

8 Faculty of Engineering, including Schools of Architecture and Urban Planning

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8.1 The Faculty

8.1.1 Location

Macdonald Engineering Building
817 Sherbrooke Street West
Montreal, QC H3A 2K6
Canada

Website: www.mcgill.ca/engineering

Faculty of Engineering Student Affairs Office:
Macdonald Engineering Building, Room 378
Telephone: (514)398-7257

8.1.2 Administrative Officers

John E. Gruzleski; B.Sc., M.Sc.(Queen's), Ph.D.(Tor.),
Eng. **Dean**

Jim Nicell; B.A.Sc., M.A.Sc., Ph.D.(Windsor), P.Eng.
Associate Dean (Student Affairs)

David L. Frost; B.A.Sc.(U.B.C.), M.S., Ph.D.(Caltech),
P.Eng. **Associate Dean (Academic)**

Frank Ferrie; B.Eng., Ph.D.(McG.)
Associate Dean (Research)

David Covo; B.Sc.(Arch.), B.Arch.(McG.), M.R.A.I.C.,
O.A.Q. **Director, School of Architecture**

David F. Brown; B.A.(Bishop's), M.U.P.(McG.), Ph.D.
(Sheffield) **Director, School of Urban Planning**

Dimitrios Berk; B.Sc.(Bosphorus), M.E.Sc.(W.Ont.),
Ph.D.(Calg.), P.Eng.
Chair, Department of Chemical Engineering

Denis Mitchell; B.A.Sc., M.A.Sc., Ph.D.(Tor.), F.A.C.I., Eng.
Chair, Department of Civil Engineering and Applied Mechanics

David A. Lowther; B.Sc.(London), Ph.D.(C.N.A.A.), P.Eng.
Chair, Department of Electrical and Computer Engineering

Arun K. Misra; B.Tech.(I.I.T., Kharagpur), Ph.D.(U.B.C.),
P. Eng. **Chair, Department of Mechanical Engineering**

Robin A.L. Drew; B.Tech.(Bradford), Ph.D.(Newcastle)
Chair, Department of Mining, Metals and Materials Engineering

Jonathan Rousham **Building Administrator**

Steve Yue; B.Sc., Ph.D.(Leeds) **Secretary of Faculty**

Tania Chomyk **Assistant to the Dean**

Enza De Martinis **Financial Officer**

Judy Pharo **Senior Faculty Student Adviser**

Lesley Morin **Records Student Affairs Officer**

Debbie Morzajew **Manager, EMF**

Susie Vodopivec **Banner SIS Trainer**

8.1.3 Historical Note

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.

model number. All Engineering students are expected to own one of the two Faculty Standard Calculators.

8.3 Academic Requirements

8.3.1 Degree Requirements

In order to obtain a Bachelor's degree, students must complete one of the departmental programs described in [section 8.4 "Academic Programs"](#).

8.3.1.1 Entrance Requirements

The degree programs in the Faculty of Engineering are designed for students who have completed a general and basic science program. This basic science requirement consists of two terms of calculus, chemistry, physics, one term of vectors, matrices and analytical geometry and one term of humanities or social sciences.

Students entering the Faculty of Engineering from Quebec complete these courses at CEGEP and enter a seven-term program.

Students entering from outside Quebec with a high school diploma generally enter an eight-term program and complete the basic science requirements at McGill.

Students who have completed Advanced Placement Exams, Advanced Levels, the International Baccalaureate, the French Baccalaureate, or McGill placement and/or advanced credit examinations may receive exemptions and/or credits for all or part of the basic science requirements. Similarly, students who have completed courses at other universities or colleges may receive exemptions and/or credits. Please see www.mcgill.ca/engineering/newstudents/credit for specific information on transfer credits.

8.3.1.2 Basic Science Requirements for Students Entering from Outside Quebec

Generally, students admitted to Engineering from outside Quebec are required to complete the basic science requirements outlined below, in addition to the departmental programs described in [section 8.4 "Academic Programs"](#).

CHEM110	(4 credits)	General Chemistry 1
CHEM120	(4 credits)	General Chemistry 2
MATH140	(3 credits)	Calculus 1
or MATH139	(4 credits)	Calculus
or MATH150	(4 credits)	Calculus A
MATH141	(4 credits)	Calculus 2
or MATH152	(4 credits)	Calculus E
MATH133	(3 credits)	Vectors, Matrices and Geometry
PHYS131	(4 credits)	Mechanics and Waves
PHYS142	(4 credits)	Electromagnetism and Optics
xxxx xxx	(3 credits)	Humanities/Social Sciences course

Calculus courses MATH150/MATH152 are designed for students who have completed a course in high school calculus. Students who complete the Calculus sequence MATH150/MATH152 will receive exemption with credit from MATH262 (Intermediate Calculus), in the regular Engineering program.

In the event that the student has some prior calculus, but is not sufficiently confident to proceed with MATH150/MATH152, the appropriate sequence is MATH140/MATH141.

If a student has no previous calculus exposure, MATH150/MATH152 may be replaced with MATH139/MATH141.

Students who are uncertain as to which calculus course sequence is appropriate for them should contact Ms. Pharo, Faculty Student adviser in the Faculty of Engineering Student Affairs Office, (514)398-7256.

Students who successfully complete one, or more, McGill Placement Tests will obtain credit for the equivalent(s), i.e., CHEM110, CHEM120, MATH140, MATH141, MATH133, PHYS131, PHYS142. Details are provided on the Faculty Website at www.mcgill.ca/engineering.

Students entering with advanced standing credits (Advanced Placements, Advanced Levels, International Baccalaureate examinations, McGill Placement Tests) are required to meet with the

Faculty Student adviser, Faculty of Engineering Student Affairs Office, to finalize their program of studies. (This must be done prior to meeting with the Departmental adviser.) An information session will be held prior to the advising sessions to process these advanced credits. Information is available on the Faculty Website at www.mcgill.ca/engineering.

8.3.1.3 Architecture – Basic Science Requirements for Students Entering from Outside Quebec

Generally, students admitted to Architecture from outside Quebec are required to complete the following courses:

CHEM110	(4 credits)	General Chemistry 1
CHEM120	(4 credits)	General Chemistry 2
MATH139	(4 credits)	Calculus
or MATH140	(3 credits)	Calculus 1
MATH141	(4 credits)	Calculus 2
MATH133	(3 credits)	Vectors, Matrices and Geometry
PHYS131	(4 credits)	Mechanics and Waves
PHYS142	(4 credits)	Electromagnetism and Optics

Students may write McGill Placement Tests to obtain credit for CHEM110, CHEM120, MATH140, MATH141, MATH133, PHYS131 and PHYS142, in the event that they have studied similar material previously. Details on the advanced placement examinations are provided in *Welcome to McGill*. Information is also available on the Faculty Website at www.mcgill.ca/engineering/newstudents.

8.3.2 Degrees and Requirements for Professional Registration

Non-Professional:

Bachelor of Science (Architecture)

The first professional degree in architecture is the Master of Architecture I. The description of the M.Arch. I program can be found in the *Graduate and Postdoctoral Studies Calendar*.

Professional:

Bachelor of Engineering

Bachelor of Engineering (Honours)

Bachelor of Software Engineering

The B.Eng. programs are accredited by the Accreditation Board of the Canadian Council of Professional Engineers and fulfill the academic requirements for admission to the provincial engineering professional organizations. All students are encouraged to seek professional registration after graduation. To become a Professional Engineer in Canada, a graduate must pass an examination on legal aspects as well as 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 of "engineer" and perform the professional activities reserved for engineers by the provincial laws and regulations.

Graduates of the Bachelor of Software Engineering program should be eligible for accreditation (once accreditation standards for Software Engineers have been adopted).

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 students have accumulated 60 credits in a B.Eng. program, they can join the Student Section of the OIQ. Registration is free.

For more information, visit the Websites of the Ordre des ingénieurs du Québec, www.oiq.qc.ca, and of the Canadian Council of Professional Engineers, www.ccpce.ca.

8.3.3 Prerequisites and/or Corequisites

Prerequisites and/or corequisites must be completed prior to course registration, if applicable. If a student has registered for a course and did not satisfy the prerequisites and/or corequisites, the course may be dropped from his/her record automatically by Minerva.

Those students who have received advance credits/exemptions or passed a placement exam, and are blocked from registration in a course due to a prerequisite and/or corequisite block, must complete a Course Authorization Form and submit it to the Faculty of Engineering Student Affairs Office. A Departmental adviser must sign and make a notation on the Course Authorization Form indicating that the prerequisite and/or corequisite has been satisfied.

Further information may be obtained from the Faculty of Engineering Student Affairs Office, Macdonald Engineering Building, Room 378.

8.3.4 Complementary Studies

Engineering students must complete 6 credits of additional complementary courses as follows:

I) Three credits on the impact of technology on society are to be chosen from the following list of courses:

II) Three credits in the humanities and social sciences, administrative studies and law are to be chosen from the following list of courses:

A. Humanities and Social Sciences

Any course at the 200 level or above from the departments of:

- Anthropology (Subject Code ANTH)
- Economics (any 200- or 300-level course excluding ECON208, ECON217, ECON227, ECON259 and ECON337)
- History (Subject Code HIST)
- Philosophy (excluding PHIL210)
- Political Science (Subject Code POLI)
- Psychology (excluding PSYC204, PSYC305 and PSYC435 but including PSYC100)
- Religious Studies (Subject Code RELG)
- School of Social Work (Subject Code SWRK)
- Sociology (excluding SOCI350)

or ARCH350 The Material Culture of Canada
or ENVR203 Knowledge, Ethics and Environment
or ENVR400 Environmental Thought
or MATH338 History and Philosophy of Mathematics

B. Administrative Studies and Law

C. Language Courses

Any language course which is deemed by the academic adviser to have a sufficient cultural component or, in the case of a student who was not already proficient in a specific language, program credit will be given for the second of two successfully completed, academically approved 3-credit language courses.

8.3.5 Student Progress

The B.Eng. programs may be completed in seven terms. The B.Sc.(Arch.) program may be completed in six or eight terms, depending upon point of entry.

A student must successfully complete the B.Eng. or B.Sc.(Arch.) programs 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 the IYES program, 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 a student's progress.

8.3.5.1 Letter Grades

In the Faculty of Engineering, letter grades are assigned according to the grading scheme adopted by the professor in charge of a particular course. They have the designations:

Grades A, B and C indicate satisfactory results. Grade D indicates marginal results which may be acceptable for peripheral courses but not for core courses required by the program. The classification of a course as core or peripheral depends on the individual student's program and will be decided by the department concerned. Grade F is a permanent grade indicating unsatisfactory results. Grade J indicates an unexcused failure to submit assignments or an unexcused absence from an examination. It is equivalent to an F grade.

8.3.5.2 Incomplete Course Deadlines

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eligible for the S/U option are taken in the conventional manner.)

3. Only students in satisfactory standing will be permitted to take a course under the Satisfactory/Unsatisfactory option. Only one course (3 credits) per term, to a maximum of 10% of a student's credits taken at McGill, may be taken this way. Grades will be reported in the normal fashion by the instructor and the grades of C and above will be converted to Satisfactory(S) and grades of D and F will be converted to Unsatisfactory(U).
4. The courses taken under this option will be excluded from the GPA, but will be included in the number of credits.
5. Note For Faculty of Engineering Students Only: If the S/U option is selected for a core course and not removed by the Course Change deadline, the Student Affairs Office will remove the option and notify the student of the change.

Note: To be considered for scholarships/renewal of awards, students must complete at least 27 credits in the regular academic session exclusive of courses completed under this option.

8.3.5.4 Course Credits

The credit assigned to a particular course reflects the amount of effort it demands of the student. One credit normally represents three hours total work per week. This is, in general, a combination of lecture hours and other contact hours such as laboratory periods, tutorials and problem periods as well as personal study hours. As a guide, the average division of time for a course is indicated in hours in the course listing after the course credit. For example, (3)(3-0-6) indicates a three-credit course consisting of three lecture hours per week, no other contact hours and six hours of personal study per week.

8.3.5.5 Extra Courses

Courses that a student elects to take which lie outside their program may be classified as "extra", provided the student chooses this option at the time of registration. Extra courses are indicated on the student's transcript and grades earned in those courses do not affect the grade point average. The option will not be added to a student's record after the Add/Drop deadline. Courses that are taken to satisfy the student's engineering program or a Minor cannot be designated as extra.

8.3.5.6 Academic Standing Decisions

In the Faculty of Engineering, a decision on the student's academic standing is based on the CGPA (Cumulative Grade Point Average) according to the criteria listed below.

- Satisfactory standing - CGPA equal to 2.00 or greater.
- Probationary standing - CGPA less than or equal to 1.99 or equal to or greater than 1.20.
- Unsatisfactory standing - CGPA less than 1.20 (if this is the student's first term, the student is normally readmitted to Probationary Standing by Faculty decision).

Note: The Faculty makes academic standing decisions after the completion of each term (Fall, Winter, Summer) based on academic results to date. Thus, if a student has been granted permission to defer one or more examinations, the standing decision will be made regardless of such deferrals.

Please see below for further information about academic standing decisions.

Satisfactory Standing

Students in satisfactory standing may proceed, with the following conditions:

All core courses in which D or F grades were obtained must either be repeated successfully (grade C or better) or be replaced by an alternative approved course which is completed successfully.

All other courses in which F grades were obtained must either be repeated successfully at some point before graduation or be replaced by some alternative approved course which is completed successfully before graduation.

Students in poor academic standing are strongly urged to contact the Student Affairs Office to discuss their situation. Office staff are available to help guide students and to provide useful advice to help students achieve their goals. Helpful workshops are provided by Student Services, e.g., study skills, stress management, test anxiety. Students who are experiencing difficulties are encouraged to explore these avenues.

Probationary Standing

Students placed on Probationary Standing may proceed with their studies under the following conditions.

Students must reduce their credit load to a maximum of 13 credits per term and must achieve at the end of the term either a CGPA of 2.00 or better, or a term GPA (TGPA) of 2.50 or better in order to continue.

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ment responsible may, in appropriate cases, arrange "reading courses" during the other term or during the Summer months. Such courses taken during a Fall or Winter term constitute a normal part of the candidate's work load. If the student is on probation, these courses must be included in the workload reduction.

8.3.5.8 Reassessment and Reread of a Grade

In accordance with the Charter of Student Rights, and subject to the conditions stated therein, students have the right to consult any written submission for which they have received a mark and the right to discuss this submission with the examiner. If, after discussion with the instructor, a student decides to request a formal reread of a final exam, the student must apply in writing, complete the Reread form and submit it to the Faculty of Engineering Student Affairs Office.

The following conditions apply:

- requests for rereads in more than one course per term will not be accepted, unless permission is given by the Faculty of Engineering;
- grades may be either raised or lowered as the result of a reread;
- rereads in courses not in the Faculty of Engineering are subject to the deadlines, rules and regulations of the relevant faculty;
- any request to have term work re-evaluated must be made directly to the instructor concerned.

The deadlines to make an application for a formal reread of a final exam are:

- the last working day of March for Fall courses,
- the last working day of July for Winter courses, and
- the last working day of November for Summer courses.

A \$35 fee for each reread will be assessed directly to the student's

PROGRAMS OF STUDY

McGill's professional program in architecture is structured as a four-and-a-half-year, or nine-term, course of study divided into two parts.

The first part, for students entering with the Diploma of Collegial Studies in Pure and Applied Science or the equivalent, is a six-term design program leading to a non-professional degree, Bach-

Architectural Complementaries

8.4.2 Department of Chemical Engineering

M.H. Wong Building, Room 3060
3610 University Street
Montreal, QC H3A 2B2

Telephone: (514) 398-4494

Fax: (514) 398-6678

Website: www.mcgill.ca/chemeng

Chair — Dimitrios Berk

Emeritus Professors

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

Musa R. Kamal; B.S.(Ill.) M.S., Ph.D.(Carnegie Mellon), Eng.

Martin E. Weber; B.S.E.(Prin.), Sc.D.(M.I.T.), P.Eng.

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

Professors

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

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

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

Associate Professors

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

P.Eng.50afessors

AlPa

exempt from course CHEM212 or CHEM234, respectively (Introductory Organic Chemistry 1 and Selected Topics in Organic Chemistry), the corresponding courses are transferred from required courses to electives.

For appropriately qualified high school graduates from outside Quebec, an extended credit program is available, as described in section 8.3.1.2 "Basic Science Requirements for Students Entering from Outside Quebec".

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

Students must obtain a C grade 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 complementary courses (departmental). A grade of "D" is a passing grade in other complementary courses and in any elective courses taken.

CURRICULUM FOR THE B.ENG. DEGREE IN CHEMICAL ENGINEERING

REQUIRED COURSES	COURSE CREDIT
Non-Departmental Courses	
CHEM212 Introductory Organic Chemistry 1	4
CHEM233 Topics in Physical Chemistry	3
CHEM234 Topics in Organic Chemistry	3
COMP208 Computers in Engineering	3
MATH262 Intermediate Calculus	3
MATH263 Ordinary Differential Equations and Linear Algebra	3
MATH264 Advanced Calculus	3
MIME221 Engineering Professional Practice	2
MIME310 Engineering Economy	3 27
Chemical Engineering Courses	
CHEE200 Introduction to Chemical Engineering	4
CHEE204 Chemical Manufacturing Processes	3
CHEE220 Chemical Engineering Thermodynamics	3
CHEE291 Instrumental Measurements Laboratory	4
CHEE314 Fluid Mechanics	4
CHEE315 Heat and Mass Transfer	4
CHEE340 Process Modelling	3
CHEE351 Separation Processes	3
CHEE360 Technical Paper 1	1
CHEE370 Elements of Biotechnology	3
CHEE380 Materials Science	3
CHEE392 Project Laboratory 1	4
CHEE393 Project Laboratory 2	5
CHEE423 Chemical Reaction Engineering	4
CHEE453 Process Design	4
CHEE455 Process Control	4
CHEE456 Design Project 1	1
CHEE457 Design Project 2	5
CHEE462 Technical Paper 2	1
CHEE474 Biochemical Engineering	3
CHEE484 Materials Engineering	3 69
COMPLEMENTARY COURSES	
Courses to be selected from those approved by the Department (see list of technical complementaries below)	9
Two courses (6 credits), selected from an approved list: one course on the impact of technology on society and one in the humanities and social sciences, administrative studies and law. See section 8.3.4 "Complementary Studies" for further information.	6
TOTAL	111
For students starting their B.Eng. studies in September who have completed the Quebec Diploma of Collegial Studies, a program for the first two terms of study is given below:	
Term 1	
CHEE200 Introduction to Chemical Engineering	Credits 4

CHEE291 Instrumental Measurement Laboratory	4
CHEM212 Introductory Organic Chemistry 1	4
MATH262 Intermediate Calculus	3
MIME221 Engineering Professional Practice	2 17
Term 2	
CHEE204 Chemical Manufacturing Processes	3
CHEE220 Chemical Engineering Thermodynamics	3
CHEM234 Topics in Organic Chemistry	3
COMP208 Computers in Engineering	3
MATH263 Ordinary Differential Equations and Linear Algebra	3 15

Students entering their second year of study or who are starting in January must plan their program of studies in consultation with their Departmental adviser.

Additional information can be found on the Faculty Website at www.mcgill.ca/engineering, as well as in section 8.3.1.2 "Basic Science Requirements for Students Entering from Outside Quebec".

TECHNICAL COMPLEMENTARIES

A minimum of 9 credits of complementary courses must be chosen from a list of technical complementaries approved by the Department. 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 (2) technical complementary courses are to be selected from those offered by the Department (list below). Permission is given to take the third complementary course from other suitable undergraduate courses in the Faculty of Engineering.

The Technical Complementary courses currently approved by the Department are as follows:

BIOT505 Selected Topics in Biotechnology (Biotechnology Minor students only)	
CHEE363 Projects Chemical Engineering 1	
CHEE438 Engineering Principles in Pulp and Paper Processes	
CHEE452 Particulate Systems	
CHEE458 Computer Applications	
CHEE464 Projects in Chemical Engineering 2	
CHEE471 Industrial Water Pollution Control (or CIVE430)	
CHEE472 Industrial Air Pollution Control (or MECH534)	
CHEE481 Polymer Engineering	
CHEE487 Chemical Processing Electronics Industry	
CHEE489 Electrochemical Engineering	
CHEE494 Research Project and Seminar	
CHEE495 Research Project and Seminar	
CHEE571 Small Computer Applications: Chemical Engineering	
CHEE581 Polymer Composites Engineering	

Courses CHEE481 and CHEE581 comprise a Polymeric Materials sequence. Additional courses in this area are available in the Chemistry Department (e.g., CHEM455) or at the graduate level (CHEE681 to CHEE684). The Department has considerable expertise in the polymer area.

Courses CHEE370 and CHEE474 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 two courses in this area: CHEE471 and CHEE472. As some water pollution control problems are solved by microbial processes, course CHEE474 is also relevant to the pollution control area. Likewise, as the solution to pollution problems frequently involves removal of particulate matter from gaseous or liquid streams, course CHEE452 is also rele-

can be accommodated within the Civil Engineering program will be made available at the time of preregistration counselling.

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

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 s h N e c h o a t i o C . R u m i n ; B . E e s a r y M . S c . 1 P h . D . e M c G .) , 2 , 9 2 7 e s
 A C A D E M e t y o f a d v a n c e d c o p a r y r l l o w . 1 2 . 7 . 5 . T D G .) , 2 , 9 2 7 e s
 s h C l i a l o r d H . o C h a m p n e s s ; M . S c . e L o n d .) , P h . D . e M c G .) ,

Professors

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

James Clark; B.Sc., Ph.D.(Br.Col.)

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

Geza Joos; B.Sc.(C'ria), M.Eng., Ph.D.(McG.) (*CRC Chair*)

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

Tho Le-Ngoc; M.Eng.(McG.), Ph.D.(Ott.), F.I.E.E.E.

Harry Leib; B.Sc.(Technion), Ph.D.(Tor.)

Martin D. Levine; B.Eng., M.Eng.(McG.), Ph.D.(Lond.), F.C.I.A.R.,
F.I.E.E.E., Eng.

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

David A. Lowther; B.Sc.(Lond.), Ph.D.(C.N.A.A.), F.C.A.E., Eng.

David V. Plant; M.S., Ph.D.(Brown) (*James McGill Professor*)

ECSE492 Optical Communications Laboratory
 ECSE493 Control and Robotics Laboratory

General Complementaries **6**

Two courses (6 credits), selected from an approved list: one course on the impact of technology on society and one in the humanities and social sciences, administrative studies and law. See section 8.3.4 "Complementary Studies" for further information.

TOTAL CREDITS **108**

CURRICULUM FOR THE B.ENG. DEGREE IN ELECTRICAL ENGINEERING (REGULAR)

REQUIRED COURSES **COURSE CREDIT**

Non-Departmental Courses

CIVE281	Analytical Mechanics	3	
or PHYS251	Classical Mechanics 1 (3)		
COMP202	Introduction to Computing 1	3	
EDEC206	Communication in Engineering	3	
MATH262	Intermediate Calculus	3	
MATH263	Ordinary Differential Equations and Linear Algebra	3	
or MATH325	Honours Ordinary Differential Equations (3)		
MATH264	Advanced Calculus	3	
or MATH248*	Honours Advanced Calculus (3)		
MATH271	Linear Algebra and Partial Differential Equations	3	
or MATH247*	Honours Applied Linear Algebra (3)		
MATH381	Complex Variables and Transforms	3	
MIME221	Engineering Professional Practice	2	
MIME310	Engineering Economy	3	
PHYS271	Quantum Physics	3	32

* CGPA of 3.30 is required to register for MATH247 and MATH248.

Departmental Courses

ECSE200	Fundamentals of Electrical Engineering	3	
ECSE210	Circuit Analysis	3	
ECSE221	Introduction to Computer Engineering	3	
ECSE291	Electrical Measurements Laboratory	2	
ECSE303	Signals and Systems 1	3	
ECSE304	Signals and Systems 2	3	
ECSE305	Probability and Random Sig. 1	3	
ECSE322	Computer Engineering	3	
ECSE323	Digital System Design	5	
ECSE330	ECSE33 Tc -0.9153		

Signature of Student: _____ Date: _____

*** Enhanced Power Concentration**

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 and state-of-the-art laboratory facilities, and a point of contact between industry and universities involved in power engineering.

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

The benefits of the Concentration are:

- 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 2005, the applicant must:

- be registered in the B.Eng. program (regular Electrical Engineering);
- have a cumulative GPA of at least 2.70;

**CURRICULUM FOR THE BACHELOR OF SOFTWARE
ENGINEERING (B.S.E.)**

8.4.5 Department of Mechanical Engineering

Macdonald Engineering Building, Room 351
817 Sherbrooke Street West
Montreal, QC H3A 2K6

Telephone: (514) 393-5676 (ENGL00 0 -12 TD 0.2733 Tc -0.1002ad7ihUoirrerax) 393-5676

ENGL00 0 -12

Associate Professors

Luca Cortelezzi; M.Sc., Ph.D.(Caltech)
 David L. Frost; B.A.Sc.(U.B.C.), M.S., Ph.D.(Caltech), P.Eng.
 Tim Lee; M.S.(Portland State), Ph.D.(Idaho)
 Larry B. Lessard; B.Eng.(McG.), M.Sc., Ph.D.(Stanford), P.Eng.
 (*Undergraduate Program Coordinator*)
 Laurent Mydlarski; B.A.Sc.(Waterloo), Ph.D.(Cornell), Eng.
 Meyer Nahon; B.Sc.(Queen's), M.Sc.(Tor.), Ph.D.(McG.), P.Eng.
 (*Graduate Program Director*)
 James A. Nemes; B.Sc.(Maryland), M.S., D.Sc.(GWU) P.E.,
 P.Eng. (*William Dawson Scholar*),
 Peter Radziszewski; B.Sc.(U.B.C.), M.Sc., Ph.D.(Laval)
 Inna Sharf; B.A.Sc.(Tor.), Ph.D.(Tor.), P.Eng.
 Vince Thomson; B.Sc.(Windsor), Ph.D.(McMaster) (*Werner
 Graupe Professor of Manufacturing Automation*)
 Paul J. Zsombor-Murray; B.Eng., M.Eng., Ph.D.(McG.), Eng.
 F.C.S.M.E.

Assistant Professors

Andrew J. Higgins; B.Sc.(Ill.), M.S., Ph.D.(Wash.)
 Pascal Hubert; B.Eng., M.Sc.(École Polytechnique),
 Ph.D.(U.B.C.), P.Eng. (*Canada Research Chair*)
 József Kövecses; M.Sc.(U. Miskolc), Ph.D.(Hung. Acad. Sci.),
 P.Eng.
 R. Mongrain; B.Sc., M.Sc.(Montr.), Ph.D.(École Polytechnique),
 Eng.
 Siva Nadarajah; B.Sc.(Math), B.Sc.(Aerospace Eng.)(Kansas),
 M.Sc., Ph.D.(Stanford)
 Damiano Pasini; M.Sc.(Pavia); Ph.D.(Bristol), P.Eng.
 Evgeny V. Timofeev; M.Sc., Ph.D.(S.T.U. St. Petersburg).
 Srikar T. Vengallatore; B.Tech(B.H.U.), Ph.D.(M.I.T.) (*Canada
 Research Chair*)

Laboratory Superintendents

A. Micozzi, G. Savard, G. Tewfik

Associate Members

R.E. Kearney; B.Eng., M.Eng., Ph.D.(McG.), Biomedical
 Engineering Unit
 B.H.K. Lee; B.Eng., M.Eng., Ph.D.(McG.)

Adjunct Professors

H. Attia, R.G. Edwards, S. Girgis, A. Hemami, Z. Liu,
 K.Mackenzie, W.D. May, C.A. Rabbath, R.Sumner,
 G.A.Wagner, T. Yee, D. Zorbas

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 stress 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, manufacture and experimentation. In these courses students learn how to apply their analytical groundwork to the solution of practical problems.

Specialist 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.

The Department offers an Honours Program which is particularly suitable for those with a high aptitude in mathematics and physics and which gives a thorough grounding in the basic engineering sciences. The complementary courses in this program can be utilized to take courses with applied engineering orientation, such as those offered in the regular program, or if preferred, to obtain an even more advanced education in engineering science.

Concentrations in Aeronautical Engineering, Mechatronics and Design are available for students in either the Regular or Honours programs who wish to specialize in these area.75 -9 TD 0.2.75 TD 0.288 TD

1 course (3 credits) at the 300 level or higher from the Faculty of Engineering or an approved course in the Faculty of Science, including Mathematics.

Two courses (6 credits), selected from an approved list: one course on the impact of technology on society and one in the humanities and social sciences, administrative studies and law. See [section 8.3.4 "Complementary Studies"](#) for further information.

TOTAL CREDITS **112**

Students entering in September or January must plan their program of studies in accordance with the regulations posted on the Faculty Website at www.mcgill.ca/engineering. After registering, students must consult with their academic adviser.

Additional information can be found in [section 8.3.1.2 "Basic Science Requirements for Students Entering from Outside Quebec"](#).

CURRICULUM FOR THE B.ENG. DEGREE IN MECHANICAL ENGINEERING (HONOURS)

REQUIRED COURSES

Non-Departmental Subjects

	COURSE CREDIT
CIVE207 Solid Mechanics	4
EDEC206 Communication in Engineering	3
COMP208 Computers in Engineering	3
MATH262 Intermediate Calculus	3
MATH263 Ordinary Differential Equations and Linear Algebra	3
MATH264 Advanced Calculus	3
MATH271 Linear Algebra and Partial Differential Equations	3
MIME221 Engineering Professional Practice	2
MIME310 Engineering Economy	3 27

Departmental Courses

MECH201 Introduction to Mechanical Engineering	2
MECH210 Mechanics 1	2
MECH220 Mechanics 2	4
MECH240 Thermodynamics 1	3
MECH260 Machine Tool Laboratory	2
MECH262 StatisticsE1 Tw3 gMuelementsLaboratory	2

Students entering in September or January must plan their program of studies in accordance with the regulations posted on the Faculty Website at www.mcgill.ca/engineering. After registering, students must consult with their academic adviser.

Additional information can be found in [section 8.3.1.2 "Basic Science Requirements for Students Entering from Outside Quebec"](#).

LIST OF COMPLEMENTARY COURSES (DEPARTMENTAL)
(Each is 3 credits)

Associate Professors

Michel L. Bilodeau; B.A.Sc.(Montr.), M.Sc.App., Ph.D.(McG.), Eng.
 Mainul Hasan; B.Eng.(Dhaka), M.Sc.(Dhahran), Ph.D.(McG.)
 Janusz A. Kozinski; B.A., M.Eng., D.Sc.(Krakow) (*William Dawson Scholar*)
 André Laplante; B.A.Sc., M.A.Sc.(Montr.), Ph.D.(Tor.), Eng.
 Frank Mucciardi; B.Eng., M.Eng., Ph.D.(McG.), Eng.
 Jacques Ouellet; B.A.Sc.(Laval), M.A.Sc, Ph.D.(Montr.), Eng.
 Mihriban Pekguleryuz; B.Eng., M.Eng.(U of Florida), Ph.D. (McG.)

Assistant Professor

Mathieu Brochu; B.Eng.(Laval), Ph.D.(McG.)

Post-Retirement Professor — John J. Jonas; B.Eng.(McG.), Ph.D.(Cantab.), F.A.S.M., Eng.

Faculty Lecturer

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

Adjunct Professors

MarcBétournay, WilliamCaley, CarlFuerst, BrynHarris, AhmadHemami, MohamadJahazi, RaadJassim, EricLifshin, MartinPugh, JohnRoot

CO-OP Program Liaison Officers

Genevieve Snider (Materials)
 Michel Vachon (Mining)

The Department of Mining, Metals 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.

The equipment operated by the Department is the best available. On the materials side there is a full range of laboratory facilities for extractive and process metallurgy as well as excellent materials characterization and processing facilities. In mining engineering the Department has rock engineering laboratories to test the mechanical properties of both rock and backfill materials and computer-aided mine design facilities.

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 around 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 conforms to requirements of the Canadian Engineering Accreditation Board (CEAB) and is designed to offer students the best training for employment in the field. The basic 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 which include the resource and manufacturing sectors. Students in the CO-OP program benefit from the practical learning experience arising from work-term employment in meaningful engineering jobs. Students also benefit from the non-tangible learning experience arising from the increased responsibilities required to obtain and successfully complete the work terms.

Students pay a two-credit course fee for each of the following work terms: MIME 280, MIME 380 and MIME 480. (Students who entered the program prior to September 2005 will also pay a 2-credit course fee for MIME 481.) An amount of \$200.00 will be billed during 10 consecutive terms for a total amount of \$2,000.00 before graduation. This latter amount covers expenses directly related to the operation of the CO-OP program. Students must register for each of the above-mentioned industrial training courses and pay the above-mentioned fees by the Minerva course registration deadlines or else late fees will apply.

Mining Engineering (CO-OP). McGill, which has the oldest mining engineering program in Canada, has always been noted for the excellence of its courses and for the training it provides in mining technology, mineral economics and mining practice. Graduates in mining engineering are in demand not only in Canada but throughout the world. Technical developments have been rapid in recent years. These offer a challenge to the imaginative student with a strong engineering interest. The Department offers a cooperative program leading to the B.Eng. degree in Mining Engineering. The CO-OP program is offered in collaboration with the Département des génies civil, géologique et des mines at École Polytechnique in Montreal, and includes formal industrial work periods. Students registered at McGill are required to take a series of technical mining courses at École Polytechnique in the latter part of the program. These courses are designated as such in the program outline (Subject Code MPMC).

Scholarships

The Department offers Entrance Scholarships each year, valued at \$3,000; these scholarships are renewable. A substantial number of other scholarships and bursaries are awarded by the Department as well as by the Canadian Mineral Industry Education Foundation.

Student Advising

Students entering the Mining or Materials Engineering programs must plan their schedule of studies in consultation with one of the departmental advisers: Professors Laplante and Yue (Materials) or Mr. J. Mossop (Mining).

CURRICULUM FOR THE B.ENG. DEGREE IN MATERIALS ENGINEERING – CO-OP PROGRAM

		COURSE CREDITS
REQUIRED COURSES		
Non-Departmental Courses		
CHEE481	Polymer Engineering	3
CHEM233	Topics in Physical Chemistry	3
CIVE205	Statics	3
CIVE207	Solid Mechanics	4
COMP208	Computers in Engineering	3
MATH262	Intermediate Calculus	3
MATH263	Ordinary Differential Equations and Linear Algebra	3
MATH264	Advanced Calculus	3
MATH289	Design Graphics	3
Departmental Courses		
MIME200	Introduction to the Minerals Industry	3
MIME202	Engineering Communication Skills	2
MIME209	Mathematical Applications	3
MIME212	Engineering Thermodynamics	3
MIME221	Engineering Professional Practice	2
MIME261	Structure of Materials	3
MIME280	Industrial Training 1	2
MIME310	Engineering Economy	3
MIME311	Modelling and Automatic Control	3
MIME317	Analytical and Characterization Techniques	3
MIME337	Electrotechnology	2
MIME341	Introduction to Mineral Processing	3
MIME350	Extractive Metallurgical Engineering	3
MIME352	Hydrochemical Processing	3
MIME356	Heat, Mass and Fluid Flow	4
MIME360	Phase Transformations: Solids	3
MIME362	Mechanical Properties	3
MIME367	Electronic Properties of Materials	3
MIME380	Industrial Training 2	2
MIME442	Modelling and Control: Mineral Processing	3
MIME452	Process and Materials Design	4
MIME455	Advanced Process Engineering	3
MIME456	Steelmaking and Steel Processing	3
MIME465	Ceramic Engineering	3
MIME480	Industrial Training 3	2
		71

COMPLEMENTARY COURSES

Technical Courses

12

9 - 12 credits from the following:

- CHEE581 (3) Polymer Composites Engineering
- CIVE512 (3) Advanced Civil Engineering Materials
- MECH530 (3) Mechanics of Composite Materials
- MIME410 (3) Research Project
- MIME412 (3) Corrosion and Degradation
- MIME451 (3) Environmental Controls: Met'l Plants
- MIME456 (3) Steelmaking & Steel Processing
- MIME457 (3) Light Metals Extraction and

654 Tc 0 Tw (M12c4 Tc 4 Tc 0 63 (CIVE512) Tj 48 0 TD 0.195 Tc ((3)) Tj 18 0 TD 0.2721 1Tc -0.0Deivem; veric 0 Tw (6Mech

**CURRICULUM FOR THE B.ENG. DEGREE IN MINING
ENGINEERING – CO-OP PROGRAM**

Technical Courses

Courses selected from those listed below or any other approved technical course(s) in Engineering, Management or Science.

Note: not all courses are given annually; verification with course instructor is advised.

A fee of \$300 is assessed by the University for each Industrial Work Period course.

8.4.7 School of Urban Planning

Macdonald-Harrington Building
815 Sherbrooke Street West
Montreal, QC H3A 2K6

Telephone: (514) 398-4075

Fax: (514) 398-8376

E-mail: admissions.planning@mcgill.ca

Website: www.mcgill.ca/urbanplanning

Director — David F. Brown

Emerita Professor

Jeanne M. Wolfe; B.Sc.(Lond.), M.Sc.(W.Ont.), M.A.(McG.)

Professor

Jane M. Glenn; B.A., LL.B.(Qu.), D. en Droit(Stras.)

Associate Professors

David F. Brown; B.A.(Bishop's), M.U.P.(McG.), Ph.D.(Sheffield)

Raphaël Fischler; B.Eng. (V. Tech. Eindhoven), M.S. Arch.S.,
M.C.P.(MIT), Ph.D.(U.C. Berk.)

Assistant Professors

Madhav G. Badami; B.Tech., M.S.(I.I.T., Madras)

M.E.Des.(Calg.), Ph.D.(UBC) (*joint appoint. with McGill School
of Environment*)

Lisa Bornstein; B.Sc.(U.C.Berk.), M.R.P.(C'neil), Ph.D.(U.C.Berk.)

Murtaza Haider; B.Sc.(Peshawar), M.A.Sc., Ph.D.(Tor.) (*joint
appoint. with Civil Engineering*)

Associate Member

Gordon O. Ewing; M.A.(Glas.), M.A., Ph.D.(McG.)

Instructor

François Dufaux; B.Arch.(Laval), M.U.P.(McG.)

Adjunct Professors

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

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

Ray Tomalty; B.A., M.P.A..(Queen's), Ph.D.(Wat.)

Guest Lecturers

CameronCharlebois, LucDanielse, MarcDenhez,

AndrewHoffmann, BrendaLee, Damaris Rose, Alain Trudeau,

MartinWexler

Modern urban planning developed into a profession in the early decades of the 20th century, largely as a response to the appalling sanitary, social and economic conditions of rapidly developing industrial cities. Initially, the disciplines of 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.

Today, 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 which 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.

McGill University was the first institution in Canada to offer a full-time planning program. An interdisciplinary program was established in 1947, in which students combined a master's degree in Urban Planning with one in a related field. An autonomous program was established in 1972. It became the School of Urban Planning in 1976.

Students come to the School from diverse backgrounds, the physical sciences, the traditional professions, such as architecture and engineering, and the social sciences. 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 historic preservation to transportation planning, from housing development to computer imaging. They devote their efforts in increasing numbers to environmental planning and sustainable development.

The School is a partner in the Montreal Interuniversity Group "Urbanization and Development", a consortium recognized by CIDA as a Centre of Excellence, which is devoted to the study of urban problems and the formulation of policies in developing regions. 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.

The objective of the School is to produce qualified professional urban planners for the public, private and not-for-profit sectors. Training is provided at the postgraduate level; the degree offered is the Master of Urban Planning (M.U.P.). 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 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 can become full members of these professional organizations after meeting the O.U.Q.'s internship and examination requirements.

For details of the M.U.P. admission requirements and curriculum, consult the *Graduate and Postdoctoral Studies Calendar*, available on the Web at www.mcgill.ca

The following 500-level courses are taught by the faculty of the School:

8.5 Minor Programs and Choice of Electives or Complementary Courses

Minors are coherent sequences of courses which may be taken in addition to the courses required for the B.Eng. degree. Minor programs 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 to 15 credits, representing one term beyond the B.Eng. degree program. All courses in a Minor program must be passed with a grade of C or better.

Students of the Faculty have a considerable variety of complementary course choices, which fall into the categories of technical and complementary studies. Students should refer to their respective departments for information concerning complementary course selections. Departments also publish, in this Calendar and in separate documents, information regarding the choice of courses. Students should also consult their course advisers.

General information concerning Minors that are designed for students registered in the Faculty of Engineering is listed below. In addition, students are also permitted to register for Minor Concentrations offered through the various departments of Engineering isdMTJ 87 0102 Ction

Impact of Technology on Society” and (ii) – “the remaining credits to be elective social science and humanities courses” (see section 8.3.4 “Complementary Studies”) may be used to satisfy some of

Note:

- A. COMP202 and COMP208 (compulsory for some Engineering students) do not form part of the Minor.
- B. COMP203 and COMP250 are considered to be equivalent from a prerequisite point of view, and cannot both be taken for credit. Students with a substantial high-level language programming course may forego this prerequisite. Some additional make-up effort may be needed at the start of the course.
- C. COMP208 cannot be taken for credit with or after COMP250.

8.5.5 Construction Engineering and Management Minor

Students in the Faculty of Engineering may obtain a Minor in Construction Engineering and Management by completing 24 to 25 credits chosen from the required and complementary courses

** This requirement is waived for students who choose ECON330D1/ECON330D2 from the list of complementaries. Students may **not** take both ECON209 and ECON330D1/ECON330D2.

8.5.7 Environmental Engineering Minor

The Environmental Engineering Minor is offered for students of Engineering and the Department of Bioresource Engineering (formerly Agricultural and Biosystems Engineering) wishing to pursue studies in this area.

The Minor program consists of 21 credits in courses. Up to a maximum of 12 credits of coursework in the student's B.Eng. program 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 the Minor and of their departmental program.

The Environmental Engineering Minor Program is administered by the Department of Civil Engineering and Applied Mechanics. Further information may be obtained from Professor S. Ghoshal, Room 475C, Macdonald Engineering Building.

Note: Not all courses listed are offered every year. Students should consult with the department concerned about the courses that are offered in a given year.

Minor Requirements (21 credits)

Introductory course (3 credits minimum) – one of:

- CHEE230 (3) Environmental Aspects of Technology
- CIVE225 (4) Environmental Engineering

plus a minimum of 18 credits, either:

- 3 credits from the course
- (3) Engineering for Development
- (3) departmental program

or a maximum of 62 credits of

- CHE3510 (3) requires approval of supervisor
- CHE3730 (3) Not open to students who have completed
- CHE4230 (3) Not open to students who have completed
- CHE4520 (3) or
- Macdonald Campus (3) CHE4710 (3)
- (3) Not open to students who have completed 18 credits, either
- (3) CHE4960 (3)

**Non-Engineering Course List
(Environmental Engineering Minor)**

**Engineering Course List
(Environmental Engineering Minor)**

Minor in Management, MGCR423 should be taken at the end of the program.

Engineering students may obtain a Minor in Management by completing 15 credits of courses from the following list of Faculty of Management courses with a grade of C or better. Successful completion of this Minor is noted on a student's transcript.

Required Courses (6 credits)

Complementary Courses (9 credits)

An Engineering course deemed equivalent by the Faculty of Management may be substituted for course MGCR373. There are three courses in Engineering that qualify: CIVE208, MECH474 and MPMC326. It should be noted that MGCR373 does not count as a technical complementary course.

A student embarking on the Minor must be prepared to take credits additional to the normal Engineering program. The student may choose the non-technical complementary course(s) required in his/her program from list B above, but under no circumstances will more than 6 credits of non-technical complementary courses count towards both the Engineering program and the Minor. Students considering this Minor should consult their adviser or the Faculty of Engineering Student Affairs Office.

8.5.8 Minor in Environment

Environmental studies involve the interactions between humans and their natural or technological environment. Environmental problems are frequently comprehensive and complex, and their satisfactory solutions require the synthesis of humanistic, scientific, and institutional knowledge.

The Minor in Environment is offered and administered by the McGill School of Environment (MSE). Inquiries should be directed to Mr. Peter Barry, MSE Program Coordinator, e-mail info.mse@mcgill.ca or telephone (514) 398-4306.

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 receive the Minor should prepare a program and have it approved by both their regular Engineering adviser and the MSE adviser. For program details, see "[Minor in Environment](#)", in [section 14.4](#).

8.5.9 Management Courses and Minor Program

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 as listed below.

Engineering Economy MIME310 introduces the concept of costs into evaluations of engineering projects and architectural proposals. Prerequisite to entry to this Minor is a grade C or better in MIME310.

Several additional courses are available, subject to timetable requirements, from the core program of the Faculty of Management. Other courses from the Management core program have considerable overlap with Engineering courses and thus are not available to Engineering students.

Note: Course MGCR211, a course in statistics, and a course in micro-economics are prerequisite for MGCR341. If included in the

8.5.10 Materials Engineering Minor

Engineering students may obtain a Minor in Materials Engineering by completing 24 credits chosen from the required and complementary courses listed below. By a careful selection of comple-

