

# McGill University

## Department of Chemical Engineering

### UNDERGRADUATE STUDENT HANDBOOK

for students entering the B.Eng. program  
in Chemical Engineering in September 2009 or January 2010

**Much information concerning courses and regulations is contained in the current University Announcement. However, because the Faculty Announcement is printed in December of the previous year and changes in the curriculum do occur, the present document is considered the definitive statement of the department's B.Eng. program for students entering the program at the times stated above. Please do not discard your copy until you graduate. You will need to consult the Faculty Announcement for additional information or any changes that may occur during your stay within the department.**

**S. Omanovic, Chairman  
Undergraduate Curriculum Committee**

**N. Tufenkji  
Undergraduate Curriculum Committee**

**J.-L. Meunier  
Undergraduate Curriculum Committee**

*Please retain your copy of this book until your graduation*

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I. TEACHING PERSONNEL IN CHEMICAL ENGINEERING

a)	Regular Staff	(M.H. Wong Bldg.)	Office Telephone
	Prof. D. Berk (Chair), P.Eng.	3100	398-4271
	Prof. D.G. Cooper	4140	398-4278
	Prof. S. Coulombe, ing.	4220	398-5213
	Prof. J.M. Dealy, Eng. (emeritus)	6110	398-4264
	Prof. R.J. Hill	4280	398-6897
	Prof. E.A.V. Jones	4230	398-4275
	Prof. M.R. Kamal, ing. (emeritus)	3140	398-4262
	Prof. R.L. Leask, P.Eng.	4120	398-4270
	Prof. Milan Maric, P.Eng.	4270	398-4272
	Prof. J.-L. Meunier, ing.	3070	398-8331
	Prof. R.J. Munz, Eng.	4260	398-4277
	Prof. S. Omanovic, P.Eng.	4130	398-4273
	Prof. T.M. Quinn	4310	398-4276
	Prof. A.D. Rey, Eng.	4100	398-4196
	Prof. Phillip Servio (sabbatical)	4110	398-1026
	Prof. Nathalie Tufenkji, ing.jr.	4300	398-2999
	Prof. J.H. Vera (emeritus)	(117A P&P)	398-4274
	Prof. Viviane Yargeau, ing.	4160	398-2273
b)	Adjunct Professors		
	Dr. T. Addona		514 767-1782
	Dr. T. Alexakis, Terragon Environmental Tech. Inc.		514-398-1443
	Mr. P. Bisailon, Services Conseils GBS enr.		450 671-2599
	Mr. M. Davidovsky, TESSAG KSH Ltd.		514 932-4611
	Dr. M. Fokas, KSH Solutions		514-932-4611
	Mr. B.E. Sarkis, Kraft Canada Inc.		514 340-2485
	Dr. J. Simandl		514 398-8308
	Mr. B. Théorét		450 623-7672
	Ms. Beatriz Alvarade, Urquhart, Hatch & Associates Inc.		514-864-5500 ext 6578
	Dr. James Anson, Urquhart, Hatch & Associates Inc.		514-864-5500 ext 6447

## II. DEPARTMENTAL ASSISTANCE TO STUDENTS

### a) Academic Advisers

Each student has an Academic Adviser to assist in the choice of courses, in the timely progress and completion of all requirements for graduation, as well as to answer questions which may arise while at McGill. It is, however, the student's responsibility, as part of a pre-graduation procedure, to provide proof that all requirements for the degree are fulfilled. The Academic Advisers for new students entering in 2009-2010 are Professors M. Maric, R. J. Munz, and N. Tufenkji.

### b) Undergraduate Curriculum Committee (UCC)

The committee is composed of two to four students elected by their classes (U1, U2 and U3) and two staff members. The committee provides a forum for all matters involving undergraduate student/staff interactions. Meetings are open and the agenda and meeting place are posted on the UCC Notice Board prior to each meeting. Electronic mail is also used for communication between students and UCC members.

Elections are held in October (U1) and in February (U2, U3). For the Academic Year 2009-2010, the membership is:

U4	- TBD
U3	- Annabelle Martensen
U2	- Ziyad Shukri
Staff	- Professors S. Omanovic (Chairman), N. Tufenkji, and J.-L. Meunier

### c) Canadian Society for Chemical Engineering. (C.S.Ch.E) Student Chapter

The President of the Student Chapter in 2009-2010 will be Jennifer Guyot. Professor Reghan Hill is the Faculty Adviser for the Student Chapter. The role and activities of the Student Chapter are described in the University Announcement.

### d) Financial Aid and Scholarships

Bursaries and loans are applied for through the Student Aid Office, Brown Student Services Bldg., Suite 3200, 3600 McTavish St. (<http://www.mcgill.ca/studentaid/>). The primary criterion is financial need.

The scholarships awarded through the department and/or the Faculty of Engineering, primarily for outstanding academic achievements, do not require an application by students.

### e) Facilities in the Department

Room Wong 1090 is reserved for the use of Chemical Engineering undergraduate students. This multifunctional room is available as a work space and communication centre. Individual mailboxes are located beside room Wong 1175. Each student must make sure he/she has a mailbox at all times. Please be tidy and quiet in Room 1090. It is not a recreational area, and if so used, it can be lost to us. Undergraduate students can also use Room Wong 1130 for course and research related meetings and presentations. The room has to be booked in advance through Ms. Jo-Ann Gadsby (Room 3060).

The department owns a substantial amount of equipment in its undergraduate and research laboratories. Specialized department services are provided by:

Undergraduate Laboratories	- Wong 4200 - Mr. F. Caporuscio
Lab. Equipment & Supplies Stores	- Wong 3270 - Ms. M. Gorman
Workshop	- Wong 3260 - Mr. L. Cusmich
Electronics Shop	- Wong 3250 - Mr. G. Lepkyj
Analytical Laboratory	- Wong 4200 – Mr. R. Roy
	- Wong 4200 – Mr. A. Golsztan
Secretarial Office	- Wong 3060 - Ms. E. Musgrave

f) **Handbook of Chemical Engineering**

An electronic copy of Perry's Chemical Engineers' Handbook is available on the Knovel's web-site ([www.knovel.com](http://www.knovel.com)). The handbook is accessible through the McGill Library web-site.

### **III. MISCELLANEOUS INFORMATION**

#### **a) French**

A knowledge of French, essential for engineers to work and communicate effectively in Quebec, is a valuable additional qualification to maintain your ability to move freely in Canada, and provides an important additional attribute for working and travelling internationally. If you do not have a working knowledge of French, you will greatly reduce your opportunities for summer or permanent jobs with companies with Quebec operations. It is also necessary for an engineer to show competence in French to become a member of the Order of Engineers of Quebec and thus to be licensed to practice as a professional engineer. Moreover, we live in a dynamic French milieu whose social and cultural riches cannot be enjoyed without a knowledge of French. It is, therefore, highly advantageous to acquire or improve your ability in French during your years at McGill.

The needs of individual students in this area vary widely. Some need beginner's courses while others require practice in speaking or technical vocabulary, etc. A number of ways of improving skills in French are:

- Write Technical Paper I and/or II in French. Allowance is made in marking of grammar and style when French is not your first language.
- Take Free Elective courses at UQAM, Ecole Polytechnique or U. de Montreal under the Montreal universities exchange of credits scheme. See Registrar's Office for the necessary form.
- Take one or more French Department courses.
- Be a member of a laboratory group which communicates internally and externally (wherever possible) in French.
- Arrange a French discussion or practice group.
- Use all opportunities available (e.g. shopping, television, internet, newspapers, radio) to practice and improve your French.

#### **b) Photocopying**

Numerous coin-operated and card-operated copying machines are available in the Wong and McConnell Buildings and Libraries.

#### **c) Oral Presentations**

- Transparencies (write-on or photocopier-type) and special felt pens can be purchased from the Department Store.
- Computer-based presentations: most classrooms are equipped with projectors for the use of computers in presentations. Other projectors are also available to students from the Instructional Communications Center (ICC, Leacock Bldg, room B12).

#### **IV. COURSE ORGANIZATION**

**a) Course Progress**

At the first advising session, new students should note the Graduation Requirements form (p. 25-27) which can be used to plan and follow their progress at McGill. Students will record on the form all additional admissions requirements, exemptions or advanced credits (see Section V below) and course marks. This form will eventually be turned in to the Adviser as part of a pregraduation procedure.

**b) Course Loads and Length of Program**

The normal course load per semester is 15-18 credits. Students taking 11 credits or less per semester are registered as part-time students. Students receiving certain bursaries and loans may be required to maintain full time status. Check with your financing provider prior to taking less than 12 credits in one semester. A student who wishes to register for more than 18 credits in a term may only do so with special permission of the Undergraduate Program Coordinator.

Students on probationary standing (see Announcement for criteria and conditions for proceeding) must take a reduced load of no more than 13 credits per semester including repeated courses. The exact number of credits will be recommended by the Academic Adviser on the basis of the difficulties experienced by the student. Care should be taken in the choice of courses for a reduced load to try and meet pre-requisites for courses to be taken in following semesters or years. For example, CMP (CHEE 204 (given in winter)) in the second semester, is a pre-requisite for both Fluid Mechanics (CHEE 314 (given in Fall)) and Separation Processes (CHEE 351 (given in Winter)).

**c) Course Change Deadlines (2009-2010)**

	<u>Fall 2009 Semester</u>	<u>Winter 2010 Semester</u>
Last day for changing courses (no financial penalty and no entry on transcript)	Sept. 15 (Tuesday)	Jan. 19 (Tuesday)
Last day for withdrawal (with a W)	Sept. 20 (Sunday)	Jan. 24 (Sunday)

Beyond this time, student names will appear on the examination lists, and in the event of students not taking the examination, they will be given a "J" grade.

**d) Course Grades**

Course grades (see the University Calendar under General University Information and Regulations) are defined as follows:

- 1) Grades of A, A-, B+, B, B- and C+ indicate the extent to which ability superior to that required to

qualify for the professional degree is demonstrated.

- 2) A grade of C (satisfactory) implies achievement at a level of performance consistent with awarding a B.Eng. degree and thus with the practice of the engineering profession.
- 3) Grades of D and F indicate the extent of deficiency below the required level.

The procedure used to arrive at the letter grades is decided by each instructor in a way appropriate to that course. Note that, in contrast to the Faculties of Arts and Science, in the Faculty of Engineering there is no general relationship between the course grade and percentage marks which may be used for assignments, quizzes, end of term examinations, etc. However, at the beginning of the semester, each course instructor will explain the general terms of the procedure for arriving at a course grade.

e) **Reassessment of a Grade**

The present guidelines are summarized below:

- 1) A student may request the professor to review the course grade. The professor will check that all the student's work has been marked and that the computation of the grade has been correctly performed. If omissions and errors are discovered, these will be corrected by report to the Associate Dean for Student Affairs.
- 2) A student may request a re-read of the final examination on payment of a \$35 fee. An alternate examiner will then re-evaluate the exam and recalculate the grade with the aid of information provided by the examiner. If the course grade is improved, the fee is refunded. The request for a re-read must be made through the Associate Dean for Student Affairs on or before the last working day of March, July, and November for the Fall, Winter, and Summer courses, respectively. It should be noted that as final exams are normally only one component of the course grade and as some courses do not have a final exam, the final examination re-read is little used in the Faculty of Engineering.

f) **Standings**

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 of 2.00 or better

Probationary standing: CGPA between 1.20 and 1.99

Unsatisfactory standing: CGPA less than 1.20 or failure to meet the conditions of Probationary standing as described below (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 and 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.

**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 Faculty of Engineering, Student Affairs Office in the Engineering Student Centre to discuss their situation. An adviser is 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. If you have already registered for more than 13 credits, you are required to meet with an Adviser in your department/school in order to assist you in decreasing your credit load prior to the add/drop deadline of the subsequent term. A student whose TGPA is 2.50 or better, but whose CGPA is less than 2.00, may continue on with his/her studies but will remain on Probationary Standing. Failure to achieve either the TGPA or CGPA requirements noted above will result in the student being placed on "Unsatisfactory Standing" (see below). Students will remain on probationary standing until they achieve a CGPA equal to or exceeding 2.00, at which time their standing will be changed to "satisfactory". Students placed on Probationary Standing who need to reduce their credit load but are unable to drop course(s) must complete a Course Authorization Form and submit it to the Faculty of Engineering, Student Affairs Office in the Engineering Student Centre. The course(s) will then be deleted manually from the student's record.

**Unsatisfactory Standing** - Students who have been placed on Unsatisfactory Standing will be asked to withdraw from the Faculty of Engineering for a minimum of one term. Courses for which the student is currently registered will be deleted automatically from the student's record by the Faculty. Students whose most recent academic standing is currently unsatisfactory as indicated on Minerva, and who wish to return to the Faculty of Engineering after a compulsory absence of a minimum of one term away, must apply for readmission on Minerva, no later than November 1 (Winter term) and June 1 (Fall term), at [www.mcgill.ca/engineering/student/sao/current/faculty\\_transfer\\_readmission](http://www.mcgill.ca/engineering/student/sao/current/faculty_transfer_readmission). Upon readmission, the student will be placed back on Probationary Standing. While on probation the student must reduce his/her credit load to a maximum of 13 credits per term, and must meet or exceed a TGPA greater than or equal to 2.50 or a CGPA greater than or equal to 2.00. A student will remain on probationary standing until they achieve a CGPA greater than or equal to 2.00, at which time their standing will be changed to "satisfactory". Students who fail to achieve the required TGPA will be permanently withdrawn from the program 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.

g) **Readmission**

A student wishing to return after an absence of a portion of an academic year or more must make application in writing to the Office of the Associate Dean of Engineering (not to the Admissions Office) to be readmitted, stating the reasons for his/her absence from the University, giving a summary of activities during that period.

Students who withdrew because of illness must provide some indication that they are ready to resume studies.

h) **Summer Courses**

Summer course offerings are published in the Summer Session Announcement available in the early winter of the corresponding year. Normally very few engineering courses are offered. Chemistry 212 and 234 are usually offered. A considerable number of courses are offered in management (Faculty of Management) and in French (Faculty of Arts and Centre for Continuing Education). Note that prior approval must be obtained from the Academic Adviser for any course that is to count for degree credit.

Research Seminar Courses CHEE 494, CHEE 495, CHEE 496 and Project Courses CHEE 363 and CHEE 464 are also available in the summer if arrangements can be made with an academic staff member of the Chemical Engineering Department.

i) **Definition of Advanced Credit and Exemption**

Students who have previously taken a required course in the program may be granted advanced credit or exemption for that course. For exemption, the credits of the course must be replaced by an equal or higher number of credits of another course having the same accreditation category breakdown (e.g. Basic Science, Mathematics, Engineering Science, Engineering Design, Complementary Studies). No replacement is needed for advanced credits.

There is no equivalence between Science Math courses and Engineering Math courses for students who do not hold a degree in Science.

Computer courses taken outside McGill, while a student is registered in Engineering, do not count for credit.

j) **Pre-requisites**

Students must have the required pre-requisite in their academic history in order to register in a course through Minerva. In exceptional cases pre-requisites may be overridden for individual students by using the Student Registration Permit Override Form.

**V. SPECIFIC PROGRAM REQUIREMENTS****A. GENERAL****a) Introduction**

This Handbook states the rules applicable to students entering the first year of the program in September 2009 or January 2010.

**b) Classification of Courses**

The program includes several categories of courses:

- 1) Required Departmental courses
- 2) Technical Complementary (TC) courses
- 3) Required Non-departmental courses
- 4) Complementary Studies (CS)
- 5) Free Electives

Courses in categories 1), 2) and 3) are referred to as "core" courses.

**c) Total and Distribution of Credit Requirements**

See following pages.

**CURRICULUM FOR THE B.ENG. DEGREE IN CHEMICAL ENGINEERING****REQUIRED COURSES****Non-Departmental Courses**

		<b><u>Course Credit</u></b>	
CHEM 212	Introductory Organic Chemistry I	4	
CHEM 234	Selected Topics in Organic Chemistry	3	
MATH 262	Intermediate Calculus	3	
MATH 263	Ordinary Differential Equations and Linear Algebra	3	
MATH 264	Advanced Calculus	3	
FACC 100	Introduction to the Engineering Profession	1	
FACC 400	Engineering Professional Practice	1	
MIME 310	Engineering Economy	3	
COMP 208	Computers in Engineering	3	<b>24</b>

**Chemical Engineering Courses**

CHEE 200	Introduction to Chemical Engineering	4	
CHEE 204	Chemical Manufacturing Processes	3	
CHEE 220	Chemical Engineering Thermodynamics	3	
CHEE 291	Instrumental Measurements Laboratory	4	
CHEE 310	Physical Chemistry for Engineers	3	
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 I	1	
CHEE 370	Elements of Biotechnology	3	
CHEE 380	Materials Science	3	
CHEE 392	Project Laboratory I	4	
CHEE 393	Project Laboratory II	5	
CHEE 423	Chemical Reaction Engineering	4	
CHEE 453	Process Design	4	
CHEE 455	Process Control	4	
CHEE 456	Design Project I	1	
CHEE 457	Design Project II	5	
CHEE 462	Technical Paper II	1	
CHEE 474	Biochemical Engineering	3	
CHEE 484	Materials Engineering	3	<b>72</b>

**COMPLEMENTARY COURSES****Technical Complementary Courses (TC)**

	<b><u>Course Credit</u></b>
Courses to be selected from those approved by the Department (see list below)	9

**Complementary Studies (CS)**

From categories I and II of Faculty Announcement Section 8.3.4 (see also courses noted in Appendix A).	6	<b>15</b>
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(Note: Out of province (High School) students need an additional 3 credits of pre-engineering Social Sciences and Humanities).

**TOTAL****111**

**d) Departmental Technical Complementary courses**

The following courses are offered as Technical Complementary (TC). Consult Minerva for TCs that are offered in 2009/2010.

CHEE 363, 464	Projects in Chemical Engineering
CHEE 438	Engineering Principles in Pulp & Paper Processes
CHEE 458	Computer Applications
CHEE 494, 495	Research Project and Seminar
CHEE 496	Environmental Research Project
CHEE 541	Electrochemical Engineering
CHEE 543	Plasma Engineering
CHEE 561	Introduction to Soft Tissue Biophysics
CHEE 562	Engineering Principles in Physiological Systems
CHEE 563/MECH 563	Biofluids and Cardiovascular Mechanics
CHEE 571	Small Computer Applications in Chemical Engineering
CHEE 582	Polymer Science and Engineering
CHEE 584	Polymer Processing
CHEE 585	Foundations of Soft Matter
CHEE 591	Environmental Bioremediation
CHEE 592/MECH534	Industrial Air Pollution Control / Air Pollution Engineering
CHEE 593/ CIVE 430	Industrial Water Pollution Control
CHEE 594	Biocolloids in Environmental Systems
CHEE 595	Energy Recovery, Use, & Impact

At least 2 Technical Complementary courses are to be selected from those offered by the Department or substitute courses as given in Appendix C. Permission is given to take the third complementary course from other suitable undergraduate courses in the Faculty of Engineering.

No more than 4 of the 9 Technical Complementary credits may be project courses such as CHEE 364,464,494,495 and 496.

Students may wish to select their Technical Complementary courses to comprise an area of specialization. The department has four major areas of specialization (polymers, biochemical and biomedical engineering, pollution control and pulp and paper) which are discussed in the McGill Undergraduate Calendar at the end of the Faculty of Engineering section.

e) **Other Complementary Courses**

In selecting non-departmental complementary courses, students must verify with the department concerned that they have the pre-requisites and that they will be accepted for enrolment into the desired courses. Some departments place limits on enrolment and give preference to their own students.

Students registering in Continuing Education courses must report to the Centre for Continuing Education, presenting a completed form available from the Faculty Records Office.

The Faculty regulations for complementary course electives are summarized in Section 9.3.4 of the Faculty of Engineering Announcement in the University Calendar 2009/2010. In addition to the required courses, chemical engineering students must take 3 credits of the Impact of Technology on Society and 3 credits of Social Sciences or Humanities (HSS) (Appendix A). Out of province (High School) students need an additional 3 credits of pre-engineering Social Sciences and Humanities (SSH) requirement.

f) **Minors**

Minors are coherent sequences of complementary courses that may be taken in addition to the courses required for the B.Eng. or B.Sc. (Arch.) degree program. Minor programs normally consist of 18 to 24 credits, allowing up to 12 credits of overlap with the degree program. The real credit cost to the student is typically 9 to 18 credits, representing one semester beyond the B.Eng. or B.Sc (Arch.) degree program. All courses in a Minor program must be passed with a grade of C or better.

Minors are available to Chemical Engineering students in the following areas:

Arts, Biomedical engineering, Biotechnology, Chemistry, Computer Science, Construction Engineering and Management, Economics, Environmental Engineering, Environmental Studies, Management, Materials Engineering, Mathematics, Physics, Technological Entrepreneurship, and Software Engineering. They are described in detail in Section 9.6 of the Engineering Announcement in the University Calendar 2009/2010.

As part of a pre-graduation procedure, students doing a Minor must provide proof that all requirements are fulfilled.

Note that students must pre-register early for Management courses. Preregistration forms are available from the Student Affairs Office (Room 22, Frank Dawson Adams Building).

Students intending to register for a Minor program must complete a form declaring their intent and submit it to Student Affairs Office, Rm 22, Frank Dawson Adams Building. If subsequently the plan is changed, it must be communicated in writing to the same office. Failure to do so may result in delayed graduation.

g) **Course Exemptions for CEGEP Graduates**

Chemistry courses

Exemption can be given for two courses:

- CHEM 212 (Intro. Organic Chem. I, 4 credits) for Chemistry 202 at CEGEP level
- CHEM 234 (Select. Top. Organic Chem. II, 3 credits) for Chemistry 302 at CEGEP level

The same or higher number of credits corresponding to a course exemption must be taken as any other basic science courses (e.g. Atmospheric and Oceanic Sciences, Biology, Chemistry, Earth and Planetary Sciences, Earth System Science, Mathematics or Physics ) at McGill in addition to the regular elective load.

B. **ADMISSION REQUIREMENTS**

Note that the rules and the decisions on this question are handled by the Admissions Office. As part of a pre-graduation procedure, students must ensure that all admission requirements are fulfilled.

**Placement Tests**

Students may write a placement test only at the time of admission to McGill. They are available in Biology (BIOL 112), Chemistry (CHEM 111, CHEM 121, CHEM 212), Mathematics (MATH 140, MATH 141, MATH 133, MATH 260) and Physics (PHYS 131, PHYS 142). Up to 12 credits of material passed in placement tests may be classified as advanced credit i.e. the credits will not be transferred to other material. A grade of C or better is required to obtain credit. Credits above 12 will be treated as exemptions.

Tests will be available only during the week of registration and the week following.

C. **TRANSFERS**

The following policy applies for transfer of credits.

- 1) The maximum number of credits transferred into any Engineering Minor from studies completed prior to entering an Engineering Program, and taken outside McGill, be six (6).
- 2) The maximum number of credits transferred into any Engineering Minor from studies that have received prior approval and completed outside McGill after entering an Engineering Program be six (6).
- 3) The combined total number of credits transferred into any Engineering Minor under items (1) and (2) above be six (6).

a) **Transfer from Science Programs to the B.Eng. in Chemical Engineering Programs**

Students who have completed all or most of the requirements for the B.Sc. in Chemistry and other chemistry-oriented disciplines (Major or Honours) may qualify for admission to a reduced B.Eng. program. A typical program is listed in this Handbook.

b) **Transfer of Credits for Courses Completed Outside this Department**

Students must complete a minimum of 60 credits of program-related courses at McGill.

While registered in the B.Eng. program core courses may not be taken outside the department. Under exceptional circumstances, permission may be granted to take core course elsewhere. See your Adviser for information.

c) **Summer Session Forms**

Students who wish to take courses at other universities which they want counted towards their B.Eng. requirements should obtain and submit the Authorization of Courses for Exemptions and/or Advanced Credits form to the Engineering Student Center (Rm. 22, Frank Dawson Adams Building). This serves as the written approval form for the Host University upon authorization by the Academic Adviser. Once the transcript of the completed course from the Host University is received by the Engineering Student Center it is matched with the approval form and placed in the student's file.

**D. RECORDING OF COURSE EXEMPTIONS OR ADVANCED CREDIT**

It is the responsibility of students to request such course exemptions or advanced credit and to ensure that they are properly recorded in the department and the Faculty.

For courses completed at other institutions, Students should request exemptions or advanced credits using the appropriate form ("Authorization of Courses for Exemptions and/or Advanced Credits") available at the Engineering Student Center (Rm. 22, Frank Dawson Adams Building). This must be completed by the student, signed by their departmental adviser, and submitted to the Engineering Student Center for approval by the Associate Director.

A request can only be considered granted and recorded when it appears on the transcript or course verification form.

(Please refer to [www.mcgill.ca/engineering/student/sao/newstudents/credit](http://www.mcgill.ca/engineering/student/sao/newstudents/credit) for details and the process on obtaining transfer credit.)

- **All pre-engineering courses must be completed preferably in the first year of studies or soon thereafter. They must not be deferred to the third or fourth years of studies.**
- **Students are responsible to ensure that they meet the course requirements for the B.Eng. They must complete the appropriate check list (p. 25 or 26) and demonstrate to their Adviser that they meet the degree requirements in each category of courses e.g. core, technical, minor program, free complementaries etc.**
- **Students must meet their Academic Adviser and verify their final year course selection prior to the commencement of their U-3 year. Timetable conflicts may cause difficulties in some cases if course selection is not planned well in advance.**

**E. EXAMPLES OF PROGRAMS****a) 111 Credits Program (CEGEP Students) - September Admission**

<u>Semester 1</u>			<u>Semester 2</u>		
CHEE 200	Intro. Chem. Eng.	4	CHEE 204	Chem. Manuf. Proc.	3
CHEE 291	Instr. Meas. Lab	4	CHEE 220	Chem Eng. Thermo.	3
CHEM 212	Intro.Organic Chem. I	4	CHEM 234	Topics in Org.Chem.	3
MATH 262	Inter. Calculus	<u>3</u>	COMP 208	Comp. in Eng.	3
		15	FACC 100	Intro Eng. Profession	1
			MATH 263	Diff. Equations	<u>3</u>
					16
<u>Semester 3</u>			<u>Semester 4</u>		
CHEE 314	Fluid Mechanics	4	CHEE 315	Heat/Mass Transfer	4
CHEE 370	Elemts. Biotech.	3	CHEE 340	Process Modelling	3
CHEE 380	Materials Sci.	3	CHEE 351	Separation Processes	3
MATH 264	Advanced Calculus	3	CHEE 360	Tech. Paper I	1
MIME 310	Eng. Economy	<u>3</u>	CHEE 310	Phys. Chemistry	<u>3</u>
		16		for Engineers	14
<u>Semester 5</u>			<u>Semester 6</u>		
CHEE 392	Project Lab. I	4	CHEE 393	Project Lab. II	5
CHEE 423	Chem. React. Eng.	4	CHEE 455	Process Control	4
CHEE 453	Process Design	4	CHEE 456	Design Project I	1
CHEE 462	Tech. Paper II	1	CHEE 484	Materials Eng.	3
***_***	Compl. Studies*	<u>3</u>	CHEE ***	Technical Compl.	3
		16	FACC 400	Eng.Prof.Practice	<u>1</u>
					17
<u>Semester 7</u>					
CHEE 457	Design Project II.	5			
CHEE 474	Biochem. Eng.	3			
CHEE ***	2x Tech. Compl.	6			
***_***	Compl. Studies*	<u>3</u>			
		17			
<b>Total Credits</b>					<b>111</b>

\*One "Impact of Technology on Society" course, and one Humanities and Social Sciences course.



c) 140 Credits Program (High School Students) - September Admission

<u>Semester 1</u>		<u>Semester 2</u>			
CHEM 110	General Chemistry 1	4	CHEM 120	General Chemistry 2	4
MATH 133	Vectors, Matric. & Geo.	3	MATH 141 (or 151)	Calculus 2*	4
MATH 140 (or 139, or 150)	Calculus 1*	3	PHYS 142	Electromag. Optics	4
PHYS 131	Mechanics and Waves	4	***_***	Compl. Studies**	3
FACC 100	Intro Eng. Profession	1	***_***	Compl. Studies**	<u>3</u>
***_***	Compl. Studies**	<u>3</u>			18
		18			
<u>Semester 3</u>		<u>Semester 4</u>			
CHEE 200	Intro. Chem. Eng.	4	CHEE 204	Chem. Manuf. Proc.	3
CHEE 291	Inst. Meas. Lab.	4	CHEE 220	Chem. Eng. Thermo.	3
CHEM 212	Organic Chem. I	4	CHEE 360	Tech. Paper I	1
MATH 262	Inter. Calculus*	3	CHEM 234	Organic Chem. II	3
MIME 310	Eng. Economy	<u>3</u>	COMP 208	Comp. in Eng.	3
		18	MATH 263	Ord. Diff. Equat. & Lin. Alg.	<u>3</u>
					16
<u>Semester 5</u>		<u>Semester 6</u>			
CHEE 314	Fluid Mechanics	4	CHEE 315	Heat and Mass Transfer	4
CHEE 370	Elemts. of Biotech.	3	CHEE 340	Process Modelling	3
CHEE 380	Materials Sci.	3	CHEE 351	Separation Processes	3
CHEE 392	Project Lab I	4	CHEE 393	Project Lab. II	5
MATH 264	Advan. Calculus ENG	<u>3</u>	CHEE 310	Phys. Chem. For Eng.	<u>3</u>
		17			18
<u>Semester 7</u>		<u>Semester 8</u>			
CHEE 423	Chem. React. Eng.	4	CHEE 455	Process Control	4
CHEE 453	Process Design	4	CHEE 457	Design Project II	5
CHEE 456	Design Project I	1	CHEE 462	Tech. Paper II	1
CHEE 474	Biochem. Eng.	3	CHEE 484	Materials Eng.	3
CHEE ***	2x Technical Compl.	<u>6</u>	CHEE ***	Technical Compl.	3
		18	FACC 400	Eng. Prof. Practice	<u>1</u>
					17

**Total Credits 140**

\* Students having successfully completed a calculus course in High School may take Calculus A (MATH 150) and Calculus E (MATH 152). Students passing MATH 150 & 152 will receive exemption with credit for MATH 262 (Intermediate Calculus). In the event that the student has some prior calculus, but is not sufficiently confident to proceed with MATH 150/152, the appropriate sequence is MATH 140/141. If a student has no previous calculus exposure, MATH 150/152 may be replaced with MATH 139/141.

\*\*One "Impact of Technology on Society" course, and two Humanities and Social Sciences courses.

d) **72-Credit Program for Students from Science Faculty Program**

- 1) **Chemistry Programs:** Students who have completed at least the U2 level McGill B.Sc. program in Chemistry, or the equivalent, will normally have completed most of the equivalences noted below. Students who at the time of transfer have completed only part of the math equivalence may choose to take the missing courses in the Faculty of Science or to take the equivalent courses in the Faculty of Engineering. The typical 72-credit program outlined in the following page considers that the student has passed MATH 315 and the equivalent courses for MATH 260/265; that the student has 6 credits in allowable complementary studies courses and has courses with laboratory component equivalent to CHEE 291.
- 2) **Biochemistry, Biology, Mathematics and Physics Programs:** Students from these programs in Faculty of Science also qualify for a credit allowance, the exact number of credits depending on which of the courses on the left below have been taken.

NOTE: Science transfer students can replace up to 6 credits of Technical Complementaries with 6 credits of previously taken 400-level (or equivalent) science courses approved by the Adviser.

<b><u>Faculty of Science Degree Requirements</u></b>		<b><u>Corresponding Credit Given for B.Eng. (Chemical) Requirements</u></b>	
1. <b><u>Chemistry</u></b>	<b><u>Cr</u></b>	1. <b><u>Chemistry</u></b>	<b><u>Cr</u></b>
CHEM 212 Intr.OrgChem. I	4	CHEM 212 Int.Organic Chem. I	4
CHEM 222 Organic Chem. II	4	CHEM 234 Topics in Org. Chem	3
CHEM 204 and CHEM 214	6	CHEE 310 Phys.Chem.For Eng.	3
or CHEM 213 and CHEM 214	6		
2. <b><u>Mathematics</u></b> **		2. <b><u>Mathematics</u></b>	
MATH 222 Calculus III	3	MATH 262 Inter. Calculus	3
MATH 315 or MATH 325	3	MATH 263 Ord.Diff.Equ&LinA	3
MATH 314 or MATH 248	3	MATH 264 Adv'd Calculus ENG	3
3. <b><u>Computer Science</u></b>		3. <b><u>Computer Science</u></b>	
COMP 200 Intro. Comp. Sci.	3	COMP 208 Comp. in Eng.	3
4. <b><u>Courses in Complementary Studies</u></b>	<b>*6</b>	4. <b><u>CS Complementaries</u></b>	<b>6</b>
5. <b><u>Courses with Identifiable Lab. Component not Counted</u></b>		5. <b><u>Chemical Engineering</u></b>	
		CHEE 291 Instr. Meas. Lab.	4
6. <b><u>400-Level Science Courses</u></b>		6. <b><u>Technical Complementaries</u></b>	<b><u>6</u></b>
		<b>Total Credit Allowance</b>	<b>38</b>

\* Courses in Complementary Studies must be clearly identified.

\*\* Note that the Mathematics equivalents will only be considered as a package: credit for individual courses will not be granted

For students of high academic standing who qualify for an equivalence of 38 credits as detailed above, the following 73-credit program applies, provided there are no timetable conflicts.

<u>Semester 1</u>			<u>Semester 2</u>		
CHEE 200	Intro. Chem. Eng.	4	CHEE 204	Chem. Manuf. Proc.	3
CHEE 314	Fluid Mechanics	4	CHEE 220	Chem. Eng. Thermo.	3
CHEE 370	Elemts. of Biotech.	3	CHEE 315	Heat/Mass Transfer	4
MIME 310	Eng. Economy	<u>3</u>	CHEE 351	Separation Processes	3
		14	FACC 100	Intro Eng. Profession	1
			CHEE 360	Tech. Paper I	<u>1</u>
					15
<u>Semester 3</u>			<u>Semester 4</u>		
CHEE 392	Project Lab. I	4	CHEE 340	Process Modelling	3
CHEE 423	Chem. React. Eng.	4	CHEE 393	Project Lab. II	5
CHEE 380	Materials Sci.	3	CHEE 455	Process Control	4
CHEE 453	Process Design	<u>4</u>	CHEE 456	Design Project I	1
		15	CHEE 484	Materials Eng.	3
			FACC 400	Eng.Prof.Practice	<u>1</u>
					17
<u>Semester 5</u>					
CHEE 474	Biochem. Eng.	3			
CHEE 457	Design Project II	5			
CHEE ***	Chem. Eng. Compl.	3			
CHEE 462	Tech. Paper II	<u>1</u>			
		12			

**Total Credits: 73**

Programs of those who have studied Chemistry at other universities must be examined in detail to determine how many credits, up to the maximum of 45, may be allowed in their case.

Note that Technical Paper I and II can be taken in either semester, but not simultaneously as the former is a pre-requisite for the latter.

Although the above program, in some instances, does not respect the course pre-requisites, they are upheld where possible. Students admitted with advanced standing should, with their Adviser, plan a program in the awareness of the possible difficulties of taking courses out of the pre-requisite sequence. The Adviser must approve this action.

**APPENDIX A****COMPLEMENTARY STUDIES FOR CHEMICAL ENGINEERING STUDENTS  
2009 - 2010**

Six credits of Complementary Studies are required in addition to the core courses of the program; of these, 3 credits must be chosen from the list "Impact of Technology on Society Courses" below and the remaining 3 credits must be taken from A, B, or C below. Out of province (High School) students need to take an additional 3 credits of pre-engineering courses from A, B or C below.

**Impact of Technology on Society Courses**

(Consult the University Calendar for updates)

<b>CHEE 230</b>	<b>Environmental Aspects of Technology</b>
<b>CHEE 430</b>	<b>Technology Impact Assessment</b>
<b>CIVE 469</b>	<b>Infrastructure and Society</b>
<b>ECON 225</b>	<b>Economics of the Environment</b>
<b>ENVR 201</b>	<b>Society and Environment</b>
<b>ENVR 480</b>	<b>Topics in Environment 2</b>
<b>GEOG 200</b>	<b>Geographical Perspectives: World Environmental Problems</b>
<b>GEOG 203</b>	<b>Environmental Systems</b>
<b>GEOG 205</b>	<b>Global Change: Past, Present and Future</b>
<b>GEOG 302</b>	<b>Environmental Management 1</b>
<b>MIME 308</b>	<b>Social Impact of Technology</b>
<b>PHIL 343</b>	<b>Biomedical Ethics</b>
<b>SOCI 235</b>	<b>Technology and Society</b>
<b>SOCI 312</b>	<b>Industrial Sociology</b>

**A. Humanities and Social Studies****B. Administrative Studies, Law and Social Sciences****C. Language**

See Section 9.3.4 of the Faculty Announcement in the University Calendar 2009/2010 for details of acceptable courses in categories A, B and C above. The above list is subject to revision; please consult the latest Faculty Announcement.

<b>APPENDIX B : Pre-requisites</b>			
<b>REQUIRED DEPARTMENTAL COURSES</b>			
(also consult the University Calendar)			
<b>Course no.</b>	<b>Title</b>	<b>Pre-requisite(s)</b>	<b>Co-requisites</b>
CHEE 200	Intro. Chem. Eng.	-	-
CHEE 204	Chem. Manuf. Proc.	CHEE 200	-
CHEE 291	Inst. Meas. Lab.	-	-
CHEE 220	Chem. Eng. Thermod.	CHEE 200	-
CHEE 310	Physical Chemistry for Engineers	CHEE 220	-
CHEE 314	Fluid Mechanics	CHEE 204	MATH 264 or MATH 265
CHEE 315	Heat/Mass Transfer	CHEE 314	-
CHEE 340	Process Modeling	MATH 261 or MATH 263, MATH 264 or MATH 265 CHEE 314	
CHEE 351	Separation Processes	CHEE 204, CHEE 220	CHEE 315
CHEE 370	Elements of Biotech.	CHEM 212	-
CHEE 380	Materials Science	-	-
CHEE 392	Project Lab. I	CHEE 291	-
CHEE 393	Project Lab. II	CHEE 392	-
CHEE 423	Chem.Reaction Eng.	CHEE 310	-
CHEE 360	Technical Paper I	-	-
CHEE 462	Technical Paper II	CHEE 360	-
CHEE 453	Process Design	CHEE 315, CHEE 351	
CHEE 455	Process Control	CHEE 315, CHEE 351, CHEE 423	-
CHEE 456	Design Project I	-	CHEE 340 , CHEE 393 and CHEE 453
CHEE 457	Design Project II	CHEE 456	-
CHEE 474	Biochemical Eng.	CHEE 370	
CHEE 484	Materials Engineering	CHEE 315, CHEE 380	-

**NON-DEPARTMENTAL COURSES**  
(Consult the University Calendar for updates)

<b>Course No.</b>	<b>Title</b>	<b>Pre-requisite</b>	<b>Co-requisites</b>
<b>CHEM 212</b>	<b>Intr. Org. Chem. I</b>	<b>(CHEM 110 or CHEM 111) and (CHEM 120 or CHEM 121) or equivalent</b>	-
<b>CHEM 234</b>	<b>Topics in Organic Chemistry</b>	<b>CHEM 212 or equivalent</b>	-
<b>MATH 262</b>	<b>Intermediate Calculus</b>	<b>MATH 141, MATH 133 or equivalent</b>	-
<b>MATH 263</b>	<b>Ordinary Diff. Equat. and Linear Algebra</b>	-	<b>MATH 260 or MATH262</b>
<b>MATH 264</b>	<b>Advanced Calculus &amp; ENG</b>	<b>MATH 260 or MATH 262 or MATH 151 or MATH 152 or equivalent</b>	-
<b>FACC 100 FACC 400</b>	<b>Intro. Eng. Profession Eng. Prof. Practice</b>	<b>none FACC 100 and at least 60 program credit</b>	<b>none none</b>
<b>MIME 310</b>	<b>Engineering Economy</b>	-	-
<b>COMP 208</b>	<b>Computers in Eng.</b>	<b>Diff. + Integral Calculus</b>	<b>Linear Algebra</b>

<b>Appendix C: Technical Complementary Courses</b>									
*A course may be cancelled if numbers warrant.		2009-2010			2010-2011 (Tentative)				
Course No.	Title	S	F	W	S	F	W	Comments	
CHEE 363 / 464	Projects in Chem. Eng. 1 / 2	Always			Always				
CHEE 438	Eng'g Principles in Pulp & Paper Proc.								
CHEE 458	Computer Applications					X			
CHEE 494 / 495	Research Project & Seminar	Always			Always			Only one of CHEE 494,495,496 can be counted in program	
CHEE 496	Environmental Research Project	Always			Always			Only one of CHEE 494,495,496 can be counted in program	
CHEE 541	Electrochemical Engineering		X			X			
CHEE 543	Plasma Engineering		X						
CHEE 561	Introduction to Soft Tissue Biophysics		X			X			
CHEE 562	Engineering Principles in Physiological Systems			X			X		
CHEE 563 or MECH 563	Biofluids & Cardiovascular Mechanics			X			X		
CHEE 571	Small Computer Applications			X			X		
CHEE 582	Polymer Engineering					X			
CHEE 584	Polymer Processing		X						
CHEE 585	Foundations of Soft Matter					X			
CHEE 591	Environmental Bioremediation			X			X		
CHEE 592 or MECH 534	Industrial Air Pollution Control Air Pollution Engineering			X			X		
CHEE 593 or CIVE 430	Industrial Water Pollution Control Water Treatment and Pollution Control		X				X	Given in alternate years	
CHEE 594	Biocolloids in Environmental Systems						X		
CHEE 595	Energy Recovery Use & Impact					X			
BIOT 505	Selected Topics in Biotechnology			X			X	Biotechnology minor required course	

**GRADUATION REQUIREMENTS**  
(111 CREDIT PROGRAMME - CEGEP Students)

NAME: \_\_\_\_\_ STUDENT ID: \_\_\_\_\_

1: ADMISSION REQUIREMENTS (if any):							
2: ADVANCED CREDITS & EXEMPTIONS:							
3: CHEMICAL ENG. (CHEE) COURSES				4: NON-DEPARTMENTAL COURSES			
course	credit	mark	sem./ year	course	credit	mark	sem./ year
200	4						
204	3			CHEM 212	4		
220	3			CHEM 234	3		
291	4			MATH 262	3		
310	3			MATH 263	3		
314	4			MATH 264	3		
315	4			MIME 221	2		
340	3			MIME 310	3		
351	3			COMP 208	3		
360	1						
370	3			5: TECHNICAL COMPL. (9 cr.)			
380	3			course	credit	mark	sem./year
392	4						
393	5						
423	4						
453	4			6: Complementary studies (6 cr.)*			
455	4			"Impact Course":			
456	1			H.S.S.:			
457	5			7: Minor in:			
462	1						
474	3						
484	3			8: Free Complementaries (if any)			

\* See Faculty Announcement in Section 9.3.4 of McGill Calendar, 2009-2010.

**GRADUATION REQUIREMENTS**  
(140 CREDIT PROGRAMME - High School Students)

NAME: \_\_\_\_\_ STUDENT ID: \_\_\_\_\_

1: ADMISSION REQUIREMENTS (if any):							
2: ADVANCED CREDIT & EXEMPTIONS:							
<b>3: PRE-ENGINEERING COURSES</b>				<b>4: CHEM. ENG. (CHEE ) COURSES</b>			
course	credit	mark	sem./year	course	credit	mark	sem./year
CHEM 110	4			200	4		
CHEM 120	4			204	3		
MATH 133	3			220	3		
MATH 140 or 139; or 150	3			291	4		
				310	3		
MATH 141 or 151	4			314	4		
PHYS 131	4			315	4		
PHYS 142	4			340	3		
<b>5: NON-DEPARTMENTAL COURSES</b>				351	3		
course	credit	mark	sem./year	360	1		
CHEM 212	4			370	3		
				380	3		
CHEM 234	3			392	4		
MATH 262	3			393	5		
MATH 263	3			423	4		
MATH 264	3			453	4		
MIME 221	2			455	4		
MIME 310	3			456	1		
COMP 208	3			457	5		
<b>6: TECHNICAL COMPL. (9 cr.)</b>				462	1		
course	credit	Mark	sem./year	474	3		
				484	3		

(continuing next page)

## 140 Credit Programme (cont'd)

7: Minor in:	8: Complementary Studies (9 cr.)*  "Impact Course":  Pre-Eng. H.S.S.:  H.S.S.:
9: Free Complementaries (if any)	10: NOTES:

\* See Faculty Announcement in Section 9.3.4 of McGill Calendar, 2009-2010. Please note the important **graduation requirement** that an additional Humanities and Social Science (Pre-Eng. H.S.S.) course is needed for students coming from High School.