Table of Contents

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 in name to that which exists at present.

1.4 The Faculty Today

The Faculty currently includes five engineering departments and two schools:

The Departments

Chemical Engineering
Civil Engineering and Applied Mechanics
Electrical and Computer Engineering
Mechanical Engineering
Mining, Metals and Materials Engineering

The Schools

Architecture
Urban Planning

The Faculty serves approximately 2300 undergraduate students and 700 graduate students in a wide variety of academic programs.

Undergraduate programs leading to professional bachelor degrees are offered in all Engineering Departments. These programs are designed to qualify the 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 post-graduate 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 *Graduate and Postdoctoral Studies Calendar*.

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 refer to section 4 "Academic Programs".

An internship program involving a paid 8- to 16-month industrial work experience is available to Engineering and Science students. Generally students will enter the internship program before starting their final year of undergraduate studies. Details can be found in section 2.9 "IYES: Internship Year for Engineering and Science". In addition, CO-OP programs are offered in Mining Engineering and in Metals and Materials Engineering.

Post-graduate 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 post-graduate programs including the professional degree programs in Architecture and in Urban Planning are described in the *Graduate and Postdoctoral Studies Calendar*.

2.3 Transfer Credits

In certain cases, credit may be granted for courses passed with a grade of C or better at other universities, up to a maximum of 45 credits for Engineering and 42 credits for Architecture. For further information, please see "Transfer Credits" on page 34.

2.4 Advanced Credit Examinations

Prior to their first registration, the Faculty of Engineering offers the opportunity for students entering the Faculty from a Quebec CEGEP program to receive advanced credit in MATH 260 Intermediate Calculus upon successful completion of the Advanced Credit Examination. The examination covers material that has a similarity to the syllabus of the CEGEP Calculus III course. For specific date(s) and time(s) of the examination, please refer to the Faculty of Engineering Website at www.mcgill.ca/engineering.

In all engineering programs, students who are successful in the MATH 260 Intermediate Calculus examination will automatically have the number of credits required for the completion of their program reduced by three.

2.5 Registration

Students who are currently registered and intend to return to the same degree program in the following academic session are required to register following procedures outlined in this Calendar, see "Registration" on page 27. **It is mandatory for all returning students to see a Departmental Academic Advisor in their Department for course confirmation during the first two weeks of the fall term and, if changes are being made, during the first two weeks of the winter term.**

Information regarding course registration is sent to new students at the time of admission. **All new students must see a Departmental Academic Advisor during the advising period.**

2.5.1 Registration for Continuing Education Courses

Students wishing to take a course(s) via the Centre of Continuing Education for credit must register through the Student Affairs Office. A complete Course Authorization Form will be required. Students must refer to the *Centre of Continuing Education Calendar* and Timetable for course information and deadlines. For further information, contact the Student Affairs Office.

2.5.2 Course Withdrawal

Students may withdraw from a course without academic penalty provided they do so within the appropriate deadlines of the term. Beyond this time their names will appear on the mark reports and, in the event that they do not take the examination, they will be given a J grade.

2.6 Advising

All students are required to seek academic advising about their programs from the Department in which they study. Additional

2.10 Calculators in Faculty Tests and Examinations

The use of calculators during tests and examinations is at the discretion of the course instructor. If a calculator is permitted in the examination, the Faculty requires that the students use a Faculty Standard Calculator, i.e., the CASIO fx-991 or the Sharp EL-546L, R, V(VB) and G only. These calculators are non-programmable, inexpensive, available through local dealers, e.g., EUS General Store in McConnell Engineering Building, and have many features of interest to Engineering students. Any model fx-991 or EL-546 is acceptable, regardless of the letter suffix which appears after the model number. All Engineering students are expected to own one of the two Faculty Standard Calculators.

3 Academic Requirements

3.1 Degree Requirements

In order to obtain a Bachelor's degree, students must complete one of the departmental programs described in section 4 "Academic Programs".

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

For more information, visit the Websites of the Ordre des ingénieurs du Québec, www.oiq.qc.ca

Students **must** specify courses as S/U at the time of registration. The option **will not** be added manually to a student's record after the Drop/Add deadline or once a mark has been submitted by the Faculty. Once a mark has been submitted, this option will not be reversed.

1. "Elective" refers to that category of the complementary studies component of the program involving a Social Science/Humanities course, or a course dealing with the impact of technology on society; or to elective courses taken outside the School of Architecture by architecture students. It does not apply to the "technical complementaries" or "architectural complementaries", or to any other category of the Engineering or Architecture programs.
2. A C grade is considered a pass under the University Satisfactory/Unsatisfactory option. (Students should note that the Faculty of Engineering accepts a D grade as a pass when courses 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.

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gram with no chance of readmission. In addition, students who have returned to satisfactory standing, but whose CGPA falls below 2.00 in a subsequent term, will be required to permanently withdraw from the program with no chance of readmission.

3.5.7 Repeated Courses

Students who fail to achieve the required results in a course must either repeat it successfully or complete a substitute course approved by their department. For students who fail prerequisite

If a deferral is granted, the maximum number of courses that a student may register for will be limited to ensure that no more than 18 credits of coursework are to be satisfied in a single term or no more than 6 exams are to be written, whichever is greater. This will provide a student with sufficient time during the term and the exam period to properly prepare for deferred examinations.
For *Engineering* and *Management* courses, students granted a deferral MUST write the final exam the NEXT time it is offered. Students should be aware that a deferred examination might not be available until the next time the course is given (one year or longer).

For *Arts* and *Science* courses, students MUST write the supplemental examination offered during either May (for Fall courses) or August (for Winter courses). Consult the Calendar of Dates for the dates set for supplemental exams, and the supplemental examination schedule posted on the Web for the exact date and time of a specific exam. Please note deferrals are not permitted for summer courses. Students may be permitted to withdraw from a course without refund instead.

For Continuing Education courses, students granted a deferral should contact the Centre for Continuing Education directly for more information.

For further information, refer to "Deferred Examinations" on page 36.

4 Academic Programs

The curricula described in the following pages, and the courses listed under Faculty of Engineering, see page 437, have been approved for the 2003-04 session, but the Faculty reserves the right to introduce changes as may be deemed necessary or desirable.

4.1 School of Architecture

Macdonald-Harrington Building, Room 201
815 Sherbrooke Street West
Montreal, QC H3A 2K6

Telephone: (514) 398-6700
Fax: (514) 398-7372
Website: www.mcgill.ca/architecture

Director — David Covo

Emeritus Professor
Harold Spence-Sales; A.A.Dipl., M.R.T.P.I., F.C.I.P.

Professors
Bruce Anderson; B.Arch.(McG.), M.Arch.(Harv.), F.R.A.I.C., O.A.Q.
Vikram Bhatt; N.Dip.Arch.(Ahmedabad), M.Arch.(McG.), M.R.A.I.C.
Derek Drummond; B.Arch.(McG.), F.R.A.I.C., O.A.A. *(William C. Macdonald Professor of Architecture)*
Avi Friedman; B.Arch.(Technion), M.Arch.(McG.), Ph.D. (Montr.), O.A.Q., I.A.A.
Alberto Pérez-Gómez; Dipl.Eng.(Nat.Pol.Inst.Mexico), M.A., Ph.D.(Essex) *(Saidye Rosner Bronfman Professor of Architectural History)*
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.(M.I.T.), D.Sc. (Ukr.Acad.Art), F.R.A.I.C., F.R.S.A., F.A.R.C., O.A.Q., O.A.A.

Associate Professors
Annmarie Adams; B.A.(McG.), M.Arch., Ph.D.(Berkeley), M.R.A.I.C. *(William Dawson Scholar)*
Martin Bressani; B.Sc.(Arch.), B.Arch.(McG.), M.Sc.Arch., Diplomes des études approfondies, Docteur de l'Université de Paris-Sorbonne(Paris IV)
Ricardo Castro; B.Arch.(Los Andes), M.Arch., M.A.(Art History) (Ore.) M.R.A.I.C.
David Covo; B.Sc.(Arch.), B.Arch.(McG.), F.R.A.I.C., O.A.Q.
Robert Mellin; B.Arch., M.Sc.(Arch.)(Penn.State), M.Arch.(McG.), M.Sc., Ph.D.(U.Penn.), M.R.A.I.C., N.A.A.
Pieter Sijpkes; B.Sc.(Arch.), B.Arch.(McG.)

Course Lecturers
Manon Asselin, Patrice Bégin, Jean D'Aragon, Maxime Gagné, Simon Jones, Richard Klopp, Marie-Paule MacDonald, David Theodore, Lise Tremblay, Roland Ulfig

Adjunct Professors
Cécile Baird, Ewa Bieniecka, Lawrence Bird, Julia Bourke, Michael Carroll, Nathalie David, Howard Davies, Georges Drolet, Gordon Edwards, François Émond, Julia Gersovitz, Dan Hanganu, Phyllis Lambert, Seymour Levine, Anna Mainella, Harry Mayerovitch, Serge Melanson, Rosanne Moss, Carl Mulvey, Joanna Nash, Louise Pelletier, Mark Poddubiuk, Louis Pretty, Daniella Rohan, Jacques Rousseau, Richard Russell, Robert Stanl11855(H)3G[(R,owat8(r) iioowi)vine,rb-rQa-7.5(C) iy8letui8(

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, biochemical and pharmaceutical industries. The technological problems and opportunities in these industries are often closely linked to social, economic and environmental concerns. For this reason, practitioners of chemical engineering often deal with these questions when they are working in management, pollution abatement, product development, marketing and equipment design.

The discipline of chemical engineering is distinctive in being based equally on physics, mathematics and [illegible]

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 — Richard J. Munz

Post-Retirement
J.-M. Charrier; Dipl.Ing., E.N. S.A.M.(Paris), M.S.,Ph.D.(Akron), Ing.
W.J. Murray Douglas; B.Sc.(Qu.), M.S.E., Ph.D.(Mich.)

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.(Carnegie Mellon), Eng.
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)*
Juan H. Vera; B.Mat.(Chile), Ing.Quim.(U.T.E.), M.S.(Berkeley), Dr.Ing.(Santa Maria), Ing.
Bohumil Volesky; M.Sc.(Czech. Tech. Univ.), Ph.D.(W.Ont.)
Martin E. Weber; B.S.E.(Prin.), Sc.D.(M.I.T.), P.Eng.

Associate Professors
Dimitrios Berk; B.Sc.(Bosphorus), M.E.Sc.(W.Ont.), Ph.D.(Calg.), P.Eng.
Jean-Luc Meunier; Dipl. Ing., EPFL(Lausanne), M.Sc., Ph.D., INRS(Varennes), Ing.

Assistant Professors
Wayne A. Brown; B.Eng., M.Eng., Ph.D.(McG.)
Sylvain Coulombe; B.Sc., M.Eng.(Sherb.), Ph.D.(McG.)
Reghan James Hill; B.Eng., Ph.D.(Cornell)
Richard L. Leask; B.A.Sc., M.A.Sc. (Wat.), Ph.D.(Tor.)
Sasha Omanovic; B.Sc., Ph.D. (Zagreb)

PAPRICAN Adjunct Professor
George J. Kubes; B.Eng., M.Eng.(Prague), Ph.D.(Bratislava)

Adjunct Professors
Andrejs Beils, Claude Belanger, Pierre Bisaillon, Richard Campeau, Peter Csakany, Mario Davidovsky, Dennis Dionne, France Dubuc, Gil Garnier, Serge Guiot, Mark Hollingworth, Bing Huang, David Juck, David J. McKeagan, Carlos Miguez, Arun S. Mujumdar, Patrice Nadeau, Raman Nayar, Norman Peters, Marc Renaud, Bassam Sarkis, John Sarlis, Jana Simandl, Armen Tasan, Roger C. Urquhart, Leszek A. Utracki, Paula Wood-Adams.

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			
CHEM 212	Introductory Organic Chemistry 1	4	
CHEM 233	Topics in Physical Chemistry	3	
CHEM 234	Topics in Organic Chemistry	3	
COMP 208	Computers in Engineering	3	
MATH 260	Intermediate Calculus	3	
MATH 261	Differential Equations	3	
MATH 265	Advanced Calculus	3	
MIME 221	Engineering Professional Practice	2	
MIME 310	Engineering Economy	3	**27**
Chemical Engineering Courses			
CHEE 200	Introduction to Chemical Engineering	4	
CHEE 204	Chemical Manufacturing Processes	3	
CHEE 220	Chemical EngineeringThermodynamics	3	
CHEE 291	Instrumental Measurements Laboratory	4	
CHEE 314	Fluid Mechanics	4	
CHEE 315	Heat and Mass Transfer	4	
CHEE 340	Process Modelling	3	
CHEE 351	Separation Processes	3	
CHEE 360	Technical Paper 1	1	
CHEE 370	Elements of Biotechnology	3	
CHEE 380	Materials Science	3	
CHEE 392	Project Laboratory 1	4	
CHEE 393	Project Laboratory 2	5	
CHEE 423	Chemical Reaction Engineering	4	
CHEE 453	Process Design	4	
CHEE 455	Process Control	4	
CHEE 456	Design Project 1	1	
CHEE 457	Design Project 2	5	
CHEE 462	Technical Paper 2	1	
CHEE 474	Biochemical Engineering	3	
CHEE 484	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 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		**Credits**	
CHEE 200	Introduction to Chemical Engineering	4	
CHEE 291	Instrumental Measurement Laboratory	4	
CHEM 212	Introductory Organic Chemistry 1	4	
MATH 260	Intermediate Calculus	3	
MIME 221	Engineering Professional Practice	2	**17**
Term 2			
CHEE 204	Chemical Manufacturing Processes	3	
CHEE 220	Chemical EngineeringThermodynamics	3	
CHEM 234	Topics in Organic Chemistry	3	

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

Additional information can be found on the Faculty Website at www.mcgill.ca/engineering, as well as in section 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::

Courses CHEE 481 and CHEE 581 comprise a Polymeric Materials sequence. Additional courses in this area are available in the Chemistry Department (e.g., CHEM 455) or at the graduate level (CHEE 681 to CHEE 684). 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 two courses in this area: CHEE 471 and CHEE 472. As some water pollution control problems are solved by microbial processes, course CHEE 474 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 CHEE 452 is also relevant. Additional courses in this area are listed under section 5.7 "Environmental Engineering Minor".

A Minor in Biotechnology is also offered in the Faculties of Engineering and of Science with emphasis on Molecular Biology and Chemical Engineering Processes. A full description of the program appears in section 5.2 "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 advisor, students may also take graduate (CHEE 500- level) courses as technical complementaries.

ELECTIVE COURSES

Students who have obtained exemptions for courses, i.e., for CEGEP courses equivalent to CHEM 212 or CHEM 234, or who take more than the minimum requirements for the degree, may

choose university-level courses in any field. Approval of an elective course requires only that no timetable conflicts are created and that it not be a repetition of material already covered in the curriculum or already mastered by the student.

CURRICULUM COMMITTEE

The Curriculum Committee is composed of three students, elected by their classes, and two staff members. This Committee provides a forum for all matters involving undergraduate student/staff interactions. While the primary concern is with matters of curriculum and courses (their content, evaluation, scheduling, etc.), the Committee has also taken up a number of

must meet with their advisor 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 advisor. 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 advisor.

CURRICULUM FOR THE B.ENG. DEGREE IN CIVIL ENGINEERING

4.4 Department of Electrical and Computer Engineering

McConnell Engineering Building, Room 633
3480 University Street
Montreal, QC H3A 2A7

Telephone: (514) 398-7110
Fax: (514) 398-4470
Website: www.ece.mcgill.ca

MATH 249	Advanced Calculus 2	3	
or MATH 381	Complex Variables and Transforms (3)		
MATH 325	Ordinary Differential Equations	3	
or MATH 261	Differential Equations (3)		
MIME 221	Engineering Professional Practice	2	
MIME 310	Engineering Economy	3	
PHYS 251	Classical Mechanics 1	3	
or CIVE 281	Analytical Mechanics (3)		
PHYS 271	Quantum Physics	3	**32**

* *CGPA of 3.30 is required to register for MATH 247 and MATH 248.*

Departmental Courses

ECSE 200	Fundamentals of Electrical Engineering	3	
ECSE 210	Circuit Analysis	3	
ECSE 221	Introduction to Computer Engineering	3	
ECSE 291	Electrical Measurements Laboratory	2	
ECSE 303	Signals and Systems 1	3	
ECSE 304	Signals and Systems 2	3	
ECSE 305	Probability and Random Sig. 1	3	
ECSE 322	Computer Engineering	3	
ECSE 323	Digital System Design	5	
ECSE 330	Introduction to Electronics	3	
ECSE 334	Introduction to Microelectronics	5	
ECSE 351	Electromagnetic Fields	3	
ECSE 352	EM Waves and Optics	3	
ECSE 361	Power Engineering	3	
ECSE 498	Honours Thesis 1	3	
ECSE 499	Honours Thesis 2	3	**51**

COMPLEMENTARY COURSES

Technical Complementaries **15**

Five technical complementary courses (15 credits), which must be ECSE courses at the 500 level (or ECSE 427, ECSE 451). Students must choose their technical complemenTc-0.TJT*-4t(JT*l0RFGs318(Y 4qo/)6.8Tc-1y3E.0035 TQ1H..5(DTD-0.0009 Tc-0.0029)-1.1185 TD-0.0n(techn13.5(ar0[(PHYS)-7y courses (15

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

COMPLEMENTARY COURSES

Technical Complementaries **18**

Six courses (18 credits) from the list of 400-level courses in Electrical Engineering that must include 9 credits (3 courses) from one of the areas of specialization listed below:

Computer Systems Technology

ECSE 424 Human-Computer Interaction
ECSE 425 Computer Organization and Architecture
ECSE 427 Operating Systems

Control and Automation

ECSE 404 Control Systems
ECSE 412 Discrete Time Signal Processing
ECSE 426 Microprocessor Systems

Integrated Circuits and Electronics

ECSE 425 Computer Organization and Architecture
ECSE 431 Introduction to VSLI CAD
ECSE 432 Physical Basis: Transistor Devices
ECSE 435 Mixed-Signal Test Techniques

Phototonics

ECSE 4237.5(to o18c21Lvust)s

***Enhanced ITT Specialization in Telecommunications**

The International Institute of Telecommunications (IIT) was established in Montreal as a center for telecommunications education. Funded by government and industry, it provides state-of-the-art laboratory facilities and a point of contact between local telecommunications industries and universities.

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

The benefits of the specialization are:

– a guaranteed project lab (ECSE 494) in telecommunications, at IIT or with an IIT company; and
– permission to take ECSE 496 at IIT.

To complete the specialization, students must take six courses as Technical Complementaries:

In addition, students must take ECSE 491 (Communications Systems Lab) and complete ECSE 494 (Electrical Engineering Design Project) in telecommunications, at IIT or with an IIT company.

There may be an enrolment limitation in this specialization in any given term.

CURRICULUM FOR THE B.ENG. DEGREE IN COMPUTER ENGINEERING

Professors
Abdul M. Ahmed; B.Sc.(Dhaka), M.Eng., Ph.D.(McG.), Eng. *(Thomas Workman Professor of Mechanical Engineering)*
Jorge Angeles; B.Eng., M.Eng.(UNAM Mexico), Ph.D.(Stanford), Eng., F.A.S.M.E., F.C.S.M.E. *(James McGill Professor)*
Bantwal R. Baliga; B.Tech.(I.I.T., Kanpur), M.Sc.(Case), Ph.D.(Minnesota)
Wagdi Habashi; B. Eng., M. Eng.(McG.), Ph.D.(Cornell), P. Eng., F.A.S.M.E. *(NSERC-Bombardier Industrial Research Chair)*
John H.S. Lee; B.Eng.(McG.), M.Sc.(M.I.T.), Ph.D.(McG.), Eng.
Dan Mateescu; M.Eng.(Poli.Univ.Buch.), Ph.D.(Rom. Acad. Sci.), Doctor Honoris Causa (Poli.Univ.Buch.), F.C.A.S.I., A.F.A.I.A.A. (Aerospace Program Coordinator)
Arun K. Misra; B.Tech.(I.I.T.,Kharagpur), Ph.D.(U.B.C.), P.Eng.
Martin Ostoja-Starzewski; M.Eng., Ph.D.(McG.), F.A.S.M.E. *(Canada Research Chair)*
Stuart J. Price; B.Sc., Ph.D.(Bristol), P.Eng.

Associate Professors
Martin Buehler; M.Sc., Ph.D.(Yale) (*William Dawson Scholar)*
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)
Meyer Nahon; B.Sc.(Queen's), M.Sc.(Tor.), Ph.D.(McG.), P.Eng. (Graduate Program Coordinator)
James A. Nemes; B.Sc.(Maryland), M.S., D.Sc.(GWU) *(William Dawson Scholar)*
Peter Radziszewski; B.Sc.(U.B.C.), M.Sc., Ph.D.(Laval)
Inna Sharf; B.A.Sc.,(Queen's), 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.(Ecole Polytechnique), Ph.D.(U.B.C.), Eng.
R. Mongrain; B.Sc., M.Sc.(Montr.), Ph.D.(Ecole Polytechnique), Eng.
Laurent Mydlarski; B.A.Sc.(Waterloo), Ph.D.(Cornell), Eng.

Laboratory Superintendents
D. Chellan, 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.)
M. Tanzer; M.D., Orthopaedic Surgery

Adjunct Professors
H. Attia, R.G. Edwards, G. Guèvremont, Z. Liu, K. Mackenzie, W.D. May, A. Pavillet, C.A. Rabbath, M.P. Robichaud, 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 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 st

MECH 413	Control Systems
MECH 432	Aircraft Structures
MECH 471	Industrial Engineering
MECH 472	Case Studies in Project Mgmt
MECH 495	Design 3
MECH 496	Design 4
MECH 497	Value Engineering
MECH 524	Computer Integrated Manufacturing
MECH 526	Manufacturing and the Environment
MECH 528	Product Design
MECH 532	Aircraft Performance, Stability and Control
MECH 541	Kinematic Synthesis
MECH 543	Design with Composite Materials
MECH 554	Microprocessors for Mechanical Systems
MECH 557	Mechatronic Design
MECH 565	Fluid Flow and Heat Transfer Equipment
MECH 572	Introduction to Robotics
MECH 573	Mechanics of Robotic Systems
MECH 577	Optimum Design

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 3.4 "Complementary Studies" for further information.

TOTAL CREDITS **113**

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 advisor.

Additional information can be found in section 3.1.2 "Basic Science Requirements for Students Entering from Outside Quebec".

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

REQUIRED COURSES		COURSE CREDIT	
Non-Departmental Subjects			
CIVE 207	Solid Mechanics	4	
EDEC 206	Communication in Engineering	3	
COMP 208	Computers in Engineering	3	
MATH 260	Intermediate Calculus	3	
MATH 261	Differential Equations	3	
MATH 265	Advanced Calculus	3	
MATH 266	Linear Algebra and Boundary Value Problems	4	
MIME 221	Engineering Professional Practice	2	
MIME 310	Engineering Economy	3	**28**
Departmental Courses			
MECH 201	Introduction to Mechanical Engineering	2	
MECH 210	Mechanics 1	2	
MECH 220	Mechanics 2	4	
MECH 240	Thermodynamics 1	3	
MECH 260	Machine Tool Laboratory	2	
MECH 262	Statistics and Measurement Laboratory	3	
MECH 291	Graphics	3	
MECH 292	Design 1	3	
MECH 321	Mechanics of Deformable Solids	3	
MECH 331	Fluid Mechanics 1	3	
MECH 341	Thermodynamics 2	3	
MECH 346	Heat Transfer	3	
MECH 362	Mechanical Laboratory 1	2	
MECH 383	Applied Electronics and Instrumentation	3	
MECH 403D1	Thesis (Honours)	3	
MECH 403D2	Thesis (Honours)	3	
MECH 404	Honours Thesis 2	3	
MECH 409	Numerical Methods in Mechanical Engineering	3	
MECH 419	Advanced Mechanics of Systems	3	
MECH 430	Fluid Mechanics 2	3	
MECH 452	Mathematical Methods in Engineering 1	3	
MECH 494	Honours Design Project	3	**63**
COMPLEMENTARY COURSES			**21**

2 of the following three courses (6 credits):

MECH 545	Advanced Stress Analysis
MECH 562	Advanced Fluid Mechanics
MECH 578	Advanced Thermodynamics

2 courses (6 credits) at the 300 level or higher to be selected from Mechanical Engineering. For students who entered in September 2000 or later, one of these two courses must be chosen from the following list:

MECH 343	Energy Conversion
MECH 413	Control Systems
MECH 432	Aircraft Structures
MECH 471	Industrial Engineering
MECH 472	Case Studies in Project Mgmt
MECH 495	Design 3
MECH 496	Design 4
MECH 497	Value Engineering
MECH 524	Computer Integrated Manufacturing
MECH 526	Manufacturing and the Environment
MECH 528	Product Design
MECH 532	Aircraft Performance, Stability and Control
MECH 541	Kinematic Synthesis
MECH 543	Design with Composite Materials
MECH 554	Microprocessors for Mechanical Systems
MECH 557	Mechatronic Design
MECH 565	Fluid Flow and Heat Transfer Equipment
MECH 572	Introduction to Robotics
MECH 573	Mechanics of Robotic Systems
MECH 577	Optimum Design

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 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 advisor.

Additional information can be found in section 3.1.2 "Basic Science Requirements for Students Entering from Outside Quebec".

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

MECH 343	Energy Conversion
MECH 413	Control Systems
MECH 432	Aircraft Structures
MECH 434	Turbomachinery
MECH 447	Combustion
MECH 471	Industrial Engineering
MECH 472	Case Studies in Project Mgmt
MECH 474	Selected Topics in Operations Research
MECH 495	Design 3
MECH 496	Design 4
MECH 497	Value Engineering
MECH 500	Selected Topics in Mechanical Engineering
MECH 501	Special Topics: Mechanical Engineering
MECH 522	Production Systems
MECH 524	Computer Integrated Manufacturing
MECH 526	Manufacturing and the Environment
MECH 528	Product Design
MECH 529	Discrete Manufacturing Systems

James A. Finch; B.Sc.(Birm.), M.Eng., Ph.D.(McG.), Eng.
(Industry Professor of Mineral Processing)
Raynald Gauvin; B.Ing., Ph.D.(Montr.), Eng.
John E. Gruzleski; B.Sc., M.Sc.(Qu.), Ph.D.(Tor.), Eng. *(Gerald G. Hatch Professor of Mining and Metallurgy)*
Rod I.L. Guthrie; B.Sc., Ph.D.(Lond.), D.I.C., A.R.S.M., Eng.
(William C. Macdonald Professor of Mining and Metallurgy)
Farmaraz (Ferri) P. Hassani; B.Sc., Ph.D.(Nott.), C.Eng.(U.K. Reg.) *(George Boyd Webster Professor of Mining Engineering)*
(Director, Mining Engineering Program)
John J. Jonas; B.Eng.(McG.), Ph.D.(Cantab.), F.A.S.M., Eng.
(Henry Birks Professor of Metallurgy)
Hani S. Mitri; B.Sc.(Cairo), M.Eng., Ph.D.(McMaster), Eng.
Jerzy Szpunar; B.Sc., M.Sc., Ph.D., D.Sc.(Krakow)

Associate Professors
Michel L. Bilodeau; B.A.Sc.(Montr.), M.Sc.App., Ph.D.(McG.), Eng.
Ralph Harris; B.Sc.(Qld), M.Eng., Ph.D.(McG.)
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.
Steve Yue; B.Sc., Ph.D.(Leeds)

Faculty Lecturers
John Mossop, Florence Paray

Adjunct Professors
Marc Betournay, William Caley, Roussos Dimitrakopoulos, Elhachmi Essadigi, Bryn Harris, Ahmad Hemami, Mohamad Jahazi, Raad Jassim, Eric Lifshin, Martin Pugh, John H. Root, Viwek Vardya, Albert E. Wraith

CO-OP Programs
Director — FraJa7uMohamw[(Elhacr9eWz A)8(.Pcr)8.0.0061 T3zi,-.raB23(fshin,)72.djunLn, mbkaaJhamw((ma6.2 59 TD5.4815 0 TD-0.néinul Ha)7.459 T

A fee of $500 is assessed by the University for each Industrial Training course.

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

Mining Technical Complementary Course List:

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

these complementary studies requirements be credited towards the Minor in Arts.

Requirements

1. The program must consist of 24 credits as follows:
   a) at least two areas of concentration from within the Faculty of Arts must be chosen, with the minimum number of credits in any one area being 6;
   b) at least 12 credits must be at the 300 or above level.
2. All courses in the Minor program must be passed with a grade of C or better.
3. The selection of courses for the Minor is to be done in consultation with the Minor Advisor, Ms. Judy Pharo, Faculty of Engineering Student Affairs Office.

For further information, contact Professor B. Haskel, Political Science, or Ms. J. Pharo, Student Affairs Office, Faculty of Engineering.

5.2 Biotechnology Minor

The Faculties of Engineering and of Science offer a Minor in Biotechnology for students interested in taking additional courses in this area. For Engineering students, the Minor has been designed specifically for students within the Chemical Engineering Department, however other Engineering students are invited to contact the Minor program supervisor, Professor Bennett, or Ms. Judy Pharo, Faculty of Engineering Student Affairs Office, for further information.

Students should identify an interest in the Minor to their academic advisor and the supervisor of the program during the U1 year, and at the time of registration for the U2 year. With the agreement of the academic advisor, students should submit their course list to the program supervisor who will certify that the proposed program conforms to the requirements for the Minor.

The Biotechnology Minor Program is administered for the Faculties of Engineering and of Science by Prof. H. Bennett, Sheldon Biotechnology Centre (Lyman-Duff Building), phone 398-3998. A full description of the Minor program appears under the Faculty of Science, "Biotechnology (BIOT)" on page 265.

A Chemical Engineering student may complete the Biotechnology Minor by taking BIOL 200, BIOL 201, BIOL 202, MIMM 211, BIOT 505, plus one course from the list of additional courses not including MIME 310. The Department of Chemical Engineering permits students in the Minor program to complete BIOT 505 as one of their technical complementary requirements. The total course credit required for the Chemical Engineering student is 15 credits beyond the 111-credit B.Eng. program.

5.3 Chemistry/Chemical Engineering Minor

The Departments of Chemistry and Chemical Engineering offer a Minor Program in Chemistry, of particular interest to Chemical Engineering students, and a Minor in Chemical Engineering, of interest to Chemistry students (

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

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

5.7 Environmental Engineering Minor

The Environmental Engineering Minor is offered for students of

5.8 Minor in Environment

Environmental studies involve the interactions between humans and their natural or technological environment. Environmental

5.11 Mathematics Minor

The Minor in Mathematics for students in the Faculty of Engineering requires satisfactory passes in 24 credits of approved courses in Mathematics not including MATH 247 (or MATH 223), MATH 260 (or MATH 222), MATH 261 (or MATH 315 or MATH 325), MATH 265 (or MATH 248 or MATH 314), MATH 266, MATH 270, MATH 319.

At least 18 credits must be chosen from the Mathematics and Statistics courses approved for the Mathematics Majors or Honours program, or from MATH 249, MATH 363, MATH 381, MATH 386. The remaining credits may be chosen from mathematically-allied courses.

In addition to an Engineering Advisor, each student in the Minor program must have an Advisor designated by the Department of Mathematics and Statistics, normally beginning in the U2 year. The selection of courses for the Minor is to be done in conjunction with the Minor Advisor. Please consult the Department of Mathe-