2015-2016

DCS GRADUATE STUDENT HANDBOOK:

PHD PROGRAM REQUIREMENTS

Introduction

The main goal of a successful PhD is not so much a thesis, but rather (and much more importantly) it is to train a researcher and prepare them for further professional development. One aspect of this training is to ensure that the individual has a broad and deep knowledge of Computer Science. The starting point for this aspect is the completion of our PhD course and breadth requirements. However course work is, by design, limited to relatively narrow and well-defined assignments, projects and exams. To be a successful PhD student, the candidate needs a much broader set of skills, including the maturity as a researcher to cope with significantly more uncertainty than is typically seen in course work. Additional skills include the abilities to evaluate the current literature, to select promising directions for future work, and to follow some of those directions through to the nuggets of new contributions. In our experience with our own students we typically see these skills develop slowly, continuing through to their graduation from our PhD program. However, our expectation is that the foundations for these skills should already be in place and evident by the beginning of the second year of PhD studies.

Specific skills that we expect to be developed by a PhD candidate include:
a) The ability to apply the basic tools of the field in potentially new ways, along with the self-understanding of what they themselves know and what they have yet to learn.
b) The ability to select significant research contributions from a larger set of published papers, and justify that selection (for example, on the basis of significance of the results or the novelty of the approach).
c) The ability to relate the papers to one another, and to other research in the literature.
d) The ability to critique the research methods used in these papers, including the strengths and weaknesses of these methods and likely threats to validity, whether these are acknowledged in the papers or not.
e) The ability to identify limitations of the results (and possibly errors) reported in the papers, along with their implications.
f) The ability to suggest alternative approaches to answering the research questions posed in these papers.
g) The ability to identify and prioritize lines of investigation for further research, based on an understanding of significant limitations of the research described in the papers and/or important open problems that the papers fail to answer, and also on the likelihood of being able to make progress on such issues.

This document provides the program requirements for the PhD program in Computer Science.   These requirements are meant to ensure that: a) our students receive regular assessment and feedback on their progress toward these goals; and b) our graduates meet these expectations.

PhD Programs in Computer Science

DCS has three distinct PhD programs which are appropriate for students with different backgrounds. Students are assigned to one of these PhD programs upon admission. The end result of these programs is the same, namely a PhD in Computer Science.

1. [PhD] Students who entered the PhD program after having completed their MSc program in our department.

2. [PhD-M] Students who have completed the MSc degree in Computer Science elsewhere and have entered the PhD program.

3. [PhD-Direct] Students who have completed a BSc and have entered directly into the PhD program. Also denoted as the PhD-U program

As described below, the degree requirements vary across these three programs due to differences in the student's prior education.

PhD Course Requirement

The course requirements are 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 PhD and PhD-M programs are required to complete four graduate half courses, while students in the PhD-Direct program must complete eight graduate half-courses.

Transfer credits for up to two half-courses can be considered for graduate courses which were completed (either at U of T or elsewhere) but were *not used toward the requirements of another degree, diploma, certificate, or any other qualifications*.

For students who have completed the MSc program here in DCS, any graduate half-courses completed beyond the MSc course requirement (i.e., taken while the student is registered as an MSc student in DCS) can be used towards the PhD course requirement.

PhD Breadth Requirement

The breadth requirements for our degree programs ensure that students complete courses from a sufficiently wide range of topics within Computer Science

The PhD program also requires breadth in different methodologies and research areas of Computer Science. Currently our courses are classified into four methodologies and fifteen different research areas (see the course classification in Appendices A and B of the (DCS Graduate Handbook: Overview of Programs). The methodologies are meant to distinguish the general tools emphasized in the course material, while the specific research areas are aligned with the activities of the various research groups in the department.

The details of this PhD breadth requirement depend on whether the student is in the PhD, PhD-M or PhD-Direct program:

- [PhD] For the case of a PhD student who is following on from an MSc degree in our department, the eight graduate half-courses taken over their MSc and PhD must include courses from at least four different research areas and three methodologies. In this sense, courses taken during the student's MSc are counted both for achieving methodological breadth and for research area breadth.

- [PhD-M] Students who completed a master's degree elsewhere are required to submit a Plan of Study and Breadth Assessment form at the beginning of their first term in order for the Associate Chair, Graduate Studies to assess which breadth credits can be transferred to their PhD program here. Including these breadth credits, these students must complete courses from at least four different research areas.

- [PhD-Direct] For the case of PhD students who are entering the program directly from a bachelor's degree, these students are required to take a total of eight graduate half-courses. These must include courses from at least four different research areas and three methodologies.

Graduate courses taken during a bachelor degree (even DCS graduate courses) do not count towards the breadth requirements.

Graduate courses which were completed (either at U of T or elsewhere) but were *not used toward the requirements of another degree, diploma, certificate, or any other qualifications* may qualify for breath credits. Students in this situation should submit a Plan of Study and Breadth Assessment form to the Graduate Office to seek the necessary approvals.

PhD Supervisor

Every PhD student will be assigned a supervisor prior to registration. The supervisor advises on course selection, research topic selection, and provides continuing help during the conduct of research. All students are required to consult frequently with their supervisors throughout their graduate studies, to report on their progress and direction and to obtain advice.

To be the primary or sole supervisor of a PhD student a faculty member must hold a 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 PhD students, but require approval from the Graduate Office before taking on any new supervisory role. When a PhD student is co-supervised, at least one of the co-supervisors must be identified as the primary supervisor (aka supervisor of record), and this faculty member have be a full, or emeritus membership in CS-SGS.

DCS prides itself on allowing students to pursue their interests as far as possible and we find that approximately ten percent of our students switch supervisors after they have arrived and learned more about research opportunities in different areas. 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 (see http://www.sgs.utoronto.ca/Documents/Supervision Guidelines.pdf).Take note of the checklists for both students and supervisors provided in Appendices 2 and 3 of that document. DCS supports the expectations stated in this guide and we encourage students to discuss these checklists with their supervisor.

Occasionally the student-supervisor match is not productive. If this happens, the student should first discuss the difficulties or concerns with their 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.

PhD Supervisory Committee

The purpose of the student's PhD supervisory committee is both to aid the student by providing timely advice and to evaluate **the student's progress towards a PhD thesis**.

Each PhD student must form a Ph.D. supervisory committee consisting of at least three members (counting the supervisor and co-supervisors). Besides the supervisor, or co-supervisor, the other committee members must be associate or full members of SGS (although not necessarily in CS-SGS).

In addition, external experts can also serve on a supervisory committee as "advisors" (SGS's term, note that it is not synonymous with "supervisor"). Advisors can take part in all the student's committee meetings with the exceptions that they do not contribute to a quorum, and can attend but not vote in the student's Final Oral Examination. The request for an external expert to serve as an advisor on a Ph.D. committee can be made by e-mail to the Associate Chair, Graduate Studies, gradchair@cs.toronto.edu, accompanied by brief rationale and a C.V.

Students should notify the Graduate Office of the formation of the PhD supervisory committee, or any changes to that committee using the Supervisory Committee Composition Form.

Timeline

Deadline	PhD Program Administration
1 month	Submit application for course and breadth credits for previously completed courses.
16 months	Form PhD supervisory committee, and hold Qualifying Oral Exam
At least annually after Qual. Exam	Yearly Progress Review in a PhD supervisory committee meeting
36 months (48 months for PhD-direct student)	Achieve Candidacy: complete all required course work and have a thesis topic that has been approved by the PhD supervisory committee.
	Departmental Thesis Examination
	Final Oral Examination at the School of Graduate Studies

A timeline for the PhD, PhD-M, and PhD-Direct programs is given in the above table. Note that the requirements for these programs were changed as of Sept 1, 2015. Students enrolled in the PhD program prior to that date and maintaining the old timeline may continue to use the old PhD checkpoint system, as described in the Graduate Handbook at the time of their entry into the program.

The first deadline above is primarily a suggestion. It is advisable that students seek approval for course credits and breadth credits for previously completed courses within the first month or so of their first term, since the resulting decision impacts which courses the student is required to take to complete their course and breadth requirements.

The other steps in the above timeline are described next.

Qualifying Oral Exam

This exam must be held within 16 months of the start of the PhD program. Note that the student must have formed the PhD supervisory committee and have had it approved at least several weeks in advance of this exam.

Working with their supervisor, the student should have selected 5-10 research papers to be emphasized at their qualifying oral. These should be important papers in one research area of relevance to CS. This research area need not correspond to the student's eventual choice of PhD topic, and hence the student does not have to have picked a thesis topic prior to this committee meeting. In relation to the selected papers, the student will be examined on the points (a) through (e) listed in the introduction above. It is expected that students will have read and understood more than just the selected papers, but it is not expected that the student master the majority of the relevant literature at the time of this exam.

In order to help focus the initial questioning, the student will prepare a short position paper (less than 10 pages, double spaced, in a reasonable font) on points (c-e) above. If the student has begun to investigate this area themselves, then s/he is

welcome to briefly describe his/her progress so far. In addition, it is the student's option to discuss the expected overall scope of the questioning with his/her supervisory committee several weeks prior to the exam.

At the beginning of the Qualifying Oral, the student will be asked to give a 15 minute talk to introduce her/his position on the research described in the selected papers. This will be followed by one or more rounds of questioning by the supervisory committee. During this questioning it is critical that the student demonstrates an understanding of CS tools and techniques that are relevant to pursuing research in the area.

The supervisory committee will provide written feedback to the student (through the DCS Graduate Office), and the student will be invited by the Graduate Office to respond to this feedback. In addition, one of the following examination results will be provided:

1. Pass.
2. Conditional Pass. The student is given one or more concrete tasks to complete by a specific deadline (no further than a year later). The tasks and the deadline are also communicated to the Graduate Office. The chair of the qualifying examination must report to the Graduate Office whether or not the student has cleared the conditions by the deadline. If the student fails to clear the conditions by the deadline then they will be considered to be making unsatisfactory academic progress.
3. Fail (with the option to repeat). The student is to not be making satisfactory academic progress, and must retake the exam within 6 months.   The student will not be given a third chance to pass the exam.
4. Fail (no option to repeat). Student must either withdraw from the program or have their registration terminated. This option only applies to students who were not considered to be making satisfactory academic progress at the time of the exam. The Associate Chair, Graduate Studies will review such a recommendation.

Yearly Progress Review

Yearly progress reviews are for students who have passed their qualifying oral, and are not yet ready for their Departmental Thesis Defense.

Deadline: Yearly progress reviews must be held at most 12 months after the student's previous PhD supervisory committee meeting (including the Qualifying Oral). If the student is expecting to schedule their Departmental Thesis Defense shortly after this deadline has passed, then they can contact the Graduate Office to request an extension of up to 6 months.

Purpose: To assess the student's research progress since the previous committee meeting and to provide feedback on the student's research plans for the coming year.

Student Preparation: The student must complete a progress monitoring report and submit this to the Graduate Office. The student may also submit their own papers, or drafts that they are working on. If the student wishes to be considered for candidacy or have their thesis proposal approved then they should provide the relevant documents (see below) to the Graduate Office for communication to their committee at least two weeks prior to the meeting.

1. Thesis Topic. SGS requires that PhD students achieve candidacy within the first 36 months of their program (48 months for PhD-direct students). Achieving candidacy involves completing all course work and having a thesis topic approved by their PhD supervisory committee.

    To obtain this approval the student needs to submit a written description of their thesis topic to the Graduate Office at least two weeks in advance of their yearly progress review meeting. This document needs to describe the scope of the proposed research, explain its context with respect to the current literature (see items e-g in the introduction above), and provide an initial research plan. The thesis topic needs to be sufficiently broad to form the basis for a thesis, and it should be plausible that the student be able to complete a thesis on this topic within two to three years. A student may still decide to switch thesis topics after achieving candidacy. This won't affect their candidacy. However the student will need to clearly describe their new thesis topic to their committee members during their next annual review.

2. Thesis Proposal. The primary purpose of a thesis proposal is for the student to seek approval from the committee for the overall scope of the eventual thesis. The student submits a written proposal to the supervisory committee outlining both the completed and anticipated the results of the thesis. A substantial portion of research should have been successfully completed, and a clear plan for completing the remainder should be included in the document. Ideally, a thesis proposal is a draft of a substantial portion of the thesis itself, along with a clear description the remaining work to be completed. The supervisory committee assesses the scope and relevance of the problems the student has to be solved in the proposed PhD thesis. The thesis proposal is typically completed six months to a year prior to the Departmental Thesis Defense.

Committee Recommendations: After a yearly progress review the supervisory committee will provide written feedback to the student (through the Graduate Office) and the student will be invited by the Grad Office to respond to this feedback. In addition, the following examination results will be provided:

1. Pass and any of the following additional recommendations:
    a. the proposed thesis topic is approved and therefore, given the completion of the course and breadth requirements, the student is to be considered to have achieved candidacy.
    b. the detailed thesis proposal has been approved.
2. Conditional Pass. The student is given one or more concrete tasks to complete by a specific deadline (no further than a year later). The tasks and the deadline are also communicated to the Graduate Office. The chair of the qualifying examination must report to the Graduate Office whether or not the student has cleared the conditions by the deadline. If the student fails to clear the conditions by the deadline then they will be considered to be making unsatisfactory academic progress.
3. Fail (with the option to repeat). The student is considered not to be making satisfactory academic progress and must hold another PhD supervisory committee meeting within 6 months.
4. Fail (no option to repeat). Student must either withdraw from the program or have their registration terminated. This option only applies to students who were not considered to be making satisfactory academic progress at the time of the current meeting. The Associate Chair, Graduate Studies will review such a recommendation.

Departmental Thesis Examination

The student defends the thesis before the supervisory committee. Outside members are also invited. A draft of the thesis should be available to the committee members three to four weeks in advance of the departmental thesis examination. Each member of the committee is expected to read the thesis in sufficient detail to form a judgment about its acceptability. The committee may approve the thesis as is, or on condition that minor corrections be made under the supervisor's supervision, or require the student to repeat the Departmental Thesis Examination.

Final Oral Exam at the School of Graduate Studies

Upon the successful defense of the thesis at the Departmental Thesis Examination, the candidate will be ready to go forward to the Final Oral Examination (FOE). Eight weeks prior to the proposed date of the examination the student should notify the Graduate Office of the intention to book a Ph.D. All forms and instructions are available on the DCS internal web page or from the Graduate Office. Full FOE details and regulations can be found on the SGS website.

It is important to allow yourself and the Graduate Office plenty of time to organize the necessary steps and follow the required procedures in setting up your Ph.D. Final Oral Examination.   The School of Graduate studies is under no obligation to find an **FOE chair if a minimum of six weeks' notice is not provided.**

Graduation

Given the completion of the Final Oral Exam and the submission of the final thesis, SGS will submit a Recommendation for **Degree and the student's name will be added to the convocation roster.**

A graduation package will be sent to the student from the Convocation Office regarding convocation dates, tickets, etc.

Deadlines

Students who fail to meet the deadlines for the Qualifying Oral exam or the Yearly Progress Review will be considered to not be making unsatisfactory academic progress. Students who anticipate being unable to schedule a committee meeting before the deadline should contact the Graduate office as soon as possible. See also General Regulations, section 9.0 Graduate Student Supervision; Degree Regulations, section 13.0 Doctoral Degrees; and specific program requirements in the Programs by Graduate Unit section.

Unsatisfactory Academic Progress

The status of being considered to be making unsatisfactory academic progress can have serious consequences. For example, if the student fails a subsequent qualifying oral or supervisory committee meeting while they have this status, or

if the student misses a second consecutive deadline, then they will be told to either withdraw from the program or have their registration terminated. (see http://www.sgs.utoronto.ca/facultyandstaff/Pages/Termination-Student-Info.aspx).

Appeals

Graduate students may appeal the decisions made by their PhD supervisory committee. The procedures for such an appeal are described in the SGS Calendar (see SGS Academic Appeals Policy).

Dropping down to the MSc 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.

Opting Into the New System for PhD Supervisory Committee Meetings

PhD students who enrolled in their program before Sept. 1, 2015 and are maintaining regular meetings with their supervisory committees will be able to continue with the previous PhD checkpoint system. Alternatively, they can opt into the new system for supervisory committee meetings, as described above. However, if a student under the previous checkpoint system fails to have a committee meeting for 18 months or more, then they will be placed into the new system.

PhD students who enrolled in their program before Sept. 1, 2015 will be asked to complete progress monitoring reports prior to each checkpoint. These reports will be reviewed by the student's supervisory committee. This replaces the previous progress monitoring system.

Time Limit to Degree Completion

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

For the PhD, PhD-M, and PhD direct programs the guaranteed funding period is 43, 48 and 60 months, respectively.

The SGS time limit for the PhD, PhD-M, and PhD-Direct programs are 6 years, 6 years, and 7 years, respectively. In exceptional circumstances, a PhD student who did not complete all the requirements for the degree within three years may be considered for one-year extensions provided, up to a hard limit of 10 years for the PhD program.

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 funding and time to degree completion; on return, the student is entitled to resume at the point where they left, without penalty.

Internships and Leaves

Internship is not a component of the PhD program in the Department of Computer Science. However, it is recognized as an important experience for graduate students.

Students must request an official leave of one to three terms for the purpose of doing an internship by completing an SGS Request for Leave of Absence form (www.sgs.toronto.ca, under Forms for Students), and submitting it to the Computer Science Graduate Office with a brief note indicating the benefits (other than financial) of the internship opportunity. The note must be signed by the student and the supervisor.

A student who is planning an internship over the summer are required to submit their Leave of Absence form by the Jan. 31 prior to their leave. For a fall internship, they must submit the form June 30. For an internship in the winter term, the form must be submitted by the previous Oct. 15. In all cases, if there is a substantial reason you are unable to meet

the deadline, contact the Graduate Office. Failure to meet these deadlines ends up costing the department money, and this charge could be passed on to you

A leave for internship can be taken for one to three terms. Official leaves are granted for an entire term and cannot be prorated to months or weeks. If your internship falls outside of a normal academic term, please consult with the Graduate Office.

Funding: Funding will be put on hold for the duration of the internship leave. You must notify the Graduate Office when you return from leave so that your registration and funding can resume.

What Happens to Scholarships: Check the regulations of any scholarship(s) you are receiving to be sure that the agency will allow a break for work experience and deferral of payments.

NSERC recipients are required to submit the form "Request for Deferment or Interruption of Award" and, in some cases, an NSERC Progress Report as well. The forms are at www.nserc.ca. These documents are to be submitted to the SGS Graduate Awards Office. Email graduateawards@sgs.utoronto.ca for questions on NSERC.

OGS does not allow a break for internship unless it is part of the degree requirement. The OGS rule is that students are permitted to work a maximum of 10 hours a week while registered as full-time students. Email graduateawards@sgs.utoronto.ca for questions on OGS. If you hold an OGS award and wish to do an internship, please contact the Graduate Office for advice.

Tuition Fees: Graduate School tuition fees are assessed on a program basis rather than on the number of courses taken or the number of sessions per year. Students are permitted to pay their program tuition fees in two parts, payable in the Fall and Winter Sessions. Graduate students who have paid tuition for the full year do not, in effect, pay tuition for the summer months but remain registered for that period. When a student takes a leave for any purpose, s/he will not be registered in the program for the duration of the leave.

Funding and Time to Completion of Degree: For SGS approved leaves the remaining funding, the remaining components of your program and the time-to-completion for your degree will be extended by the amount of time (number of terms) taken for the internship. This is calculated per term and cannot be prorated by weeks or days.

A break in registration may impact income tax calculations. Also, it may mean that any student loans will be immediately payable - you should check with your loan agency about repayment regulations. International students should ensure that they have an appropriate visa that will allow them to not be registered as a student while they work at an internship