McGill University
Department of Chemical Engineering

UNDERGRADUATE STUDENT HANDBOOK

for students entering the B.Eng. program
in Chemical Engineering in September 2017 and January 2018

Montreal, June 2017

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Much information concerning courses and regulations is contained in the current University e-Calendar, which you are advised to consult for additional information or any changes that may occur during your stay within the department.

Prof. Sasha Omanovic, Associate Chair - Undergraduate Program
Prof. Jean-Luc Meunier - Undergraduate Curriculum Committee
Prof. Pierre-Luc Girard-Lauriault - Undergraduate Curriculum Committee
Prof. Corinne Hoesli - Undergraduate Curriculum Committee
Corina Sferdenschi, B.Sc. – Undergraduate Coordinator

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I. TEACHING PERSONNEL IN CHEMICAL ENGINEERING

	M.H. Wong Bldg.	Office Telephone
Prof. D. Berk, P.Eng.	4260	514-398-4271
Prof. S. Coulombe, ing.	3100	514-398-5213
Prof. P.-L. Girard-Lauriault	4150	514-398-4006
Prof. N.-M. Dorval Courchesne, ing. jr	4230	514-398-4301
Prof. R.J. Hill	4280	514-398-6897
Prof. C. Hoesli, ing.	4300	514-398-4275
Prof. A. M. Kietzig, ing.	4140	514-398-3302
Prof. J. Kopyscinski	4310	514-398-4276
Prof. R.L. Leask, P.Eng.	4120	514-398-4270
Prof. M. Maric, P.Eng.	4270	514-398-4272
Prof. J.-L. Meunier, ing.	3070	514-398-8331
Prof. C. Moraes	4330	514-398-4278
Prof. S. Omanovic, P.Eng.	4130	514-398-4273
Prof. A.D. Rey, FRCS	4100	514-398-4196
Prof. P. Servio	4110	514-398-1026
Prof. N. Tufenkji, ing.	4160	514-398-2999
Prof. V.Yargeau, ing.	4180	514-398-2273

II. STATEMENT OF PROGRAM EDUCATIONAL OBJECTIVES AND LEARNING OUTCOMES

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

The McGill University Chemical Engineering undergraduate program focuses on providing strong foundations in engineering science and chemical process design, and the integration of these with complementary areas of study in biochemical engineering, materials engineering, and energy. The program aims to train versatile and conscientious professionals who will work in leading firms and institutions in Québec, Canada and around the world. The overall educational objectives of the program are to train engineers who will:

- Pursue successful careers as chemical engineers in industry or academia.
- Positively impact society as leaders that promote safe, sustainable and ethical practices in their field.
- Be able to work in interdisciplinary teams, effectively communicate to diverse audiences and pursue lifelong learning opportunities.

Specifically, at the end of the Chemical Engineering undergraduate program, students should be able to:

1. Use appropriate knowledge and skills to identify, formulate, analyze, and solve complex chemical engineering problems drawing on mathematics, natural sciences, chemical engineering fundamentals and specialized areas of chemical engineering.

2. Apply modern engineering tools including specialized engineering software to solve these problems, and understand the limitations of these tools.

3. Develop solutions for complex, open-ended chemical engineering problems, processes and plant designs, while meeting specified needs with appropriate attention to health and safety risks, applicable standards, economic, resource availability, sustainability as well as environmental, cultural and societal considerations.

4. Conduct investigations of complex engineering or scientific problems by developing and using experimental methods and tools, analyzing and interpreting data, as well as synthesizing the information obtained in order to reach valid conclusions.

5. Communicate effectively via oral and written communication, individually or as a team.

6. Work effectively in teams and assume leadership/coordination roles.

7. Understand the professional and ethical responsibilities of the engineer towards society and the environment, and act accordingly.

8. Appropriately incorporate economics and business considerations into the chemical engineering practice.

9. Recognize the need for lifelong learning, and engage in activities related to continuous professional development and learning.

To achieve these goals, the methods implemented by the program aim to:

- Instill students with a strong knowledge of engineering fundamentals and to consolidate this knowledge via problem analysis, hands-on experimental investigation as well as design projects. To ensure that graduates from the program are able to adapt to a variety of professional settings, the students must apply their knowledge in settings that require team work and effective communication.
- Promote interdisciplinary work, independence and leadership. In core courses, students are challenged with complex open-ended engineering problems. In the capstone design project courses, students complete a plant design project under the supervision of an experienced professional engineer.
- Encourage versatility by requiring the completion of technical complementary courses and by offering students the possibility to complete a minor from a list of over twenty options. Students also have the opportunity to obtain hands-on experience working on research projects under the supervision of a faculty member.
- Encourage continuous improvement, self-evaluation and transparency. Students engage in self-evaluation exercises such as quizzes, surveys and self-assessments. Students provide feedback to instructors both via course evaluations and meetings with the curriculum committee each semester.

III. DEPARTMENTAL ASSISTANCE TO STUDENTS

a) Academic Advising

If a student needs help with matters such as course selection, course transfer, internships, study abroad, or needs to meet an academic adviser, the student should contact the McGill Engineering Student Centre (MESC - http://www.mcgill.ca/engineering/current-students/undergraduate/mesc). MESC is located on the main floor of the Frank Dawson Adams building, Room 22.

Mandatory Department Information/Advising Session:

Compulsory Advising session
Out of Province Students and Quebec CEGEP students:
Date and Time: Wednesday, August 30, 9:30 a.m.
Location: M.H. Wong Building, Room 1020

Individual advising (first-come, first-served basis)
Date and Time: Wednesday, August 30, 10:30 a.m. to 12:30 p.m.
Location: M.H. Wong Building, Room 1020

You are expected to attend the mandatory department information session starting at 9:30 a.m. in Room 1020 in the W.H. Wong Building, to meet the Chair of the department, finalize your course registration and meet your fellow students. Individual advising drop in (first-come, first-served basis) will be from 10:30 a.m. to 12:30 p.m. in the same room.

During the add/drop period of each semester, the Undergraduate Student Affairs Coordinator will be available at MESC every day to meet with you on a first-come, first-serve basis.
For any academic advising needs during the year, please send an email to ugrad.chemeng@mcgill.ca.

b) Undergraduate Curriculum Committee (UCC)

The committee is composed of four students elected by their classes (U1, U2, U3 and U4), the president of the Council, the VP Academic and four staff members. The committee provides a forum for all matters involving undergraduate student/staff interactions.

Elections are held in September (U1, U4) and in March (U2, U3). For the Academic Year 2017-2018, the membership is:

U4	- Kerry Lawless
U3	- Leena Struzina
U2	- Anastasia Startseva
U1	- Hemanshu Anand
President	- Ameer Nizami
VP Academic	- Rachel Mot
Staff	- Professor Sasha Omanovic (Associate Chair, Undergraduate Program and Chair of UCC)
	- Professor Jean-Luc Meunier (UCC)
	- Professor Pierre-Luc Girard-Lauriault (UCC)
	- Professor Corinne Hoesli (UCC)
	- Corina Sferdenschi (Undergraduate Coordinator)

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

The President of the Student Chapter in 2017-2018 is Julie Chouinard; Prof. Corinne Hoesli is the Faculty Advisor for the Student Chapter. For more information about the role and activities of the Student Chapter, please see: http://chess.mcgilleus.ca/.

d) Financial Aid and Scholarships

Bursaries and loans are applied for through the Scholarships and Student Aid Office, Brown Student Services Bldg., Suite 3200, 3600 McTavish St. (http://www.mcgill.ca/studentaid/scholarships-aid). 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.

Additional scholarships can be identified and applied for through Career Planning Service (CaPS) and Student Awards. Further information can be found on the following web page http://www.mcgill.ca/engineering/current-students/undergraduate/scholarships-financial-aid/external-scholarships.

e) Facilities in the Department

There are three breakout rooms that are available to Chemical Engineering Undergraduate students in the space across the hallway from Lab Wong 1160. These rooms can accommodate up to 8 people and two of the rooms have flat screen displays for presentations. These rooms are meant for team work, design meetings, preparation of presentations or for work on projects. They are not social rooms. Please see Ms. Jo-Ann Gadsby on floor 3A for access. 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.

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. L. Volpato
Electronics Shop	- Wong 3250 - Mr. G. Lepkyj
Analytical Laboratory	- Wong 4200 - Mr. R. Roy
	- Wong 4200 - Mr. A. Golsztajn
Administrative Office	- Wong 3060 - Mr. Kevin Mitchell

f) Handbook of Chemical Engineering

An electronic copy of Perry's Chemical Engineers' Handbook is available on the Access Engineering's web-site (http://accessengineeringlibrary.com). The handbook is accessible through the McGill Library web-site.

IV. MISCELLANEOUS INFORMATION

a) French

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 with social and cultural riches that cannot be enjoyed without a good 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 a technical paper in French. Allowance is made in marking of grammar and style when French is not your first language. Please mention this to the professor.
- Take elective courses at UQAM, École Polytechnique de Montréal or U. de Montreal through the Quebec Inter-University Transfer program. Additional information and

the necessary form can be found here: http://www.mcgill.ca/students/iut

- Take one or more French Department courses.
- Be a member of a laboratory group which communicates internally and externally (wherever possible) in French.
- Arrange for 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 copying machines are available in the Wong and McConnell Buildings and Libraries and all students can print via the uprint function connected to their Minerva.

c) Oral Presentations

Most classrooms are equipped with projectors for the use of computers in presentations. Other projectors are also available to students from ICS (Audiovisual Equipment Loans – (please go to the McGill IT Knowledge Base and type in Article 1744). They are located at 688 Sherbrooke St. W., 2nd floor.

V. COURSE ORGANIZATION

a) Course Progress

At the first advising session, new students should note the Graduation Requirements form (**p. 27-29**) 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 and course marks (see section VI below). This form will eventually be used in your discussions with an Academic Adviser as part of pre-graduation procedures. Your progress and remaining requirements to complete towards graduation can be seen on Minerva (Main Menu/Student/Student Records Menu/Degree Evaluation).

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. International students in Canada on a visa may also be required to maintain full time status. Contact International Student Services if you have questions (http://www.mcgill.ca/internationalstudents/contactus). A student who wishes to register for more than 18 credits in a term may only do so with special permission of MESC.

Students on probationary standing must take a reduced load of no more than 13 credits per semester including repeated courses (see Section *f* further in the handbook). The exact number of credits will be recommended by an 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, CHEE 204 (given in Winter) is a pre-requisite for both CHEE 314 (given in Fall) and CHEE 351 (given in Winter).

NOTE: Please note some students may need to take an additional semester to finish their program in order to decrease their course load throughout their studies. Please contact the Undergraduate Student Affairs Coordinator for further information on how to best plan your schedule if you cannot follow the proposed curriculum.

c) Course Change Deadlines (2017-2018)

	Fall 2017 Semester	Winter 2018 Semester
Last day to change courses (no financial penalty and no entry on transcript)	Sept. 19 (Tuesday)	Jan. 17 (Tuesday)
Last day for withdrawal (with refund) (with a W)	Sept. 26 (Tuesday)	Jan. 24 (Tuesday)
Last day for withdrawal (without refund)* (with a W)	Oct. 31 (Tuesday)	Mar. 07 (Tuesday)

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.

*Please note that these dates are different for multi-term courses beginning in both Fall and Winter. Please consult the Course Change tab under Registration in the e-calendar.

d) Course Grades

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

l) 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.

In the Faculty of Engineering, letter grades are assigned according to the grading scheme adopted by the professor in charge of a particular course. This may not correspond to grades indicated in the "Numerical Scale of Grades" column in Grading and Grade Point Averages in the Undergraduate Calendar. A grade of D indicates marginal performance which is acceptable only for Complementary Studies courses (i.e., Group A Impact of Technology on Society and Group B Humanities and Social Sciences, Management Studies and Law). A grade of D is not acceptable for required (core) courses. For the Department of Chemical Engineering, core courses include all required courses (departmental and non-departmental) as well as technical complementary courses.

NOTE: A grade "D" in a pre-requisite course that is a required course in the Chemical Engineering program is considered sufficient to register for the subsequent courses. A grade "D" is, however, not a passing grade and thus, the course for which a "D" grade was obtained must be passed successfully before graduation.

e) Reassessment of a Grade

You can request a formal reread of a final examination once you have discussed it with your instructor. You must complete a Request for a Reread of a Final Exam form and submit it to the Student Affairs Office (MESC). For an electronic version of the form, please see: http://www.mcgill.ca/engineering/current-students/undergraduate/courses-registration/exams-assessment/reassessment-grade.
You may request rereads for only one course per term, unless you obtain permission from the Student Affairs Office (MESC). Grades may be either raised or lowered as the result of a reread. A fee for each reread will be assessed directly to your McGill account if the result remains the same or is lowered. If the grade is raised, there is no charge.

Reread application deadlines:
Fall courses: last working day of March
Winter courses: last working day of July
Summer courses: last working day of November

Non-Engineering courses: Rereads in courses not in the Faculty of Engineering are subject to the deadlines, rules, and regulations of the relevant faculty.

f) Standings

In the Faculty of Engineering, a decision on the student's academic standing is determined on the basis of CGPA (Cumulative Grade Point Average), according to the criteria listed below. It is your responsibility to assess your academic standing by reviewing your MINERVA transcript at the end of each term once all final grades have been received.

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

Fall Term:

Satisfactory

-CGPA equal to 2.00 or greater (≥2.00)

Satisfactory Standing permits you to proceed with your studies under 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 and successfully completed.
- All other courses in which F grades were obtained must either be repeated successfully prior to graduation or be replaced by some alternative approved course and successfully completed before graduation.

Probationary

-CGPA less than 2.0 (< 2.0) and equal to or greater than 1.20 (≥ 1.20) or TGPA equal to or greater than 2.50 (≥ 2.50) and a CGPA of less than 2.0 (<2.0)

Probationary Standing permits you to proceed with your studies under the following conditions:

- must reduce your 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 TGPA of 2.50 or better in order to continue.
- whose TGPA is 2.50 or better, but whose CGPA is less than 2.00 may continue with your studies but will remain on Probationary Standing until such time your CGPA reaches 2.0.
- failure to achieve either the TGPA or CGPA requirements noted above will result in you being placed in "unsatisfactory Standing".
- you must consult a faculty or departmental advisor, before withdrawal deadlines, concerning your course selection.

Interim Unsatisfactory *

-CGPA less than 1.20 (< 1.20) or TGPA falls below 2.50 (< 2.50) and your CGPA is below 2.00 (<2.00)

Interim Unsatisfactory Standing permits you to proceed with your studies under the following conditions:

- must reduce your 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 TGPA of 2.50 or better in order to continue.
- whose TGPA is 2.50 or better, but whose CGPA is less than 2.00 may continue with your studies but will remain on Probationary Standing until such time your CGPA reaches 2.0.
- failure to achieve either the TGPA or CGPA requirements noted above will result in you being placed in "unsatisfactory Standing".
- you must consult a faculty or departmental advisor, before withdrawal deadlines, concerning your course selection.

*If you were in Unsatisfactory standing at any time during your previous academic studies and were readmitted to the Faculty of Engineering, you may not continue in your program and will be asked to withdraw from the Faculty of Engineering for a minimum of one term or permanently based on the conditions of your last letter of readmission. Courses for which you are currently registered in will be automatically deleted from your record.

Winter Term:

Satisfactory

-CGPA equal to 2.00 or greater (≥2.00)

Satisfactory Standing permits you to proceed with your studies under 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 and successfully completed.
- All other courses in which F grades were obtained must either be repeated successfully prior to graduation or be replaced by some alternative approved course and successfully completed before graduation.

Probationary

-CGPA less than 2.0 (< 2.0) and equal to or greater than 1.20 (≥ 1.20) or TGPA equal to

or greater than 2.50 (≥ 2.50) and a CGPA of less than 2.0 (<2.0)

Probationary Standing permits you to proceed with your studies under the following conditions:

- must reduce your 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 TGPA of 2.50 or better in order to continue.
- whose TGPA is 2.50 or better, but whose CGPA is less than 2.00 may continue with your studies but will remain on Probationary Standing until such time your CGPA reaches 2.0.
- failure to achieve either the TGPA or CGPA requirements noted above will result in you being placed in "unsatisfactory Standing".
- you must consult a faculty or departmental advisor, before withdrawal deadlines, concerning your course selection.

Unsatisfactory *

-CGPA less than 1.20 (< 1.20) or TGPA falls below 2.50 (< 2.50) and your CGPA is below 2.00 (<2.00)

Unsatisfactory Standing requires you to withdraw from the Faculty of Engineering for a minimum of one term.

*If you were in unsatisfactory standing at any time during your previous academic studies and were readmitted to the Faculty of Engineering, you may not continue in your program and will be asked to withdraw from the Faculty of Engineering for a minimum of one term or permanently based on the conditions of your last letter of readmission. Courses for which you are currently registered in will be automatically deleted from your record.

g) Readmission

To return to McGill after an absence from a Fall and/or Winter term of an academic year, you must submit an application for readmission using Minerva's Faculty Transfer/Readmission Menu (Minerva Main Menu/Student/Student Records Menu/Faculty Transfer / Readmission). In your application, state the reasons for your absence from the University and give a summary of your activities during that period using the comment section.

If you withdrew because of illness, you must provide the Student Affairs Office (MESC) with a medical note from a physician to support your application for readmission, stating that you are ready and able to resume studies.

For important deadlines regarding readmission, please see:
http://www.mcgill.ca/engineering/current-students/undergraduate/advising-programs/readmission-faculty-transfers

h) Summer Courses

Summer course offerings are published in the e-calendar and MINERVA in the early winter of the corresponding year. Normally very few engineering courses are offered. CHEM 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 an Academic

Adviser for any course that is to count for degree credit.

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

For more information about summer courses, please see: http://www.mcgill.ca/summer/

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.

VI. SPECIFIC PROGRAM REQUIREMENTS

A. GENERAL

a) Introduction

This Handbook states the rules applicable to students entering the first year of the program in September 2017 and January 2018 (CEGEP only).

b) Classification of Courses

The program includes several categories of courses:

l) Required Departmental courses
2) Technical Complementary (TC) courses
3) Required Non-departmental courses
4) Complementary Studies (CS)

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

c) Total and Distribution of Credit Requirements

See following pages.

LIST OF COURSES FOR THE B.ENG. DEGREE IN CHEMICAL ENGINEERING

REQUIRED COURSES

Non-Departmental Courses		**Course Credit**	
CHEM 212	Introductory Organic Chemistry 1	4	
CHEM 234	Topics in Organic Chemistry	3	
MATH 262	Intermediate Calculus	3	
MATH 263	Ordinary Differential Equations for Engineers	3	
MATH 264	Advanced Calculus for Engineers	3	
FACC 100	Introduction to the Engineering Profession	1	
FACC 250	Responsibilities of the Professional Engineer	0	
FACC 300	Engineering Economy	3	
FACC 400	Engineering Professional Practice	1	
COMP 208	Computers in Engineering	3	**24**

Chemical Engineering Courses			
CHEE 200	Chemical Engineering Principles 1	3	
CHEE 204	Chemical Engineering Principles 2	3	
CHEE 220	Chemical Engineering Thermodynamics	3	
CHEE 231	Data Analysis and Design of Experiments	3	
CHEE 291	Instrumentation and Measurement 1	4	
CHEE 310	Physical Chemistry for Engineers	3	
CHEE 314	Fluid Mechanics	3	
CHEE 315	Heat and Mass Transfer	3	
CHEE 35l	Separation Processes	3	
CHEE 360	Technical Paper	1	
CHEE 370	Elements of Biotechnology	3	
CHEE 380	Materials Science	3	
CHEE 390	Computational Methods in Chemical Engineering	3	
CHEE 400	Principles of Energy Conversion	3	
CHEE 401	Energy Systems Engineering	3	
CHEE 423	Chemical Reaction Engineering	3	
CHEE 440	Process Modelling	3	
CHEE 453	Process Design	4	
CHEE 455	Process Control	3	
CHEE 456	Design Project 1	3	
CHEE 457	Design Project 2	5	
CHEE 474	Biochemical Engineering	3	
CHEE 484	Materials Engineering	3	
CHEE 491	Instrumentation and Measurement 2	4	**75**

COMPLEMENTARY COURSES

Technical Complementary Courses (TC)	**Course Credit**
Courses to be selected from those approved by the Department (see list below)	**9**
Complementary Studies (CS)	**9**
9 credits from Group A and Group B of Faculty Announcement (see list below)	
TOTAL	**117**

d) Departmental Technical Complementary Courses

For up-to-date curriculum, please consult the University Calendar
The purpose of this requirement is to provide students with an area of specialization within the broad field of chemical engineering. Alternatively, students use the technical complementary courses (TCs) to increase the breadth of their chemical engineering training. Note that many of the technical complementary courses are offered only in alternate years. Students should, therefore, plan their TCs as far ahead as possible.

Group A: At least 3 credits from the following:

CHEE 301 Resource Recovery from Waste (3)
CHEE 511 Catalysis for sustainable fuels and chemicals (3) – *pending approval*
CHEE 515 Material Surfaces: A Biomimetic Approach+ (3)
CHEE 521 Nanomaterials and the Aquatic Environment+ (3)
CHEE 541 Electrochemical Engineering (3)
CHEE 543 Plasma Engineering (3)
CHEE 563 Biofluids and Cardiovascular Mechanics+ (3)
CHEE 582 Polymer Science & Engineering (3)
CHEE 584 Polymer Processing (3)
CHEE 585 Foundations of Soft Matter (3)
CHEE 587 Chemical Processing: Electronics Industry (3)
CHEE 591 Environmental Bioremediation (3)
CHEE 593 Industrial Water Pollution Control+ (3)
CIVE 430 Water Treatment and Pollution Control+ (3)
CIVE 521 Nanomaterials and the Aquatic Environment+ (3)
MECH 534 Air Pollution Engineering (3)
MECH 563 Biofluids and Cardiovascular Mechanics+ (3)
MIME 515 Material Surfaces: A Biomimetic Approach+ (3)

+ Students may choose only one course in each of the following sets:
- CHEE 515 or MIME 515
- CHEE 521 or CIVE 521
- CHEE 563 or MECH 563
- CHEE 593 or CIVE 430

Group B: Maximum 6 credits from the following:

BIEN 320 Molecular, Cellular and Tissue Biomechanics (3 credits)
BIEN 330 Introduction to Tissue Engineering (3 credits)
BIEN 340 Transport Processes in Biological Systems (3 credits)
BIEN 350 Biosystems and Control (3 credits)
BIEN 462 Engineering Principles in Physiological Systems (3 credits)
BIEN 510 Nanoparticles in the Medical Sciences (3 credits)
BIEN 520 High Throughput Bioanalytical Devices (3 credits)
BIEN 550 Biomolecular Devices (3 credits)
BIEN 570 Active Mechanics in Biology (3 credits)
BIOT 505 Selected Topics in Biotechnology (3 credits) *
BREE 325 Food Process Engineering (3 credits)
BREE 522 Bio-Based Polymers (3 credits)
CHEE 363 Projects Chemical Engineering 1 (2 credits) **
CHEE 494 Research Project and Seminar 1 (3 credits) **
CHEE 495 Research Project and Seminar 2 (4 credits) **
CHEE 496 Environmental Research Project (3 credits) **
CIVE 557 Microbiology for Environmental Engineering (3 credits)
MIME 470 Engineering Biomaterials (3 credits)
MIME 558 Engineering Nanomaterials (3 credits)

**** BIOT 505 can only be chosen by students taking the Minor in Biotechnology.***
**** Students may choose only one project course: CHEE 363, CHEE 494, CHEE 495, or CHEE 496 (see Section e for more information).***

Group C: The remaining credits, up to a maximum of 3, may be taken from other suitable undergraduate courses in the Faculty of Engineering at the 300-level or higher, with departmental permission.

e) Research Project Courses

Enrolment in a Research Project course (CHEE 363, CHEE 494, CHEE 495, or CHEE 496) requires a confirmation email sent by your supervisor to the UG coordinator (ugrad.chemeng@mcgill.ca). Once the confirmation is received the UG coordinator will provide you with the necessary override to register. Finding a professor who is willing to supervise a project is the responsibility of the student. Professors from other Departments can co-supervise projects, but the principal supervisor must be a professor in the Department of Chemical Engineering.

f) 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.

For course listings and regulations related to Complementary Studies (Impact of Technology on Society courses and Humanities and Social Sciences, Management Studies and Law courses), students should refer to the "Complementary Studies" section of the B. Eng. Chemical Engineering program requirements in the University e-calendar and the list below:

COMPLEMENTARY STUDIES FOR CHEMICAL ENGINEERING STUDENTS 2017-2018

9 credits of Complementary Studies (CS) are required in addition to the core courses of the chemical engineering program. Of these, 3 credits must be chosen from Group A "Impact of Technology on Society Courses" below. The remaining 6 credits must be taken from Group B "Humanities and Social Sciences, Management Studies and Law".

Group A - Impact of Technology on Society Courses

ANTH 212 (3) Anthropology of Development
BTEC 502 (3) Biotechnology Ethics and Society
CIVE 469 (3) Infrastructure and Society
ECON 225 (3) Economics of the Environments
ECON 347 (3) Economics of Climate Change
ENVR 201 (3) Society and Environment
GEOG 200 (3) Geographical Perspectives: World Environmental Problems
GEOG 203 (3) Environmental Systems
GEOG 205 (3) Global Change: Past, Present and Future
GEOG 302 (3) Environmental Management 1
MECH 526 (3) Manufacturing and the Environment
MGPO 440* (3) Strategies for Sustainability
MIME 308 (3) Social Impact of Technology
PHIL 343 (3) Biomedical Ethics
RELG 270 (3) Religious Ethics and the Environment
SOCI 235 (3) Technology and Society
SOCI 312 (3) Sociology of Work and Industry
URBP 201 (3) Planning the 21st Century City

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

Anthropology (ANTH)
Economics (any 200- or 300-level course excluding ECON 227 and ECON 337)
History (HIST)
Philosophy (excluding PHIL 210 and PHIL 310)
Political Science (POLI)
Psychology (excluding PSYC 204 and PSYC 305, but including PSYC 100)
Religious Studies (RELG)
School of Social Work (SWRK)
Sociology (excluding SOCI 350)

OR 3 credits from the following:

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

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

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

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

The above list is subject to revision; please see the Faculty of Engineering undergraduate section of the Undergraduate Programs, Courses and University Regulations for updates.

D. Curriculums

CEGEP Entry (September Admission)			
Semester 1 (Fall)		17	Prerequisites/Co-requisites
CHEE 200	Chemical Engineering Principles 1	3	-
CHEE 291	Instrumentation and Measurement 1	4	-
CHEM 212	Introductory Organic Chemistry 1	4	P - CHEM 110 or equivalent / C - CHEM 120 or equivalent
CHEE 231	Data Analysis and Design of Experiments	3	C - CHEE 291
MATH 262	Intermediate Calculus	3	P - MATH 141 or equivalent, MATH 133 or equivalent
Semester 2 (Winter)		16	Prerequisites/Co-requisites
CHEE 204	Chemical Engineering Principles 2	3	P - CHEE 200
CHEE 220	Chemical Engineering Thermodynamics	3	P - CHEE 200 / C - MATH 262
CHEM 234	Topics in Organic Chemistry	3	P - CHEM 212
COMP 208	Computers in Engineering	3	P - MATH 140, MATH 141 / C - MATH 133
FACC 100	Introduction to the Engineering Profession	1	-
MATH 263	Ordinary Differential Equations for Engineers	3	C - MATH 262
Semester 3 (Fall)		16	Prerequisites/Co-requisites
CHEE 314	Fluid Mechanics	3	P - CHEE 204 or BIEN 200/ C - MATH 264
CHEE 360	Technical Paper	1	-
CHEE 370	Elements of Biotechnology	3	-
CHEE 380	Materials Science	3	-
CHEE 390	Computational Methods in Chemical Engineering	3	P - CHEE 204, COMP 208, MATH 263 / C - MATH 264
FACC 250	Responsibilities of the Professional Engineer	0	P - FACC 100 or BREE 250
MATH 264	Advanced Calculus for Engineers	3	P - MATH 262 / C - MATH 263
Semester 4 (Winter)		18	Prerequisites/Co-requisites
CHEE 310	Physical Chemistry for Engineers	3	P - CHEE 220 or MIME 212 or BREE 301
CHEE 315	Heat and Mass Transfer	3	P - CHEE 314
CHEE 351	Separation Processes	3	P - CHEE 204, CHEE 220 / C - CHEE 315
CHEE 484	Materials Engineering	3	P - CHEE 380 / C - CHEE 315
CHEE xxx	Technical Complementary	3	-
CS	Complementary Studies Group B (HSSML) - 1	3	-
Semester 5 (Fall)		16	Prerequisites/Co-requisites
CHEE 400	Principles of Energy Conversion	3	P - CHEE 315, CHEE 390, CHEE 484
CHEE 423	Chemical Reaction Engineering	3	P - CHEE 310, CHEE 315
CHEE 453	Process Design	4	P - CHEE 315, CHEE 351
CHEE 474	Biochemical Engineering	3	P - CHEE 314, CHEE 370
FACC 300	Engineering Economy	3	-
Semester 6 (Winter)		17	Prerequisites/Co-requisites
CHEE 401	Energy Systems Engineering	3	P - CHEE 400
CHEE 440	Process Modelling	3	P - CHEE 423, MATH 264
CHEE 455	Process Control	3	P - CHEE 315, CHEE 351, CHEE 423 / C - CHEE 491
CHEE 456	Design Project 1	3	C - CHEE 453
CHEE 491	Instrumentation and Measurement 2	4	P - CHEE 231, CHEE 291, CHEE 315, CHEE 423 / C - CHEE 455
FACC 400	Engineering Professional Practice	1	P - FACC 100, FACC 250, and 60 program credits
Semester 7 (Fall)		17	Prerequisites/Co-requisites
CHEE 457	Design Project 2	5	P - CHEE 456
CHEE xxx	Technical Complementary	3	-
CHEE xxx	Technical Complementary	3	-
CS	Complementary Studies Group A (Impact)	3	-
CS	Complementary Studies Group B (HSSML) - 2	3	-
	Total credits:	**117**	

CEGEP Entry (January Admission)

Semester 1 (Winter)		14	Prerequisites/Co-requisites
CHEM 212	Introductory Organic Chemistry 1	4	P - CHEM 110 or equivalent / C - CHEM 120 or equivalent
MATH 262	Intermediate Calculus	3	P - MATH 141 or equivalent, MATH 133 or equivalent
MATH 263	Ordinary Differential Equations for Engineers	3	C - MATH 262
FACC 100	Introduction to the Engineering Profession	1	-
CS	Complementary Studies Group B (HSSML) - 1	3	-
Semester 2 (Fall)		16	Prerequisites/Co-requisites
CHEE 200	Chemical Engineering Principles 1	3	-
CHEE 231	Data Analysis and Design of Experiments	3	C - CHEE 291
CHEE 291	Instrumentation and Measurement 1	4	-
MATH 264	Advanced Calculus for Engineers	3	P - MATH 262 / C - MATH 263
CS	Complementary Studies Group B (HSSML) - 2	3	-
Semester 3 (Winter)		12	Prerequisites/Co-requisites
CHEE 204	Chemical Engineering Principles 2	3	P - CHEE 200
CHEE 220	Chemical Engineering Thermodynamics	3	P - CHEE 200 / C - MATH 262
CHEM 234	Topics in Organic Chemistry	3	P - CHEM 212
FACC 250	Responsibilities of the Professional Engineer	0	P - FACC 100 or BREE 250
COMP 208	Computers in Engineering	3	P - MATH 140, MATH 141 / C - MATH 133
Semester 4 (Fall)		13	Prerequisites/Co-requisites
CHEE 314	Fluid Mechanics	3	P - CHEE 204 or BIEN 200 / C - MATH 264
CHEE 360	Technical Paper	1	-
CHEE 370	Elements of Biotechnology	3	-
CHEE 380	Materials Science	3	-
CHEE 390	Computational Methods in Chemical Engineering	3	P - CHEE 204, COMP 208, MATH 263 / C - MATH 264
Semester 5 (Winter)		15	Prerequisites/Co-requisites
CHEE 310	Physical Chemistry for Engineers	3	P - CHEE 220 or MIME 212 or BREE 301
CHEE 315	Heat and Mass Transfer	3	P - CHEE 314
CHEE 351	Separation Processes	3	P - CHEE 204, CHEE 220 / C - CHEE 315
CHEE 484	Materials Engineering	3	P - CHEE 380 / C - CHEE 315
CHEE xxx	Technical Complementary	3	-
Semester 6 (Fall)		16	Prerequisites/Co-requisites
CHEE 400	Principles of Energy Conversion	3	P - CHEE 315, CHEE 390, CHEE 484
CHEE 423	Chemical Reaction Engineering	3	P - CHEE 310, CHEE 315
CHEE 453	Process Design	4	P - CHEE 315, CHEE 351
CHEE 474	Biochemical Engineering	3	P - CHEE 314, CHEE 370
FACC 300	Engineering Economy	3	-
Semester 7 (Winter)		17	Prerequisites/Co-requisites
CHEE 401	Energy Systems Engineering	3	P - CHEE 400
CHEE 440	Process Modelling	3	P - CHEE 423, MATH 264
CHEE 455	Process Control	3	P - CHEE 315, CHEE 351, CHEE 423 / C - CHEE 491
CHEE 456	Design Project 1	3	C - CHEE 453
CHEE 491	Instrumentation and Measurement 2	4	P - CHEE 231, CHEE 291, CHEE 315, CHEE 423 / C - CHEE 455
FACC 400	Engineering Professional Practice	1	P - FACC 100, FACC 250, and 60 program credits
Semester 8 (Winter)		14	Prerequisites/Co-requisites
CHEE 457	Design Project 2	5	P - CHEE 456
CHEE xxx	Technical Complementary	3	-
CHEE xxx	Technical Complementary	3	-
CS	Complementary Studies Group A (Impact)	3	-
	Total credits:	**117**	

non-CEGEP Entry (September Admission)

Semester 1 (Fall)		18	Prerequisites/Co-requisites
CHEM 110	General Chemistry	4	P - College level math and physics or instructor permission
MATH 133	Linear Algebra and Geometry	3	P - A course in functions
MATH 140	Calculus 1	3	P - High-school calculus
PHYS 131	Mechanics and Waves	4	C - Calculus course [MATH 140]
FACC 100	Intro to the Engineering Profession	1	-
CS	Complementary Studies Group B (HSSML) - 1	3	-
Semester 2 (Winter)		18	Prerequisites/Co-requisites
CHEM 120	General Chemistry 2	4	P - College level math and physics or instructor permission
MATH 141	Calculus 2	4	P - MATH 140
PHYS 142	Electromagnetism and Optics	4	P - PHYS 131 / C - MATH 141
CS	Complementary Studies Group A (Impact)	3	-
CS	Complementary Studies Group B (HSSML) - 2	3	-
Semester 3 (Fall)		17	Prerequisites/Co-requisites
CHEE 200	Chemical Engineering Principles 1	3	-
CHEE 291	Instrumentation and Measurement 1	4	-
CHEM 212	Introductory Organic Chemistry 1	4	P - CHEM 110 / C - CHEM 120
CHEE 231	Data Analysis and Design of Experiments	3	C - CHEE 291
MATH 262	Intermediate Calculus	3	P - MATH 141, MATH 133
Semester 4 (Winter)		18	Prerequisites/Co-requisites
CHEE 204	Chemical Engineering Principles 2	3	P - CHEE 200
CHEE 220	Chemical Engineering Thermodynamics	3	P - CHEE 200 / C - MATH 262
CHEM 234	Topics in Organic Chemistry	3	P - CHEM 212
COMP 208	Computers in Engineering	3	P - MATH 140, MATH 141 / C - MATH 133
MATH 263	Ordinary Differential Equations for Engineers	3	C - MATH 262
CHEE xxx	Technical Complementary	3	-
Semester 5 (Fall)		18	Prerequisites/Co-requisites
CHEE 314	Fluid Mechanics	3	P - CHEE 204 or BIEN 200/ C - MATH 264
CHEE 370	Elements of Biotechnology	3	-
CHEE 380	Materials Science	3	-
CHEE 390	Computational Methods in Chemical Engineering	3	P - CHEE 204, COMP 208, MATH 263 / C - MATH 264
FACC 250	Responsibilities of the Professional Engineer	0	P - FACC 100 or BREE 250
MATH 264	Advanced Calculus for Engineers	3	P - MATH 262 / C - MATH 263
FACC 300	Engineering Economy	3	-
Semester 6 (Winter)		18	Prerequisites/Co-requisites
CHEE 310	Physical Chemistry for Engineers	3	P - CHEE 220 or MIME 212 or BREE 301
CHEE 315	Heat and Mass Transfer	3	P - CHEE 314
CHEE 351	Separation Processes	3	P - CHEE 204, CHEE 220 / C - CHEE 315
CHEE 484	Materials Engineering	3	P - CHEE 380 / C - CHEE 315
CHEE xxx	Technical Complementary	3	-
CHEE xxx	Technical Complementary	3	-
Semester 7 (Fall)		18	Prerequisites/Co-requisites
CHEE 400	Principles of Energy Conversion	3	P - CHEE 315, CHEE 390, CHEE 484
CHEE 423	Chemical Reaction Engineering	3	P - CHEE 310, CHEE 315
CHEE 453	Process Design	4	P - CHEE 315, CHEE 351
CHEE 456	Design Project 1	3	C - CHEE 453
CHEE 474	Biochemical Engineering	3	P - CHEE 314, CHEE 370
FACC 400	Engineering Professional Practice	1	P - FACC 100, FACC 250, and 60 program credits
CHEE 360	Technical Paper	1	-
Semester 8 (Winter)		18	Prerequisites/Co-requisites
CHEE 401	Energy Systems Engineering	3	P - CHEE 400
CHEE 440	Process Modelling	3	P - CHEE 423, MATH 264
CHEE 455	Process Control	3	P - CHEE 315, CHEE 351, CHEE 423 / C - CHEE 491
CHEE 457	Design Project 2	5	P - CHEE 456
CHEE 491	Instrumentation and Measurement 2	4	P - CHEE 231, CHEE 291, CHEE 315, CHEE 423 / C - CHEE 455
	Total credits:	**143**	

g) Minors

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

Minors available in Chemical Engineering:

- Arts Minor
- Biomedical Engineering Minor
- Biotechnology Minor
- Chemistry
- Computer Science Minor
- Construction Engineering and Management Minor
- Economics Minor
- Environmental Engineering Minor
- Minor in Environment
- Management Minor
- Materials Engineering Minor
- Mathematics Minor
- Minor in Mining
- Minor in Nanotechnology - *New*
- Physics Minor
- Software Engineering Minor
- Technological Entrepreneurship Minor

For complete descriptions of these minors, see the Faculty of Engineering's "Minor Programs" page in the University e-Calendar.

In addition, students are permitted to register for Minor Concentrations offered through the various departments in the Faculty of Arts. Students are advised to seek approval from the specific department in the Faculty of Arts as well as MESC, prior to embarking on these Minors.

Students intending to register for a Minor Concentration must complete a Course Authorization Form and submit it to MESC. If subsequently the plan is changed, the student must submit a new Course Authorization Form indicating their desire to drop the Minor. Failure to do so may result in delayed graduation.

In order to register for one of the four minors offered by the Faculty of Management, non-Management students must complete and submit the corresponding application (http://www.mcgill.ca/desautels/minors) to the B.Com Student Affairs Office, Bronfman 110).

Students are responsible for verifying that they have met the requirements of their Minor before applying for graduation. Students must see an advisor from the department through which their Minor is offered.

h) Course Exemptions for CEGEP Graduates

New students who have completed CEGEP level courses in Organic I and/or II (http://www.mcgill.ca/students/transfercredit/prospective/cegep) and who are entering the Department of Chemical Engineering in Fall 2017, or who intend to complete the Minor program in Biomedical Engineering (http://www.mcgill.ca/study/2017-2018/faculties/engineering/undergraduate/programs/bachelor-engineering-beng-minor-biomedical-engineering), will have two options available to satisfy these program requirements.

Option 1: You may write a McGill Placement Examination in Organic Chemistry I and II (CHEM 212, CHEM 222 (234) at McGill University in August 2017. Should you register to take one or both of these McGill Placement Examinations, and successfully achieve a passing grade in said course/s you will

- **be granted full transfer credit on the basis of this examination/s;**
- **have the transfer credit reflected on your McGill transcript;**
- **have your program credit requirements decreased to reflect these transfer credits.**

OR

Option 2: You must register for CHEM 212 Organic and CHEM 234 Organic II during your studies at McGill as outlined in your program requirements.

For application procedures and details related to the time, place and location of the McGill Placement Examinations please VIEW the following link and register accordingly (http://www.mcgill.ca/students/exams/science).

B. TRANSFERS

For information on transfer credit for French Baccalaureate, International Baccalaureate exams, Advanced Placement exams, Advanced Levels and Science Placement Exams, see http://www.mcgill.ca/students/transfercredit/prospective/ and select your basis of admission.

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 should note that a minimum of 60 credits completed at McGill University are required for a McGill degree.

While registered in the B.Eng. program, core courses may not be taken outside the department. For the Department of Chemical Engineering, core courses include all required courses (departmental and non-departmental) as well as technical complementary courses (departmental). Engineering students are permitted to take any Freshman (U0) or General Complementary (Impact or Humanities and Social

Sciences) course outside McGill. For additional information, please see the Student Exchanges and Study Away page on the Faculty of Engineering website.

C. 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. Students must complete and submit the Request for Transfer Credit or Exemption form to MESC (Rm. 22, Frank Dawson Adams Building).

A request can only be considered granted and recorded when it appears on the student's McGill transcript or their Degree Evaluation report.

D. IMPORTANT NOTES FOR STUDENTS

Do your degree evaluations early!!!!

Students are responsible to ensure that they meet the course requirements for the B.Eng. They must complete the appropriate check list **(p. 27 to 29)** and demonstrate to their Academic Adviser that they meet the degree requirements in each category of courses e.g. core, technical, minor program, complementary courses, etc.

Students are advised to 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.

76-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 76-credit program outlined on the following page considers that the student has passed MATH 315 and the equivalent courses for MATH 262/264; that the student has 9 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 Complementary Courses with 6 credits of previously taken 400-level (or equivalent) science courses approved by a Chemical Engineering Academic Adviser.

Faculty of Science Degree Requirements		Chemical Eng. Requirements	
1. Chemistry	Cr	1. Chemistry	Cr
CHEM 212 Intro Org Chem.	4	CHEM 212 Intro Organic Chem.1	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 223 and CHEM 253 and CHEM 243 and CHEM 263)	6		
2. Mathematics **		2. Mathematics	
MATH 222 Calculus III	3	MATH 262 Inter. Calculus	3
MATH 315 or MATH 325	3	MATH 263 Ord. Diff. Eqs. Eng.	3
MATH 314 or MATH 248	3	MATH 264 Adv. Calculus Eng.	3
3. Computer Science		3. Computer Science	
COMP 250 Intro. Comp. Sci.	3	COMP 208 Comp. in Eng.	3
4. Courses in Complementary Studies	*9	4. Complementary Studies Courses	9
5. Courses with Identifiable Lab. Component not Counted		5. Chemical Engineering CHEE 291 Instrum. Meas. 1	4
6. 400-Level Science Courses		6. Technical Complementary Courses	6
		Total Credit Allowance	**41**

* 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 41 credits as detailed above, the following 76-credit program applies, provided there are no timetable conflicts.

Semester 1 (Fall)		15	Prerequisites/Co-requisites
CHEE 200	Chemical Engineering Principles 1	3	-
CHEE 314	Fluid Mechanics	3	P - CHEE 204 or BIEN 200/ C - MATH 264
CHEE 370	Elements of Biotechnology	3	-
CHEE 231	Data Analysis and Design of Experiments	3	C - CHEE 291
FACC 300	Engineering Economy	3	-
Semester 2 (Winter)		14	Prerequisites/Co-requisites
CHEE 204	Chemical Engineering Principles 2	3	P - CHEE 200
CHEE 220	Chemical Engineering Thermodynamics	3	P - CHEE 200 / C - MATH 262
CHEE 315	Heat and Mass Transfer	3	P - CHEE 314
CHEE 351	Separation Processes	3	P - CHEE 204, CHEE 220 / C - CHEE 315
CHEE 360	Technical Paper	1	-
FACC 100	Introduction to the Engineering Profession	1	-
Semester 3 (Fall)		16	Prerequisites/Co-requisites
CHEE 380	Materials Science	3	-
CHEE 423	Chemical Reaction Engineering	3	P - CHEE 310, CHEE 315
CHEE 453	Process Design	4	P - CHEE 315, CHEE 351
CHEE 390	Computational Methods in Chemical Engineeri	3	P - CHEE 204, COMP 208, MATH 263 / C - MATH 264
CHEE 400	Principles of Energy Conversion	3	P - CHEE 315, CHEE 390, CHEE 484
FACC 250	Responsibilities of the Professional Engineer	0	P - FACC 100 or BREE 250
Semester 4 (Winter)		19	Prerequisites/Co-requisites
CHEE 401	Energy Systems Engineering	3	P - CHEE 400
CHEE 440	Process Modelling	3	P - CHEE 423, MATH 264
CHEE 455	Process Control	3	P - CHEE 315, CHEE 351, CHEE 423 / C - CHEE 491
CHEE 456	Design Project 1	3	C - CHEE 453
CHEE 491	Instrumentation and Measurement 2	4	P - CHEE 231, CHEE 291, CHEE 315, CHEE 423 / C - CHEE 455
CHEE 484	Materials Engineering	3	P - CHEE 380 / C - CHEE 315
Semester 5 (Fall)		12	Prerequisites/Co-requisites
CHEE 474	Biochemical Engineering	3	P - CHEE 314, CHEE 370
CHEE 457	Design Project 2	5	P - CHEE 456
FACC 400	Engineering Professional Practice	1	P - FACC 100, FACC 250, and 60 program credits
CHEE xxx	Technical Complementary	3	-
	Total credits:	**76**	

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 41, may be allowed in their case.

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 Academic 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.

GRADUATION REQUIREMENTS
(117 CREDIT PROGRAMME - CEGEP Students)

CEGEP Entry

Name: **ID:**

Admission requirements (if any):

Advanced credits / exemptions:

Course		Cr	Mark	Notes
CHEE 200	Chemical Engineering Principles 1	3		
CHEE 204	Chemical Engineering Principles 2	3		
CHEE 220	Chemical Engineering Thermodynamics	3		
CHEE 231	Data Analysis and Design of Experiments	3		
CHEE 291	Instrumentation and Measurement 1	4		
CHEE 310	Physical Chemistry for Engineers	3		
CHEE 314	Fluid Mechanics	3		
CHEE 315	Heat and Mass Transfer	3		
CHEE 351	Separation Processes	3		
CHEE 360	Technical Paper	1		
CHEE 370	Elements of Biotechnology	3		
CHEE 380	Materials Science	3		
CHEE 390	Computational Methods in Chemical Engineering	3		
CHEE 400	Principles of Energy Conversion	3		
CHEE 401	Energy Systems Engineering	3		
CHEE 423	Chemical Reaction Engineering	3		
CHEE 440	Process Modelling	3		
CHEE 453	Process Design	4		
CHEE 455	Process Control	3		
CHEE 456	Design Project 1	3		
CHEE 457	Design Project 2	5		
CHEE 474	Biochemical Engineering	3		
CHEE 484	Materials Engineering	3		
CHEE 491	Instrumentation and Measurement 2	4		
CHEE xxx	Technical Complementary	3		
CHEE xxx	Technical Complementary	3		
CHEE xxx	Technical Complementary	3		
CHEM 212	Introductory Organic Chemistry 1	4		
CHEM 234	Topics in Organic Chemistry	3		
MATH 262	Intermediate Calculus	3		
MATH 263	Ordinary Differential Equations for Engineers	3		
MATH 264	Advanced Calculus for Engineers	3		
FACC 100	Introduction to the Engineering Profession	1		
FACC 250	Responsibilities of the Professional Engineer	0		
FACC 300	Engineering Economy	3		
FACC 400	Engineering Professional Practice	1		
COMP 208	Computers in Engineering	3		
CS	Complementary Studies Group B (HSSML) - 1	3		
CS	Complementary Studies Group B (HSSML) - 2	3		
CS	Complementary Studies Group A (Impact)	3		
Minor in:				
Free complementaries (if any):				

GRADUATION REQUIREMENTS
(143 CREDIT PROGRAMME - non-CEGEP Students)

non-CEGEP Entry

Name: **ID:**

Admission requirements (if any):

Advanced credits / exemptions:

Course		Cr	Mark	Notes
CHEM 110	General Chemistry	4		
CHEM 120	General Chemistry 2	4		
MATH 133	Linear Algebra and Geometry	3		
MATH 140	Calculus 1	3		
MATH 141	Calculus 2	4		
PHYS 131	Mechanics and Waves	4		
PHYS 142	Electromagnetism and Optics	4		
CHEE 200	Chemical Engineering Principles 1	3		
CHEE 204	Chemical Engineering Principles 2	3		
CHEE 220	Chemical Engineering Thermodynamics	3		
CHEE 231	Data Analysis and Design of Experiments	3		
CHEE 291	Instrumentation and Measurement 1	4		
CHEE 310	Physical Chemistry for Engineers	3		
CHEE 314	Fluid Mechanics	3		
CHEE 315	Heat and Mass Transfer	3		
CHEE 351	Separation Processes	3		
CHEE 360	Technical Paper	1		
CHEE 370	Elements of Biotechnology	3		
CHEE 380	Materials Science	3		
CHEE 390	Computational Methods in Chemical Engineeri	3		
CHEE 400	Principles of Energy Conversion	3		
CHEE 401	Energy Systems Engineering	3		
CHEE 423	Chemical Reaction Engineering	3		
CHEE 440	Process Modelling	3		
CHEE 453	Process Design	4		
CHEE 455	Process Control	3		
CHEE 456	Design Project 1	3		
CHEE 457	Design Project 2	5		
CHEE 474	Biochemical Engineering	3		
CHEE 484	Materials Engineering	3		
CHEE 491	Instrumentation and Measurement 2	4		
CHEE xxx	Technical Complementary	3		
CHEE xxx	Technical Complementary	3		
CHEE xxx	Technical Complementary	3		

Continued on the next page…..

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Course		Cr	Mark	Notes
CHEM 212	Introductory Organic Chemistry 1	4		
CHEM 234	Topics in Organic Chemistry	3		
MATH 262	Intermediate Calculus	3		
MATH 263	Ordinary Differential Equations for Engineers	3		
MATH 264	Advanced Calculus for Engineers	3		
FACC 100	Introduction to the Engineering Profession	1		
FACC 250	Responsibilities of the Professional Engineer	0		
FACC 300	Engineering Economy	3		
FACC 400	Engineering Professional Practice	1		
COMP 208	Computers in Engineering	3		
CS	Complementary Studies Group B (HSSML) - 1	3		
CS	Complementary Studies Group B (HSSML) - 2	3		
CS	Complementary Studies Group A (Impact)	3		
Minor in:				
Free complementaries (if any):				