



School of Biomedical Engineering

## Graduate Student Handbook

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# 1. PREAMBLE

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Welcome to graduate studies in the School of Biomedical Engineering (SBME)! Since its official opening in July of 1999, SBME has grown and established itself as part of the Dalhousie community within the Faculties of both Medicine and Engineering. As a graduate student, you'll work closely with engineers and clinicians on projects that address contemporary medical problems. Our sincere hope is that you experience much success and personal growth during your studies. Our goal is to prepare you well for the next step in your career or academic life, whatever the direction you choose to pursue!

This document is intended to assist you toward the successful completion of the degree program. The guidelines and information presented here should be viewed in the context of “normal” circumstances, and are not necessarily exhaustive. The rules and regulations described here are specifically applicable to biomedical engineering students; however, they do comply with the overall university regulations (Graduate Studies Calendar; [academiccalendar.dal.ca](http://academiccalendar.dal.ca)), the Faculty of Graduate Studies (FGS, [www.dal.ca/faculty/gradstudies](http://www.dal.ca/faculty/gradstudies); Graduate Studies Calendar), and Senate of Dalhousie University ([www.dal.ca/dept/university\\_secretariate/university\\_senate](http://www.dal.ca/dept/university_secretariate/university_senate)).

## 2. PROGRAMS

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SBME offers both a Master of Applied Science (MASc) and a Doctor of Philosophy (PhD) degree. It is our intent to provide an overview of general information here; however, important resources to familiarize yourself with are the Graduate Academic Calendar and the Faculty of Graduate Studies. An overview of the MASc and PhD program timelines are provided in appendix A and B respectively. Key contact information is provided in appendix C.

### **2.1 M.A.Sc Program Requirements**

The MASc program is comprised of graduate-level coursework, seminar attendance and presentations, and a supervised research project leading to the defence of a thesis.

#### 2.1.1 COURSES

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Students are required to take six half-credit graduate courses, four of which must be selected from the SBME suite of graduate courses. However, students may take up to two senior undergraduate courses (3000 or 4000 level for Science courses and 4000 level for Engineering courses) as part of this requirement. Students may register for a maximum of two directed readings.

#### 2.1.2 SEMINARS

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Students are required to participate in the SBME seminar series by (i) regularly attending seminars and (ii) conducting a seminar on their thesis work. The presentations are 30-40 minutes in length followed by 10-15 minutes of questions from the audience. Students should contact the seminar coordinator to schedule their seminar, which normally occurs in the second year of the program.

### 2.1.3 RESEARCH DAY

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Students are required to present their work at the SBME's annual Research Day, typically in their second year.

### 2.1.4 THESIS PROPOSAL

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Each student will present a thesis proposal to their Supervisory Committee (SC) in written form at about the one-year mark. The student will make an oral presentation of the proposal to the SC at a scheduled meeting, with time for discussion and informal exchange of ideas to focus the research.

### 2.1.5 THESIS

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A research thesis comprising original work by the student will be carried out under the direct supervision the Thesis Supervisor (TS). This document will be a scholarly work subject to the regulations of the Faculty of Graduate Studies.

### 2.1.6 MASC PROGRAM TIMELINE OVERVIEW

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<b>Timeline (from registration)</b>	<b>Deliverable</b>
Within 30 days	Approval of program
Within 3 months	Supervisory Committee (SC) confirmed; Informal SC meeting held
Within 8 months	First SC meeting / research plan approval
Within 11 months	First progress report due
Within 12 months	Thesis proposal meeting / approval
In second year	Seminar presentation Research Day presentation
Within 5 years	Thesis submission and defense

## **2.2 PhD Program Requirements**

The Ph.D. program is comprised of graduate-level course work, seminar attendance and presentations, publications, a comprehensive examination, and a supervised research project leading to the defence of a Ph.D. thesis. A PhD thesis is comprehensive and student driven.

### **2.2.1 COURSES**

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Students will normally complete four graduate-level half-courses, or two if they come from a previous Masters of Biomedical Engineering degree, on the advice of their Supervisor and Supervisory Committee. This course list must be approved by the SBME graduate coordinator. A maximum of one half-course may be a Directed Reading.

### **2.2.2 SEMINARS**

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Ph.D. candidates must participate in the SBME seminar series. This includes regular attendance at the seminars and presentation of two seminars: the first normally in the 2nd year of the program (typically between the submission of the Ph.D. Thesis Proposal and the Candidacy Examination), and the second to present the outcome of the research work to the School, shortly before the thesis defence.

### **2.2.3 RESEARCH DAY**

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Students are required to present their work at the SBME's annual Research Day starting in second year and at minimum one additional time.

### **2.2.4 PUBLICATION**

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Ph.D. candidates must present their research work at one or more national or international conferences during their program and submit at least one research paper based on their thesis work to a refereed journal prior to program completion.

### **2.2.5 THESIS PROPOSAL**

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Each student will present a thesis proposal to their Supervisory Committee (SC) in written form at about the one-year mark. The student will make an oral presentation of the proposal to the SC at a scheduled meeting, with time for discussion and informal exchange of ideas to focus the research.

### **2.2.6 THESIS**

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A research thesis comprised of original work will be carried out under the direct supervision of the Thesis Supervisor. Subject to the regulations of the Faculty of Graduate Studies, this document will be a scholarly work, and will represent an original contribution to knowledge relevant to Biomedical Engineering.

### 2.2.7 PHD COMPREHENSIVE EXAMINATION

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Ph.D. candidates must successfully complete a Comprehensive Examination that demonstrates their background preparation to successfully complete and defend their research thesis. This will normally occur at the 2-year point in their program. See Appendix E for a detailed overview of this process.

### 2.2.8 PHD PROGRAM TIMELINE OVERVIEW

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Timeline (from registration)	Deliverable
Within 30 days	Approval of program
Within 4 months	Supervisory Committee (SC) confirmed; Informal SC meeting held
Within 8 months	First SC meeting / research plan approval
Within 11 months	First progress report due
Within 12 months	Approval of Research Proposal
In second year	Seminar presentation; Research Day presentation; Candidacy Examination
Within 6 years	Thesis submission and defense

## 3. Period of Study

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### 3.1 MASTERS PROGRAM

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All Masters programs are defined as “one-year” for the purpose of assessing fees. Students required to take additional courses as a requisite of admission also qualify for the “one-year” fee assessment as long as the total number of credits does not exceed 4.5 full or 9 half-credits.

The MASc program is designed to be completed in approximately two years of full-time study. The minimum time for completing the program is twelve (12) months and the maximum is five years.

### 3.2 PHD PROGRAM

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PhD candidates will pay full fees for two years, followed by thesis-only fees until completion of the program.

The Ph.D. program will normally be completed in 4 years of full-time study. The minimum time for completing the program is two years and the maximum is six years.

## 4. TRANSFER FROM M.A.Sc TO Ph.D. PROGRAM

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Transfer to the Ph.D. program from the M.A.Sc. program will be considered only for exceptional students. When permitted, transfer will normally occur after one (1) year in the M.A.Sc. program.

Transfer will be contingent on:

1. Successful completion of 5 half-classes with a minimum cumulative A-.
2. Preparation of a 10–15 page Ph.D. Transfer Proposal, outlining a research program that has a high probability of completion and of making a significant new contribution to knowledge.
3. Oral defence of the Transfer Proposal at a Transfer Examination.

The Transfer Examination Committee will consist of the candidate's Supervisory Committee plus one other member who is appointed to both the SBME and the Faculty of Graduate Studies at Dalhousie.

The examination will consider:

1. The Ph.D. Transfer Proposal with its defence and
2. The demonstrated research capabilities of the student.

After transfer, candidates will complete the remainder of the total of six half-classes from their M.A.Sc. program (if applicable), plus a minimum of two additional half-classes for their Ph.D. program, on the advice of their supervisor and supervisory committees. This total must include a minimum of four half-classes from the suite of 5000-level SBME offerings and no more than two Directed Readings half-courses. This course list must be approved by the SBME's graduate coordinator.

Students transferring from the M.A.Sc. program will submit their Ph.D. Thesis Proposal after one year in the Ph.D. program.

## 5. SUPERVISORS AND SUPERVISORY COMMITTEES

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Both M.A.Sc and Ph.D programs require an appointed thesis supervisor (TS), or two co-supervisors, confirmed 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. The rights and responsibilities of supervisors, students and academic units are detailed in the [Graduate Studies Academic Calendar \(section 9\)](#). In addition to a TS, the student is also supported by a selected supervisory committee (SC).

### 5.1 THESIS SUPERVISORS

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All students will have a Thesis Supervisor or two co-supervisors, at least one of whom is appointed in the School of Biomedical Engineering. In addition,

- i) Supervisors also will have a Ph.D. or equivalent research experience as judged by the faculty members of the SBME;
- ii) Will be members of the Faculty of Graduate Studies at Dalhousie University;
- iii) PhD Supervisors will have previously supervised a thesis-based Masters student and previously served on a supervisory committee of a doctoral student.



## 5.2 SUPERVISORY COMMITTEE COMPOSITION

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The Supervisory Committee (SC) is identified within three months of starting the program. Supervisory committees are selected by the supervisor in consultation with the student. A supervisory committee should complement the expertise available to the student in completing their research program. The membership of all supervisory committees must be recorded in the Graduate Student Information System (GSIS), and changes to membership must be submitted on the student's program update form (available through FGS) and recorded by the department in GSIS.

The SC shall minimally consist of:

1. the Thesis Supervisor or co-supervisors;
2. another faculty member from the SBME;
3. another faculty member;
4. Any other faculty members deemed necessary by the Thesis Supervisor and/or the Graduate Coordinator of the SBME.

All members of supervisory committees are Regular, Adjunct (Retired), Adjunct (FGS), or Adjunct (Scholar) members of the Faculty of Graduate Studies. At least two members must have their primary appointments in different departments. Regular members should constitute no less than 50% of the committee.

## 5.3 SUPERVISORY COMMITTEE DUTIES

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The duties of the Supervisory Committee include:

1. to co-ordinate the overall program in accordance with all regulations concerning the degree sought, including those presented in the University Calendar and the Faculty of Graduate Studies.
2. to meet with the student immediately after appointment. This is an informal meeting to review the qualifications of the student and to discuss committee composition, their program of study, and their proposed thesis question.
3. to meet as needed for the purpose of evaluating and discussing the proposed thesis research project.
4. to approve the student's Thesis Proposal.
5. to assist the student as a group or on an individual basis with problems or concerns arising from the research.

## 5.4 SUPERVISORY COMMITTEE MEETINGS

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The Supervisory Committee will meet:

1. Immediately after appointment (informal).
2. within eight (8) months after initial registration to approve the research plan.
3. within twelve (12) months after initial registration to approve the thesis proposal.
4. Periodically as required and at least annually.

**1. Informal meeting immediately after appointment**

This meeting is informal and requires no presentation / submission. The purpose is to review the qualifications of the student, discuss the committee composition to ensure it is composed of members most appropriate to support the students' work and to review the program of study and offer preliminary thoughts on the proposed thesis question. No form required.

**2. Meeting to approve research plan**

This is a short meeting where no power point is required but can be used if desired. This should be a 10-minute presentation (maximum) of what is going to come forward in the proposal. The purpose is to allow the SC to provide preliminary advice for the development of the actual proposal. Graduate Student Supervisory Committee Assessment (GSSCA) Form required.

**3. Thesis Proposal meeting**

Each student will present a thesis proposal to their SC in written form at about the one-year mark. The student will make an oral presentation of the proposal to the SC at a scheduled meeting, with time for discussion and informal exchange of ideas to focus the research. Please see section 6.3 for a detailed description of Thesis Proposal requirements. GSSCA Form required.

## **6. EVALUATION OF PERFORMANCE**

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The Graduate Coordinator acts as a general overseer of student progress. An overview of the program timeline / responsibilities for the MASc and PhD programs can be found in Appendix A and B respectively. Progress through the program is evaluated through:

### **6.1 PROGRESS EVALUATION WITH THESIS SUPERVISOR / SUPERVISORY COMMITTEE**

Students are encouraged to have regular meetings with their thesis supervisor which may or may not include the SC. This enables the student to seek advice on challenges and enables the TS/SC to evaluate the progress of research.

Each Supervisory Committee meeting will require a GSSCA form to be completed by the committee detailing the level of satisfaction with progress. This is communicated with the student. Any discrepancy between the student and TS/SC concerning research performance should be brought to the attention of the Graduate Coordinator.

A detailed overview of the structure of SC meetings can be found in Appendix D.

### **6.2 ANNUAL PROGRESS REPORTS**

Progress reports are required from all graduate students eleven months after the start of a new program, and annually thereafter. Reports are submitted through GSIS. Once the student reports on his/her progress over the past year, constructive feedback is required from their thesis supervisor, the graduate coordinator, and the Faculty of Graduate Studies. This requirement is 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 Graduate Coordinator 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.

### **6.3 THESIS PROPOSALS**

Each student will present a thesis proposal to their SC in written form at about the one-year mark. The student will make an oral presentation of the proposal to the SC at a scheduled meeting, with time for discussion and informal exchange of ideas to focus the research.

The proposal should not exceed 20 pages in length (MAsc students) or 40 pages in length (PhD students) and will:

- Include, at minimum, a title page, table of contents, introduction/literature review, thesis objectives/hypothesis, proposed methods and materials, timeline for the project, progress/results to date, and a list of references.
- Be double spaced, 12 point font, excluding the table of contents, tables, figures, list of references, and appendices.

And for PhD students:

- Demonstrate the likelihood of an original contribution to knowledge relevant to Biomedical Engineering.

The committee will appoint a chair for the meeting; the chair is not the TS and should be a member of SBME. It is the Chair's responsibility to ensure that a GSSCA Form is completed and signed by all committee members. The assessment form is a record of the committee's acceptance of the proposal.

Major modification of the research objectives and plan as presented and agreed upon at this meeting should only be considered if the SC is notified and in agreement.

## **7. MASTERS THESIS AND DEFENCE**

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The Thesis research is undertaken after the approval of the Thesis Proposal. Note that a defence will not be scheduled until all other course requirements are met, including completion of graduate courses and seminar presentations.

The Faculty of Graduate Studies facilitates thesis format checking and submission for all Graduate Students (<https://www.dal.ca/faculty/gradstudies/currentstudents/thesesanddefences.html>).

The Masters thesis examining committee composition is detailed in the FGS regulations for a Master's Theses in [Section X of the Graduate Academic Calendar](#).

In addition, the examining committee:

- (i) Includes the supervisory committee;
- (ii) Has one member who must not have been directly involved in the thesis supervision;
- (iii) Must be approved by the Graduate Coordinator and the Director of the School of Biomedical Engineering.

Students are required to notify the Graduate Coordinator of their intent to graduate. Following that, 12 business days before the desired thesis defence date, students are required to submit their thesis to the SC and to advise the Administrative Coordinator so a room can be booked.

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 examining committee 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 examining committee. 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. All theses are either approved or rejected according to the FGS regulations found in [Section X of the Graduate Academic Calendar](#).

## 8. PHD THESIS AND DEFENCE

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PhD thesis research and preparation begins after approval of the thesis proposal. PhD thesis defences are arranged through FGS directly, not SBME. 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 here: <https://www.dal.ca/faculty/gradstudies/currentstudents/thesesanddefences/defence.html>

Please note, each Ph.D. candidate must present his/her research work at one or more national or international conferences during their program and must have submitted at least one research paper based on the thesis work prior to program completion and thesis defence.

The Ph.D. Examination Committee minimum composition is detailed in the FGS regulations for the Defense of a Doctoral Thesis ([Section X in the Graduate Calendar](#)).

In addition, the examination committee:

- i. Includes one member from another academic unit at Dalhousie University, appointed in the Faculty of Graduate studies,
- ii. Includes two members who will normally have been members of the supervisory committee examining committee,
- iii. Must be approved by the Graduate Coordinator and the Director of the School of Biomedical Engineering.

## 9. FUNDING AND SCHOLARSHIPS

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Information on internal and external funding opportunities, including travel grants, can be found on the FGS website at: <https://www.dal.ca/faculty/gradstudies/funding.html>.

Graduate students may hold Teaching Assistantships (TAs). However, only a limited number of such positions are available within the SBME. Students may also seek TA positions outside the School and should discuss their plans to do so with their TS.

## APPENDIX A- MASC PROGRAM TIMELINE

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30  
days

### APPROVAL OF PROGRAM

Meet with your supervisor and/or the Graduate Coordinator to approve your program of study.

**ACTION REQUIRED:** Email your course selections to the Administrative Coordinator for inputting into the Graduate Student Information System (GSIS).

3  
months

### SUPERVISORY COMMITTEE (SC) CONFIRMED

Your thesis supervisor will select the committee members.

**ACTION REQUIRED:** Fill in the [Graduate Student Supervisory Committee Meeting Form](#) (member section) with your supervisor and bring to Administrative Coordinator.

An informal meeting with your SC is recommended at this time to briefly discuss your thesis question, committee membership, and program of study.

8  
months

### FIRST SC MEETING/RESEARCH PLAN APPROVAL

**ACTION REQUIRED:** Bring the Graduate Student Supervisory Committee Meeting form to the meeting.

11  
months

### PROGRESS REPORT

**ACTION REQUIRED:** Submit a progress report annually using [GSIS](#). This automatically gets emailed to your Supervisor for approval and then the Graduate Coordinator.

12  
months

### THESIS PROPOSAL MEETING / APPROVAL

You will provide a written proposal of your thesis (please follow the guidelines in the ['Thesis Proposal' guide](#)).

**ACTION REQUIRED:** Provide a new Graduate Student Supervisory Committee Meeting form. Return the completed form to the Administrative Coordinator. Ensure that the thesis proposal approval checkbox has been checked.

2nd  
year

### SEMINAR & RESEARCH DAY PRESENTATIONS

Seminar: The presentations are 30-40 minutes in length followed by 10-15 minutes of questions from the audience.

Research Day: Present your research at the annual BME Research Day.

**ACTION REQUIRED:** Contact the seminar coordinator to schedule your seminar.

Upon  
approval

### THESIS SUBMISSION

**ACTION REQUIRED:** Notify the Graduate Coordinator of your intention to graduate.

Email your thesis to your Supervisory Committee at least 12 business days before the defence.

Notify Administrative Coordinator 12 business days before your desired defense date so a room can be booked.

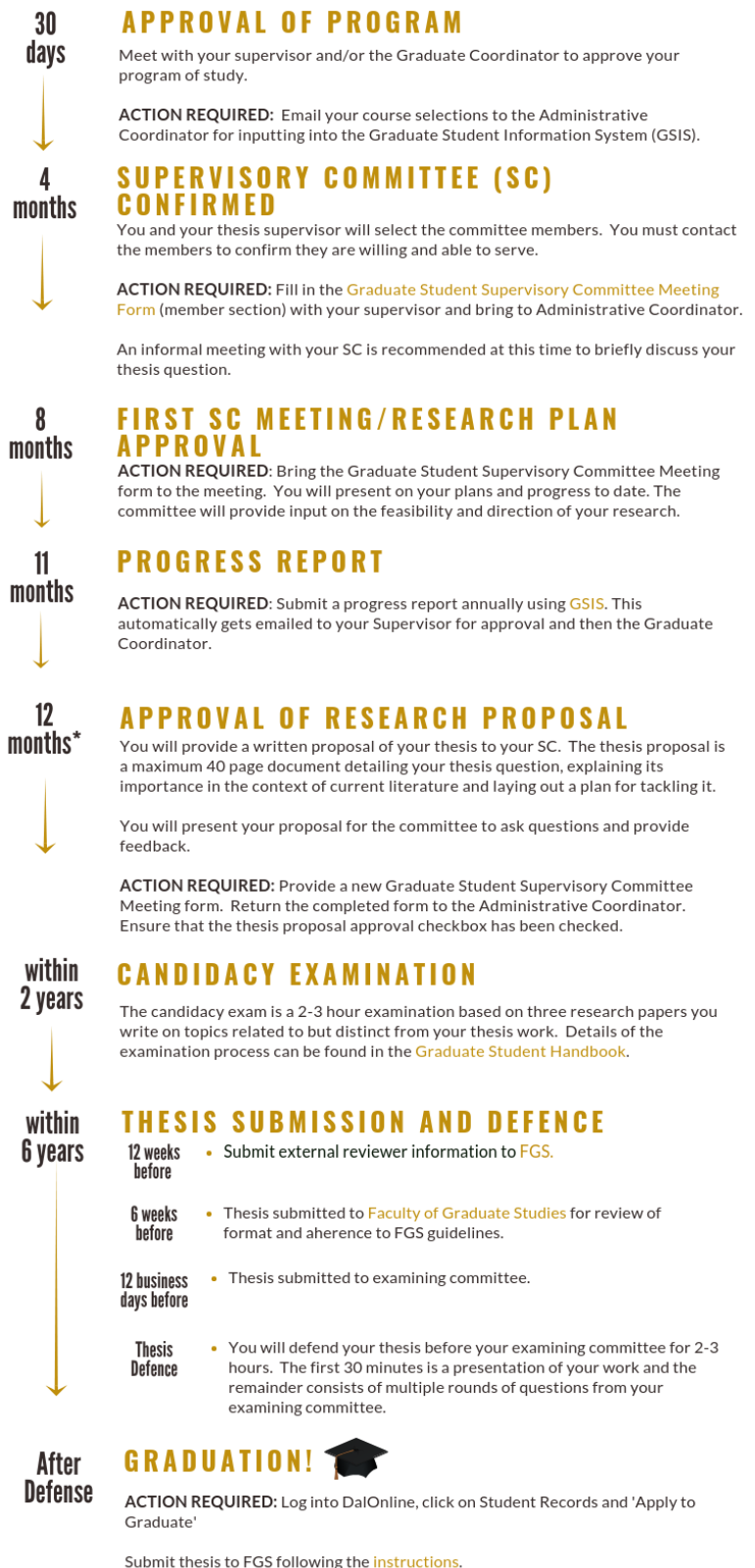
After  
Defense  
within 5  
years\*

### GRADUATION!

**ACTION REQUIRED:** Log into [DalOnline](#), click on Student Records and 'Apply to Graduate'

Submit thesis to FGS following the [instructions](#).

## APPENDIX B- PHD PROGRAM TIMELINE



### \*ADDITIONAL PROGRAM REQUIREMENTS



- Two presentations at the SBME Research Day (starting in year 2)
- Two department seminars: 1 typically between proposal and candidacy exam, 1 after final results.

## APPENDIX C: KEY CONTACT INFORMATION

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Geoff Maksym, director

[geoff.maksym@dal.ca](mailto:geoff.maksym@dal.ca)

902.494.2624

Jeremy Brown, graduate coordinator

[j.brown@dal.ca](mailto:j.brown@dal.ca)

902.473.1515

John Frampton, seminar & research day coordinator

[john.frampton@dal.ca](mailto:john.frampton@dal.ca)

902.494.4175

Sandra Pereira, administrative coordinator

[sandra.pereira@dal.ca](mailto:sandra.pereira@dal.ca)

902.494.3427

Website for forms and policies:

<https://www.dal.ca/faculty/school-biomedical-engineering/current-students/academic-policies.html>

## APPENDIX D: SUPERVISORY COMMITTEE MEETING STRUCTURE

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Prior to each committee meeting, students are to prepare a summary of progress made on their research since the last committee meeting and submit the summary to all Supervisory Committee members at least 1 week in advance of the meeting date. It is recommended that the summary include the presentation of data and results, a discussion of the results, problems that may have arisen, an indication of progress made in relation to the timeline in the thesis proposal, questions for the committee members, and responses to any “Actions Required Before Next Meeting” as outlined in the previous meeting’s “Graduate Student Advisory Committee Meeting Assessment Form”.

At the committee meeting, students are required to make an oral presentation of their results and progress since the last meeting and answer questions from the committee. The presentation should not exceed twenty (20) minutes and the use of a PowerPoint presentation is recommended. The intent of committee meetings is not only to ensure the timely progress of a student’s research program, but also to allow an open and informed discussion of the research being conducted in order to aid and guide the student. The committee meetings should provide feedback to the student that will enrich their thesis project and graduate training.

For every supervisory committee meeting, a designated chair is required to ensure that an SBME Graduate Student Advisory Committee Assessment Form is filled-out, dated, and signed by all committee members. The assessment form is a record of the student’s performance and progress. Both the committee and student have the ability to provide written comments on the assessment form with a copy of the report provided to the student and placed in their file. After each committee meeting, the designated chair will go through the form with the student and explain the committee’s evaluation and comments. The student is then given an opportunity to respond in writing to the committee and is required to date and sign the form.



## APPENDIX E: PHD COMPREHENSIVE EXAMINATION

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The Comprehensive Examination Committee will consist of:

1. The candidate's Supervisory Committee, plus
2. At least one other faculty member who is a member of the Faculty of Graduate Studies and appointed in SBME
3. A Committee Chair appointed by the Graduate Coordinator.

The candidate will be presented with five (5) questions relevant to the research thesis program. He/she will then choose three (3) of these questions and will answer them in three (3) corresponding original, scholarly documents of 20-25 pages in length. Each document will have the format of a scientific journal review paper and the candidate will have four (4) weeks to complete them before submitting them to the SBME Graduate Coordinator and thereby to the Candidacy Examination committee for review.

The candidate must successfully defend the documents and his/her background knowledge of the research thesis area in a 2-3 hour oral examination. Successful examination will be based on consideration of both the written documents and the oral defence.

It is the responsibility of the Graduate Coordinator to report the results of the Comprehensive Examination to the Faculty of Graduate Studies.