Computer Science
UNIVERSITY OF TORONTO

GRADUATE HANDBOOK 2016-2017

MSc PROGRAM

Introduction

This document describes the MSc degree program in the Department of Computer Science which consists of four graduate half-courses, selected to satisfy the MSc breadth requirement, and a major research paper. The major research paper should demonstrate the student's ability to:

a) carry out independent work in organizing existing concepts; and

b) suggest and develop new approaches to solving problems in a research area.

MSc Course Requirement

The course requirement covers the minimum number of courses required by a degree program. In order to obtain credit for a course, the student must obtain a mark of B- or higher. Students in the MSc program are required to complete four graduate half courses while registered in the program.

The only exception to this is for students who obtain a transfer credit for graduate courses which were completed but never used toward the requirements of another degree, diploma, certificate, or any other qualifications, (either at U of T or elsewhere), or as a Non-Degree Special Student. Students may transfer up to 1.0 Full Credit Equivalents (maximum two half-credit courses) to their current degree program.

MSc Breadth Requirement

The breadth requirement for our degree programs, MSc and PhD, ensure that students complete courses from a sufficiently wide range of topics within Computer Science. The Master's degree requires breadth in **methodologies**.

CS courses are classified into four methodologies and fifteen research areas based on their content. **Methodologies** are core problem-solving approaches and/or techniques and general tools emphasized in the course material, while **research areas** are aligned with the activities of the various research groups in the department.

The list of courses in each of the four methodologies is available in **Appendix A** of the Graduate Student Handbook: Overview of Programs**.**

Courses not found in the Appendices do not qualify for breadth credit, unless this has been approved and/or is explicitly noted in the course schedule posted by the Graduate Office. Students may request an assessment of breadth for courses from other departments by submitting evidence of the course content (e.g., a syllabus or copies of course notes) and the problem-solving approach or technique used in the course (e.g., copies of assignments or exams).

To satisfy the MSc breadth requirement the student must complete one course from at least three of the four methodology areas. As long as three of the methodology areas are satisfied, students may satisfy their fourth course requirement in various ways. Often, students choose to take a second course from one of the methodologies, leaving one methodology in which they take no courses. A student may also choose to take a graduate half-course from another department at U of T. Alternatively, students may choose one course from each of the four methodologies.

Graduate courses taken in fulfillment of a bachelor degree's course requirement (even graduate courses from our department) **do not count** towards the breadth requirements.

Graduate courses that were completed (either at U of T or elsewhere) **may qualify** for breadth credits. Students in this situation should submit a Plan of Study and Breadth Assessment form to the Graduate Office to seek the necessary approvals.

Below are brief descriptions of the four methodological areas.

The Four Methodologies

Methodology 1: Analysis and Computation in Discrete Models
The courses in this grouping focus on analysis of and algorithms for discrete mathematical structures, such as graphs, formal logic, and formal models of computation. The grouping includes courses that analyze computational limitations and discrete computation. These courses study and apply techniques from areas like probability, combinatorics, algebra, mathematical programming, and formal logic.

Methodology 2: Analysis and Computation in Continuous Models
The courses in this grouping focus on analysis of and algorithms for continuous mathematical models. Topics include the derivation of mathematical models, their properties, and computational techniques for approximating their solution. These courses study and apply techniques from areas like probability and statistics, computer graphics, computer vision, numerical analysis and machine learning.

Methodology 3: Building Software and Hardware Artifacts
This grouping includes courses that study the design and implementation of specific software or hardware artifacts. These courses expose students to the challenges in building artifacts such as computer-animated movies, computer aided design systems, databases, network protocols and devices, and simulations of large scale systems. Courses in this group typically have a significant project component where students build a substantial software or hardware artifact.

Methodology 4: Human-Centered and Interdisciplinary Computing
This grouping includes courses that study computational paradigms and methods within human - computer interaction and scientific domains outside traditional computational sciences. These courses typically have a cross-disciplinary component, involving fields such as the life sciences, linguistics, psychology, social sciences, and economics.

MSc Program Requirement

1. Plan of Study

Completed Plan of Study within 60 days of start of program, outlining courses the student intends to take, the breadth areas that will be satisfied, request for any transfer course/breadth credits for a University of Toronto program or program elsewhere. This document must be signed by you and your supervisor or faculty group representative.

2. Graduate Skills Seminars

Graduate Skills Seminars, in addition to taking courses and working on your research, there are other factors that are just as important to your success in grad school and in your future career. These include:

- **Knowing and Overcoming the challenges of doing research**
- **Planning your career path**
- **Networking with researchers in your community**
- **Efficient Time Management**
- **Interacting with your Supervisor**
- **Effectively Presenting your work**

These seminars are designed to provide you these crucial skills. Attendance is a mandatory component of your program, and will be checked. Besides presentations and talks, the seminar also gives you a chance to ask questions and get feedback on any topic you have regarding your graduate program experience. It is also an important community activity that connects graduate students in separate buildings, allowing for an exchange of experiences and ideas.

3. Supervisor Committee

Supervisory Committee Confirmation/Change form within 12 months from the start of your program. If you were admitted with a primary supervisor identified, this document will confirm the supervisory relationship. If you were admitted to a group, this document will confirm the identity of your primary supervisor.

Student Supervision

Every MSc student will be assigned a supervisor or research group prior to registration. The supervisor(s) will provide guidance on course selection, and research topic selection. All MSc students are required to consult frequently with their supervisors throughout their graduate studies, to report on their progress, ask questions and to obtain advice regarding their research project.

To be the primary or sole supervisor of an MSc student a faculty member must hold an associate or full membership in the School of Graduate Studies, with a specific graduate faculty appointment in the Department of Computer Science (i.e., a CS-SGS membership).

Faculty with an emeritus appointment in CS-SGS can also supervise MSc students, with approval from the Graduate Office before taking on any new supervisory role. When an MSc student is co-supervised, at least one of the co-supervisors must be identified as the primary supervisor (a.k.a. supervisor of record), and this faculty member must hold an associate, full, or emeritus membership in CS-SGS.

Occasionally the student-supervisor match is not productive. Any student who finds himself or herself in such a situation should discuss difficulties or concerns with the current supervisor. In many cases the reason for wanting the change is an issue which might be resolved by talking it out. If no resolution can be found, students who feel a need to change supervisor are welcome to seek advice from the Associate Chair, Graduate Studies. That said, the ability to switch supervisors depends on the availability of another faculty member to serve in this role. A Supervisory Committee Composition Form must be submitted to seek approval for change of supervision.

An excellent guide for making the most of the relationship between a student and their supervisor is provided by SGS. Take note of the checklists for both students and supervisors provided in Appendices 2 and 3 of the document. The Department of Computer Science supports the expectations stated in this guide and we encourage students to discuss these checklists with their supervisor.
uoft.me/SupervisionGuidelines

Time Limit to Degree Completion

There are two program time limits. The **departmental** time limit refers to the amount of time a student can receive guaranteed funding from the department. **SGS** time limits refer to the amount of time a student can register in their program.

1. For the MSc program the guaranteed funding period is 17 months.
2. The SGS time limit for the MSc is 36 months (3 years).

In exceptional circumstances, an MSc student who does not complete all the requirements for the degree within the SGS time limit may be considered for three (3) one-year extensions, up to a hard limit of 6 years for the MSc program.

The first two extension requests require the approval of the Associate Chair, Graduate Studies; the third requires approval from both the Associate Chair and the School of Graduate Studies.
Students who have serious health problems or personal circumstances that prevent them from making satisfactory progress are entitled to take a leave from graduate studies. Such leave effectively stops the clock for both funding and time to degree completion; on return, the student is entitled to resume at the point where they left, without penalty.

Dropping down to the MSc program from a PhD program

Students in the PhD-Direct program may choose to drop down to the MSc program, in which case they are required to complete the standard MSc program requirements (namely, the MSc course breadth requirements along with the MSc research paper). Similarly, students in the PhD program who do not have a previous MSc degree in Computer Science can drop down to our MSc program. In either case, the student's guaranteed funding period will be reduced to 17 months, the limit for the MSc program. If the student has been funded for more than 17 months, their funding will be terminated. A Program Transfer form must be submitted to make the switchover official.

Timeline

MONTHS IN PROGRAM	PROGRAM PROGRESS
1 to 2 months	Submit **Breadth Evaluation and Plan of Study Form** to Department Graduate Office.
12 months	**Coursework:** MSc students should manage their time so that at least 3 half-credit courses can be completed within the first 12 months, leaving at most one half-course for the remaining 5 months. **Research:** In addition to course work MSc students should select their research topic and begin their research within the first 12 months of their program. One way to achieve this is to take two half courses in the first term, and one in your second term. The first two half-courses should provide you with more in-depth knowledge of possible research areas and, by taking only one half-course in your second term, you should have time to begin making progress on your research. **Supervision Confirmation:** Submit this document as a confirmation of your supervisory relationship(s).
17 months Prepare to complete the degree or **transition** to PhD program if desired	**Coursework:** At least 4 graduate courses completed with a grade of B- or better; taken from at least 3 out of 4 methodologies. **Research Paper:** Two reader reports must be submitted to the Graduate Office at least two days prior to the SGS deadline. Request to **Convocate** form: Must be submitted at least two days prior to SGS deadline
Transition to PhD* (Please speak with the grad office in Fall if you intend to transition)	**PhD Supervisor:** At least one eligible reader must indicate that they will be the PhD supervisor for MSc students wishing to continue on to the PhD program. **Reference letters:** Letters in support of the PhD transition should be sent directly to the Graduate Office. **Timeframe:** SGS only allows students to change registration at the start of each academic term (September, January and May). **PhD Program Application:** Upon approval for transition, student must complete an SGS admission application and pay the application fee in order to register in the PhD program.
Graduation (Convocation)	Upon receipt of the Request to Convocate Form, completion of the course and breadth requirements, and approval of the research paper by two reviews, the Graduate Office will submit a Recommendation for Degree to SGS and the student's name will be added to the convocation roster. A graduation package will be sent to the student regarding convocation dates, tickets, etc.

***Funding Information for Transitioning Students:**
Approved students will be allowed to transition to the PhD program without interruption in their

departmental funding upon completion of their Master's. The only exception to this would be when a student is requesting dual registration, in which case PhD funding will commence only upon completion of Master's. Students may be dually registered (for a maximum of one term) in either the Fall or Winter sessions. Dual registration is not permitted in the summer term.

Research Paper

- Should demonstrate the student's ability to do independent work in reviewing the relevant literature, identifying a problem in a research area, organizing existing concepts, suggesting and developing new approaches to solving problems in a research area, and reporting the results.

- The standard for this paper is that it could reasonably be submitted for peer-reviewed publication. Negative results are also acceptable given a reasonable prior hypothesis and a thorough analysis of the reasons for these negative results.

- Length: a rough guideline is 30 – 60 pages, double spaced.

Approval of Research Paper

- Must have the written approval of two readers, one of whom must be the student's supervisor.

- The second reader must hold an associate, full, or emeritus membership in the graduate faculty at the School of Graduate Studies (in any U of T department). The readers should be given at least two weeks to review the paper. They will then submit their evaluation of the paper to Graduate Office for review and consideration by the Associate Chair, Graduate Studies.

- If the research paper is unacceptable to either reader, the reader will provide the student with a list of deficiencies, and the student is given an opportunity to improve the research paper. After improvement, the research paper is again submitted to two readers; normally they will be the same two readers but in exceptional circumstances, with the approval of the Associate Chair, Graduate Studies, the second reader may be different.

For Students wishing to transition to the PhD program

- Both readers must indicate in their evaluation that your MSc Research paper achieves the standard expected for transition to the PhD program and complete the corresponding section of the evaluation form.

- One of the two readers must indicate on their evaluation form that they are interested in supervising your PhD studies.

- If you plan to continue your PhD studies with a new supervisor, the new supervisor must be the second reader (or if need be, can be a third reader). Note that in order to be permitted to supervise a PhD student in the CS department, the faculty member must hold a full or emeritus membership in CS-SGS (and, in the case of an emeritus members, have the approval of the Associate Chair, Graduate Studies).

- Upon admission to the PhD program from the MSc program, you will be guaranteed 43 additional months of departmental funding to complete the PhD program.