Arts

Faculty of Engineering

Faculty of Religious Studies

Faculty of Science

Schulich School of Music

Typical Program of Study

Students entering the program from CEGEP follow a different curriculum from those entering from out of province. Students will be advised by the Department as to which courses they should select from the course lists above.

For a detailed curriculum, see <http://www.mcgill.ca/mecheng/undergrad/curriculum>.

For all minors and concentrations, 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 minor or concentration.

12.7.6 Bachelor of Engineering (B.Eng.) - Mechanical Engineering - Aeronautical Engineering (15 credits)

Students in this concentration take five courses in the area of Aeronautical Engineering. All courses must be passed with a grade of C or better.

Students should discuss their course selection with their adviser and 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.

Required Courses

6 credits

MECH 532	(3)	Aircraft Performance, Stability and Control
MECH 533	(3)	Subsonic Aerodynamics

Complementary Courses

9 credits

3-6 credits from the following:

MECH 535	(3)	Turbomachinery and Propulsion
MECH 536	(3)	Aircraft Structures

3-6 credits from the following:

MECH 537	(3)	High-Speed Aerodynamics
MECH 538	(3)	Unsteady Aerodynamics
MECH 539	(3)	Computational Aerodynamics
MECH 565	(3)	Fluid Flow and Heat Transfer Equipment
MECH 566	(3)	Fluid-Structure Interactions

12.7.7 Bachelor of Engineering (B.Eng.) - Honours Mechanical Engineering - Aeronautical Engineering (15 credits)

Students in this concentration take five courses in the area of aeronautical engineering. All courses must be passed with a grade of C or better.

Students should discuss their course selection with their adviser and 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.

Required Courses

6 credits

MECH 532	(3)	Aircraft Performance, Stability and Control
MECH 533	(3)	Subsonic Aerodynamics

Complementary Courses

9 credits

3-6 credits from the following:

MECH 535	(3)	Turbomachinery and Propulsion
MECH 536	(3)	Aircraft Structures

3-6 credits from the following:

MECH 537	(3)	High-Speed Aerodynamics
MECH 538	(3)	Unsteady Aerodynamics
MECH 539	(3)	Computational Aerodynamics
MECH 565	(3)	Fluid Flow and Heat Transfer Equipment
MECH 566	(3)	Fluid-Structure Interactions

12.7.8 Bachelor of Engineering (B.Eng.) - 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 526	(3)	Manufacturing and the Environment
MECH 528	(3)	Product Design
MECH 530	(3)	Mechanics of Composite Materials
MECH 541	(3)	Kinematic Synthesis
MECH 543	(3)	Design with Composite Materials
MECH 557	(3)	Mechatronic Design
MECH 565	(3)	Fluid Flow and Heat Transfer Equipment
MECH 576	(3)	Geometry in Mechanics

MECH 577	(3)	Optimum Design
MECH 579	(3)	Multidisciplinary Design Optimization
MECH 593	(3)	Design Theory and Methodology

12.7.9 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 526	(3)	Manufacturing and the Environment
MECH 528	(3)	Product Design
MECH 530	(3)	Mechanics of Composite Materials
MECH 541	(3)	Kinematic Synthesis
MECH 543	(3)	Design with Composite Materials
MECH 557	(3)	Mechatronic Design
MECH 565	(3)	Fluid Flow and Heat Transfer Equipment
MECH 576	(3)	Geometry in Mechanics
MECH 577	(3)	Optimum Design
MECH 579	(3)	Multidisciplinary Design Optimization
MECH 593	(3)	Design Theory and Methodology

12.7.10 Bachelor of Engineering (B.Eng.) - Mechanical Engineering - Mechatronics (18 credits)

Not offered until further notice.

Students in this concentration take six courses in the area of control, robotics, and/or CAD/CAM.

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.

Required Courses

12 credits

MECH 513	(3)	Control Systems
MECH 554	(3)	Microprocessors for Mechanical Systems
MECH 557	(3)	Mechatronic Design
MECH 572	(3)	Introduction to Robotics

Complementary Courses

6 credits from the following:

MECH 528	(3)	Product Design
MECH 541	(3)	Kinematic Synthesis
MECH 573	(3)	Mechanics of Robotic Systems
MECH 576	(3)	Geometry in Mechanics

12.7.11 Bachelor of Engineering (B.Eng.) - Honours Mechanical Engineering - Mechatronics (18 credits)

Not offered until further notice.

Students in this concentration take six courses in the area of control, robotics, and/or CAD/CAM.

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

Required Courses

12 credits

MECH 513	(3)	Control Systems
MECH 554	(3)	Microprocessors for Mechanical Systems
MECH 557	(3)	Mechatronic Design
MECH 572	(3)	Introduction to Robotics

Complementary Courses

6 credits from the following:

MECH 528	(3)	Product Design
MECH 541	(3)	Kinematic Synthesis
MECH 573	(3)	Mechanics of Robotic Systems
MECH 576	(3)	Geometry in Mechanics

12.8 Department of Mining and Materials Engineering**12.8.1 Location****General Office:**

Wong Building, Room 2140
3610 University Street
Montreal QC H3A 0C5

Website: www.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**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

12.8.2 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:

section 12.8.4.3: Bachelor of Engineering (B.Eng.) - Materials Engineering CO-OP (148 credits)

section 12.8.5.3: Bachelor of Engineering (B.Eng.) - Mining Engineering CO-OP (150 credits)

12.8.2.1 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.

12.8.3 Department of Mining and Materials Engineering Faculty

Chair

Stephen Yue

Associate Chair, Student Affairs

Mathieu Brochu

Associate Chair, Graduate Studies

In-Ho Jung

Director, Mining Engineering Program

Hani Mitri

Emeritus Professors

John E. Gruzleski; B.Sc., M.Sc.(Qu.), Ph.D.(Tor.), Eng., F.C.I.M., F.A.S.M. (*Gerald G. Hatch Emeritus Professor*)

John J. Jonas; B.Eng.(McG.), Ph.D.(Camb.), Eng., F.A.S.M., F.R.S.C. (*Henry Birks Emeritus Professor*)

Gordon W. Smith; B.Eng., M.Eng., Ph.D.(McG.), Eng.

Professors

George P. Demopoulos; Dipl.Eng.(NTU Athens), M.Sc., Ph.D.(McG.), Eng., F.C.I.M. (*Gerald Hatch Faculty Fellow*)

Roussos Dimitrakopoulos; B.Sc.(Thessaloniki), M.Sc.(Alta.), Ph.D.(École Poly., Montr.) (*Canada Research Chair I*)

James A. Finch; B.Sc.(Birm.), M.Eng., Ph.D.(McG.), Eng., F.C.I.M., F.R.S.C. (*Gerald G. Hatch Professor*)

Raynald Gauvin; B.Eng., Ph.D.(Montr.), Eng.

Roderick I.L. Guthrie; B.Sc., Ph.D.(Lond.), D.I.C., A.R.S.M., Eng., F.C.I.M., R.R.S.C. (*William C. Macdonald Professor*)

Faramarz (Ferri) P. Hassani; Ph.D.(Nott.), C.Eng.(U.K. Reg.) (*George Boyd Webster Professor*)

Hani S. Mitri; B.Sc.(Cairo), M.Eng., Ph.D.(McM.), Eng.

Stephen Yue; B.Sc., Ph.D.(Leeds) (*James McGill Professor*) (*Lorne Trotter Chair in Aerospace Engineering*)

Associate Professors

Mathieu Brochu; B.Eng.(Laval), Ph.D.(McG.) (*Canada Research Chair II*)

Richard Chromik; B.Sc.(Penn. St.), M.Sc., Ph.D.(SUNY)

Associate Professors

Mainul Hasan; B.Eng.(Dhaka), M.Sc.(Dhahran), Ph.D.(McG.)

In-Ho Jung; B.Sc.(POSTECH), Ph.D.(École Poly., Montr.) (*Gerald Hatch Faculty Fellow*) (*William Dawson Scholar*) (*on leave 2014-2015*)

Mustafa Kumral; B.Eng.(Hacettepe), M.Eng.(Cukurova), Ph.D.(Leeds)

Frank Mucciardi; B.Eng., M.Eng., Ph.D.(McG.), Eng.

Showan Nazhat; B.Eng., M.Sc., Ph.D.(Lond.) (*Gerald Hatch Faculty Fellow*), *Associate Dean, Research and Graduate Education*

Mihriban Peguleryuz; B.Eng., M.Eng.(Flor.), Ph.D.(McG.)

Assistant Professors

Kirk Bevan; Ph.D.(Purd.)

Marta Cerruti; B.Sc., Ph.D., Laurea in Chemistry (Torino)

Jun Song; Ph.D., M.Sc.(Princ.)

Nathaniel Quitarano; B.Sc.(Calif., Berk.), Ph.D.(MIT)

Agus Sasmito; B.Eng.(Gadjah Mada), Ph.D. Mech. Eng.(NUS)

Kristian Waters; M.Sc., M.Eng.(Manc.), Ph.D.(Birm.)

Faculty Lecturer

Florence Paray; B.Eng.(CSP), M.Eng., Ph.D.(McG.)

Course Lecturer

Bruno Benedetti

Yves Buro

Junghwan Kim

Manas Paliwal

Marco Quirion

Adjunct Professors

Bruno Benedetti

Mostafa Benzaazoua

Marc Bétournay

Martin Bureau

P.W. Cox

Robin A.L. Drew

Daryoush Emadi

Elhachmi Essadiqi

Carlton Fuerst

Mory Ghomshei

Bryn Harris

Brendan Griffin

Robert Harrison

Ahmad Hemami

Wynand J. Kleingeld

Eric Lifshin

Arun Mujumdar

Jan Nessett

Adjunct Professors

Joe Stachulak

Denis Thibodeau

Michel Trudeau

Karim Zaghib

Co-op Program Liaison Officers

Teresa Barrett (Mining)

Genevieve Snider (Materials)

12.8.4 About Materials Engineering**12.8.4.1 Materials Engineering (Co-op)**

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, namely metals, ceramics, polymers, and composites. 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 \$200 will be billed during ten consecutive terms for a total amount of \$2,000 before graduation. These fees cover expenses directly related to the operation of the Co-op program. Students must register for each of their industrial training courses within the university registration period for returning students or late fees will apply. Before registering for any work term course, students must contact the Materials Co-op Liaison Officer for approval.

12.8.4.2 Student Advising

Students entering this program must plan their schedule of studies in consultation with one of the departmental advisers. Appointments may be obtained by contacting the Administrative and Student Affairs Coordinator.

12.8.4.3 Bachelor of Engineering (B.Eng.) - Materials Engineering CO-OP (148 credits)

Program credit weight: 148 credits

Program credit weight for Quebec CEGEP students: 119 credits

In addition to regular courses and laboratories, the B.Eng. Materials Engineering curriculum includes seminars, colloquia, and student projects reinforced by field trips to industrial operations.

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

33 credits

CCOM 206	(3)	Communication in Engineering
CHEM 233	(3)	Topics in Physical Chemistry
CIVE 205	(3)	Statics
CIVE 207	(4)	Solid Mechanics
COMP 208	(3)	Computers in Engineering
FACC 100*	(1)	Introduction to the Engineering Profession
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

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

Required Materials Engineering Courses

Revision, May 2014. Start of revision.

71 credits

ECSE 461	(3)	Electric Machinery
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 442	(3)	Analysis, Modelling and Optimization in Mineral Processing
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 473	(3)	Introduction to Computational Materials Design
MIME 480	(2)	Industrial Training 3

Revision, May 2014. End of revision.

Complementary Courses

15 credits

Technical Complementaries

Revision, May 2014. Start of revision.

9 credits

6-9 credits from the following:

CHEE 515*	(3)	Material Surfaces: A Biomimetic Approach
CIVE 512	(3)	Advanced Civil Engineering Materials
MECH 530	(3)	Mechanics of Composite Materials
MIME 410	(3)	Research Project
MIME 470	(3)	Engineering Biomaterials
MIME 512	(3)	Corrosion and Degradation of Materials
MIME 515*	(3)	Material Surfaces: A Biomimetic Approach
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

* Students choose either CHEE 515 or MIME 515

Revision, May 2014. End of revision.

0-3 credits from the following:

BMDE 504	(3)	Biomaterials and Bioperformance
CHEM 574	(3)	Introductory Polymer Chemistry
CHEM 585	(3)	Colloid Chemistry

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
BTEC 502	(3)	Biotechnology Ethics and Society
CIVE 469	(3)	Infrastructure 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
MECH 526	(3)	Manufacturing and the Environment
MGPO 440*	(3)	Strategies for Sustainability
MIME 308	(3)	Social Impact of Technology
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)

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
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
INDR 294*	(3)	Introduction to Labour-Management Relations
MATH 338	(3)	History and Philosophy of Mathematics
MGCR 222*	(3)	Introduction to Organizational Behaviour
MGCR 352*	(3)	Marketing Management 1
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>.

Language Courses

If you are not proficient in a certain language, no more than 3 credits will be given for 6 credits of courses at the 100 level or higher in that language. A maximum of 3 credits of language courses will be counted toward the Complementary Studies requirement.

However, 3-6 credits may be given for language courses at the 200 level or higher that have a sufficient cultural component. These courses must be approved by the McGill Engineering Student Centre (Student Affairs Office) (Frank Dawson Adams Building, Room 22).

12.8.5 About Mining Engineering

12.8.5.1 Mining Engineering (Co-op)

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 technology, mineral economics, and mine design. The minerals industry is currently going through an expansion phase that has never been seen before. This is highly beneficial to both our graduate and undergraduate students. Tremendous career opportunities are available in Canada and around the world. There have been rapid technical developments in recent years, presenting a challenge to the creative student with a strong interest in engineering and a taste for innovative solutions.

The Department offers a co-operative program leading to the accredited B.Eng. degree in Mining Engineering. It includes four paid industrial work terms. The Co-op program is offered in collaboration with the mining engineering program at *École Polytechnique* in Montreal. Students registered at McGill are required to take a series of Mining courses at *École Polytechnique* in the latter part of the program. These courses are designated by subject code MPMC in the program.

Students must register for each work term (MIME 290, MIME 291, MIME 392, MIME 494) and pay associated fees by the Course Change (add/drop) registration deadline or else late fees will apply. Before registering for any work term course, students must contact the Mining Co-op Liaison Officer for approval.

12.8.5.2 Student Advising

Students entering this program must plan their schedule of studies in consultation with one of the departmental advisers: Professor Ferri Hassani or Professor Hani Mitri.

12.8.5.3 Bachelor of Engineering (B.Eng.) - Mining Engineering CO-OP (150 credits)

Program credit weight: 150-152 credits

Program credit weight for Quebec CEGEP students: 121-123 credits

In addition to regular courses and laboratories, the curriculum of the B.Eng. Mining Engineering Co-op program includes seminars, colloquia, and student projects reinforced by field trips to industrial operations.

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 121- to 123-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

34 credits

CCOM 206	(3)	Communication in Engineering
CIVE 205	(3)	Statics
CIVE 207	(4)	Solid Mechanics
COMP 208	(3)	Computers in Engineering
EPSC 221	(3)	General Geology
EPSC 225	(1)	Properties of Minerals
FACC 100*	(1)	Introduction to the Engineering Profession
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

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

Required Mining Engineering Courses

62 credits

ECSE 461	(3)	Electric Machinery
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 Feasibility Study Project
MPMC 328*	(3)	Environnement et gestion des rejets miniers
MPMC 421*	(3)	Exploitation en souterrain

* Mining courses taken at École Polytechnique

Complementary Courses

25-27 credits

11-12 credits from either Stream A or Stream B

Stream A - CEGEP Students

11 credits

CEGEP students must take the following courses:

MPMC 321*	(3)	Mécanique des roches et contrôle des terrains
MPMC 326*	(3)	Recherche opérationnelle I
MPMC 329*	(2)	Géologie minière
MPMC 330*	(3)	Géotechnique minière

* Mining courses taken at École Polytechnique

Stream B - Non-CEGEP Students

12 credits

Non-CEGEP students must take the following courses:

CIVE 208	(3)	Civil Engineering System Analysis
CIVE 311	(4)	Geotechnical Mechanics
MIME 329	(2)	Mining Geology
MIME 421	(3)	Rock Mechanics

Technical Complementaries

8-9 credits

Courses can be chosen from the following or from any other approved technical courses in Engineering, Management, or Science (including mathematics courses).

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

MIME 320	(3)	Extraction of Energy Resources
MIME 350	(3)	Extractive Metallurgical Engineering
MIME 442	(3)	Analysis, Modelling and Optimization in Mineral Processing
MIME 484	(3)	Mining Project
MIME 494	(2)	Industrial Work Period 4
MIME 520	(3)	Stability of Rock Slopes
MIME 521	(3)	Stability of Underground Openings
MIME 526	(3)	Mineral Economics
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 course taken at École Polytechnique

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
CIVE 469	(3)	Infrastructure 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
MECH 526	(3)	Manufacturing and the Environment
MGPO 440*	(3)	Strategies for Sustainability
MIME 308	(3)	Social Impact of Technology
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)

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

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
INDR 294*	(3)	Introduction to Labour-Management Relations
MATH 338	(3)	History and Philosophy of Mathematics
MGCR 222*	(3)	Introduction to Organizational Behaviour
MGCR 352*	(3)	Marketing Management 1
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>.

Language Courses

If you are not proficient in a certain language, no more than 3 credits will be given for 6 credits of courses at the 100 level or higher in that language. A maximum of 3 credits of language courses will be counted toward the Complementary Studies requirement.

However, 3-6 credits may be given for language courses at the 200 level or higher that have a sufficient cultural component. These courses must be approved by the McGill Engineering Student Centre (Student Affairs Office) (Frank Dawson Adams Building, Room 22).

12.9 School of Urban Planning

12.9.1 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

Website: www.mcgill.ca/urbanplanning

12.9.2 About the School of Urban Planning

Urban planning can be described as the collective management of urban development. It is concerned with the welfare of communities, control of the use of land, design of the built environment, including transportation and communication networks, and protection and enhancement of the natural environment. 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.

Modern urban planning developed into a profession largely as a 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 the 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 multidisciplinary nature is still a hallmark of planning practice and of planning education.

McGill was the first university in Canada to offer a planning degree, starting in 1947. The School of Urban Planning itself was established as an independent unit in 1972. Today, it brings together students from various fields (such as those mentioned above) and different parts of the world in a professional master's program and an *ad hoc* Ph.D. program. Key features of the work done at the school are the use of real-world projects for learning, a focus on policy-relevant research, and strong engagement with the community, both in Canada and abroad.

The School has a long track record of research, capacity-building and consulting in developing regions as well as in Montreal and other Canadian cities. Faculty and students collaborate actively with members of other McGill departments, notably Architecture, Geography, Civil Engineering, and Law, and with colleagues at other institutions in Canada and abroad. Alumni of the School work as planners and designers at various levels of government, in non-profit

organizations, and with private consulting firms. Their expertise ranges from urban design to transportation planning, from housing policy to computer modelling. They devote their efforts in increasing numbers to environmental planning and sustainable development.

The objective of the School is to enable young urban planners to exercise leadership in the public, private, and community sectors. Training is provided at the postgraduate level. The main degree offered is the Master of Urban Planning (M.U.P.). Many specializations are possible within the program; one of them, in Transportation Planning, is formally recognized as a concentration. M.U.P. students in the core program may also opt to spend a semester in Barbados as part of the Barbados Field Study Semester, which focuses on global environmental issues. Details concerning each of these concentrations can be found at www.mcgill.ca/urbanplanning/programs/mup-transportation-planning (see also www.tram.mcgill.ca), and at www.mcgill.ca/bfss, 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 School also welcomes a small number of students into its *ad hoc* Ph.D. in Urban Planning, Policy, and Design. That program aims to prepare students for careers in high-level research and teaching.

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. Similar requirements must be met for admission to the American Institute of Certified Planners (A.I.C.P.) and other such organizations. For details of the M.U.P. admission requirements and curriculum, consult the School's website at www.mcgill.ca/urbanplanning as well as the *eCalendar* under *Faculties & Schools > Faculty of Engineering > Graduate > Academic Programs > Urban Planning*.

Although the M.U.P. program is primarily a professional degree program, it has a very important research component. The work done on the Supervised Research Project in the course of the second year of study qualifies for funding by federal and provincial funding agencies such as SSHRC, NSERC, FQRSC, and FQRNT. 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; the Transportation Research Group at McGill holds seminars on issues pertaining to various aspects of urban and regional transportation; and the "urban.studies@mcgill" seminars bring 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 *eCalendar* for Graduate and Postdoctoral Studies.

12.9.3 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
ARCH 550	(3)	Urban Planning and Development
CIVE 433	(3)	Urban Planning
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 519	(6)	Sustainable Development Plans
URBP 520	(3)	Globalization: Planning and Change
URBP 530	(3)	Urban Environmental Planning
URBP 536	(1)	Transportation Seminar 1
URBP 537	(1)	Transportation Seminar 2
URBP 538	(1)	Transportation Seminar 3
URBP 551	(3)	Understanding Urban Change

12.9.4 School of Urban Planning Faculty

Director
Raphaël Fischler

Emeritus Professors

David Farley; B.Arch.(McG.), M.Arch., M.C.P.(Harv.)

Jane Matthews-Glenn; B.A., LL.B.(Qu.), D. en droit(Strasbourg)

Professor

Richard Shearmur; B.A.(Camb.), M.U.P.(McG.), Ph.D.(Montr.)

Associate Professors

Madhav G. Badami; B.Tech., M.S.(IIT, Madr.), M.E.Des.(Calg.), Ph.D.(Br. Col.) (*joint appt. with McGill School of Environment*)

Lisa Bornstein; B.Sc.(Calif., Berk.), M.R.P.(Cornell), Ph.D.(Calif., Berk.)

Ahmed Elgeneidy; B.Sc., M.Sc.(Alexandria), Ph.D.(Port. St.)

Raphaël Fischler; B.Eng.(U. Tech. Eindhoven), M.Sc., M.C.P.(MIT), Ph.D.(Calif., Berk.)

Nik Luka; B.A.(Ryerson), M.Arch.(Laval), Ph.D.(Tor.) (*joint appt. with School of Architecture*)

Adjunct Professors

Cameron Charlebois; B.Sc.(Arch.), B.Arch., M.B.A.(McG.)

Murtaza Haider; B.Sc.(NWFP UET-Pesh.), M.A.Sc., Ph.D.(Tor.)

Marc-André Lechasseur; LL.B.(Sher.), LL.M.(Montr.)

Mario Polèse; B.A.(CUNY), M.A., Ph.D.(Penn.)

Ray Tomalty; B.A., M.P.A.(Qu.), Ph.D.(Wat.)

Guest Lecturers

Heather Braiden

David Brown

Suzanne Doucet

Paul LeCavalier

Denis Lévesque

James McGregor

Pierre Morissette

Larry Sherman

Martin Wexler

12.10 Other Engineering Related Programs**12.10.1 Bioresource Engineering**

The Faculty of Engineering cooperates with the Faculty of Agricultural and Environmental Sciences in providing courses of instruction for a curriculum in agricultural and biosystems engineering to meet requirements for a professional degree awarded in the Faculty of Agricultural and Environmental Sciences. For details, refer to the B.Eng.(Bioresource) program requirements in the eCalendar under *Faculties & Schools > Faculty of Agricultural and Environmental Sciences > Undergraduate > 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 MS1-027
21,111 Lakeshore Road
Sainte-Anne-de-Bellevue QC H9X 3V9
Telephone: 514-398-7773
Fax: 514-398-8387

Website: www.mcgill.ca/bioeng

12.10.2 Biomedical Engineering

Lyman Duff Medical Sciences Building
3775 University Street
Montreal QC H3A 2B4
Telephone: 514-398-6736
Website: www.mcgill.ca/bme

Some of the courses offered by the Department of Biomedical Engineering (subject code BMDE) may be of interest to Engineering students, and may be approved as complementary courses. The Faculty of Engineering also offers a Minor in Biomedical Engineering; for more information, see [section 12.11.2.1: Bachelor of Engineering \(B.Eng.\) - Minor Biomedical Engineering \(21 credits\)](#).

12.11 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., B.S.E., or B.Sc.(Arch.) degree. Minors normally consist of 18–24 credits, allowing 9–12 credits of overlap with the degree program. The real credit cost to the student is typically 9–15 credits, representing one term beyond the B.Eng., B.S.E., or B.Sc.(Arch.) degree program. All courses in a minor must be passed with a grade of C or better.

Engineering students choose from a considerable variety of complementary courses under the categories of technical and complementary studies. Students should refer to their department for information concerning selection of complementary courses, and should see their department adviser. Departments also publish information regarding the choice of courses in this publication and in separate documents.



Note: Students are also permitted to register for minor concentrations offered by departments in the Faculty of Arts. Students must obtain approval from both the department in the Faculty of Arts and from the McGill Engineering Student Centre (Student Affairs Office) (Frank Dawson Adams Building, Room 22), before registering in one of these minors.

Minor Programs:

- [section 12.11.1: Arts Minor](#)
- [section 12.11.2: Biomedical Engineering Minor](#)
- [section 12.11.3: Biotechnology Minor](#)
- [section 12.11.4: Chemistry Minor](#)
- [section 12.11.5: Computer Science Courses and Minor Program](#)
- [section 12.11.6: Construction Engineering and Management Minor](#)
- [section 12.11.7: Economics Minor](#)
- [section 12.11.8: Minor in Environment](#)
- [section 12.11.9: Environmental Engineering Minor](#)
- [section 12.11.10: Minor Programs in Finance, Management, Marketing, and Operations Management](#)
- [section 12.11.11: Materials Engineering Minor](#)
- [section 12.11.12: Mathematics Minor](#)
- [section 12.11.13: Mining Engineering Minor](#)
- [section 12.11.14: Minor in Musical Science and Technology](#)
- [section 12.11.15: Physics Minor](#)
- [section 12.11.16: Software Engineering Minor](#)
- [section 12.11.17: Technological Entrepreneurship Minor](#)

12.11.1 Arts Minor

The Arts Minor is open to B.Sc.(Arch.), B.Eng., and B.S.E. students. In this Minor, students choose courses from two areas of concentration in the Faculty of Arts, approved by a Faculty Adviser in the McGill Engineering Student Centre (Student Affairs Office) (Frank Dawson Adams Building, Room 22), or by the Senior Faculty Adviser in the Faculty of Arts. B.Eng. and B.S.E. students may count some of their Complementary Studies courses toward this Minor.

Minor Adviser: Faculty Student Adviser in the McGill Engineering Student Centre (Student Affairs Office) (Frank Dawson Adams Building, Room 22) OR Donald Sedgwick (Senior Faculty Adviser, Faculty of Arts)

12.11.1.1 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) OR Donald Sedgwick (Senior Faculty Adviser, Faculty of Arts)

B.Sc.(Arch.), B.Eng., and B.S.E. students may obtain the Arts Minor as part of their B.Eng., B.S.E., 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. and B.S.E. students may use courses from the Complementary Studies lists (Group A and Group B) in their program that are offered by the Faculty of Arts to satisfy some of these requirements. No more than 9 credits of these courses can be credited toward the Arts Minor.

12.11.2 Biomedical Engineering Minor

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

Minor Adviser: Prof. R. Leask (Wong Building, Room 4120) or Prof. R. Mongrain (Macdonald Engineering Building, Room 369)

12.11.2.1 Bachelor of Engineering (B.Eng.) - Minor Biomedical Engineering (21 credits)

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

Note: Open to all students in the Faculty of Engineering (including B.S.E. students).

Minor program credit weight: 21-25 credits

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

To complete this Minor, students must obtain a grade of C or better in all approved courses and satisfy the requirements of both the Major program and the Minor.

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

Complementary Introductory Courses in Life Sciences

3-7 credits

One or two courses from the following list (equivalents can be approved):

ANAT 212	(3)	Molecular Mechanisms of Cell Function
BIOC 212	(3)	Molecular Mechanisms of Cell Function
BIOL 200	(3)	Molecular Biology
BIOL 201	(3)	Cell Biology and Metabolism
CHEM 212	(4)	Introductory Organic Chemistry 1
PHGY 209	(3)	Mammalian Physiology 1
PHGY 210	(3)	Mammalian Physiology 2

Specialization Courses

12-18 credits from the following:

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

Physiological Systems, Artificial Cells and Organs

BMDE 505	(3)	Cell and Tissue Engineering
CHEE 562	(0)	
PHGY 311	(3)	Channels, Synapses & Hormones
PHGY 312	(3)	Respiratory, Renal, & Cardiovascular Physiology
PHGY 313	(3)	Blood, Gastrointestinal, & Immune Systems Physiology
PHGY 517	(3)	Artificial Internal Organs
PHGY 518	(3)	Artificial Cells

Bioinformatics, Genomics and Proteomics

ANAT 365*	(3)	Cellular Trafficking
ANAT 458	(3)	Membranes and Cellular Signaling
BIOC 311	(3)	Metabolic Biochemistry
BIOC 312	(3)	Biochemistry of Macromolecules
BIOC 458*	(3)	Membranes and Cellular Signaling
BMDE 506	(3)	Molecular Biology Techniques
BMDE 509	(3)	Quantitative Analysis and Modelling of Cellular Processes
COMP 302	(3)	Programming Languages and Paradigms
COMP 360	(3)	Algorithm Design
COMP 421	(3)	Database Systems
COMP 424	(3)	Artificial Intelligence
COMP 462	(3)	Computational Biology Methods
COMP 526	(3)	Probabilistic Reasoning and AI

* Students choose either ANAT 365 or BIOC 458

Biomaterials, Biosensors, and Nanotechnology

BMDE 504	(3)	Biomaterials and Bioperformance
BMDE 505	(3)	Cell and Tissue Engineering
BMDE 508	(3)	Introduction to Micro and Nano-Bioengineering
CHEE 380	(3)	Materials Science
ECSE 424	(3)	Human-Computer Interaction
MECH 553	(3)	Design and Manufacture of Microdevices
MIME 360	(3)	Phase Transformations: Solids
MIME 362	(3)	Mechanical Properties
MIME 470	(3)	Engineering Biomaterials
PHYS 534	(3)	Nanoscience and Nanotechnology

Biomechanics and Prosthetics

BMDE 503	(3)	Biomedical Instrumentation
CHEE 561	(3)	Introduction to Soft Tissue Biophysics
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

BMDE 519	(3)	Biomedical Signals and Systems
COMP 302	(3)	Programming Languages and Paradigms
COMP 360	(3)	Algorithm Design
COMP 424	(3)	Artificial Intelligence
COMP 558	(3)	Fundamentals of Computer Vision
ECSE 303	(3)	Signals and Systems 1
ECSE 304	(3)	Signals and Systems 2
ECSE 412	(3)	Discrete Time Signal Processing
PHYS 557	(3)	Nuclear Physics

Neural Systems and Biosignal Processing

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 517	(3)	Neural Prosthetic Systems
ECSE 526	(3)	Artificial Intelligence
PHYS 413	(3)	Physical Basis of Physiology

Complementary Courses

0-6 credits

Up to 6 credits in the B.Eng., B.S.E., or B.Sc.(Arch.) program can also be credited to the Minor, with the permission of the Departmental Adviser and approval of the Minor Adviser. In particular, courses at the 200 level or higher that are prerequisites for certain specialization courses would be eligible, with permission of the Minor Adviser. By careful selection of complementary courses, the Minor can be satisfied with 9 additional credits in the student's major program or a maximum of 12 credits of overlap with the major program.

12.11.3 Biotechnology Minor

Biotechnology can be defined as the science of understanding, selecting, and promoting useful organisms and specific gene products for therapeutic purposes. It requires a broad comprehension of biology and engineering and detailed knowledge of at least one basic subject such as molecular genetics, protein chemistry, microbiology, or chemical engineering.

The Minor in Biotechnology, offered by the Faculty of Engineering and the Faculty of Science, emphasizes an area relevant to biotechnology that is complementary to the student's main program. It is designed specifically for Chemical Engineering students; other Engineering students interested in taking this Minor should contact a faculty student adviser in the McGill Engineering Student Centre (Student Affairs Office) (Frank Dawson Adams Building, Room 22).

Students who are interested in this Minor should inform their departmental academic adviser in Year 1 and at the time of registration in Year 2. With the agreement of their departmental academic adviser, students must submit a Request for Course Authorization to the Engineering Student Centre in order to add the Minor.

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

Faculty of Science Adviser (for selection of Science courses only): Nancy Nelson, Undergraduate Adviser, Department of Biology

12.11.3.1 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, students must complete 24 credits, 18 of which must be exclusively for the Minor. Approved substitutions must be made for any of the required courses that are part of the student's major program.

The Department of Chemical Engineering permits students taking this Minor to complete BIOT 505 (Selected Topics in Biotechnology) as one of their technical complementary courses. Chemical Engineering students complete 15 credits beyond their 141-credit (115-credit for CEGEP students) B.Eng. program to obtain this Minor.

Required Courses

12 credits

BIOT 505	(3)	Selected Topics in Biotechnology
CHEE 200	(3)	Chemical Engineering Principles 1
CHEE 204	(3)	Chemical Engineering Principles 2
CHEE 474	(3)	Biochemical Engineering

OR

Alternative Required Courses (for Chemical Engineering students)

A Chemical Engineering student may complete the Biotechnology Minor by taking the courses below plus one course from the list of complementary courses, not including FACC 300.

BIOL 200	(3)	Molecular Biology
BIOL 201	(3)	Cell Biology and Metabolism
BIOL 202	(3)	Basic Genetics
BIOT 505	(3)	Selected Topics in Biotechnology
MIMM 211	(3)	Introductory Microbiology

Complementary Courses

12 credits selected from courses outside the Department of the student's major program and/or from the lists below. If courses are chosen from the lists below, at least three courses must be taken from one area of concentration as grouped.

Biomedicine

ANAT 541	(3)	Cell and Molecular Biology of Aging
EXMD 504	(3)	Biology of Cancer
PATH 300	(3)	Human Disease

Chemistry

CHEM 382	(3)	Organic Chemistry: Natural Products
CHEM 502	(3)	Advanced Bio-Organic Chemistry
CHEM 552	(3)	Physical Organic Chemistry

General

FACC 300	(3)	Engineering Economy
----------	-----	---------------------

Immunology

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

Management

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

ECON 208	(3)	Microeconomic Analysis and Applications
MGCR 211	(3)	Introduction to Financial Accounting
MGCR 341	(3)	Finance 1
MGCR 352	(3)	Marketing Management 1
MGCR 472	(3)	Operations Management

Microbiology

MIMM 323	(3)	Microbial Physiology
MIMM 324	(3)	Fundamental Virology
MIMM 413	(3)	Parasitology
MIMM 465	(3)	Bacterial Pathogenesis
MIMM 466	(3)	Viral Pathogenesis

Molecular Biology (Biology)

BIOL 300	(3)	Molecular Biology of the Gene
BIOL 314	(3)	Molecular Biology of Oncogenes
BIOL 520	(3)	Gene Activity in Development
BIOL 524	(3)	Topics in Molecular Biology
BIOL 551	(3)	Principles of Cellular Control

Molecular Biology (Biochemistry)

BIOC 311	(3)	Metabolic Biochemistry
BIOC 312	(3)	Biochemistry of Macromolecules
BIOC 450	(3)	Protein Structure and Function
BIOC 454	(3)	Nucleic Acids
PSYT 455	(3)	Neurochemistry

Physiology

EXMD 401	(3)	Physiology and Biochemistry Endocrine Systems
EXMD 502	(3)	Advanced Endocrinology 01
EXMD 503	(3)	Advanced Endocrinology 02
PHAR 562	(3)	General Pharmacology 1

PHAR 563	(3)	General Pharmacology 2
PHGY 517	(3)	Artificial Internal Organs
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

12.11.4 Chemistry Minor

The Departments of Chemistry and Chemical Engineering offer this Chemistry Minor, of particular interest to Chemical Engineering students, and a Chemical Engineering Minor, of interest to Chemistry students; see the *eCalendar* under *Faculties & Schools > Faculty of Science > Undergraduate > Academic Programs > Chemistry*. Students taking the Chemistry Minor complete 10 credits of required courses in physical and organic chemistry, and choose an additional 15 credits of complementary courses from the areas of inorganic, analytical, organic, and physical chemistry.

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

For more information about the Chemical Engineering Minor, see Prof. David Cooper (Chemical Engineering).

12.11.4.1 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 223 (Introductory Physical Chemistry 1) and CHEM 243 (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 credit for one of the two required laboratory courses, but they must complete a total of 25 credits in chemistry for the Minor.

Inorganic Chemistry

CHEM 281	(3)	Inorganic Chemistry 1
CHEM 371*	(2)	Inorganic Chemistry Laboratory
CHEM 381	(3)	Inorganic Chemistry 2
CHEM 591	(3)	Bioinorganic Chemistry

Analytical Chemistry

CHEM 287	(2)	Introductory Analytical Chemistry
CHEM 297*	(1)	Introductory Analytical Chemistry Laboratory
CHEM 367	(3)	Instrumental Analysis 1
CHEM 377	(3)	Instrumental Analysis 2

Organic Chemistry

CHEM 302	(3)	Introductory Organic Chemistry 3
CHEM 362*	(2)	Advanced Organic Chemistry Laboratory
CHEM 382	(3)	Organic Chemistry: Natural Products

Physical Chemistry

Revision, July 2014. Start of revision.

CHEM 345	(3)	Molecular Properties and Structure 1
CHEM 355	(3)	Molecular Properties and Structure 2
CHEM 493*	(2)	Advanced Physical Chemistry Laboratory
CHEM 574	(3)	Introductory Polymer Chemistry

Revision, July 2014. End of revision.

12.11.5 Computer Science Courses and Minor Program

The School of Computer Science offers an extensive range of courses for Engineering students interested in computers. Engineering students may obtain a Computer Science Minor as part of their B.Eng., B.S.E., or B.Sc.(Arch.) degree by completing 24 credits of courses, passed with a grade of C or better.

Minor Adviser: Students interested in this Minor should see Liette Chin, Undergraduate Program Coordinator (School of Computer Science, Lorne Trotter Building, Room 2070) and the Minor Adviser in Computer Science.

School of Computer Science website: www.cs.mcgill.ca

12.11.5.1 Computer Science Courses in Engineering Programs

The School of Computer Science offers an extensive range of courses for Engineering students interested in computers. The course taken by students in most B.Eng. programs (COMP 208) and other courses included in the core of the various B.Eng. and B.S.E. programs are listed below.

See the *eCalendar* under *All Courses* for other courses offered by the School of Computer Sciences (subject code COMP).

Computer Science Courses in Engineering Programs

COMP 202	(3)	Foundations of Programming
COMP 206	(3)	Introduction to Software Systems
COMP 208	(3)	Computers in Engineering
COMP 250	(3)	Introduction to Computer Science
COMP 251	(3)	Algorithms and Data Structures
COMP 302	(3)	Programming Languages and Paradigms
COMP 360	(3)	Algorithm Design
COMP 421	(3)	Database Systems

12.11.5.2 Bachelor of Engineering (B.Eng.) - Minor Computer Science (24 credits)

Minor Adviser: Students interested in this Minor should see Liette Chin, Undergraduate Program Coordinator, in the School of Computer Science (Lorne Trotter Building, Room 2070) to obtain the appropriate forms, and should see both the Minor Adviser in Computer Science and their department adviser for approval of their course selection. Forms must be submitted and approved before the end of the Course Change (drop/add) period of the student's final term.

Note: This Minor is open to B.Eng., B.S.E., and B.Sc.(Arch.) students in Engineering.

Engineering students may obtain the Minor in Computer Science as part of their B.Eng., B.S.E., or B.Sc.(Arch.) degree by completing the 24 credits of courses passed with a grade of C or better. In general, some complementary courses within B.Eng. and B.S.E. programs may be used to satisfy some of these requirements, but the Minor will require at least 12 extra credits from Computer Science (COMP) courses beyond those needed for the B.Eng. or B.S.E. degree. Students should consult their departments about the use of complementaries, and credits that can be double counted.

Note: COMP 202 and COMP 208 (compulsory for some Engineering students) do not form part of the Minor in Computer Science.

For more information, see the School of Computer Science website: <http://www.cs.mcgill.ca>.

Required Courses

6 credits

COMP 206	(3)	Introduction to Software Systems
COMP 250	(3)	Introduction to Computer Science

Complementary Courses

18 credits

3 credits from the following:

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

3 credits from the following:

COMP 273	(3)	Introduction to Computer Systems
ECSE 221	(3)	Introduction to Computer Engineering

3-4 credits from the following:

CIVE 320	(4)	Numerical Methods
COMP 350	(3)	Numerical Computing
ECSE 443	(3)	Introduction to Numerical Methods in Electrical Engineering
MATH 317	(3)	Numerical Analysis
MECH 309	(3)	Numerical Methods in Mechanical Engineering

0-3 credits from the following:

COMP 251	(3)	Algorithms and Data Structures
----------	-----	--------------------------------

6-9 credits chosen from other Computer Science courses at the 300 level or higher.

Notes:

A. COMP 208 may be taken before COMP 250; however, it cannot be taken for credit in the same term or afterward.

B. COMP 396 (Undergraduate Research Project) cannot be taken for credit toward this Minor.

Courses that make considerable use of computing from other departments may also be selected, with the approval of the School of Computer Science. Students should consult with their advisers about counting specific courses.

12.11.6 Construction Engineering and Management Minor

Students taking the Minor in Construction Engineering and Management complete 15 credits of required courses in management and law. Students choose complementary courses from the areas of either building structures or heavy construction, and from other construction- and management-related courses.

This Minor is particularly designed for Civil Engineering students.

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

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

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

Minor program credit weight: 24-25 credits

Note: This Minor is particularly designed for Civil Engineering students, but is open to all B.Eng., B.S.E., 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)	Computers in Engineering
FACC 300	(3)	Engineering Economy

Required Courses: Management and Law

15 credits

CIVE 324	(3)	Sustainable Project Management
FACC 220	(3)	Law for Architects and Engineers
INDR 294	(3)	Introduction to Labour-Management Relations
MGCR 211	(3)	Introduction to Financial Accounting
MGCR 341	(3)	Finance 1

Complementary Courses

3-4 credits (4 credits from List A OR 3 credits from List B)

List A - Building Structures

4 credits from the following:

ARCH 447	(2)	Lighting
ARCH 451	(2)	Building Regulations and Safety
ARCH 554	(2)	Mechanical Services
CIVE 492	(2)	Structures

OR

List B - Heavy Construction

3 credits from the following:

MIME 322	(3)	Rock Fragmentation
MIME 333	(3)	Materials Handling

Construction-Related Complementary Courses

6 credits from the following:

BUSA 462	(3)	Management of New Enterprises
CIVE 446	(3)	Construction Engineering
CIVE 527	(3)	Renovation and Preservation: Infrastructure
ECSE 461	(3)	Electric Machinery

FINE 445	(3)	Real Estate Finance
MIME 520	(3)	Stability of Rock Slopes
MIME 521	(3)	Stability of Underground Openings
MPMC 321*	(3)	Mécanique des roches et contrôle des terrains

* Course offered in French at École Polytechnique in Montreal

12.11.7 Economics Minor

Engineering students who want to complete a minor in Economics are required to complete the following program rather than one of the minor concentrations offered by the Department of Economics in the *eCalendar* under *Faculties & Schools > Faculty of Arts > Undergraduate > Academic Programs > Economics*, unless they have obtained permission from the Faculty of Engineering.

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

12.11.7.1 Bachelor of Engineering (B.Eng.) - Minor Economics (18 credits)

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

Program credit weight: 18 credits

This Minor consists of 18 credits of required and complementary courses given in the Economics Department. In addition, it is presumed that all Engineering students will have a sufficient background in statistics. Engineering Economy, FACC 300, does not form part of this Minor. Engineering students who want to complete a minor in economics are required to complete the following program rather than one of the minor concentrations offered by the Department of Economics in the Faculty of Arts section of this *eCalendar*, unless they have obtained permission from the Faculty of Engineering.

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

Required Courses

9 credits

ECON 209*	(3)	Macroeconomic Analysis and Applications
ECON 230D1**	(3)	Microeconomic Theory
ECON 230D2**	(3)	Microeconomic Theory

* This requirement is waived for students who choose ECON 330D1/ECON 330D2 from the list of complementary courses. Students may not take both ECON 209 and ECON 330D1/ ECON 330D2.

** Students may, with consent of the instructor, take ECON 250D1/ ECON 250D2 Introduction to Economic Theory: Honours, in place of ECON 230D1/ECON 230D2.

Complementary Courses

9 credits from:

ECON 225	(3)	Economics of the Environment
ECON 303	(3)	Canadian Economic Policy
ECON 304	(3)	Financial Instruments & 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.

12.11.8 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 McGill School of Environment (MSE).

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 MSE Adviser. For program details, see the eCalendar under *Faculties & Schools > McGill School of Environment > Undergraduate > : Minor in Environment*.



Note: Engineering students interested in this Minor must submit a completed Course Authorization 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, MSE Program Adviser (email: kathy.roulet@mcgill.ca; telephone: 514-398-4306).

12.11.9 Environmental Engineering Minor

The Environmental Engineering Minor is offered for students in Engineering and in the Department of Bioresource Engineering wishing to pursue studies in this area. Students completing this Minor take an introductory course in environmental engineering, bio-environmental engineering, or environmental aspects of technology, then choose from a wide variety of complementary courses within and outside the Faculty of Engineering on environmental topics. Students may choose to participate in the Barbados Field Study Semester (BFSS) or in the Barbados Interdisciplinary Tropical Studies (BITS) field semester and have the field study courses count toward this Minor.

The Environmental Engineering Minor is administered by the Department of Civil Engineering and Applied Mechanics.

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

For more information on the Barbados Field Study Semester, see www.mcgill.ca/bfss.

For more information on the Barbados Interdisciplinary Tropical Studies field semester, see www.mcgill.ca/bits.

For more information on environmental studies in the Faculty of Engineering, see www.mcgill.ca/enveng.

12.11.9.1 Bachelor of Engineering (B.Eng.) - Minor Environmental Engineering (21 credits)

Minor Adviser: Prof. S. Ghoshal, 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 Applied Mechanics and is offered for all students in Engineering (including B.S.E. students) 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 Minor.

To complete the Minor in Environmental Engineering, students must obtain a grade of C or better in all approved courses in the Minor, and satisfy the requirements of both the Minor and their major program.

Note: Not all courses listed are offered every year. Students should see the "Courses" section of this eCalendar to know if a course is offered.

Complementary Courses

21-22 credits

18 credits from Stream A, B, or C below

and

One course (3-4 credits) from the following list:

BREE 327	(3)	Bio-Environmental Engineering
CHEE 230	(3)	Environmental Aspects of Technology
CIVE 225	(4)	Environmental Engineering

Stream A

15 credits* from the Engineering Course List and 3 credits from the Non-Engineering Course List below

* A minimum of 6 credits must be from outside the student's department. A maximum of 6 credits of research project courses may be counted toward this category, provided the project has sufficient environmental engineering content (project requires approval of project supervisor and coordinator of the Minor).

Stream B

15 credits of courses that make up the "Barbados Field Study Semester" below, provided the project for CIVE/AGRI/URBP 519 Sustainable Development Plans has sufficient environmental engineering content (project requires approval of the Coordinator of the Minor);

AND

One course (3-4 credits) chosen from the Engineering Course List below, excluding CHEE 496.

Barbados Field Study Courses

Required Courses

6 credits

URBP 507	(3)	Planning and Infrastructure
URBP 520	(3)	Globalization: Planning and Change

Complementary Courses

9 credits

One of the following cross-listed courses (3 credits):

AGRI 452	(3)	Water Resources in Barbados
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

Courses offered at the Macdonald campus:

BREE 217*	(3)	Hydrology and Water Resources
BREE 322	(3)	Organic Waste Management
BREE 416	(3)	Engineering for Land Development
BREE 518	(3)	Bio-Treatment of Wastes

* Not open to students who have passed CIVE 323.

Courses offered at the Downtown campus:

ARCH 377	(3)	Energy, Environment and Buildings
ARCH 515	(3)	Sustainable Design
CHEE 351	(3)	Separation Processes
CHEE 370	(3)	Elements of Biotechnology
CHEE 496	(3)	Environmental Research Project
CHEE 591	(3)	Environmental Bioremediation
CHEE 592	(3)	Industrial Air Pollution Control
CHEE 593	(3)	Industrial Water Pollution Control
CIVE 225	(4)	Environmental Engineering
CIVE 323**	(3)	Hydrology and Water Resources
CIVE 421	(3)	Municipal Systems
CIVE 428	(3)	Water Resources and Hydraulic Engineering
CIVE 430	(3)	Water Treatment and Pollution Control
CIVE 451	(3)	Geoenvironmental Engineering
CIVE 550	(3)	Water Resources Management
CIVE 555	(3)	Environmental Data Analysis
CIVE 557	(3)	Microbiology for Environmental Engineering
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)	Groundwater Engineering
MECH 447	(3)	Combustion
MECH 526	(3)	Manufacturing and the Environment
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+	(3)	Microbial Ecology
MICR 341	(3)	Mechanisms of Pathogenicity
RELG 270	(3)	Religious Ethics and the Environment
SOIL 210++	(3)	Principles of Soil Science
SOIL 331	(3)	Environmental Soil Physics
WILD 375	(3)	Issues: Environmental Sciences
WILD 415	(2)	Conservation Law
WOOD 420	(3)	Environmental Issues: Forestry

+ Not open to students who have passed CHEE 370.

++ Not part of the Minor for Agricultural Engineering students.

Courses offered at the Downtown campus:

ANTH 206	(3)	Environment and Culture
BIOL 205	(3)	Biology of Organisms
BIOL 432	(3)	Limnology
CMPL 580	(3)	Environment and the Law
ECON 225	(3)	Economics of the Environment
ECON 326	(3)	Ecological Economics
ECON 347	(3)	Economics of Climate Change
EPSC 549	(3)	Hydrogeology
GEOG 200	(3)	Geographical Perspectives: World Environmental Problems
GEOG 201	(3)	Introductory Geo-Information Science
GEOG 203	(3)	Environmental Systems
GEOG 205	(3)	Global Change: Past, Present and Future
GEOG 302	(3)	Environmental Management 1
GEOG 308	(3)	Principles of Remote Sensing
GEOG 321	(3)	Climatic Environments
GEOG 404	(3)	Environmental Management 2
MIMM 211	(3)	Introductory Microbiology

12.11.10 Minor Programs in Finance, Management, Marketing, and Operations Management

Prerequisite: None

Management Minors Adviser: 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) or an adviser in 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 is comprised of 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.

A student embarking on a minor must be prepared to take credits additional to their Engineering program. Students in a B.Eng. or B.S.E. 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 the B.Eng./B.S.E. program section.

Students must have a CGPA of 3.0 or better to be considered for one of these Minor programs.

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.

Detailed information on these Minor programs can be found in the *eCalendar* under *Faculties & Schools > Desautels Faculty of Management > Undergraduate > Overview of Programs Offered by the Desautels Faculty of Management > : Minors for Non-Management Students*.

Further information can also be found at

www.mcgill.ca/engineering/current-students/undergraduate/advising-programs/academic-program-curriculum/minor-programs.

12.11.10.1 Minor Finance (For Non-Management Students) (18 credits)

The Minor Finance consists of 18 credits of Management courses and is offered to non-Management students in the Faculties of Arts, Engineering, and Science.

The Minor has been designed to provide students with an understanding of the key concepts in corporate finance as well as investment banking.

Required Courses (9 credits)

FINE 342	(3)	Finance 2
FINE 441	(3)	Investment Management
MGCR 341*	(3)	Finance 1

Complementary Courses (9 credits)

9 credits selected from:

FINE 442	(3)	Capital Markets and Institutions
FINE 443	(3)	Applied Corporate Finance
FINE 445	(3)	Real Estate Finance
FINE 448	(3)	Financial Derivatives
FINE 449	(3)	Market Risk Models
FINE 451	(3)	Fixed Income Analysis
FINE 480	(3)	Global Investments
FINE 482	(3)	International Finance 1
FINE 492	(3)	International Finance 2
FINE 541N1	(1.5)	Applied Investments
FINE 541N2	(1.5)	Applied Investments
FINE 547	(3)	Advanced Finance Seminar

or other appropriate 300- or 400-level FINE courses with the approval of the Program Adviser.

* Prerequisite: MGCR 271, Business Statistics, or another equivalent Statistics course approved by the Program Adviser.

Note: Students should select their Statistics course only after consulting the "Course Overlap" section in the Faculty of Arts, the "Course Overlap" section in the Faculty of Science, and the "Course Overlap" section in the Desautels Faculty of Management to avoid overlapping Statistics courses.

12.11.10.2 Minor Management (For Non-Management Students) (18 credits)

The Minor Management consists of 18 credits of Management courses and is currently offered to non-Management students in the following Faculties: Arts, Engineering, Science, Agricultural & Environmental Sciences, Music, Religious Studies, and Kinesiology.

This Minor is designed to provide non-management students with the opportunity to obtain basic knowledge in various aspects of management.

Complementary Courses (18 credits)

Selected from categories A, B, and C:

Category A

3 credits selected from:

MGCR 211	(3)	Introduction to Financial Accounting
MGCR 341*	(3)	Finance 1

Category B

9 credits selected from:

MGCR 222	(3)	Introduction to Organizational Behaviour
MGCR 271**	(3)	Business Statistics
MGCR 293***	(3)	Managerial Economics
MGCR 331	(3)	Information Systems
MGCR 352	(3)	Marketing Management 1
MGCR 382	(3)	International Business
MGCR 472*	(3)	Operations Management

Category C

6 credits selected from:

3-6 credits from any 300- or 400-level Management courses for which prerequisites have been met.

0-3 credits may be from a specifically designated course by the student's home faculty.

* Prerequisite: MGCR 271, Business Statistics, or another equivalent Statistics course approved by the Program Adviser.

** 3 credits of statistics: Students who have taken an equivalent Statistics course in another faculty may not count those credits towards the Minor; an additional 3-credit complementary course must be chosen from the course list above.

*** Students who have taken an equivalent Economics course in another faculty may not count those credits toward the Minor; an additional 3-credit complementary course must be chosen from the course list above.

Note: Students should select their Statistics course only after consulting the "Course Overlap" section in the Faculty of Arts, the "Course Overlap" section in the Faculty of Science, and the "Course Overlap" section in the Desautels Faculty of Management to avoid overlapping Statistics courses.

12.11.10.3 Minor Marketing (For Non-Management Students) (18 credits)

The Minor Marketing consists of 18 credits of Management courses and is currently offered to non-Management students in the Faculties of Arts, Engineering, Science, and the Schulich School of Music.

This Minor is designed to provide students with an understanding of the fundamental concepts in marketing and a framework for applying marketing in a decision-making context. Students will be introduced to the basic concepts in marketing. The use of marketing theory and concepts for decision making will be covered. Marketing research methods for marketing decisions is introduced. Subsequently, students will be able to specialize by choosing from the list of complementary courses.

Required Courses (9 credits)

MGCR 352	(3)	Marketing Management 1
MRKT 354	(3)	Marketing Management 2
MRKT 451	(3)	Marketing Research

Complementary Courses (9 credits)

3 credits:

MGCR 271*	(3)	Business Statistics
-----------	-----	---------------------

6 credits selected from:

MRKT 357	(3)	Marketing Planning 1
MRKT 365	(3)	New Products
MRKT 438	(3)	Brand Management
MRKT 452	(3)	Consumer Behaviour
MRKT 453	(3)	Advertising Management
MRKT 455	(3)	Sales Management
MRKT 459	(3)	Retail Management
MRKT 483	(3)	International Marketing Management

or other appropriate 300- or 400-level MRKT courses with the approval of the Program Adviser.

* Students who have taken an equivalent Statistics course in another faculty may not count those credits toward the Minor; an additional 3-credit complementary course must be chosen from the course list above.

Note: Students should select their Statistics course only after consulting the "Course Overlap" section in the Faculty of Arts, the "Course Overlap" section in the Faculty of Science, and the "Course Overlap" section in the Desautels Faculty of Management to avoid overlapping Statistics courses.

12.11.10.4 Minor Operations Management (For Non-Management Students) (18 credits)

Mentors: Please consult the Bachelor of Commerce website at: <http://www.mcgill.ca/desautels/programs/bcom/academics/courseinfo>

The Minor Operations Management consists of 18 credits of Management courses and is currently offered to non-Management students in the Faculties of Arts, Engineering, Science, and Agricultural & Environmental Sciences.

It provides non-Management students with the opportunity to pursue a career that involves decision making at the operational level. Graduates will be able to find employment in consulting, manufacturing, supply chain, distribution, retail operations, healthcare management and environmental management for profit and non-profit corporations. This Minor has been designed to provide students with an understanding of the key concepts in operations management theory and practice.

Required Courses (6 credits)

MGCR 472	(3)	Operations Management
MGSC 373	(3)	Operations Research 1

Complementary Courses (12 credits)

3 credits

MGCR 271*	(3)	Business Statistics
-----------	-----	---------------------

9 credits selected from:

MGSC 372	(3)	Advanced Business Statistics
MGSC 402	(3)	Operations Strategy
MGSC 403	(3)	Introduction to Logistics Management
MGSC 405	(3)	Quality Management
MGSC 415	(3)	Supplier Management
MGSC 431	(3)	Operations and Supply Chain Analysis
MGSC 479	(3)	Applied Optimization

MGSC 575	(3)	Applied Time Series Analysis Managerial Forecasting
MGSC 578	(3)	Simulation of Management Systems

or other appropriate 300- or 400-level MGSC courses with the approval of the Program Adviser.

* 3 credits of Statistics: Students who have taken an equivalent Statistics course in another faculty may not count those credits toward the Minor; an additional 3-credit complementary course must be chosen from the course list above.

Note: Students should select their Statistics course only after consulting the "Course Overlap" section in the Faculty of Arts, the "Course Overlap" section in the Faculty of Science, and the "Course Overlap" section in the Desautels Faculty of Management to avoid overlapping Statistics courses.

12.11.11 Materials Engineering Minor

Students taking the Materials Engineering Minor complete 15 credits of required courses in materials science; materials engineering; electronic properties of materials; metallic and ceramic powders processing; and applications of polymers, and choose three complementary courses in other areas related to materials engineering.

Minor Adviser: Prof. Nate Quitoriano (Minor Coordinator), Wong Building, Room 3610

12.11.11.1 Bachelor of Engineering (B.Eng.) - Minor Materials Engineering (24 credits)

Minor Adviser: Prof. Nate Quitoriano (Minor Coordinator), Wong Building, Room 3610

Engineering students may obtain a Materials Engineering Minor by completing 24 credits chosen from the required and complementary courses listed below. By a careful selection of complementary courses, Engineering students may obtain this Minor with a minimum of 15 additional credits.

Required Courses

15 credits

CHEE 380*	(3)	Materials Science
CHEE 484	(3)	Materials Engineering
MIME 260*	(3)	Materials Science and Engineering
MIME 345	(3)	Applications of Polymers
MIME 465	(3)	Metallic and Ceramic Powders Processing
MIME 467	(3)	Electronic Properties of Materials

* Students choose either CHEE 380 or MIME 260.

Complementary Courses

9 credits from the following:

CHEE 587	(3)	Chemical Processing: Electronics Industry
ECSE 545	(3)	Microelectronics Technology
MECH 530	(3)	Mechanics of Composite Materials
MIME 360	(3)	Phase Transformations: Solids
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

12.11.12 Mathematics Minor

Students in the Minor in Mathematics for Engineering students complete 18 credits of Mathematics courses (subject code MATH), not including Mathematics courses that are required in their Engineering program (or equivalent courses), and choose 6 credits from other Mathematics-related 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, normally beginning in Year 2 (please consult the Department of Mathematics and Statistics for this adviser). Course selection for this Minor must be done in conjunction with the Minor advisers.

12.11.12.1 Bachelor of Engineering (B.Eng.) - Minor Mathematics (24 credits)

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, normally beginning in the U2 year (please consult the Department of Mathematics and Statistics for this adviser). Selection of courses must be done in conjunction with the Minor advisers.

Note: The Mathematics Minor is open to all students in the Faculty of Engineering (B.Eng., B.S.E., and B.Sc.(Arch.)).

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

Course Selection

At least 18 credits must be chosen from the Mathematics and Statistics courses approved for the Mathematics Major or Honours program, or from the following courses:

MATH 249	(3)	Honours Complex Variables
MATH 363	(3)	Discrete Mathematics
MATH 381	(3)	Complex Variables and Transforms

The remaining credits may be chosen from mathematically-allied courses.

The following courses cannot be used toward the Minor:

MATH 222	(3)	Calculus 3
MATH 223	(3)	Linear Algebra
MATH 247	(3)	Honours Applied Linear Algebra
MATH 248	(3)	Honours Advanced Calculus
MATH 262	(3)	Intermediate Calculus
MATH 263	(3)	Ordinary Differential Equations for Engineers
MATH 264	(3)	Advanced Calculus for Engineers
MATH 270	(3)	Applied Linear Algebra
MATH 271	(3)	Linear Algebra and Partial Differential Equations
MATH 314	(3)	Advanced Calculus
MATH 315	(3)	Ordinary Differential Equations
MATH 319	(3)	Introduction to Partial Differential Equations
MATH 325	(3)	Honours Ordinary Differential Equations

12.11.13 Mining Engineering Minor

Students taking the Mining Engineering Minor complete 14 credits of required courses in mining engineering, including an introduction to the minerals industry, courses in mining science and technology, rock fragmentation and materials handling, and an industrial work term. Students choose 9 credits from mining-related courses within the Departments of Mining and Materials Engineering; Mechanical Engineering; Civil Engineering and Applied Mechanics; Chemical Engineering; and Electrical and Computer Engineering.

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

Minor Adviser: Prof. Hani Mitri (Minor Coordinator), Frank Dawson Adams Building, Room 121.

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

Minor Adviser: Prof. Hani Mitri (Minor Coordinator)

Frank Dawson Adams Building, Room 121

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
MIME 526	(3)	Mineral Economics
MIME 588	(3)	Reliability Analysis of Mining Systems

List B: Mechanical Engineering

0-6 credits from the following:

MECH 497	(3)	Value Engineering
MECH 557	(3)	Mechatronic Design
MECH 572	(3)	Introduction to Robotics
MECH 573	(3)	Mechanics of Robotic Systems
MECH 577	(3)	Optimum Design

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

12.11.14 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. The MST Minor is designed to serve students who already have a good background in the sciences and prior experience with math and computer science courses.

Engineering students may apply for admission to the Minor in Musical Science and Technology. Detailed information on this program can be found in the eCalendar under *Faculties & Schools > Schulich School of Music > Undergraduate > Programs of study > Department of Music Research: Composition; Music Education; Music History; Theory; Faculty Program > : Minor Musical Science and Technology (18 credits)*. Enrolment in Music Technology programs is highly restricted.

Application forms will be available from the Department of Music Research (research.music@mcgill.ca; Room A726C) in the Schulich School of Music from February 1, and must be completed and returned to the Department of Music Research by June 1. Late applications will not be accepted and no students will be admitted to the Minor in January. Successful applicants will be notified by June 20. Registration will be limited to available lab space.

For further information about this Minor, call 514-398-4540 or email research.music@mcgill.ca. Further information on this program is also available on the Music Technology website at www.music.mcgill.ca/musictech/programmes_and_admissions.

Minor Adviser: Prof. Philippe Depalle (Area Chair for the Music Technology program); email: philippe.depalle@mcgill.ca

12.11.15 Physics Minor

Students in Honours Electrical Engineering taking the Physics Minor take 9 credits of required courses in thermal physics and honours quantum physics and choose three other Physics courses (subject code PHYS).

Minor Adviser: Prof. F. Buchinger (Department of Physics)

12.11.15.1 Bachelor of Engineering (B.Eng.) - Minor Physics (18 credits)

Minor Adviser: Prof. F. Buchinger, Department of Physics

Students in Honours Electrical Engineering may obtain this Minor as part of their B.Eng. degree by completing 18 credits of Physics courses, as listed below.

Required Courses

9 credits

PHYS 253	(3)	Thermal Physics
PHYS 357*	(3)	Honours Quantum Physics 1
PHYS 457*	(3)	Honours Quantum Physics 2

* Students who take PHYS 357 and PHYS 457 can omit PHYS 271 from their normal Electrical Engineering program.

Complementary Courses

9 credits from the following:

PHYS 351	(3)	Honours Classical Mechanics 2
PHYS 362	(3)	Statistical Mechanics
PHYS 432	(3)	Physics of Fluids
PHYS 514	(3)	General Relativity
PHYS 551	(3)	Quantum Theory
PHYS 557	(3)	Nuclear Physics

PHYS 558	(3)	Solid State Physics
PHYS 559	(3)	Advanced Statistical Mechanics
PHYS 562	(3)	Electromagnetic Theory
PHYS 567	(3)	Particle Physics

12.11.16 Software Engineering Minor

This Minor will prepare an engineering student for a career in software engineering. It will provide a foundation in basic computer science, computer programming, and software engineering practice.

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

12.11.16.1 Bachelor of Engineering (B.Eng.) - Minor Software Engineering (24 credits)

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

The Software Engineering Minor will prepare engineering students for a career in software engineering. It will provide a foundation in basic computer science, computer programming, and software engineering practice.

This Minor consists of 24 credits (eight courses). Up to four courses (12 credits) may be double-counted for credit toward the B. Eng. degree in Electrical Engineering or Computer Engineering. Students in other programs may double-count up to three courses (9 credits).

Students considering this Minor should consult with the Minor Adviser listed above.

Required Courses

12 credits

COMP 250	(3)	Introduction to Computer Science
ECSE 221	(3)	Introduction to Computer Engineering
ECSE 321	(3)	Introduction to Software Engineering
ECSE 428	(3)	Software Engineering Practice

Complementary Courses

12 credits from the following:

Engineering Courses

6-12 credits from the following:

CHEE 571	(3)	Small Computer Applications: Chemical Engineering
CIVE 460	(3)	Matrix Structural Analysis
CIVE 550	(3)	Water Resources Management
CIVE 572	(3)	Computational Hydraulics
ECSE 322	(3)	Computer Engineering
ECSE 420	(3)	Parallel Computing
ECSE 421	(3)	Embedded Systems
ECSE 422	(3)	Fault Tolerant Computing
ECSE 424	(3)	Human-Computer Interaction
ECSE 427	(3)	Operating Systems
ECSE 429	(3)	Software Validation
ECSE 526	(3)	Artificial Intelligence
ECSE 532	(3)	Computer Graphics
MECH 524	(3)	Computer Integrated Manufacturing
MECH 539	(3)	Computational Aerodynamics

MECH 576 (3) Geometry in Mechanics

Computer Science Courses

0-6 credits from the following (no more than 6 credits will count toward the Minor):

COMP 302 (3) Programming Languages and Paradigms
 COMP 421 (3) Database Systems
 COMP 424 (3) Artificial Intelligence
 COMP 527 (3) Logic and Computation

12.11.17 Technological Entrepreneurship Minor

This Minor is offered jointly by the Faculties of Engineering and Management. It will appeal to those students who have a concept, process, or product idea in mind and who want to explore the opportunity of commercializing it. It will also be of interest to students who have a general interest in entrepreneurship and intend to pursue a career in small- and medium-sized high-technology/engineering companies.

Students taking the Minor choose 18 credits from courses in technological entrepreneurship (entrepreneurship, marketing management, organization policy, marketing of technology, leadership, and human resources management). Students can also choose to take business plan design and project courses, which give students an opportunity to design a business plan and develop a technology or engineering project.

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

12.11.17.1 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 offered jointly by the Faculties of Engineering and Management. It will appeal to those students who have a concept, process, or product idea in mind and who want to explore the opportunity of commercializing it. It will also be of interest to students who have a general interest in entrepreneurship and intend to pursue a career in small- and medium-sized high-technology/engineering companies.

Engineering students (including B.Eng., B.S.E., and B.Sc.(Arch.) students) may obtain the Technological Entrepreneurship Minor by completing six courses (18 credits). B.Eng. and B.S.E. students may double-count up to two courses (6 credits) of Complementary Studies (Group B, Humanities, and Social Sciences courses) toward the Minor.

Students considering this Minor should consult the Minor Adviser listed above.

Complementary Courses

18 credits (six courses) from the following:

BUSA 465 (3) Technological Entrepreneurship
 FACC 500 (3) Technology Business Plan Design
 FACC 501 (3) Technology Business Plan Project
 MGCR 352 (3) Marketing Management 1
 MGCR 423 (3) Strategic Management
 ORGB 321 (3) Leadership
 ORGB 423 (3) Human Resources Management

