



# *Electrical Engineering with Computer Science*

## *Department of Electrical and Computer Engineering*

Electrical Engineering concerns the harnessing of electrical energy for human benefit. Use of electrical energy is very versatile, and thus electrical engineering covers a broad range of applications. Examples of such applications include telecommunications, digital electronics, computers, robots, electric motors, generators of all sizes, electric power distribution systems, electric cars, etc. In recent years, the computer has become an integral part of many of these areas to the point where knowledge of computer systems and associated software is mandatory for the electrical engineer. This is especially true where the use and development of computational tools form a substantial part of the task at hand. To prepare students for careers that require good knowledge of electrical hardware and software, a concurrent degree program in Electrical Engineering and Computer Science is offered.

The B.E.Sc. in Electrical Engineering is a four year program while the B.Sc. with a Major in Computer Science is of three years duration. However, some courses can be counted towards both degrees and the end result is that a program has been established which allows the student to graduate with both degrees in five years. Students take the common first year of Engineering courses. After second year, for the next three years, a combination of courses from the third and fourth years of the B.E.Sc. degree and the second and third years of the B.Sc. degree are taken depending on timetabling and prerequisites.

The combination of qualifications in both Electrical Engineering and Computer Science provides an excellent opportunity for students interested in this particular aspect of the profession. Such qualified graduates are much in demand from many organizations covering a wide range of industrial, manufacturing and general business activity. The curriculum for the Electrical Engineering program is unchanged. The subject matter covered in Electrical Engineering includes electric circuits, electronics, controls, digital signal processing, microprocessors, electromagnetics, digital logic plus a variety of elective courses at the fourth year level which allow the student to pursue topics of interest within the overall electrical engineering framework. The content of the Computer Science degree is related to the fundamentals of the discipline and includes courses in computer organization, algorithms and data structures, operating systems and computer networks.

### ***Admission and Program Structure***

In order to be eligible to enter the Major in Computer Science a minimum mark of 60% in each of: Applied Math 1413 and Engineering Science 1036a/b or Computer Science 1026a/b and 65% in Computer Science 1037a/b or 1027a/b, is required. Students may enter Year 2 of the Computer Science module only after completion of Year 2 of the concurrent program. In order to be considered for the concurrent program students must apply and be admitted to the Computer Science module by the Office of the Dean of the Faculty of Science after completion of the required prerequisite courses. At least 8 of the courses counted towards the B.Sc. degree must be taken from the offerings of the Faculty of Science. In addition students must take 1.0 course from each of Category A and Category B (see calendar for listing of course categories). As well, 2.0 designated essay courses must be taken (Eng Sci 2211F/G and Eng Sci 4498F/G will count as 1.0 of the essay requirement). A maximum of 10.0 courses may be double tied to both degrees. Computer Science 3305a/b and 3307a/b/y will be counted as two 0.5 fourth year technical electives in the B.E.Sc. degree program. The final course selection must be approved in consultation with both the Faculty of Engineering and the Faculty of Science.



## ***Electrical Engineering with Computer Science cont'd***

***First year Engineering program*** (2010-2011): Applied Math 1413, Eng Sci 1050, Physics 1026, Applied Math 1411a/b, Chemistry 1024a/b, Eng Sci 1021a/b, Eng Sci 1022a/b/y, Eng Sci 1036a/b, 1.0 non-technical elective.

***Second year Engineering program*** (2011-2012): Applied Math 2415, Computer Science 1037a, ECE 2205a, ECE 2277a, ECE 2240a, Eng Sci 2211F, ECE 2231b, ECE 2233b, ECE 2236b, ECE 2241b, MME 2234b.

***Third year Engineering program:*** Applied Math 3415a, ECE 3330a, ECE 3332a, ECE 3337a, ECE 3370a, Stat Sci 2141a, ECE 3331b, ECE 3333b, ECE 3336b, ECE 3375b, 0.5 non-technical elective taken from the approved list.

***Fourth year Engineering program:*** Business 2299, ECE 4416, ECE 4429a, ECE 4437a, Eng Sci 4498G, five 0.5 technical electives. (Note: Comp Sci 3305a/b and 3307a/b/y are used as two 0.5 fourth year technical so only three additional 0.5 technical electives are required for the B.E.Sc. degree.)

*See current Academic Calendar for technical electives in the Electrical Engineering program. Electives must be chosen from the approved list. Some technical electives may not be offered in a given academic year. A maximum of two Computer Science half-courses at the 3000-level or higher from the list can be used as technical electives for students registered in the concurrent degree program in Computer Science. CS 3305a/b and CS 3307a/b/y will be used in this program.*

### ***Major in Computer Science Module:***

(This module cannot be completed in a single year because of prerequisites. The 3000-level Computer Science courses require the 2000-level Computer Science courses as prerequisites, so this must be taken into consideration. This module, therefore, will take at least two years to complete after having taken Computer Science 1027a or 1037a.)

- Computer Science 2208a/b
- Computer Science 2209a/b
- Computer Science 2210a/b
- Computer Science 2211a/b
- Computer Science 2212a/b/y
- Math 2155a
- Computer Science 3305a/b
- Computer Science 3307a/b/y
- 2.0 additional courses from: Math 2156b, 3000-level Computer Science half courses

*Note: This document is for guideline purposes only. Once a student is admitted to the concurrent program, they will receive an outline from the Faculty of Science detailing the courses which will be used for the B.Sc. degree.*