

Faculty of Engineering, Architecture and Science PROGRAMS AND ACADEMIC DEPARTMENTS

COMPUTER SCIENCE

Degree Awarded: Bachelor of Science (BSc)

Administered by the School of Computer Science

ADMISSION INFORMATION

Administered by the School of Computer Science and The G. Raymond Chang School of Continuing Education.

All applicants to the program must have the following qualifications: A and C, or B and C.

ADMISSION:

A. O.S.S.D. with six Grade 12 U/M courses, including Grade 12 U courses in: English, Advanced Functions (MH-F4U), one of Physics (SPH4U), or Chemistry (SCH4U), or Biology (SBI4U), and either Calculus and Vectors (MCV4U) or Mathematics of Data Management (MDM4U). Calculus and Vectors (MCV4U) is the preferred mathematics course.

OR

B. Ability to meet the Ryerson Mature Student Guidelines.

AND

C. Meet one of the following:

- a university degree (obtained within the last 10 years) in mathematics, science or engineering with a minimum GPA of 2.0; **or**
- a three year college diploma (obtained within the last 10 years) in computer science with a GPA of 3.0 (only specific Ontario college programs will be considered. Contact Undergraduate Admissions and Recruitment for details); **or**
- eight or more Ryerson continuing education credits in Computer Science courses (completed within the last 10 years) with equivalents in the full-time Bachelor of Science, Computer Science program, and completed with a minimum grade of 'C' in each course.

NOTES:

1. ENG4U/EAE4U is the preferred English.
2. Physics is the recommended Grade 12 U Science.
3. The grade(s) required in the subject prerequisites (normally in the 65-70 percent range) will be determined subject to competition.
4. Students applying for advanced standing will be assessed on an individual basis to determine transfer credits that they will be given.
5. Some students may wish to transfer from the part-time to the full-time Computer Science degree program. Only students who have completed all of the courses (or equivalent) in the first two years of the full-time program will be eligible for this program change.
6. Subject to competition, candidates may be required to present averages/grades above the minimum.

PROGRAM OVERVIEW

Ryerson's Bachelor of Science in Computer Science Part-time Program is designed for individuals who are currently employed and do not have the opportunity to commit to a full-time education schedule. It is intended primarily for students who have some prior post-secondary education in computer science or related program in addition to the high school admission requirements. The academic content of the program is identical to the current full-time degree program in Computer Science, but will be modified to allow some substitutions to be drawn from existing continuing education courses. Some courses that are not available in the evening may be offered in the late afternoon period.

The Bachelor of Science (Computer Science) program is designed to produce graduates who can work effectively as software practitioners in the wide variety of professional areas in the computing industry. Students are trained to be multilingual in the programming areas that are currently in demand. They are given a practical treatment of both systems programming and applications programming. This combination will satisfy future career requirements in areas where a technical knowledge of all phases of software in a given application is a major advantage. Through courses in electronics and hardware/software technology, students gain knowledge of the hardware/software interface which is becoming essential to many microcomputer applications. An optional thesis in fourth year allows higher-ranking students the opportunity to work on projects representative of assignments encountered in industry.

Students in the Computer Science program get a lot of exposure to: Networked environments, Web-based applications, Client-server applications, Database design, Software Engineering and Compiler design.

The skills acquired by our students make them very desirable by the computing industry. Employment opportunities for graduates include positions in computer science bureaus, consulting firms, engineering departments and virtually all organizations that have computer installations.

FULL-TIME DEGREE PROGRAM

The School of Computer Science and The G. Raymond Chang School of Continuing Education offers this curriculum on a full-time basis as well. Please refer to the 2011-2012 Full-Time Undergraduate Calendar.

Normally, Computer Science courses completed more than eight years ago, do not qualify for transfer credit.

Optional Specialization in Management Sciences

Students who opt for this specialization will gain a solid foundation in management science courses, specifically tailored to better prepare them for a career in engineering or applied science management or for graduate studies in management related specializations (e.g. MBA). Students must complete all first year courses and obtain CLEAR Standing to be eligible to enroll in this specialization.

Furthermore, in order to continue taking courses within the specialization, students must maintain their CLEAR Standing. Students' CGPAs will continue to be calculated based only on their required program courses and separate

CGPAs will be computed for courses in the specialization. In order to have the specialization designation reflected on their degrees, students must successfully complete all six courses in the specialization and achieve a CGPA of 2.0 or more before graduation.

Courses within the optional specialization cover four major areas in management science: Strategic Engineering Management, Operations Management/Operations Research, Financial Sciences, and Organizational Sciences. Required courses include: Entrepreneurship & Innovation Management, Managerial Accounting, Operations Management, and Organization Design & Dynamics. Elective courses span the following: Investment Analysis, Management Information Systems, Operations Research, and Project Management.

Required courses: EMS 201, EMS 202, EMS 204, EMS 303, ECN 801.

Elective courses (select one): EMS 203, EMS 302, EMS 304.

Courses are offered in the Spring/Summer term. All required courses are prerequisites to the corresponding elective courses. For example EMS 202 is a prerequisite to EMS 302. Additional prerequisites may be required. See the course description pages for details.

Course Identification

Part-time courses are administered by either the program department or The G. Raymond Chang School of Continuing Education. The mode of delivery is not reflected in this calendar. Continuing education courses are listed in your enrollment information package and are identified by with a 'C' prefix (e.g., CACC100). These identifiers are for internal use only and do not affect the equivalency.

Program Co-ordinators

For further information on this program please contact:

Alireza Sadeghian (416) 979-5000 ext. 6961 or
Marcos Santos (416) 979-5000 ext. 7062.

Liberal Studies

Students must take two lower level liberal studies courses and four upper level liberal studies courses to graduate.

Minors

Students may pursue any Minor offered by Ryerson, and are eligible for only one Minor. Please refer to the Minors Policy section of this calendar for further information on individual Minor requirements and restrictions.

The G. Raymond Chang School of Continuing Education Certificates

Undergraduate students wishing to pursue a continuing education certificate program should be aware of possible restrictions. Please refer to the Curriculum Advising website at www.ryerson.ca/curriculumadvising for complete details.

Bachelor of Science COMPUTER SCIENCE

1st SEMESTER

Common to both Co-operative and Regular Program

REQUIRED:

CPS 109	Computer Science I
MTH 110	Discrete Mathematics I
MTH 207	Calculus and Computational Methods I

REQUIRED GROUP 1: One course from the following:

BLG 143	Biology I
CHY 103	General Chemistry I
PCS 110	Units and Vectors

LIBERAL STUDIES: One course from [Table A](#).

2nd SEMESTER

Common to both Co-operative and Regular Program

REQUIRED:

CPS 209	Computer Science II
CPS 393	Introduction to C and UNIX
MTH 210	Discrete Mathematics II
MTH 310	Calculus and Computational Methods II

LIBERAL STUDIES: One course from [Table A](#).

3rd SEMESTER

Common to both Co-operative and Regular Program

REQUIRED:

CMN 300	Communication in the Computer Industry
CPS 213	Computer Organization I
CPS 305	Data Structures
CPS 311	Object Oriented Programming and Design
MTH 108	Linear Algebra

4th SEMESTER

Common to both Co-operative and Regular Program

REQUIRED:

CPS 310	Computer Organization II
CPS 406	Introduction to Software Engineering
CPS 590	Introduction to Operating Systems
GMS 200	Introduction to Global Management
MTH 304	Probability and Statistics I

Co-operative Program - Available to Full-time Students Only

In addition to the regular curriculum, students must complete WKT 103, WKT 203, WKT 303, WKT 403, and WKT 503 prior to graduation. The department may waive the requirement for WKT 503. WKT (Work Term) courses are offered in the Fall, Winter and Spring/Summer semesters, and are graded on a pass/fail basis.

5th SEMESTER

Common to both Co-operative and Regular Programs

REQUIRED:

- CPS 510 Database Systems I
- CPS 633 Computer Security
- CPS 706 Introduction to Data Communications
- CPS 721 Artificial Intelligence I

LIBERAL STUDIES: One course from [Table B](#).

Co-operative Program - Available to Full-time Students Only

In addition to the regular curriculum, students must complete WKT 103, WKT 203, WKT 303, WKT 403, and WKT 503 prior to graduation. The department may waive the requirement for WKT 503. WKT (Work Term) courses are offered in the Fall, Winter and Spring/Summer semesters, and are graded on a pass/fail basis.

6th SEMESTER

Common to both Co-operative and Regular Programs

REQUIRED:

- CPS 506 Comparative Programming Languages
- CPS 615 Theory of Parsing
- CPS 616 Advanced Algorithms

LIBERAL STUDIES: One course from [Table B](#).

PROFESSIONALLY-RELATED: One course from Mathematics Group in [Table I](#).

Co-operative Program - Available to Full-time Students Only

In addition to the regular curriculum, students must complete WKT 103, WKT 203, WKT 303, WKT 403, and WKT 503 prior to graduation. The department may waive the requirement for WKT 503. WKT (Work Term) courses are offered in the Fall, Winter and Spring/Summer semesters, and are graded on a pass/fail basis.

7th SEMESTER

Common to both Co-operative and Regular Programs

LIBERAL STUDIES: One course from [Table B](#).

PROFESSIONALLY-RELATED: Four courses from [Table I](#).

Co-operative Program - Available to Full-time Students Only

In addition to the regular curriculum, students must complete WKT 103, WKT 203, WKT 303, WKT 403, and WKT 503 prior to graduation. The department may waive the requirement for WKT 503. WKT (Work Term) courses are offered in the Fall, Winter and Spring/Summer semesters, and are graded on a pass/fail basis.

8th SEMESTER

Common to both Co-operative and Regular Programs

LIBERAL STUDIES: One course from [Table B](#).

PROFESSIONALLY-RELATED: Four courses from [Table I](#).

Co-operative Program - Available to Full-time Students Only

In addition to the regular curriculum, students must complete WKT 103, WKT 203, WKT 303, WKT 403, and WKT 503 prior to graduation. The department may waive the requirement for WKT 503. WKT (Work Term) courses are offered in the Fall, Winter and Spring/Summer semesters, and are graded on a pass/fail basis.

PROFESSIONALLY-RELATED TABLE I

A **total of nine courses** is required between 5th and 8th semesters. A minimum of **one** to a maximum of **three** courses must be taken from the Mathematics Group, a minimum of **five** to a maximum of **seven** courses must be selected from the Computer Science Group, and a minimum of **one** to a maximum of **three** courses must be selected from the Engineering/Science/Business Group.

Computer Science Group

- CPS 40A/B* Thesis
- CPS 511 Computer Graphics
- CPS 520 Computer Assisted Instruction/Learning
- CPS 530 Component-Based Programming for the Web
- CPS 606 Advanced Computer Organization
- CPS 607 Autonomous Mobile Robotics
- CPS 610 Database Systems II
- CPS 613 Human-Computer Interaction
- CPS 621 Introduction to Multimedia Systems
- CPS 630 Web Applications
- CPS 707 Software Verification and Validation
- CPS 710 Compilers and Interpreters
- CPS 711 Introduction to CAD/CAM
- CPS 720 Artificial Intelligence II
- CPS 730 Web Technology and Performance Measurements
- CPS 731 Software Engineering I
- CPS 750 Telecomm Networks: Wireless Systems
- CPS 801 Operating Systems
- CPS 811 Distributed Systems and Networks
- CPS 812 Advanced Compilers and Interpreters
- CPS 813 Human-Robot Interaction
- CPS 815 Analysis of Algorithms
- CPS 820 Knowledge Based Systems
- CPS 831 Software Engineering II
- CPS 832 Mainframe Systems
- CPS 840 Selected Topics in Computer Science
- CPS 841 Advanced Topics in Computer Science
- CPS 842 Information Retrieval and Web Search
- CPS 843 Digital Image Computing

(Continued)

CPS 844 Data Mining
 CPS 845 Extreme Programming and Agile Processes

Engineering/Science/Business Group

ACC 100 Introductory Financial Accounting
 ACC 333 Core Concepts of Accounting
 ACC 406 Introductory Management Accounting
 ACC 414 Intermediate Accounting I
 BLG 143 Biology I
 BLG 151 Microbiology I
 BLG 311 Cell Biology
 BLG 400 Genetics
 CHY 102 General Chemistry
 CHY 213 Analytical Chemistry I
 CHY 223 Analytical Chemistry II
 CHY 381 Physical Chemistry I
 CMN 288 Promotional Comm in New Media Contexts
 CMN 305 Strategic Public Relations in Prof Comm
 CMN 306 Risk and Crisis Communication
 CMN 314 Professional Presentations
 CMN 450 Participatory Media and Communication
 ECN 301 Intermediate Macroeconomics I
 ECN 504 Intermediate Microeconomics I
 ECN 808 Economics of Technological Change
 EES 512 Electric Circuits
 ENT 500 New Venture Startup
 ENT 526 Entrepreneurial Behaviour and Strategy
 FIN 300 Managerial Finance I
 FIN 401 Managerial Finance II
 FIN 501 Investment Analysis I
 GEO 542 Introduction to Remote Sensing
 GMS 550 Business-to-Business e-Commerce
 ITM 350 Concepts of e-Business
 LAW 122 Business Law
 LAW 603 Advanced Business Law
 LAW 723 Issues in Information Technology Law
 MHR 405 Organizational Behaviour and Interpersonal Skills
 MHR 523 Human Resources Management
 MHR 640 Leadership
 MKT 100 Principles of Marketing
 PCS 224 Solid State Physics
 PCS 510 Fundamentals of Astrophysics
 RMG 910 Multi-Channel Retailing

Mathematics Group

MTH 330 Calculus and Geometry
 MTH 404 Probability and Statistics II
 MTH 430 Dynamic Systems Differential Equations
 MTH 500 Introduction to Stochastic Processes
 MTH 501 Numerical Analysis I
 MTH 503 Operations Research I
 MTH 540 Geometry
 MTH 601 Numerical Analysis II
 MTH 603 Operations Research II
 MTH 607 Graph Theory
 MTH 609 Number Theory
 MTH 640 Complex Analysis

MTH 710 Fourier Analysis
 MTH 712 Differential Equations II
 MTH 714 Logic and Computability
 MTH 718 Design and Codes
 MTH 814 Computational Complexity
 MTH 816 Cryptography
 MTH 817 Combinatorics
 MTH 820 Image Analysis

** Successful completion of all 5th and 6th semester courses is required prior to enrollment in CPS 40A/B. Co-operative students must achieve a cumulative grade point average of 2.50 to enroll for this course.*

FACULTY/ADVISORY COUNCIL

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Bell Canada Junior Choir

University of Toronto

A. TABRIZI*Lawyer*

Intellectual Property Technology

Ted Rogers School of Management**PROGRAMS AND ACADEMIC DEPARTMENTS****BUSINESS MANAGEMENT**

Degree Awarded: Bachelor of Commerce (BComm)

Administered by the Ted Rogers School of Hospitality and Tourism Management

ADMISSION INFORMATION

Administered by the Ted Rogers School of Business Management

DEGREE: Four years of study following Grade 12 U/M graduation.

All applicants to the program must have the following qualifications: A and C, or B and C.

A. O.S.S.D. with six Grade 12 U/M courses, including Grade 12 U courses in: English and Mathematics (one of Grade 12 U Advanced Functions (MHF4U), Calculus and Vectors (MCV4U) or Mathematics of Data Management (MDM4U)).**OR****B.** Ability to meet Ryerson's Mature Student Guidelines.**AND****C.** Completion of at least one certificate program from the Business Management area taken through The G. Raymond Chang School of Continuing Education, or seven individual courses from the Bachelor of Commerce (Business Management) program taken through The G. Raymond Chang School of Continuing Education, or equivalent qualifications from other post-secondary institutions.**NOTES:**

1. The cumulative grade point average required for admission each year is determined on the basis of competition. Candidates are encouraged to present cumulative grade point averages of 2.67 (B-) or higher to maximize their chances for admission consideration on a competitive basis.
2. The grade(s) required in the subject prerequisites (normally in the 70 percent range) will be determined subject to competition.
3. ENG4U/EAE4U is the preferred English.
4. Grade 12 U Advanced Functions (MHF4U) or Grade 12 U Calculus and Vectors (MCV4U) are the preferred Mathematics courses.

DIRECT ENTRY PROGRAM

The Ted Rogers School of Business Management, Ryerson University will accept graduates of three-year Ontario College of Applied Arts and Technology (CAAT) Business Administration Diplomas into the third year of the Business Management program.

College graduates are required to complete all third and