Regulations for the Software Engineering Masters Programs in the Department of Computing and Software at McMaster University

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1 Master of Engineering (M.Eng.) in Software Engineering

This program is intended for those interested in a career as a practicing professional Software Engineer. Students must:

1. Successfully complete six one-term graduate courses.
2. Complete an independent software development project, including professional oral and written reports, demonstrating the ability to apply the material studied.

1.1 Admission Policy and Standards

Students can be admitted to the M.Eng. program in Software Engineering if they have an accredited Bachelor's degree in Engineering or a recognized Bachelor's degree in Computer Science or Mathematics. Students with a degree in another field and substantial background in computer science or engineering may also be considered. Admissions are on a competitive basis.

1. The admission requirements are as given in the General Regulations of the Graduate School.
2. Each student's program of study will be individually designed to ensure appropriate depth and breadth in Software Engineering.
3. Students should have completed the following courses. (The subsequent course numbers in parentheses identify the equivalent McMaster course(s).)
   - *Basic Mathematics*
     - Three courses in calculus
       - Calculus 1
       - Calculus 2
       - Calculus 3
     - One course in scientific computation
     - One course in linear algebra
     - Introduction to discrete mathematics and predicate logic
   - *Basic Computer Science*
     - Introduction to programming
     - Data structures
4. Normally admissions coincide with the commencement of Term 1.

1.2 Funding Models

Funding is normally the responsibility of the candidate. Funds may be available in the form of teaching assistantships, entrance scholarships and funding to support the software development project (see below). Students may also enter the program on a part-time basis. In most instances, part-time students will have external employment while participating in the program.

1.3 Supervisor

All students will have a supervisor in CAS to guide them through the program. The supervisor will be assigned in the offer of admission and in particular serves as the project supervisor (see Section 1.5).

1.4 Course Requirements

All students in the Software Engineering M.Eng. program must complete six one-term graduate courses. Students must complete:

1. One of: 701 Logic and Discrete Mathematics in Software Engineering, 702 Data Structures and Algorithms. Students are encouraged to consider taking both 701 and 702.

2. Two of: 703 Software Design, 704 Embedded, Real-Time Software Systems, 707 Formal Specification Techniques

For the remaining three courses, at least two must be from the Department of Computing and Software. One may be from another department in the Faculty of Engineering or from Mathematics. At most two courses may be at 600 level. Students propose the course selection; the Chair or delegate must then approve the selection. Necessary changes must be proposed and approved in the same way.

1.5 Software Development Project

This project provides an opportunity for students to demonstrate that they can apply what has been learned in the program.

1. This project should produce a software product to be utilized by users other than the developer.

2. Projects may be specified by the supervisor in CAS, by McMaster departments, or by industry.

3. An Examination Committee is formed, consisting of the supervisor(s) and at least one other faculty member in CAS. The student and the supervisor(s) nominate the Examination Committee. The committee is appointed by the Chair or delegate.

4. The Examination Committee must give initial approval on the project.

5. Students must submit the project, including all documentation, to the Examination Committee for grading.

6. The project will be judged on more than functionality. The project must exemplify the design approach taught in the program.

7. All project documentation must meet departmental standards.

8. The documentation must include an "executive level" description of the product and its structure.

9. The Examination Committee decides on the outcome: pass or fail. If the decision is fail, comments must be provided to aid in a revision. The decision must be made within three weeks of receipt of the project.

10. If the initial decision was fail, the student may resubmit the project after addressing the committee's concerns. If the subsequent decision is fail, the student is dismissed from the program.

1.6 Program Timing

This section describes the expected rate of progress through the program for full-time students.

1. Students will take at least two courses in each of the first two terms. It is possible to complete the course requirements in two terms.

2. All courses should be completed within 16 months of entry into the program.

3. The software development project will be started by the third term of the first year.

4. The software development project should be completed within 20 months of entry into the program.

2 Master of Applied Science (M.A.Sc.) in Software Engineering

This program is intended for those who are interested in performing research or advanced development in the area of Software Engineering. Students must:

1. Successfully complete four or more one-term graduate courses,
2. Successfully complete and defend an M.A.Sc. thesis which reports the results of the research.

2.1 Admission Policy and Admission Standards

Students are normally admissible to the M.A.Sc. program in Software Engineering if they have the equivalent of a B.Eng. degree in Software Engineering from McMaster University. Admissions are on a competitive basis.

1. The admission requirements are as given in the General Regulations of the Graduate School.
2. Students from other backgrounds will be made aware of the M.Eng. program, with its larger course requirement, and the Computer Science M.Sc. program, as well as the Second Degree undergraduate Computer Science program.
3. Each student's background will be assessed and his/her program of study will be designed to ensure appropriate depth and breadth in Software Engineering.
4. Students should have completed the courses listed in Section 1.1 as well as the following courses. The course numbers in parentheses are the equivalent McMaster course(s).
    - *Basic Computer Science*
        - Concurrent Systems and Operating Systems
    - *Software Design and Documentation*
        - specification and requirements
        - software design
    - *Engineering*
        - A control course
        - A course in digital electronics
    - *Basic Science*
        - Physics and one of Chemistry or Biology

2.2 Supervisor and Supervisory Committee

All students will have a supervisor to guide them through the program. In addition, each student will be assigned a Supervisory Committee that will review and assess the student's progress. With permission of the Chair, more than one faculty member may jointly be the co-supervisors.

1. The supervisor(s) will normally be faculty members who have agreed to provide financial support and are experts in the student's intended area of research.

2. Students with financial support from government, international agencies, or other reliable sources can be admitted without a permanent supervisor. In these instances a temporary supervisor will be assigned.

3. The Supervisory Committee consists of at least three faculty members including the supervisor(s) and at least two other faculty members from CAS. An additional member may be from another department or an expert in the student's area of research from outside McMaster.

4. The student and the supervisor(s) nominate the Supervisory Committee. The committee is appointed by the Chair or delegate.

5. The supervisor is the chair of the Supervisory Committee (in the case of co-supervisors, one of these will serve as chair) and is responsible for ensuring that the committee meets as required.

6. The Supervisory Committee will normally function as the Examining Committee for the thesis.

7. The Supervisory Committee may meet by request of the student or the supervisor.

2.3 Course requirements

All students in the Software Engineering M.A.Sc. program must complete at least four one-term graduate courses. Students must complete the following courses

1. 701 Logic and Discrete Mathematics in Software Engineering

2. One of: 702 Data Structures and Algorithms, 705 Computability and Complexity, 706 Programming Languages, 708 Scientific Computation

3. One of: 703 Software Design, 704 Embedded, Real-Time Software Systems, 707 Formal Specification Techniques

4. One other course, freely chosen, may be at 600 level and/or outside of the department

A student lacking the appropriate background might be required to take additional courses (Prescribed Undergraduate Courses or Prescribed Graduate Courses). In these instances, the student must be informed of any such requirements in the admissions offer. The student, with the agreement of the supervisor, proposes the course selection; the Chair or delegate must then approve the selection. Necessary changes must be proposed and approved in the same way.

2.4 Thesis

The thesis must be independent novel work that adds to the understanding of software development. The thesis must describe a substantial body of work that demonstrates scholarly competence, understanding of the relevant literature in the subject area and familiarity with industrial practice in the area being studied.

1. The supervisor and student may jointly decide to discuss the work in smaller units.

2. The supervisor will evaluate the thesis and specify any necessary improvements. The supervisor may reject the thesis without detailed comments if the English is not correct or understandable. It is the student's responsibility to provide a well-written thesis.

3. The supervisor is responsible for determining that the thesis is at an appropriate level and that it meets the standards of the thesis requirements of the program.

4. In the event of a disagreement between the supervisor and the student about the acceptability of the thesis, the Chair may ask another faculty member for an opinion. If necessary the Chair may appoint a new supervisor.

2.5 Thesis Examination Committee

The Thesis Examination Committee makes the final evaluation of the thesis.

1. Normally the Thesis Examination Committee has the same membership as the Supervisory Committee described in Section 2.2.

2. The supervisor may not chair the Thesis Examination Committee.

3. When needed, a distinct Thesis Examination Committee may be formed following the rules in Section 2.2.

2.6 Thesis Defense

The student must defend the thesis with a presentation that is open to the public. The Examination Committee evaluates the scientific merit and presentation of the thesis and determines whether or not the candidate has satisfied the degree requirements.

1. The student must give a public seminar on his/her thesis research at least four weeks prior to the desired defense date. Copies of the thesis must be distributed to the members of the

Thesis Examination Committee prior to the seminar. Members of the Thesis Examination Committee are expected to attend the seminar. The seminar normally lasts 60 minutes (including questions from the public).

2. On the basis of the thesis contents and the seminar, the Thesis Examination Committee decides whether the thesis is ready for defense. This decision must be made within two weeks of the public seminar. If the decision is to withhold approval, comments must be provided to aid in a revision.

3. Once the student has addressed the committee's concerns, the thesis is again considered by the committee. This procedure is repeated until approval is given. In the event of a disagreement between the student and the Thesis Examination committee, the case may be referred to the Chair for resolution.

4. The defense is open to all interested individuals.

5. The student first gives a 15 minute summary of their work.

6. The audience and members of the Examination Committee ask questions about the material presented in the thesis, related issues, the impact of the results and future research.

7. The defense normally takes no more than 90 minutes.

8. The Examination Committee evaluates the student's performance and determines whether or not the requirements for the M.A.Sc. degree have been met in a closed meeting after the student has left the room.

2.7 Program Timing

This section describes the expected rate of progress through the program.

1. Normally, a supervisor will be named when the student enters the program; a supervisor must always be named within the first three months. With the approval of the Chair, more than one faculty member may jointly act as the supervisor.

2. Students with financial support from government, international agencies, or other reliable sources can be admitted without a specified supervisor. In these instances, the Chair will specify a temporary supervisor. The student must find a willing permanent supervisor no later than 3 months after entry into the program. If the student cannot find a supervisor after 3 months, one will be assigned by the Chair.

3. Students will take at least 2 one-term courses in each of the first two terms.

4. Four courses should be completed within 12 months of entry into the program. If additional courses are required, an additional term may be allowed.

5. The thesis will be started no later than the third term of the first year.

6. The Supervisory Committee will be named no later than the end of the first year.
7. The Examination Committee, if different from the Supervisory Committee, should be named at least one month before the defense.
8. The supervisor must evaluate the thesis within two months after submission.
9. The thesis should be completed and defended within 20 months of entry into the program.
10. Departmental funding can continue for no more than 24 months after entry into the program.