Master of Applied Science in Computer Science

The Program

The MASc in Computer Science is a course-based Masters (full-time) completed over a period of a 16 months or 2 years of full-time study. It is open to students with an undergraduate major in Computer Science, or the equivalent combination of courses. Students have flexibility to select from numerous elective courses to design a Master's program that meets their professional interests and aspirations. Students will also have the option to complete an elective, project-based course in a workplace environment or a co-operative education option. The Department also offers a thesis-based, research-intensive Master's in Computer Science.

Admission Requirements

Incoming students should have a Bachelor's degree or equivalent with a major in Computer Science or related field. A degree in a related field is acceptable if the applicant shows evidence of a sufficient Computer Science background suitable for entry into the program as determined by the departmental Graduate Committee. The minimum background is the equivalent of all required courses of a StFX Major degree in Computer Science:

- Introduction to Programming: An introduction to computers, algorithms and programming. Topics include problem analysis, algorithm development, data representation, control structures, arrays, and file manipulation.

- Programming and Data Structures: this course covers memory management and data abstraction via classes and objects, and introduces the linear data structures lists, stacks, and queues. Structured programming is encouraged viamodular development.

- Advanced Data Structure: this course provides a deep investigation of foundational data structures and algorithms. Criteria for selecting appropriate data structures and algorithms for a given problem are presented. General problem solving is emphasized throughout the course. Specific topics include stacks, queues, lists, trees, searching, sorting, traversals, recursion, graphs, hashing, and complexity analysis.

- Computer Organization: this course covers basic computer arithmetic, architectures, and instruction sets; in-depth study of the central processing unit, memory and input/output organization; and microprogramming and interfacing.

- Database Management Systems: an introduction to the theory and practice associated with the design and implementation of databases. Topics include database models (relational model in detail), design, normalization, transactions, SQL, and a DBMS (Oracle). A project

involving the design and implementation of a database and the creation of an application with embedded SQL is a key component of the course.

- Discrete Structures: An introduction to sets, binary relations and operations; induction and recursion; partially ordered sets; simple combinations; truth tables; Boolean algebras and elementary group theory, with applications to logic networks, trees and languages; binary coding theory and finite-state machines.

- Operating Systems: an overview of operating systems functions: file management, CPU scheduling, process management, synchronization, memory management, and deadlock handling. UNIX will be introduced and used in this course.

- Matrix Algebra and Introduction to Statistics are recommended.

Students who have completed undergraduate programs in related disciplines (e.g. business information systems) may be eligible for admission. If the applicant is missing some prerequisite courses, acceptance may still be recommended as long as the student has sufficient CS background. Alternatively, a student might be required to take qualifying courses at the undergraduate level.

Proof of English language competency is required for applicants whose first language is not English or whose normal language of instruction has been other than English. The StFX English Language admission standard requires an IELTS score of 6.5 with no band below 6.

Admission is competitive. The minimum admission average is 70.

Program Structure

To complete the program, students must complete 10-11 courses. Each course is worth the equivalent of 3 credits, with the exception of *Computer Science Graduate Seminar*, which is a mandatory 6 credits and taken during the students first Fall semester, and *Project*, an optional experiential project-based course, which is also worth 6 credits. This means that to complete the program, students must complete 1 mandatory course and 9-10 elective courses totaling 36 credits.

The full-time pathways are as follows:

2-year pathway

	YEAR 1			**YEAR 2**		
Semester	Fall	Winter	Spring/Summer	Fall	Winter	Spring/Summer
Dates	September-December	January-April	May-August	September-December	January-April	May-August
Credits	**9**	**9**	**-**	**9**	**9**	**-**
						Total: 36 Credits

Condensed 16-month pathway

	YEAR 1			YEAR 2		
Semester	Fall	Winter	Spring/Summer	Fall	Winter	Spring/Summer
Dates	September-December	January-April	May-August	September-December	January-April	May-August
Credits	**9**	**9**	**9**	**9**	**-**	**-**
						Total: 36 Credits

Note: Students in both the 2-year and 16-month pathway graduate in May following their last semester of courses.

Available Courses

Below are the graduate-level courses available to students in the MASc. Not every course is offered every year. Students will also have the option of completing up to 3 credits of undergraduate courses (not listed below) or graduate courses outside of Computer Science to count towards their MASc in Computer Science degree.

1. *Real-Time System* 3 Credits
2. *High Performance Computing* 3 Credits
3. *Embedded Systems* 3 Credits
4. *Theory of Computing* 3 Credits
5. *Representations and Reasoning* 3 Credits
6. *Specification and Verification* 3 Credits
7. *Computational Logic* 3 Credits
8. *Artificial Intelligence* 3 Credits
9. *Matrix Computation* 3 Credits
10. *Data Mining and Machine Learning* 3 Credits
11. *Computer and Network Security* 3 Credits
12. *Computer Graphics* 3 Credits
13. *Advanced Database Systems* 3 Credits
14. *Constraint Processing and Heuristic Search* 3 Credits
15. *Big Data* 3 credits
16. *Advanced Data Analytics* 3 Credits
17. *Mobile Application Design and Development* 3 Credits
18. *Biomedical Computation* 3 Credits
19. *Evolutionary Computation* 3 Credits
20. *Software Engineering* 3 Credits
21. *Project* 6 Credits
22. *Computer Science Graduate Seminar* 6 Credits

Experiential Learning

One of the cornerstones of this program is the opportunities provided to students to engage in experiential learning, which will help students build confidence and gain experience in the field prior to entering the workforce. The program is structured so that real-world problems are embedded throughout the program (in the Computer Science Graduate Seminar course and throughout the elective courses). Additionally, students have the opportunity to complete CSCI 591- Project (listed above). This course provides real-life software development experience working by applying classroom learning in a real work context. Students work with an industry or academic partner and develop a computing a solution to a real-world problem. Students are responsible to manage the project from development to execution to presentation to the client and final review.