Faculty of Engineering

GRADUATE STUDIES HANDBOOK

Last update: May 2020

ABBREVIATIONS

DEGS	Dalhousie Engineering Graduate Student Society
EC	Examining Committee
FGS	Faculty of Graduate Studies at Dalhousie University
GC	Graduate Coordinator (Departmental)
GSC	Graduate Studies Committee of the Faculty of Engineering
GSIS	Graduate Studies Information System (Online system)
NSERC	Natural Sciences and Engineering Research Council
SC	Supervisory Committee
TS	Thesis or Project Supervisor

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1. PREAMBLE

Welcome to graduate studies in the Faculty of Engineering at Dalhousie University!

You are part of a diverse, thriving community of innovative research and teaching at Dalhousie. Your role in this community is vital in our collective pursuit of creative solutions to today's most challenging problems. Many of the world's best-known universities attribute their reputations to excellence in research, much of which is carried out by dedicated graduate students. We wish you much success and personal growth during your graduate training at Dalhousie.

The following document summarizes the policies and general information concerning your graduate studies program in the Faculty of Engineering at Dalhousie, including funding, supervision, degree requirements and regulations. It should be noted that the rules and regulations described here are specifically applicable to Engineering students; however, they do comply with the overall university regulations:

- ✓ Graduate Studies Calendar: academiccalendar.dal.ca;
- ✓ Faculty of Graduate Studies (FGS): www.dal.ca/faculty/gradstudies;
- ✓ Senate of Dalhousie University: www.dal.ca/dept/university_secretariate/university_senate.

Each department may have variations in details (www.dal.ca/faculty/engineering/departments). As such, this document is intended to complement but not replace the Dalhousie University Graduate Studies Calendar and other regulations. It is necessary that all students familiarise themselves with the regulations stated in the Graduate Studies Calendar. Any questions pertaining to these policies should be brought to the attention of your Graduate Coordinator (GC), and then if needed to the Faculty of Engineering Graduate Studies Committee (GSC).

This document is intended to assist you, the graduate student, toward the successful completion of your degree program. The guidelines and information presented here should be viewed in the context of "normal" circumstances and are not necessarily exhaustive**.**

2. DEGREE PROGRAMS AND REQUIREMENTS

Graduate students in the Faculty of Engineering may be pursuing one of a number of degree programs, including the Master of Engineering (MEng), Master of Science (MSc), Master of Applied Science (MASc), or the Doctor of Philosophy (PhD) degrees. It is our intent here to provide an overview of general information regarding each degree programs in the Faculty of Engineering. The Graduate Studies Calendar and FGS should be consulted for detailed and up-to-date information. Any information specific to a department within the Faculty of Engineering (courses, policies) is available on their respective websites, and also from their GCs and administrators. An overview of the graduate programs and timelines is provided in Appendix A. The program requirement form should be submitted for every graduate student by the end of their 1st month in program.

2.1 Master of Engineering (MEng)

The MEng degree is intended to serve the needs of students who wish to obtain advanced knowledge in a specialized field, but who do not require traditional research training. Thus, it involves a larger course load than the more research intensive MASc or MSc degree, and a practically oriented project in some instances. The MEng is currently offered in Civil Engineering, Electrical and Computer Engineering, Industrial Engineering, Internetworking Engineering, Mechanical Engineering, and Process Engineering and Applied Science.

2.1.1 MEng Requirements

The MEng is offered in the departments of Civil, Electrical and Computer, and Mechanical Engineering. It requires a course load of a minimum of seven 3-credit hour courses, fulfilling the graduate seminar requirement, and a 6-credit hour project. Senior level undergraduate courses (maximum of 6 credit hours, *i.e.* 2 courses) not taken by the student for previous credit may be included in the program subject to prior approval by the department. A project is required as a part of the program. The project course requires students to perform engineering or research work while undertaking a three to four-month project culminating in a written report, which is examined by the student's supervising committee (SC).

2.1.2 MEng in Biological, Chemical and Industrial Requirements

The MEng in Biological, Chemical and Industrial Engineering requires a course load of no less than 27 credit hours and the graduate seminar. This translates to no less than nine 3-credit hour courses of which up to six credit hours of the program requirement may be completed in the form of an optional 6-credit hour project. Senior level undergraduate courses (maximum of 12-credit hours, *i.e.* 4 courses) not taken by the student for previous credit may be included in the program subject to prior approval by the department. For those accepted to do a project, this project course will require students to perform engineering or research work, while undertaking a three- to four-month project culminating in a written report, which is examined by the students' Supervising Committee (SC).

2.1.3 MEng in Internetworking Requirements

The MEng in Internetworking requires a course load of 50 credit hours (*i.e.* ten 5-credit hour courses), seminar and an optional project. For those electing to undertake a project, this project course will require the students to submit a satisfactory written report and pass an oral examination of their project.

2.2 Master of Applied Science (MASc) and Master of Science (MSc)

The MASc and MSc are the thesis-based research-oriented graduate degree offered at the master's level by the Faculty of Engineering. The MASc is offered in all departments except the Engineering Mathematics & Internetworking department. MSc degrees are available in Engineering Mathematics, offered by the department of Engineering Mathematics & Internetworking, and in Food Science, offered by the department of Process Engineering and Applied Science. The MASc and MSc both involve a comprehensive, research-oriented thesis in addition to other specified program requirements.

2.2.1 MASc/MSc Requirements

MASc and MSc graduate programs consist of a minimum of 12-credit hour of courses (four 3-credit hour courses), the graduate seminar, and a thesis which must be successfully defended in front of the SC by the end of the program. Only one 3-credit hour senior level undergraduate course may be taken as part of the 12-credit hour of courses, except for the MSc in Engineering Mathematics where two 3-credit hour courses are permitted. Students are encouraged to consult with their respective department for individual requirements in addition to these, as requirements may vary from department to department. The thesis

topic for a specific student is selected upon the advice and/or approval of the Thesis Supervisor (TS). Course selection for students should be made in consultation with the TS, their SC, and the GC if required. Students may be required to take several courses in addition to the minimum depending on their background.

The MASc in Biomedical Engineering has different requirements; students from this program should consult the department's own Graduate Handbook (cdn.dal.ca/content/dam/dalhousie/pdf/faculty/school-biomedical-engineering/GraduateStudiesHandbook.pdf).

2.2.2 MASc/MSc Residency Rule

Full-time students are required, as part of their MASc/MSc graduate program, to be on campus for at least two terms in the first year of their program. Exceptions to this requirement must be approved by the student's Head of Department.

2.3 Doctor of Philosophy (PhD)

The PhD is offered through the FGS. However, students are registered in a home department or school, in engineering. The PhD is the highest degree offered at the University and requires a comprehensive and student-driven thesis. Students are also able to explore the Interdisciplinary PhD program offered through the FGS (idphd.grad.dal.ca).

2.3.1 PhD Requirements

PhD graduate programs consist of coursework, the graduate seminar, and a thesis. The student's TS and SC have the responsibility for recommending the course of study for each Doctoral student. Twelve credit hours of courses (*i.e.* four 3-credit hour courses) beyond a Master's degree are normally required for the PhD degree, although additional courses may be required depending upon the background of the student, upon the recommendation of the SC. At least 75% of the required course credits must be taken at Dalhousie. With the approval of the TS and SC, a student may be allowed to take more courses at other universities if they are not available at Dalhousie. No undergraduate course credits are allowed in a PhD degree program.

The PhD in Biomedical Engineering has different requirements; students from this program should consult the department's own Graduate Handbook (cdn.dal.ca/content/dam/dalhousie/pdf/faculty/school-biomedical-engineering/GraduateStudiesHandbook.pdf)

2.3.2 Advanced Placement Credits

A PhD student may request advanced placement credits based on graduate courses completed within a previous graduate program that are deemed equivalent to graduate courses within the student's proposed program of study (Section 3.7 of the Graduate Calendar). For courses counted towards a previous graduate degree at Dalhousie with minimum grades of "B", advanced placement of up to 6-credit hours (two 3-credit hour courses) may be used to reduce the overall course requirements. Credits obtained outside of Dalhousie (advanced placement, transfer credits, letter of permission) cannot exceed 33% of the program's overall course requirements. Advanced placement and transfer credits can be used within 10 years of course completion; the application for advance placement must be made within the first term following admission to the program and must be approved by the GC and FGS.

2.3.3 PhD Residency Rule

A candidate for the PhD must spend at least four terms in their first two years of study in the program on Dalhousie's campus. Exceptions to this requirement must be approved by the Dean of the FGS.

2.3.4 PhD Comprehensive Examinations

The Faculty of Engineering Guidelines for the PhD Comprehensive Examinations are presented in Appendix B. The comprehensive examination takes place after the completion of the required coursework for the degree and needs to be completed by the end of the second year of study. It consists of at least two written examinations, followed by an oral examination. The examinations are set by an Examining Committee (EC), which is recommended by the candidate's SC.

2.4 Graduate Seminar

All graduate students in the Faculty of Engineering (except MSc students in Engineering Mathematics) are required to meet a seminar requirement, according to the guidelines given by their departments. This normally involves delivering seminars, as well as attending and participating in all graduate seminars held in their department throughout the duration of the student's residency period. The department GC is responsible for deciding whether a student has met the requirement.

2.5 Transferring Between Programs

2.5.1 Transferring from the MASc or MSc to the PhD Program

Students registered in an MASc or MSc program in the Faculty of Engineering and making exceptional progress after one year in the program (and normally within 16 months of initial registration) may be considered for transfer to the PhD program, according to the following conditions:

1. Students must have (a) demonstrated exceptional research performance and potential and (b) completed a minimum of four (4) courses with an average grade of at least A- (GPA $\geq$ 3.7) (Note that biomedical engineering requires 5 courses). Successful candidates will normally have to also complete the required number of courses in the PhD program they are transferring into, in addition to the four (4) courses already taken as a MASc/MSc student. The total number of courses may, at times, be reduced upon the recommendation of the TS and SC, and approval by the GSC and FGS.
2. Before requesting a transfer, the student should be fully aware of the objectives, requirements and procedures of the PhD program. The SC of the student should have reviewed the student's progress at a prior committee meeting and be in agreement with the transfer. This review should include the background knowledge of the candidate, and the progress attained to date in the MASc/MSc program. The SC should also keep in mind the overall timeline leading to the PhD comprehensive exam, as the starting date of their PhD will be the initial start date of their master's program.

3. To apply for a transfer, the student's TS shall inform the GC by submitting the following documents:

    i. a formal request for transfer to the PhD program by the student, with approval by the TS;
    ii. a funding commitment letter from the TS or evidence of external support;
    iii. a report on the progress to date in the MASc/MSc research project;
    iv. a proposal for a program of research for the PhD;
    v. a separate letter from the SC outlining their recommendation on the proposed transfer.

4. The GC of the Department will assess the application and give his/her recommendation to the GSC in writing. Departmental approval must be obtained by the GC before sending the letter to the GSC. After approval from the GSC, a letter shall be written by the Chair of GSC to FGS recommending the final approval of the transfer for the student to PhD. The student's department will have the responsibility of completing all paperwork required for the transfer to become effective.

2.5.2 General Program Change

Graduate students wishing to change from one program to another within the Faculty of Engineering must consult with the GCs in the appropriate departments. A formal written request should be made by the student to the GCs. To grant the request, the department(s) must concur and notify FGS in writing using the appropriate FGS form. FGS will issue final approval.

3. SUPERVISORS AND SUPERVISORY COMMITTEES

All graduate studies programs require an appointed TS, decided before admission to the program. The relationship between a graduate student and his/her supervisor is very important and requires a great deal of mutual respect. Section 9.4 of the FGS Regulations outlines the rights and responsibilities of the student and the supervisor, as well as the graduate student's department (a summary is provided in Appendix C). In addition to a TS, the student is also supported by a selected SC. The SC should be formed within 8 months of initial registration by submission of the appropriate form. SC members are selected by the TS and should complement the TS's expertise to assist the student in completing the thesis research. As per Section 9.3 of the Graduate Calendar, regular members should constitute no less than 50% of the membership of a SC (regular members are full-time faculty members at Dalhousie, as opposed to adjuncts).

The SC for an MEng student doing the project course should consist of, at a minimum, a TS (and co-supervisor if applicable) and another faculty member. For an MASc or MSc student, the SC should consist of, at a minimum, a TS (and co-supervisor if applicable), another faculty member from the department of the student, and a third member from outside of the student's department. The SC for PhD students follows the same composition as that of MASc or MSc students with, at a minimum, a TS (and co-supervisor if applicable), another faculty member from the department of the student, and a third member from outside of the student's department. The total number of members required on a SC for a PhD student may vary with department. Every member of any SC must also be a member of FGS; SC members for PhD students must also hold a doctorate degree. The composition of the SC can be changed at a later date if necessary. The membership of this committee is approved by the GC on the student's program form on the Graduate Studies Information System (GSIS). The TS is responsible for the direction of the appropriate research or industrial project.

The SC will work with the student to coordinate the overall program in accordance with all regulations concerning the degree sought. The SC will meet immediately after appointment to evaluate the qualifications of the student, and to discuss and approve a program of study. They will also meet as needed for the purpose of evaluating and discussing the proposed thesis research project and assist the student as a group or on an individual basis with problems or concerns arising from the research.

4. PROGRAM/COURSE OF STUDY APPROVAL

The course of study for each graduate student can be unique and must be approved by the GC of the student's home department. Students are required to consult with their TS, and GC if necessary, to define their program, which includes their courses and SC, and ensure that this information is entered and approved by the GC on the program form on GSIS. This should be done by submitting the program requirement form by the end of the 1st month in program. Changes to a program may be made through the submission of a program update form, provided approval of the TS and GC is granted.

5. EVALUATION OF PERFORMANCE

5.1 Grade Requirements

The minimum passing grade for Master's and PhD students is "B-" in all course requirements of their degree program. Master's students may only carry one course failure; however, the failed course must be repeated or replaced with an additional, relevant course, with any subsequent failure leading to academic dismissal. PhD student cannot carry a course failure.

5.2 Thesis Progress Evaluation by Supervisory Committee

Students and TS are encouraged to have regular meetings which may or may not include other members of the SC. This enables the student to obtain advice on problems which may be encountered and enables the TS/SC to evaluate the progress of the research.

TS and SC are urged to make regular evaluations of progress on coursework and research, and to provide written feedback to graduate students. On the basis of regular committee meetings (twice a year during the research portion of the degree, following FGS guidelines), the SC may consider the student's progress to be unsatisfactory. If such is the case, the student shall be notified in writing by the SC. Discrepancies between the student and TS/SC concerning research performance should be brought to the attention of the GC.

5.3 Annual Progress Reports

Each year, one month before the anniversary of the term of initial registration in the program, all graduate students must submit a progress report on GSIS. This is a requirement of all graduate students at

Dalhousie to ensure that adequate progress is being made by the student in their program, to protect the student by having a complete record of his/her graduate study, and to help the student, TS, and GC meet program goal dates. Failure to submit an annual progress report on time may result in delayed registration and payment of scholarships in the following term.

5.4 Thesis and Project Proposals

Each graduate student is encouraged to prepare a research proposal/plan and present it to their SC. It is suggested that such a document be prepared and presented in written form by the end of the first year. The thesis proposal should include a review of the pertinent literature, background information on the proposed project, research objectives, materials/equipment required, methods, a projected schedule, and any preliminary results. It is important to note that this proposal can be modified as the project progresses. However, major modification of the research objectives and plan should only be considered if the TS/SC are in agreement.

5.5 Dismissal

There are some circumstances that may result in the dismissal of a graduate student: unsatisfactory performance, failure of more than the maximum allowed number of failed graduate courses, and failure of the comprehensive exam. Normally, the GC of the department involved, in consultation with the TS and SC, will recommend to FGS that a student be dismissed, with supporting information. If FGS concurs with the recommendation, the Dean of Graduate Studies will inform the student that he/she is dismissed from the program. Rules pertaining to dismissal are provided in the Graduate Calendar.

5.6 Grievances and Appeals

A grievance is usually initiated by a student if some condition(s) in his/her working environment at the university is deemed unacceptable. This may be a grievance regarding academic work, interpersonal relationships with faculty, staff or other students, safety or other working conditions. In the course of graduate study, a student is subject to a number of decisions based on university or faculty regulations. If a decision is considered to be a procedural error, the student may launch an appeal of the decision. A grievance or appeal should be brought to the attention of the TS or SC, or raised with the appropriate GC. If the matter cannot be resolved at this level, it should be referred to FGS who shall resolve the matter with the assistance of GSC, the Dean of Engineering, or the Dean of Graduate Studies, as appropriate.

6. THESES AND PROJECT REPORTS

Guidelines for the preparation of graduate theses may be obtained from the FGS website: www.dal.ca/faculty/gradstudies/currentstudents/thesesanddefences.html. Although students are given a reasonable amount of freedom in selecting thesis format, the online guide must be consulted on acceptable and unacceptable writing practices.

6.1 MEng Project Report

For those MEng students participating in the project course, a scholarly written work must be completed with prior approval of their SC. This may consist of an engineering project, laboratory research project, an advanced design project, analysis of research data, or an in-depth review of an approved aspect of the scientific literature. MEng projects are not required to be submitted to FGS; however, the final version, after corrections and approval by the SC, is to be submitted to the graduate office of the student's department.

6.2 MASc and MSc Thesis and Defence

The Master's thesis research is undertaken after approval of the thesis proposal. Students must seek the approval of their TS and SC to ensure that the volume and quality of work meets the standards of the Faculty of Engineering and is sufficient to warrant thesis preparation. Students are encouraged where possible to publish their results in refereed literature prior to defence of the thesis.

For MASc and MSc theses, the "Appointment for Oral Examination" form is submitted to the Graduate Administrator when the TS is satisfied with the quality, style and format of the thesis or project and the SC has agreed to a date for the defence presentation. The department will then schedule the defence in an appropriate room and find a chair/moderator (the chair/moderator cannot be a member of the SC). Note that a defense will not be scheduled until all course requirements are met, including completion of graduate courses and the graduate seminar.

The Master's thesis defence is an oral examination designed to test the knowledge of the candidate on the topics discussed in the thesis. The candidate must be prepared to defend the validity of the results, discussion and conclusions presented in the thesis. The defence normally begins with an introduction of

the candidate and EC by the chair, followed by a 25-minute oral summary of the thesis by the candidate. The oral presentation is normally followed by a period of questioning by the EC. The moderator or chair of the defence may invite questions from the audience if time permits. The committee will then deliberate *in camera* and present the candidate with a decision immediately following the defence. The decision can be 'pass' with no corrections, 'pass' with minor or major corrections and a timeline dictated by the nature of the correction, a 're-examination', or 'fail'. The results of the defence/presentation must be recorded on a "Results of an Oral Examination" form and submitted to the department. Instructions on how to submit the thesis online can be found on the FGS website: www.dal.ca/faculty/gradstudies/currentstudents/thesesanddefences/submission.html.

6.3 PhD Thesis and Defence

PhD thesis defences are arranged through FGS directly, not home departments. A timeline for preparing for the PhD defence, beginning at 6 months prior to a projected defence date, with appropriate forms and steps, is provided on the FGS website at: www.dal.ca/faculty/gradstudies/currentstudents/thesesanddefences/defense.html.

An oral defence of the PhD thesis will not take place until all other program requirements are met, including completion of graduate coursework, completion of comprehensive examination, and completion of the graduate seminar. When the TS and SC agree that the student is prepared to defend their thesis, a 'Request to Arrange Oral Defence of a Doctoral Thesis' form (www.dal.ca/faculty/gradstudies/currentstudents/thesesanddefences/forms.html) should be completed by the TS and forwarded to FGS. Indicated on this form, the TS/SC must identify an external examiner from outside of Dalhousie to be a member of the examining committee (EC) of the PhD. The EC will normally include the SC in addition to the external examiner. The external examiner must hold a PhD, be an expert in their field, and must not have been directly involved in the student's research project (full conflict of interest guidelines can be found on the FGS website). An electronic copy of the thesis required for examination must be submitted to FGS at least six weeks prior to the scheduled defence date.

The external examiner will be present at the defence to lead the questioning of the student or will participate via teleconferencing or video-conferencing. For PhD defences, the chair is appointed by FGS, and a non-examining departmental representative is appointed by the GC of the department.

The PhD defence begins with an introduction of the candidate and EC, followed by a 20-minute oral summary of the thesis by the candidate. The oral presentation is normally followed by a period of questioning by the EC, beginning with the external examiner. The chair of the defence may invite questions from the audience if time permits. The EC will then deliberate *in camera* and present the candidate with a decision immediately following the defence. The decision can range from pass with no corrections, pass with corrections to be made within a suggested timeline by the EC, or fail (which includes an option, if approved by the EC, to give the student the opportunity to do additional work, rework the thesis and defend it a second time).

After final approval of the thesis by the EC, the student will submit the thesis in electronic form to the FGS. Instructions for online submission of the thesis can be found at the FGS website: www.dal.ca/faculty/gradstudies/currentstudents/thesesanddefences/submission.html. Binding of a thesis is voluntary, and at the student's expense. The FGS website lists local businesses that provide this service should students wish a commemorative copy for themselves or their department.

7. PERIOD OF STUDY

7.1 Master's Program

All Master's programs in the Faculty of Engineering are defined as one year for the purpose of assessing fees. Most students will take more than one year to complete their program. Students are required to pay program fees for one full academic year (three terms), and continuing fees thereafter. For MASc, course work should be completed during the first year of residency. The minimum time for completing the requirements of a Master's program is twelve months, with a maximum time of four years (full time). It is important that students continue to register each term, including the summer, until all program requirements are achieved.

7.2 PhD Program

The PhD program fees are now constant every year in the program, and international differential fees are not applied; therefore, a PhD student will pay the same amount every year of their program. As of May 2020 (when this version of the Handbook was updated), FGS had not provided the program residency time (minimum time in program, and in conjunction, minimum amount of tuition fees to be paid) in order to obtain a PhD. If a PhD requires more than 3 years for completion (average in Engineering of approximately 4.5 years), this program residency time will not affect any student in the PhD in Engineering.

Courses need to be completed before the start of the comprehensive exam. The maximum in program time for the PhD is six years. It is important that students continue to register each term, including the summer, until all program requirements are achieved.

7.3 Part-Time Studies

Part-time registration may be granted to Master's students who are unable to engage in research or courses on a regular basis. Part-time students have up to a maximum of 7 years to complete their program. Part-time students are not normally eligible for scholarships or other forms of financial assistance. There is no part-time option for PhD studies.

7.4 Vacation

The University expects that full-time graduate students are either taking courses or doing research throughout the entire calendar year. Students are normally entitled to two weeks of vacation. The time and duration of vacation leave should be discussed with the TS well in advance.

7.5 Leaves of Absence

7.5.1 Medical and Personal Leaves of Absence

Students who require a leave of absence from their program of study because of illness or personal situation may apply in writing for a leave of absence to the department using the appropriate form (www.dal.ca/faculty/gradstudies/currentstudents/forms). Leaves of absence can be granted for up to three terms (one year). An official leave of absence does not count towards time in program. Students may not hold any Dalhousie Scholarships during a leave of absence, and during the leave, a student cannot study elsewhere for credit at Dalhousie. A leave frees the student from the necessity of paying tuition fees, and it also suspends any use of university services and privileges, including consultations with professors and library, and student services. Please note that retroactive approval cannot be given for leaves of absence.

7.5.2 Parental Leaves of Absence

Parental leaves are considered independent of other leaves of absence. Information on parental leave and childcare can be found at www.dal.ca/faculty/gradstudies/currentstudents/family. Graduate students expecting a child are eligible for a leave and should meet with their TS and GC to discuss a timeline for returning. Specific scholarships may have particular policies and students are encouraged to contact these institutions directly.

7.5.3 Withdrawal, Academic Dismissal and Reinstatement

A student may withdraw from their program under a variety of circumstances: based on their own request (voluntary withdrawal), at the request of the university, or automatically if they fail to maintain their registration by the required academic deadlines. Academic dismissal may also occur. A student who is academically dismissed cannot apply for re-admission for at least 12 months following the official date of the dismissal. Students must apply to be readmitted by following the admissions procedure. However, students may apply in writing to their departments for early reinstatement within the 12-month period.

This letter must outline a plan for successful completion; if supported by the department, the Dean of FGS may give approval for early reinstatement. Withdrawal from a graduate program can result in refusal of readmission to the graduate program. Failure to register and pay tuition fees for any term is considered to be voluntary withdrawal. Readmitted students (except those who were withdrawn for academic purposes) must pay fees for the terms in which they were not registered at the current fee rate to a maximum of three terms. Note that students may be readmitted only once during the course of their program.

8. FUNDING AND SCHOLARSHIPS

Success and timeliness in a graduate program require appropriate financial support. It is important that all graduate student have a clear financial plan for their studies. Important information for students include estimates of the cost of living and studying in Halifax, Nova Scotia. Funding for graduate studies in the Faculty of Engineering varies from student to student, and can come from various sources, including internal and external awards and scholarships, and personal and other funds. There are internal scholarship opportunities (internal to departments, the faculty and the university), external scholarship opportunities, including provincial and national funding agencies, bursaries, research assistantships (often paid from a grant held by a faculty member), teaching assistantships, and personal funding sources and student loans. Information on specific scholarship opportunities and timing of competitions can be found on the FGS website at www.dal.ca/faculty/gradstudies/funding.

8.1 Internal Scholarships and Awards

Internal scholarships that are applicable to students in the faculty of engineering and available through a competitive application process include Faculty of Engineering Scholarships (winter competition for scholarships awarded in the summer for the Fall term) which are administered by the Faculty of Engineering. Larger university awards such as the Killam Predoctoral Scholarship, and the President's Awards (full list available online with specific criteria described) or provincial awards such as the Nova Scotia Graduate Scholarship (NSGS; www.dal.ca/faculty/gradstudies/funding/scholarships/nsgrad.html) are administered through FGS and are awarded through a single competition for the Harmonized Scholarship with deadlines in January. Finally, FGS scholarships are internal awards that are decided at the department level (without an application process). Students are encouraged to contact FGS directly regarding bursaries (www.dal.ca/faculty/ gradstudies/funding/bursaries).

8.2 External Scholarships and Awards

Students in the Faculty of Engineering are most often researching within NSERC (Natural Sciences and Engineering Research Council; www.nserc-crsng.gc.ca) supported fields, and those students with high academic standing and achievements are urged to apply for NSERC Postgraduate Scholarships. The NSERC competition takes place each fall, and application information is usually available in early September on their website. The Alexander Graham Bell Canada Graduate Scholarships at the Doctoral level and NSERC Postgraduate Scholarships at the Doctoral level are normally due to NSERC by mid-October, but students are required to apply internally to FGS a few weeks prior. Applications to the Master's level competition for Canada Graduate Scholarships through NSERC are normally due to NSERC by early December, and internally a few weeks prior. NSERC applications are all submitted online. Some students may be undergoing research that is more applicable to the CIHR (Canadian Institutes of Health Research) or SSHRC (Social Sciences and Humanities Research Council of Canada) than NSERC. It is important to note that in a given year of competition, students can only apply to one of the tri-council organizations for funding (NSERC, CIHR or SSHRC).

8.3 Teaching Assistantships

Teaching assistantships may be available for students who are asked to demonstrate laboratories or otherwise assist instructors with the preparation, presentation or marking of course material. Information on the availability and value of such awards may be obtained from the Heads of departments. Students looking for additional support and training in teaching and learning are encouraged to explore programs with the Centre for Learning and Teaching at Dalhousie (www.dal.ca/dept/clt).

8.4 Travel Funding

Funding for travel for conferences or research purposes during graduate studies is also available from a number of sources. Students can be provided support through research grants of their supervisors. FGS provides graduate students with funding for conference travel if they are presenting a paper or poster, and students must apply for these funds directly to FGS at least one month prior to the date of travel (www.dal.ca/faculty/gradstudies/funding/grants.html). Dalhousie Engineering Graduate Society (DEGS) and Dalhousie Association of Graduate Students (DAGS) (www.dags.ca) also have some conference travel awards available. Students are encouraged to contact these societies directly for more information.

Societies hosting national and international conferences often have student travel awards available on a competitive basis. Students are encouraged to explore these options when they are attending conferences.

9. GRADUATE STUDIES ADMINISTRATION AND SUPPORTS

9.1 Graduate Admission Office

The Faculty of Engineering Graduate Admissions Office is responsible for the planning, executing, and administration of all aspects of graduate admissions in the Faculty of Engineering. Each department has a Graduate Administrator who handles much of the day-to-day running of the graduate studies programs within departments.

9.2 Graduate Studies Committee (GSC)

The GSC consists of the GCs from each department in the Faculty of Engineering, a graduate student representative from the DEGS, the Dean of Engineering, and the Graduate Studies Admissions Administrator (non-voting). A Chair is elected from the GCs. GSC meets monthly to deal with graduate student requests as appropriate, and acts as the graduate scholarship and awards committee for the Faculty of Engineering. GSC also evaluates and recommends the approval of new graduate courses and programs to the Engineering Faculty Council, and monitors academic regulations approved by Senate including periodic program reviews. The GSC also advises on academic policy and long-term planning with regard to graduate studies.

9.3 The Dalhousie Engineering Graduate Society (DEGS)

DEGS is a Student Union-recognised society which caters to the interests of graduate students in the Faculty of Engineering. The Society is represented in the Faculty of Engineering Council, the Library Advisory Committee, GSC and most other Faculty standing committees whose activities directly or indirectly affect the graduate students in Engineering. The objectives of the DEGS are to represent and promote the unity and the welfare of graduate students and to further the intellectual and cultural interests of graduate students.

Membership is automatic for all registered graduate students. Details are provided in the Student Union and DEGS constitutions. A portion of the Student Union fee is used for the activities sponsored by DEGS.

The DEGS administration consists of an elected Executive President, Vice-President, and Treasurer as well as a Council made up of elected departmental representatives and an appointed Secretary. Elections are usually held within the first week of November. All registered members are eligible to vote and be voted for. Details are given in the DEGS constitution. The DEGS regular meetings are held once a month. They are open to all graduate students although only council members can vote at such meetings. Various departments in the Faculty of Engineering have also created their own Departmental student societies.

APPENDIX A: Program Timelines and Requirements Summary

MSc and MASc PROGRAM	
REQUIREMENT	**TIME**
Program Approval	End of first month after initial registration
Supervisory Committee Approval	Initial Registration plus eight months
Progress Reports	To be submitted one month prior to the anniversary date of initial registration - Online via GSIS
Scheduling of Defence/Presentation. Thesis/Project to the Departmental Graduate Coordinator and Secretary and Supervisory committee with "Appointment for an Oral Examination Form"	Two (2) weeks prior to the defence
Maximum time that all requirements must be met	Initial registration plus four (4) years
PhD PROGRAM	
REQUIREMENT	**TIME**
Program Approval	End of first month after initial registration
Supervisory Committee Approval	Initial Registration plus eight months
Progress Reports	To be submitted one month prior to the anniversary date of initial registration – Online via GSIS
Comprehensive Exams	To be completed by no later than the end of the second year in program.
Scheduling of Defence: all through FGS	Process starts 12 weeks prior to the expected date of the defence: see FGS website (www.dal.ca/faculty/ gradstudies/currentstudents/ thesesanddefenses.htm) for timelines and checklist. PhD defences are arranged with the FGS Thesis Clerk (thesis@dal.ca)
Maximum time that all requirements must be met	Initial registration plus six (6) years

APPENDIX B: Guidelines for PhD Comprehensive Examinations

These guidelines provide additional information regarding PhD Comprehensive Exam requirements of the Faculty of Engineering and give specific procedures for implementation of these requirements. A copy of the rules must be given to each PhD student shortly after registration.

Purpose of the Comprehensive Exams:

The purpose of the comprehensive exam is to test the candidate's understanding of the chosen field of study as a whole and evaluate his/her suitability to begin Ph.D. level thesis research.

Outcome of the Comprehensive Exam

The result of the comprehensive exam is "pass", "fail" or "re-examination". Failure to pass this exam will result in academic dismissal. Students may apply for reinstatement (within 12 months) or readmission (over 12 months from dismissal) as per Faculty of Graduate Studies (FGS) regulations. A candidate who has been reinstated or readmitted will be permitted to repeat the entire examination (once) within twelve months of reinstatement/readmission

Recommendation of the examining committee to re-examine is only permitted if the failure was marginal. Re-examination of marginal candidates must be carried out within six months of the initial examination. Candidates requiring re-examination will remain registered in the program and receive a temporary grade of 'IP' and may not necessarily be required to rewrite both written examinations. Candidates given the opportunity for a re-examination are only permitted to re-examine once.

General Description:

All candidates being considered for a doctoral degree in the Faculty of Engineering are required to complete the comprehensive exam requirements. These exams will take the form of *a minimum of* two written and one oral examinations administered by the candidate's SC. The process is designed to examine, in depth, the candidate's knowledge and skills in both the general research area and the specific topics of the thesis being undertaken. While there are distinct activities to be completed, the examination process will be initiated at the end of the first year in the program and *will be completed before the end of the second year*. Despite the obvious pressures of exams, the process is not intended to be adversarial but rather undertaken in open communication and interaction with the SC. As well, the exam process is

designed to assist in the development of the candidate's skills in communication, research planning and defense, as well as providing an indication of the expectations for the quality and sophistication of the thesis work and future assessments.

It is the candidate and supervisor committee's responsibility to be aware of all rules and regulations, as well as to be pro-active in ensuring that the requirements are met in a timely fashion; although the SC is responsible for setting and administering the required examinations.

In compliance with FGS regulations (§ 7.5 of the Graduate Studies Calendar), ***comprehensive exams may only be taken after the completion of all required course work*** and ***in no case*** should the examinations be held ***less than one year prior to the submission of a thesis for defence***.

Procedures

1) Setting of the Comprehensive Exam

Following a request by the candidate, the SC will hold an *in camera* discussion to evaluate the student's performance and set the parameters for the written exams. During this evaluation, the committee may consider the student's academic record, including courses completed as part of the doctoral program, publication record, presentations made, and the needs of the proposed thesis. The appropriate area and scope of the written examinations is then selected, and examiners identified. As well, the SC should designate a member to coordinate the written exam process; this will normally be the candidate's TS.

2) Notification of the Candidate

The SC will notify the candidate in writing, through a letter or memo, of the scope and subject area of each exam (written and oral) as well as the timing and the names of the examiners; a copy of this letter/memo will be provided to the department's graduate coordinator and graduate secretary to be included in the candidate's file.

In accordance with the Faculty of Engineering Guidelines, the candidate must be given ***at least 3 months notice*** to prepare for the written and oral exams. While the exact questions can not be communicated to the candidate beforehand, the Committee should endeavor to provide a reasonable level of guidance for study and preparation.

3) The Written Examinations

A ***minimum of two written exams*** must be completed. The exams should cover both the general field of the candidate's research as well as specific knowledge and skills required for the thesis topic. The Committee should set the area of examination, timing, resource material permitted and division of topic areas for each exam. Each exam may be a 'sit-down' exam that should be set to be completed in one sitting ***not exceeding an 8-hour time limit*** or a 'take-home' exam that should be completed in a continuous period ***not exceeding 5 days.*** The timing between each exam should be reasonable.

4) Oral Examination

The oral exam will normally be completed **within one month** of completion of the written exams. In any case, **within three months** after successfully completing the written examinations, the SC will hold a meeting with the candidate. The purpose of this meeting is to conduct an oral examination of the candidate. A member from the Department who is not a member of the SC may be asked to chair the Oral Examination at the recommendation of the GC, in consultation with the SC. As both written and oral exam must be completed within two years from the entrance to the Ph.D. program, the written exams must be completed by 21 months in order to have the oral exam completed within two years.

In preparation for this meeting, the candidate may be required to submit a written proposal to the Committee for review prior to the meeting. This written proposal will often include:

- An introduction to the area or topic of research,
- A review of the problem or issue being investigated,
- An up-to-date literature review,
- Specific objectives of the research or project,
- Discussion of the methodology proposed to meet those objectives,
- Discussion of the current practice or knowledge and an indication of the difference or originality of the proposed research plan or project,
- Any preliminary research that has been completed and a plan of the proposed research to be completed.

Questions for the candidate during the oral examination should focus on the specific thesis area but may be reasonably expanded into the general knowledge areas required for the research not included in the written examination. This is to be done in order to extend the evaluation of the candidate's knowledge and understanding of subject matters covered in the written examinations. Emphasis may be placed on topics in which the candidate's responses are judged to be weak in the written exam to evaluate the candidate's ability to respond, in a scholarly and professional manner, to a variety of verbal questions

5) Completion of the Comprehensive Exam

Immediately following the oral exam, the SC will hold an *in camera* meeting to assess the candidate's performance for the whole comprehensive exam process (*i.e.*, written and oral examinations and thesis proposal). The Committee may again review the candidate's academic record and the results of the written and oral exams.

The Committee will then complete the 'PhD Comprehensive Examination Results' form with the appropriate "pass", "fail" or "re-examination" recommendation. In the case of "fail" or "re-examination", the Committee needs to provide written justification and feedback to the candidate.

The completed form will then be forwarded to the Department for further processing; including the preparation of a letter to be sent to the candidate informing them of the results of the comprehensive examination and the submission of the result to FGS using a grade change form.

APPENDIX C

Responsibilities and Rights

of

Graduate Students and Supervisors

APPENDIX C.1: Responsibilities of Supervisors

When faculty members accept the supervision of graduate students, they assume several responsibilities:

- to provide reasonable access to students and to be available for consultation at relatively short notice;
- to be as helpful as possible in suggesting research topics and in assisting students to define their theses;
- to tell students approximately how long it will be before written work, such as drafts of chapters, can be returned with comments;
- to be thorough in their examination of thesis chapters, supplying, where appropriate, detailed comments on such matters as literary form, structure, use of evidence, relation of the thesis to published work on the subject, footnoting, and bibliographical techniques, and making constructive suggestions for rewriting and improving the draft;
- to indicate clearly when a draft is in a satisfactory final form or, if it is clear to the supervisor that the thesis cannot be successfully completed, to advise the student accordingly;
- to know the departmental and University regulations and standards to which the writer of a thesis is required to conform, and to make sure that the student is aware of them;
- to continue supervision when on leave, possibly with arrangements also being made for members of the supervisory committee to assist the student for the leave period;
- to advise and help the student to approach other faculty members for assistance with specific problems or even to request the reading of a chapter or section of the thesis;
- to see that all ethics and animal care approvals as appropriate, are secured.

APPENDIX C.2: Responsibilities of Students

When graduate students undertake the writing of a thesis, they assume several responsibilities:

- to choose a topic (often with the supervisor's help) and to produce a thesis that is essentially their own work;
- to produce a thesis which meets the standards of scholarship required by the University and the department, including demonstration of their capacity for independent scholarship and research in their field;
- to acknowledge direct assistance or borrowed material from other scholars or researchers;
- to realize that the supervisor has undergraduate or other duties which may at times delay the student's access to the supervisor at short notice;
- to give serious and considered attention to advice and direction from the supervisor;
- to submit their work to the judgment of the department and to abide by its decision when any rights of appeal, if exercised, have been exhausted;
- to know the departmental and University regulations and standards to which the writer of a thesis is required to conform;
- to comply with all ethics and animal care requirements.

APPENDIX C.3: Rights of Supervisors

Supervisors have the following rights:

- to expect students to give serious and considered attention to their advice concerning what they regard as essential changes in the thesis;
- to terminate supervision and advise the student to find another supervisor if the student does not heed advice and ignores recommendations for changes in the thesis, or if the student is not putting forth a reasonable effort;
- to have their thesis supervision properly credited by the department as an intrinsic part of their workload so that, in the assignment of duties, they are not overburdened to the point of having their effectiveness impaired as supervisors;
- to have the thesis-writer acknowledge, by footnoting, all portions of the supervisor's own research over which the supervisor wants to retain future rights of authorship;
- to have thesis-writers give permission for the results of their research to be used for the benefit of a larger project when they are working as assistants with their supervisor on research that is part of such a project. this is always with the understanding that students will retain scholarly credit for their own work and be given acknowledgment of their contribution to the larger project.

APPENDIX C.4: Rights of Students

Students have the following rights:

- to have a clear understanding of what is expected in thesis writing (expected length, acceptable methodology, validity of topic, notification of progress);
- to expect help from their supervisor in establishing a feasible topic and in solving problems and assessing progress as the thesis is being written;
- to receive a fair assessment of the completed thesis and explanations of negative criticism;
- to be allowed to have a new supervisor when they can offer convincing reasons to the department for the change and the change can be reasonably accommodated by the department;
- to be protected from exploitation by their supervisor or other faculty members if the latter should:
- intrude upon the student's right of authorship or fail to give a student authorship credit for team research (where applicable, the department's protocols on authorship should be provided to students before they embark on research), or
- divert the student's efforts from the timely completion of the thesis;
- to submit a thesis even if the supervisor is not satisfied, although such action should be taken only in extreme cases and after full consultation with the department.

APPENDIX C.5: Responsibilities of the Department

Departments have certain responsibilities in supporting and maintaining their graduate programs:

- to provide necessary facilities and supervision for each student admitted, and not to accept more candidates than can be offered effective supervision (Therefore departments should consider carefully such matters as faculty retirements, sabbatical leaves, teaching loads, and library resources before admitting each student with a declared research interest. When, as is often the case in many disciplines, applicants are unable to choose a field of research until they have had some experience in graduate study or in a particular department, the department should still regulate admissions according to the number of faculty members available for supervision);

- to uphold a high academic standard for theses;

- to provide adequate supervision at all times, so that, when a supervisor leaves the University for another permanent position, substitute arrangements are made as soon as possible;

- to allow students to change supervisors if their research interests shift or develop in a new direction and a change of supervisor will not deprive them of financial support and if the change can be reasonably accommodated by the department;

- to provide procedures which assist and encourage students to complete the thesis, such as early review and approval of topic and methodology, guidelines on access and appeals, oversight of the students' schedule, and a clearly stated system of thesis review and evaluation;

- to regard supervision of graduate students as a major consideration in making replacement appointments for faculty;

- to encourage students to give papers as they proceed, so that they can test their ideas on a wider audience than the supervisory committee;

- to ensure that the graduate coordinator acts as a general overseer of students' progress; to instruct all students (or see that they attend Faculty-level workshops) on research ethics; to explain to students the University's policies on intellectual property rights.