

Faculty of Engineering and Computer Science

71.10	FACULTY OF ENGINEERING AND COMPUTER SCIENCE	71.70	DEPARTMENT OF COMPUTER SCIENCE AND SOFTWARE ENGINEERING
71.20	BENG	71.80	COMPUTATION ARTS AND COMPUTER SCIENCE
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71.60	ENGINEERING COURSE DESCRIPTIONS		

Section 71

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Sir George Williams Campus

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Student Academic Services, Room: EV 002.125; 514-848-2424, ext. 3055

Mission Statement

The Faculty of Engineering and Computer Science is dedicated to providing high-quality and comprehensive undergraduate and graduate curricula, to promoting high-calibre research, and to the development of the profession of engineering and computer science in an ethical and socially responsible manner. We strive to prepare graduates to solve real world problems with excellent professional skills leading to superior career opportunities.

71.10 FACULTY OF ENGINEERING AND COMPUTER SCIENCE

71.10.1 Programs Offered

The following programs are offered in the Faculty of Engineering and Computer Science:

1. BEng degrees in Aerospace, Building, Civil, Computer, Electrical, Industrial, Mechanical, and Software Engineering.
2. BCompSc degree.
3. Minor in Computer Science.
4. Certificate in Science and Technology.

The requirements for the programs are different, and the appropriate section in the following pages must be consulted for each.

71.10.2 Admission Requirements

General admission requirements are listed in §13

In addition, the following specific requirements exist for the various programs. Applicants should specify their choice of program on their application.

Students entering the Faculty of Engineering and Computer Science are presumed to have acquired some familiarity with computers and programming, either through a course or through time spent working with a personal or other computer.

APPLICANTS FROM QUEBEC INSTITUTIONS

Successful completion of a two-year pre-university Cegep program is required, including the specific courses in the appropriate profile, as follows:

1. **BEng (all programs)**
BCompSc (Computer Systems Option)

Cegep Profile

Mathematics 201 —
103 or NYA, 105 or NYC, 203 or NYB
Physics 203 —
101 or NYA, 201 or NYB
Chemistry 202 —
101 or NYA

2. **BCompSc (Computer Applications, Computation Arts, Computer Games, Information Systems, Mathematics and Statistics, Software Systems, and Web Services and Applications Options; and Minor in Computer Science)**

Cegep Profile 10.12

Mathematics 201 —
103 or NYA, 105 or NYC, 203 or NYB

Applications from graduates of Cegep technology programs will also be considered. Program requirements for successful applicants will be determined on an individual basis.

APPLICANTS FROM OUTSIDE QUEBEC

Academic qualifications presented by students applying from institutions outside Quebec should be comparable to those expected of students applying from within Quebec.

Where the pre-university education is shorter than in Quebec, students may be considered for admission to the first year of the Extended Credit Program. (See §13.3.2 to 13.3.6, §71.20.2, and 71.70.3)

MATURE ENTRY

Admission requirements are listed in §14.

71.10.3 Academic Regulations

Students should refer to the Academic Regulations of the University in §16.

Definitions

Assessable courses: *all record entries of courses* listed in this Concordia Calendar for which a grade point value is specified in §16.1.11. However, any course which is a requirement for admission to a program offered by the Faculty of Engineering and Computer Science will not be counted unless specifically listed on the student's admission letter.

Dean's Office: appropriate member of the Dean's Office, normally the Associate Dean, Student Academic Services.

Program of Study: course requirements in effect at the time of the latest admission or readmission to a program, for example, BEng (Civil) or BCompSc (Information Systems), including modifications on an individual basis as specified or approved in writing by the Dean's Office, or the Student Request Committee of Faculty Council.

Grade Points: as defined in §16.1.11 of this Calendar.

Assessment Grade Point Average (AGPA): as defined in §16.3.10 of this Calendar.

Academic Year: a period which begins with a summer session followed by a regular session (fall and winter).

Objectives

The objectives of these regulations are:

- a) to ensure that the Faculty can certify that all of its graduates are qualified to enter their profession, and
- b) to ensure that students can, with the assistance or intervention of the Faculty, assess themselves objectively and plan programs of study designed to meet their individual needs.

Grading System

See §16.1.11 for the Concordia grading system.

NOTE: Although a "C-" grade is designated as satisfactory, an AGPA of at least 2.00 for the assessment period is required for acceptable standing in the Faculty of Engineering and Computer Science.

Regulations

1. Students' standings are assessed at the end of each academic year providing they have registered for at least 12 credits subsequent to their previous assessment, or in the case of a first assessment, subsequent to their admission to a program of study.
Standings of students who have attempted less than 12 credits since their last assessment are assessed as follows:
 - a) The standings of potential graduates are determined on the basis that these credits constitute an extension of the last assessment period.
 - b) The standings of other students are determined at the end of the academic year in which they have attempted a total of at least 12 credits since their last assessment.
2. Students' standings are determined according to the following criteria.

Acceptable Standing:

An AGPA of at least 2.00 for the assessment period.

Students in acceptable standing may proceed subject to the following conditions: any failing grade must be cleared by repeating and passing the failed course; or in the case of an elective, by replacing the failed course by an alternative within the same group of electives and passing this course. Any variation must be approved by the Dean's Office.

Conditional Standing:

An AGPA of at least 1.50 but less than 2.00 for the assessment period.

Students in conditional standing may proceed subject to the following conditions.

- a) They must successfully repeat all courses in which failing grades were obtained, or replace them by alternatives approved by the appropriate member of the Dean's Office in consultation with the student's department.
- b) They must repeat or replace by approved alternatives at least one-half of those courses in which they obtained grades in the "D" range. The specific courses to be repeated will be determined by the Dean's Office in consultation with the student's department.
- c) Courses to be taken may be specified by the Dean's Office. In no case will the number exceed five per term for full-time students and two per term for part-time students.
- d) They must obtain acceptable standing at the time of their next assessment.

Failed Standing:

Failure to meet the criteria for acceptable or conditional standing, or remaining in conditional standing over two consecutive assessments.

Failed students may apply for readmission through the Dean's Office – Student Academic Services. If readmitted, they will be placed on academic probation. The Application for Readmission form is available in the Student Academic Services Office or can be obtained from the Student Academic Services website located at: concordia.ca/encs.

Failed students should consider the following deadline when they submit their application. Full consideration will be given to all applications that have been received by the deadline indicated on the Application for Readmission form. Every attempt will be made to inform students regarding the status of their application by August 1 of each year.

Students who are in failed standing and have been absent from their program for 30 consecutive months should refer to §71.10.4 since a new application for admission is required.

No students will be readmitted in the winter term or summer session.

Readmitted students are subject to the following regulations:

- a) They must successfully repeat all courses in which failing grades were obtained, or replace them by alternative courses approved by the appropriate member of the Dean's Office in consultation with the relevant Department.
- b) They must repeat or replace, by approved alternatives, all of the courses in which they obtained grades in the "D" range for the academic year in which they were assessed as failed, and any previous outstanding repeats. The specific courses to be repeated will be determined by the Dean's Office.
- c) They must successfully complete all courses they are required to repeat prior to further registration in other courses.
- d) They must return to acceptable standing at the time of their next assessment.
- e) Other conditions may be applied as deemed appropriate by the Dean's Office.

Availability of Supplemental Examinations

Supplemental examinations are not offered in the Faculty of Engineering and Computer Science other than in the courses COMP 201 and COMP 218.

71.10.4 Registration Regulations

1. Students in the Faculty of Engineering and Computer Science who have been absent from their program for six consecutive terms or more will be officially withdrawn from their program by the Faculty and must submit a new application for admission through the Office of the Registrar.

2. Except for students registered for the co-operative format, the maximum load in the summer sessions is 14 credits, with no more than eight credits in either of its terms.
3. Students from outside the Faculty of Engineering and Computer Science must obtain permission in writing from the Student Academic Services Office prior to registering in any 400-level courses offered by the Faculty.

Prerequisites

1. Students are responsible for ensuring that they have successfully completed all prerequisites to a course before attempting to register for the course.
2. Students must complete all 200-level courses required for their program before registering for any 400-level courses.
3. All 200-level courses within the program which are prerequisites for other courses must be completed with a C- or higher. A 200-level course in which a student has obtained a D+ or lower must be repeated before attempting a course for which it is a prerequisite.
4. A student who has registered for a course without satisfactorily completing all prerequisites may be withdrawn from the course.

71.10.5 Graduation Regulations

Students must satisfy all program requirements, be in acceptable standing, and have a minimum final graduation GPA of 2.00. The standings of potential graduates who have attempted less than 12 credits since their last assessment are determined on the basis that these credits constitute an extension of the last assessment period.

Students who fail to meet acceptable standing but meet conditional standing will have the following options:

- a) register for 12 credits and meet the criteria for acceptable standing;
- b) register for fewer than 12 credits. In this case, standing will be determined on the basis that these credits constitute an extension of the last assessment period.

The maximum number of credits obtained as an Independent student which may be transferred into programs offered by the Faculty of Engineering and Computer Science is as follows:

BEng and BCompSc: 30

71.10.6 Availability of Programs

Full-time students in the Engineering program normally follow an eight-term sequence. In general, introductory level courses are offered in both day and evening. Subject to the Registration Regulations in §71.10.4 above, a student may register on a part-time basis. Further information on sequencing may be found in the Undergraduate Program Guide issued by the Dean's Office.

71.10.7 Curriculum Requirements and Course Sequences

All students in Engineering programs are required to meet the Canadian Engineering Accreditation Board (CEAB) standards. Students are required to graduate having met the substantial equivalent of the curriculum in force in the winter term prior to degree conferral. It is the student's responsibility to ensure that their course selection meets the program requirements for their graduation. To accommodate this requirement, students are provided with course equivalencies and course sequences on the Student Academic Services website at concordia.ca/encs/students/sas.

Engineering students should follow the outlined cohort sequence for their program. Failure to do so may result in scheduling problems, the unavailability of courses, or ultimately an extension in the time period to complete their program.

71.10.8 The Co-operative Format

A limited number of high ranking students entering the first year of the regular program leading to the BCompSc degree and the BEng degree are permitted to undertake their studies in the co-operative format in conjunction with the Institute for Co-operative Education. See §24.

The academic content is identical to that of the regular programs; however, in order to continue their studies in the co-operative format in the Faculty of Engineering and Computer Science, or to graduate from one of its programs as members of the Institute for Co-operative Education, students must satisfy the following conditions:

- (i) maintain an assessment grade point average (AGPA)* of at least 2.50 in their program;
- (ii) be assigned a grade of pass or pass with distinction for each of the three work-term courses (CWTE or CWTC). Under certain conditions, a student may be placed on co-op probation status. For details, refer to §24;
- (iii) remain in their designated work-study sequence. Any deviations must have prior approval by the director of the Institute for Co-operative Education in consultation with Student Academic Services. For additional information, please refer to §24.

*The AGPA is calculated over all courses in the program in the manner described in §16.3.10.

Regulations for Work Terms

1. Successful completion of the work terms shown in the Co-op Schedule indicated in §24 is a prerequisite for graduation as a member of the Institute for Co-operative Education.

2. Work-term job descriptions are screened by the co-op coordinator. Only jobs approved by the Institute for Co-operative Education will be accepted as being suitable for the work-term requirements.
3. Work-term jobs are full-time employment normally for a minimum of 12 consecutive weeks (14 to 16 weeks preferably).
4. A work-term report must be submitted each work term on a subject related to the student's employment. This report must be submitted to the Institute for Co-operative Education on or before the deadline shown in §24. Grammar and content of work-term reports are evaluated by the Institute for Co-operative Education and the technical aspects are evaluated by the co-op program director responsible. Evidence of the student's ability to gather material relating to the job, analyze it effectively, and present it in a clear, logical, and concise form is required in the report.
5. The required communication component consists of an oral presentation on a technical subject or engineering task taken from the student's work environment. The presentation will be given on campus in a formal setting after students have returned to their study term. A written summary is also required. Guidelines for the preparation of this oral presentation are provided in the Co-op Student Handbook.
6. Work terms will be evaluated for satisfactory completion. Assessment is based upon the employer evaluation of performance, the work-term report and communication component which together constitute the job performance as related to the whole work term. Students must pass all required components. The grade of pass with distinction, pass, or failure will be assigned to each of the work-term courses. A failing grade will result in the student's withdrawal from the Institute for Co-operative Education.

71.10.9 Concordia Institute for Aerospace Design and Innovation (CIADI)

The Concordia Institute for Aerospace Design and Innovation (CIADI) promotes awareness and provides leading-edge know-how among Engineering students and practising engineers in design and innovation, particularly in the field of aerospace, with emphasis on its multidisciplinary nature. While some members of the Institute may enter their field upon completion of their degree, the initiation into research provided to CIADI members is helpful to students who wish to pursue graduate studies in the field of aerospace.

Membership

Students accepted to the Institute are selected from among the top second- and third-year undergraduate students in the Faculty of Engineering and Computer Science, and work on collaborative design and research projects over several terms of Engineering studies. Students are supervised by Concordia faculty members and receive mentoring from industry representatives working in the field. Eligible projects are credited by the Faculty as capstone design projects.

Registration

Students accepted to the Institute register in one or two zero-credit courses, IADI 301 and 401, in order to remain affiliated with CIADI. A pass or fail is awarded for these courses. Students who receive a pass for IADI 301 may continue in CIADI. Students who successfully complete one or both courses, IADI 301 and 401, will be recognized as full members of the Institute and this recognition will also appear on their official transcript. Students who successfully complete both IADI 301 and 401 will also have this recognition appear on their diploma. Students who fail IADI 301 will not be allowed to continue with CIADI and shall receive no acknowledgement of this activity on their official transcript.

71.20 BENG

71.20.1 Curriculum for the Degree of BEng

The University offers programs leading to the degree of BEng in the fields of Aerospace, Building, Civil, Computer, Electrical, Industrial, Mechanical, and Software Engineering.

The BEng degrees in Aerospace, Computer, Electrical, Industrial, Mechanical and Software Engineering require completion of a minimum of 120 credits. The BEng degrees in Building and Civil Engineering consist of 119 credits. Program requirements comprise a group of required courses with a group of elective courses which allow students to select part of their program to provide some depth in an area of specialization (their "option") according to their particular interests, or breadth in the general field of their chosen discipline.

In their final undergraduate year, students with high standing may apply for permission through the Dean's Office to register for a limited number of graduate courses offered by the Faculty in lieu of some courses in the undergraduate program.

Engineering students wishing to register for a minor must notify the Student Academic Services Office of the Faculty of Engineering and Computer Science in writing. Those students must comply with the regulations of the Faculty governing the chosen minor and must meet the following requirements:

1. Students may not apply for a minor until they have completed a minimum of 20 credits in their Engineering program.
2. Students pursuing a minor must maintain a cumulative GPA of 2.70 in their program courses. Students who fall below a 2.70 GPA in their program courses are required to withdraw from the minor.
3. A maximum of three credits earned to meet the minor requirements may be counted towards the Engineering degree.

Successful completion of a BEng program requires hard work and considerable dedication on the part of each student. Courses are presented with the expectation of an average of about two hours of "outside" work for each lecture hour and about one-half hour of "outside" work for each hour spent in the laboratory for all programs of study.

71.20.2 Extended Credit Program

Students admitted to an Extended Credit Program under the provisions of §13.3.2 or §13.8.1 must successfully complete the requirements of a specific program, as set out in §71.30 to §71.55 and in §71.70.9, plus the following courses:

MATH 202³, 203³, 204³, 205³

PHYS 204³, 205³

CHEM 205³

Six credits chosen from courses in the humanities and social sciences. ESL courses and courses that focus on the acquisition of a language may not be used to meet this requirement.

Students in the Extended Credit Program (ECP) or the Mature Entry Program (MEP) (see §14.2.3) or any other students who have been assigned credits in Humanities and Social Sciences must select those credits from the two corresponding lists in §71.110. Those credits cannot be chosen from the list of Other Complementary Studies.

71.20.3 Accreditation by the Canadian Council of Professional Engineers

All Engineering programs in the Faculty have been designed to meet the criteria of the Canadian Engineering Accreditation Board. These programs are assessed at regular intervals according to the rules and procedures of the Board. Graduates of accredited programs are qualified for membership in the Ordre des ingénieurs du Québec, or its equivalent in any other provincial jurisdiction.

71.20.4 Membership in the Ordre des ingénieurs du Québec

The Ordre des ingénieurs du Québec (oig.qc.ca) currently admits graduates of the BEng curricula in Building, Civil, Computer, Electrical, Industrial, Mechanical, and Software Engineering, as members. Quebec law requires that candidates seeking admission to provincially recognized Quebec professional corporations (such as the Ordre des ingénieurs du Québec) possess an appropriate knowledge of the French language.

A person is deemed to have that knowledge who:

- (1) has taken at least three years of full-time instruction given in French at the secondary or post-secondary level;
- (2) has passed the French mother tongue examinations in the fourth or fifth grade of the secondary level;
- (3) has obtained in Quebec, a secondary-school certificate for the 1985-86 school year or later.

In all other cases, a person must obtain a certificate delivered by the Office québécois de la langue française (oqlf.gouv.qc.ca) or hold a certificate defined as equivalent by regulation of the Government.

71.20.5 Degree Requirements

To be recommended for the degree of BEng, students must satisfactorily complete the courses of the Engineering Core as well as those specified for their particular program in subsequent sections in accordance with the graduation requirements in §71.10.5.

Engineering Core		Credits
ELEC 275	Principles of Electrical Engineering	3.50 (2)
ENCS 282	Technical Writing and Communication	3.00
ENGR 201	Professional Practice and Responsibility	1.50
ENGR 202	Sustainable Development and Environmental Stewardship	1.50 (1)
ENGR 213	Applied Ordinary Differential Equations	3.00
ENGR 233	Applied Advanced Calculus	3.00
ENGR 301	Engineering Management Principles and Economics	3.00
ENGR 371	Probability and Statistics in Engineering	3.00
ENGR 391	Numerical Methods in Engineering	3.00 (3)
ENGR 392	Impact of Technology on Society	3.00 (4)
	General Education elective	3.00 (5)
		<hr/>
		30.50

NOTES:

- (1) The Engineering Core credits for students in the Building Engineering program are reduced from 30.5 credits to 29 credits since Building Engineering students are not required to take this course in their program.
- (2) The Engineering Core credits for students in the Mechanical, Industrial and Aerospace Engineering programs are reduced from 30.5 credits to 27 credits since Mechanical, Industrial and Aerospace Engineering students are not required to take this course in their program. Students in Electrical and Computer Engineering shall replace ELEC 275 with ELEC 273.
- (3) Students in Software Engineering may replace ENGR 391 with COMP 361.
- (4) Students in Building Engineering shall replace ENGR 392 with BLDG 482.
- (5) Students must select three General Education elective credits from one of the lists in §71.110. Students in Industrial Engineering shall take ACCO 220 as their General Education elective.

71.20.6 General Education Elective

All Engineering students must complete three credits of General Education. This course may be chosen from courses listed in §71.110.

Please note the following:

- 1) Prior to registering, students who do not have any specified prerequisites for a General Education elective course must obtain permission of the relevant Department.
- 2) An ESL course or an introductory course that deals with the acquisition of a language will not be considered as a General Education elective.
- 3) Should students wish to take a General Education elective course not listed above, they must receive written permission from the Student Academic Services Office of the Faculty of Engineering and Computer Science prior to taking the course.

71.20.7 Writing Skills Requirement

The Faculty of Engineering and Computer Science is committed to ensuring that its students possess good writing skills. Hence, every student in an undergraduate degree program is required to demonstrate competence in writing English or French prior to graduation.

All students admitted to the Faculty of Engineering and Computer Science as of September 2001 must meet the writing skills requirement. To do this, students must either pass the Engineering Writing Test or complete ENCS 272 with a grade of C- or higher. Please note the successful completion of the course ENCS 272 fulfills the Faculty writing skills requirement; however, it cannot be used for credit in any ENCS degree or certificate program.

Newly admitted students are strongly encouraged to meet the requirement very early in their program (fall term of first year for students starting in September or winter term of first year for students starting in January) in order to avoid the risk of delayed graduation should remedial work prove necessary. The Engineering Writing Test is especially designed to address the writing skills typically demanded of engineers. Students who are required to take ESL courses should meet the writing skills requirements in the term following completion of their ESL courses.

All ESL and English/French language courses taken to satisfy this requirement are in addition to Engineering program requirements.

71.20.8 Industrial Experience and Reflective Learning Courses

Students employed full-time in an engineering position during their non-study terms may have this Industrial Experience recorded on their official transcript and student record, provided they successfully complete the Reflective Learning course associated with this work term.

Industrial Experience work terms will be coded as ENGR 107, 207, and 307, and the associated Reflective Learning courses will be coded as ENGR 108, 208, and 308 respectively.

Students may only register for these courses with the permission of the Faculty.

The Industrial Experience terms ENGR 107, 207, and 307 carry no credit value and are used to indicate that the student is on an Industrial Experience term.

The ENGR 108, 208, and 308 Industrial Experience Reflective Learning courses are worth three credits and are marked on a pass/fail basis. They are above and beyond the credit requirements of the student's program and are not transferable nor are they included in the full- or part-time assessment status.

Students studying for a co-op work term or CIADI term should not register for these Industrial Experience and Reflective Learning courses.

71.20.9 Certificate in Science and Technology

The Certificate in Science and Technology is a non-degree program that caters to students who wish to prepare for admission to a degree program in engineering or computer science. It is not intended for students who wish to prepare for admission to a science program.

The certificate requires the successful completion of 30 credits. The grade in each course must be C or better for the course to count towards the certificate. A GPA of 2.00 must be maintained to remain in the certificate program.

Students enrolled in the certificate program may request a transfer into a degree program in the Faculty of Engineering and Computer Science after the completion of at least 18 credits with a minimum GPA of 2.50 in the certificate program.

For advising assistance, students should contact Student Academic Services at 514-848-2424, ext. 3055 or 3057.

Admission Requirements

Students who have a DEC or satisfy out-of-province (see §13.3.2) or international (see §13.3.6) admissions criteria may be considered for admission, based on their academic profile, age, experience and potential.

Independent students wishing to enter the certificate program must be in good standing. Students may transfer up to 12 credits into the certificate program. The credits that may be so transferred are determined by the University at the point of entry into the program. Programs for individual students can be designed in consultation with an academic advisor at Student Academic Services.

Structure of the Certificate (30 credits)

Students must successfully complete all the courses in the Mathematics and Basic Science course section before registering for any Engineering and Computer Science courses.

Mathematics and Basic Science Courses (18 credits)		<i>Credits</i>
MATH 203	Differential and Integral Calculus I	3.00
MATH 204	Vectors and Matrices	3.00
MATH 205	Differential and Integral Calculus II	3.00
PHYS 204	Mechanics	3.00
PHYS 205	Electricity and Magnetism	3.00
ENGR 213	Applied Ordinary Differential Equations	3.00
		18.00

Engineering and Computer Science Courses

Students must complete at least 12 credits from the following list of courses:

		<i>Credits</i>
BCEE 371	Surveying	3.00
BLDG 212*	Building Engineering Drawing and Introduction to Design	3.00
CIVI 212*	Civil Engineering Drawing and Introduction to Design	3.00
COEN 212	Digital Systems Design I	3.50
COEN 231*	Introduction to Discrete Mathematics	3.00
COEN 243*	Programming Methodology I	3.00
COEN 311	Computer Organization and Software	3.50
COMP 228*	System Hardware	3.00
COMP 232*	Mathematics for Computer Science	3.00
COMP 248*	Object-Oriented Programming I	3.50
COMP 249	Object-Oriented Programming II	3.50
ELEC 264	Signals and Systems I	3.00
ELEC 273	Basic Circuit Analysis	3.50
ENGR 233	Applied Advanced Calculus	3.00
ENGR 242	Statics	3.00
ENGR 243	Dynamics	3.00
ENGR 301	Engineering Management Principles and Economics	3.00
INDU 211	Introduction to Production and Manufacturing Systems	3.00
INDU 330	Engineering Management	3.00
MECH 211	Mechanical Engineering Drawing	3.50
MECH 215*	Programming for Mechanical and Industrial Engineers	3.50
MECH 313	Machine Drawing and Design	3.00
SOEN 228*	System Hardware	4.00

*Students cannot receive credits for both BLDG 212 and CIVI 212; COMP 228 and SOEN 228; COEN 231 and COMP 232; COEN 243 and COMP 248; COEN 243 and MECH 215; COMP 248 and MECH 215.