



Inspiring Innovation and Discovery



**McMaster** School of Biomedical Engineering

Graduate Student Handbook

2016-2017

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This document is not intended to replicate or modify the information found in the School of Graduate Studies (SGS) Calendar (available at <https://graduate.mcmaster.ca/grad-council/graduate-calendar.html>). If there is any discrepancy between this document and the SGS Calendar, then the School of Graduate Studies Calendar shall prevail. Students and faculty are encouraged to look at the SGS Calendar for information about:

- Graduate study at McMaster;
- General regulations of the School of Graduate Studies;
- University regulations;
- Graduate fees and financial assistance;
- University regulations affecting graduate students;
- University services;
- Fellowships, scholarships, bursaries and other awards;
- University governing bodies;
- Student appeals; and
- Degree programs (including degree requirements).

#### **DEPARTMENTAL CONTACTS**

**Dr. Michael Noseworthy, Co- Director**  
ETB-406  
Email: [nosewor@mcmaster.ca](mailto:nosewor@mcmaster.ca)  
Ext. 23727

**Dr. Ram Mishra, Co-Director**  
Health Sciences Centre  
Ext. 22396  
Email: [mishrar@mcmaster.ca](mailto:mishrar@mcmaster.ca)

**Tina Thorogood, Administrative Coordinator**  
ETB-109  
Email: [campbt@mcmaster.ca](mailto:campbt@mcmaster.ca)  
Ext. 23486

## **GRADUATE STUDY AT MCMASTER UNIVERSITY**

When McMaster moved to its current graduate organization, the aims of graduate work were described as "the highest development of the powers of reasoning, judgment, and evaluation in intellectual concerns; specialized training in professional skills; initiation into research or scholarly work and development of a capacity for its successful and independent pursuit; the fruitful pursuit of research and scholarly work". This description remains as valid today as it was then. Research is central to graduate work, and McMaster's strong research orientation has a pronounced effect on the character of its graduate programs. The numerous research achievements of McMaster faculty members have been recognized by grants, prizes, medals, and fellowships in academic societies. Such distinctions attest to the qualifications and dedication of faculty members in developing and disseminating knowledge. The education that McMaster faculty provide is valuable not only for the graduate student's career but also for the student's development as a person.

## **RESPONSIBILITIES OF GRADUATE STUDENTS TO THE UNIVERSITY**

Just as the University has responsibilities to graduate students, they have responsibilities to the University.

The student's responsibilities include, but are not limited to:

- registering annually until graduation, withdrawal, or withdrawal in good standing due to time limit;
- paying fees as required;
- complying with the regulations of the School of Graduate Studies as set out in this Calendar.

<https://graduate.mcmaster.ca/grad-council/graduate-calendar.html>

### **Academic Integrity**

The Office of Academic Integrity strives to assist instructors and students with issues of academic integrity. The McMaster University Academic Integrity Policy can be found here: <http://www.mcmaster.ca/academicintegrity/>

\*Please also take note of the policies and guidelines referring to student misconduct. The School of Biomedical Engineering will also adhere to these policies.

### **Leaves of Absence**

Leaves of absence are normally granted on a term-by-term basis and, whenever possible, should commence at the beginning of a term (i.e., January 1, May 1, or September 1). During the period of a Leave the student cannot expect to be given supervision or be entitled to use the University's facilities. Students applying for a leave of absence for personal reasons must normally have completed at least one year of full time graduate studies. During a Leave of Absence no tuition will be charged nor will the student be eligible for any scholarship support. The length of time for completing the degree and for eligibility for scholarship support (see qualifier in section 2.5.5 of the Graduate Calendar) will be extended by the duration of the Leave on the resumption of studies. Leaves of Absence affecting Teaching Assistantship duties are covered by the Collective Agreement with Local 3906 (Unit 1) of the Canadian Union of Public employees.

Students should be aware that in the event of Leaves of Absence continuation of the same research project and/or supervisor cannot be guaranteed.

### **Reasons for Leaves of Absence**

A Leave of Absence for up to one year is permitted for reasons of illness or for reasons related to family responsibilities such as pregnancy and child rearing.

Students who have successfully completed at least one full year in a graduate program may apply for a Leave of Absence for up to one year for other personal circumstances provided that the student's supervisor and the department support the request.

Forms for leave of absence request can be found here:

<http://graduate.mcmaster.ca/current-students/forms/140-current/forms/570-student-forms.html>

A Leave of Absence may be requested to work in industry for one semester as a Master's student, or 2 semesters as PhD. The Leave in this case must be relevant to the graduate program and agreed upon by the student, supervisor (and their committee), School Directors, and the School of Graduate Studies. The student must complete the Request to be Full-Time Off-Campus form which can be found at <http://graduate.mcmaster.ca/current-students/forms/140-current/forms/570-student-forms.html>.

## **Vacation**

Full-time graduate students are expected to be on campus for all three terms of the university year, as specified in Section 1.3 of the Graduate Calendar. Normal vacation entitlement is two weeks of vacation during the year, to be scheduled by mutual agreement with the research supervisor and the employment supervisor. Exception to this allotment requires approval from the supervisory committee.

## **SAFETY & SECURITY**

### **Mandatory Health and Safety Training**

Graduate students must complete the mandatory health and safety training courses.

- 1) Asbestos Awareness
- 2) Ergonomics
- 3) Fire Safety
- 4) Office WHMIS
- 5) Slips, Trips and Falls
- 6) Health and Safety Orientation Training

Training can be completed on Mosaic. After completion students are required to send verification to their supervisor.

### **Emergency**

In case of emergency on campus dial 88. The McMaster Security office is located in E.T. Clarke 201 and can be contacted at ext. 24281. This office is responsible for overall security on campus.

### **Escort Service – SWHAT**

During the months of September through April, students operate an escort service, "Students Walk Home Attendant Team" (SWHAT). After dark, if you telephone ext. 27500, you can arrange to be escorted to your car or residence by a male and a female student. During the summer term, Campus Security will escort you to your car or residence and they can be reached at ext. 27500.

## **GRADUATE STUDIES AT MCMASTER**

### **Registration**

*ALL incoming students are required to produce a career plan within their first year of study with the assistance of the staff in ECCS. The staff at ECCS will contact each student by email to set up an appointment to assist in preparing a career plan.*

All students are required to register for the academic year on-line using MOSAIC (<https://adweb.cis.mcmaster.ca/cis/ahtml/login.htm>). Registration information is available on: **ALL STUDENTS MUST REGISTER FOR PLACEHOLDER SGS 700 FOR EACH TERM EVEN IF THEY ARE NOT TAKING COURSES. This "placeholder" course ensures that you are fully registered at the university.**

Sessional Dates:

<http://academiccalendars.romcmaster.ca/content.php?catoid=20&navoid=3579&hl=%22sessional+dates%22&returnto=search>

Tuition and Fees: [http://www.mcmaster.ca/bms/student/pdf/fees\\_grad.pdf](http://www.mcmaster.ca/bms/student/pdf/fees_grad.pdf)

Initially you will require both your student number and your bar code shown on your admission letter or student card to set a PIN number. Any student who fails to register on time will be charged a late fee.

In addition to completing registration, students are also required to complete a payment agreement using MOSAIC.

For more information on how to complete your Payment Agreement, please refer to the "Financial Matters" section of the registration website. <http://graduate.mcmaster.ca/currentstudents/registration>

Funding Options: [http://www.mcmaster.ca/bms/student/SAC\\_funding.html](http://www.mcmaster.ca/bms/student/SAC_funding.html)

Payment Guide [http://www.mcmaster.ca/bms/student/pdf/SAC\\_pa\\_guide.pdf](http://www.mcmaster.ca/bms/student/pdf/SAC_pa_guide.pdf)

### **New VISA Students**

Visa Students must register on-line, but will receive the message "Study Permit Required". Registration will not be complete until a copy of the study permit has been presented to the Graduate Studies office (Gilmour Hall, Room 212)

### **Email**

The School of Graduate Studies and the Department will use electronic mail to communicate directly with graduate students at various times during the year. The University Technology Services (UTS) provides each with an e-mail address. You are required to "self-register" for your e-mail address via the MUGSI (McMaster University Information System): <https://adweb.cis.mcmaster.ca/cis/ahtml/login.htm>

During the self-registration process you will be given a password, it is important to keep a note of this original password, it will be required again for library and computer access. If you have any major problems you can call the UTS helpline ext. 24357.

All students are required to register for services on MUGSI on an annual basis. Student accounts not renewed by October 15 are disabled and subject to deletion. Students are expected to read their email on a regular basis. Not reading email messages will not be treated as a valid reason for not adhering to regulations, procedures or deadlines.

## **FINANCIAL SUPPORT**

### **Payment of Departmental Scholarship & Teaching Assistantship SGS Notifies Students of Pay Schedules.**

Taxes – The University is required by law to deduct Employment Insurance and Canada Pension premiums on ALL employment income. You should complete the Personal Tax Credit Return Forms (TD1 and TD1ON) which may lower the rate at which you are taxed. These forms are available on line on the School of Graduate Studies webpage under "Forms Initiated by a Student":

<http://graduate.mcmaster.ca/resources>

CUPE - If you are receiving a Teaching Assistantship (TA) or a Research Assistantship (RA) in lieu of TA, you are a member of the Canadian Union of Public Employees, Local 3906. Union dues are deducted in each month in which you receive TA/RA monies.

Dental Plan - All full-time graduate students who are receiving a TA and/or a RA in lieu of a TA of 130 hours or greater will have Dental Plan premiums deducted each month for the full year (September to August). Information on the Dental Plan is available at:

<http://www.cupe3906.org/wordpress/benefits-forms/unit-1-benefits/dental>

### **Employment Regulations**

There are 3 terms in the School of Graduate Studies: Fall (September to December), Winter (January through April) and Summer (May through August). Students who begin as full-time students are expected to remain as full-time until the degree requirements are completed, or until they take up employment of more than 10 hours/week. In the latter case they are no longer full-time students, but continue to pay the full time fees for the program. Once a student has ceased full-time status it cannot be regained unless approved by both the Department and the School of Graduate Studies.

If a student is to be employed at the University other than as a TA or RA in Lieu of TA, the School of Graduate Studies should be informed in writing of the nature of the employment and the approval of the supervisor and Director is required. The approval of Graduate Studies is required if the student is to be hired for University Teaching.

### **Discounted Fees - \* New Policy Effective September 2010\***

Only full-time Ph.D. students (term 13 or greater) will be charged tuition at a discounted rate. The discounted tuition rate is normally equal to ½ of the domestic tuition rate

### **TUITION FEES OVERALL**

[http://www.mcmaster.ca/bms/student/pdf/fees\\_grad.pdf](http://www.mcmaster.ca/bms/student/pdf/fees_grad.pdf) (Full Disclosure)

Canadian Fees Full Time = \$7,008.00/ Part-time = \$3,504.00

Visa Fees Full Time = \$16,761.00/ Part-time = \$8,601.00

Mandatory Supplementary Fees = \$851.92 (Full time)

Mandatory Supplementary Fees = \$538.95 (Part-time)

### **SCHOLARSHIPS & AWARDS**

Recipients of graduate scholarships and awards are made on the basis of academic merit or other achieved merit. General information on scholarships is available in the Graduate Calendar (Section 8) and online: <http://graduate.mcmaster.ca/graduate-scholarships>

BME Travel Scholarship - The School of Biomedical Engineering Graduate Student Travel Assistance Grants are funded by BME from funds specifically allocated for student development. These grants are designed to enable students to travel for the purpose of presenting at conferences, attending workshops, or other activities with the objective of fostering scientific exchange, networking with other researchers, and showcasing the talents of McMaster's graduate students. These travel scholarships are valued up to \$500, the application can be found here: [http://msbe.mcmaster.ca/student\\_resources.html](http://msbe.mcmaster.ca/student_resources.html)

### **UNIVERSITY ADMINISTRATIVE INFORMATION**

#### **Graduate Transcripts**

If you wish to obtain a McMaster graduate transcript, you must place your order with the receptionist in the Office of the Registrar (Gilmour Hall, Room 108). The form is available on-line at: [http://registrar.mcmaster.ca/forms/trans\\_request.pdf](http://registrar.mcmaster.ca/forms/trans_request.pdf)

#### **Housing**

In an effort to assist students in their search for housing, the University operates an Off-Campus Resource Centre. The office is located in MUSC B112. For additional information, please visit:

<http://macoffcampus.mcmaster.ca/>

### **Parking & Transit Services**

Security & Parking Services strive to provide our University Community and visitors, with safe and well maintained parking and transiting infrastructure. The University is dedicated to courteous and helpful customer service through information resources, polite and knowledgeable staff, and convenient parking facilities. If you require parking for an extended period, please contact the Parking & Transit Service Office.

<http://parking.mcmaster.ca/>

### **Student Wellness Centre**

The Student Wellness Centre is a resource for all McMaster students. It offers services in several main areas: personal counseling, academic skills, services for students with disabilities and Leadership Training. Located in MUSC B107.

### **Student Health Services**

The medical services are located in the McMaster University Student Centre B101 ext. 27700. Health care is available throughout the year. Whether you have a health emergency, a concern about nutrition, or a bad case of the flu, you can expect care, dispensed by health professionals who are friendly, concerned and accessible.

<http://wellness.mcmaster.ca/>

### **Financial Aid & Scholarships**

The Student Financial Aid & Scholarships office provides service to students in all areas of financial support: loans (i.e. OSAP, BCSAP), bursaries, work programs and scholarships.

<http://sfas.mcmaster.ca/>

### **McMaster Library**

McMaster University has four libraries to help with your research, teaching and learning.

- [Mills Memorial Library](#) (Humanities and Social Sciences)
- [Innis Library](#) (Business) located in Kenneth Taylor Hall, Room 108
- [H.G.Thode Library of Science & Engineering](#)
- [Health Sciences Library](#) housed in the Health Sciences Centre

### **International Student Services**

The aim of McMaster University's International Students Services (ISS) is to make your stay as comfortable and beneficial as possible. .

<https://iss.mcmaster.ca/>

### **Graduate Students Association (GSA)**

The mandate of the GSA is to promote the welfare and interests of the members through the provision of facilities and opportunities for social, athletic and intellectual activities; to the members before the duly elected and appointed authorities of McMaster University, and to promote communication and participation in all matters of common interest between the members of other student organizations, both at McMaster and in other educational institutions.

<http://www.mcmaster.ca/gsa/>

### **Biomedical Engineering Graduate Students Association (BMEGA)**

The Biomedical Engineering Graduate Association is a group of about five students within BME who, throughout the year, organize fun and exciting social get-togethers for BME. In this respect, the goal is to bring us together through exciting and/or relaxing social activities that help build relationships, memories, and a unique identity, thus making the BME program more than about research and academia.

In the past BMEGA has organized the following events:

- The Inside Ride: Coast to Coast Against Cancer, where we put together a BME team of 6 who competed in an indoor cycling competition and helped raise money for children and families affected by cancer.
- Co-recreational Volleyball Intramurals
- Hallowe'en Party and Pumpkin Carving Contest
- Rock Climbing
- Winter Holiday Wine and Cheese Get-Together
- Salvation Army Food Hamper and Gifts for Children Volunteering
- Second Term Wine and Cheese Get-Together
- Sushi Dinner at Sapporos
- GSA Reading Week Ski Trip
- GSA D-League Softball (all summer long!)
- Phoenix Lunches
- Golf Day
- BME Open House (recruitment)

BMEGA can be found at <http://www.eng.mcmaster.ca/bmega/> and reached by email at [bmega@mcmaster.ca](mailto:bmega@mcmaster.ca).

## **INTERNATIONAL STUDENTS**

### **Student Visa. Employment Authorization**

Visa students are required to provide photocopies of their study permit and/or employment authorization to the School of Graduate Studies.

### **Immigration Information**

For information on renewing your student visa or other immigration information, please visit the Citizenship and Immigration Canada site:

<http://www.cic.gc.ca/>

### **Social Insurance Number (SIN)**

If you have a Teaching Assistantship or Research Assistant position as part of your offer of admission, you will need to apply for a SIN. The Service Canada Office is located at 1550 Upper James Street and is open Monday to Friday from 8:30 am to 4:00 pm. The SIN application can be found on the Service Canada site:

<http://www.servicecanada.gc.ca/eng/sin/apply/how.shtml>

You will require the following documents when applying for your SIN:

- A job offer. Please contact the department to obtain this letter
- Your passport and study permit
- Social Insurance Number application form

### **University Health Insurance Plan (UHIP)**

Your UHIP coverage will begin once you arrive on campus, enrollment is done automatically once you are fully registered in the program. All students with dependents living in Ontario must submit an application form to enroll their dependents and pay the appropriate additional fees. To complete an application form, please visit the International Student Services (ISS) office in Gilmour Hall room 104. For the 2014/2015 academic year, the cost of single coverage for 12 months is \$684.00. This amount is pro-rated for students who begin in January or May.

<https://iss.mcmaster.ca/online-resources/uhip-registration.html>

## **GRADUATE STUDIES IN BIOMEDICAL ENGINEERING**

### **Course Registration**

The complete list of graduate courses in the School of Biomedical Engineering is listed in the School of Graduate Studies Calendar.

[http://digitalcommons.mcmaster.ca/sgs\\_cal/18/Current](http://digitalcommons.mcmaster.ca/sgs_cal/18/Current) courses being offered can be found at the following link:

<http://msbe.mcmaster.ca/graduate/courses.html>

You will need to register for graduate courses using MOSAIC, please indicate the category (M) Masters, (D) Ph.D., or (EC) Extra Credit on this form.

**M (Count towards the Master degree requirements)**

This category identifies the course as satisfying the Master's degree requirement. The minimum passing grade for an M course is B-.

**D (Count towards the Doctoral degree requirements)**

This category identifies the course as satisfying the Doctoral degree requirement, including any additional graduate requirements or undergraduate courses specified by the Supervisor or Director of the School). The minimum passing grade for a D course is B-.

**EC (Extra Course)**

This category identifies courses that the student is taking with the approval of their supervisor but that are not required for the degree. If a failing grade (less than B- for a graduate course or less than D- for an undergraduate course) is received in a course taken as Extra, the course and grade will not appear on the student's transcript unless there is a case of academic dishonesty.

Courses that are required by the Supervisor or Director of the School as additional requirements in excess of the stated minimum for the program must be designated as M or D.

Graduate students should make their course selection after consulting with their research supervisor.

### **Required Courses for All Graduate Students**

All graduate students must complete and pass SGS #101 – Academic Research Integrity and Ethics within the first 12 months after their admission. The purpose of this course is to ensure that the standards and expectations of academic integrity and research ethics are communicated

and understood by students. Registration for this course is completed on MOSAIC. If you have taken SGS #101 but have not fulfilled the requirements, you will be required to take it until completion.

All graduate students are also required to complete and pass SGS #201 – Accessibility for Ontarians with Disabilities Act (AODA), which can be completed online ([www.mcmaster.ca/accessibility](http://www.mcmaster.ca/accessibility)).

Students may not graduate or register in subsequent academic year without having successfully completed these courses.

### **Core Courses**

#### **BIOMED \*701 / Biomedical Engineering (Core)**

3 unit(s)

An introduction to biomedical engineering. The biological, chemical, electrical, and mechanical principles involves the design and operation of medical devices and bioprocesses. The research themes of the School of Biomedical Engineering are emphasized: biomaterials and tissue engineering; biomedical imaging; biomedical technology (e.g. biophotonics and medical robotics); bioprocessing.

#### **BIOMED 706 / Biomedical Engineering II (Core)**

3 unit(s)

H. Sheardown, M. Noseworthy, P. Margetts, T. Hoare, J. West-Mays (cross-listed as [CHEM ENG 781](#))

An introduction to biomedical engineering with a health science focus. The biological and chemical concepts involved in the design and operation of medical devices and biological processes will be discussed. The following research themes will be emphasized: cell biological responses to biomaterials, toxicity / pharmacokinetics, tissue and genetic engineering, gene therapy, biotechnology physiological response to biomaterials.

**\*All Students are welcome to take both.\***

#### ***DEGREE COMPLETION OVERVIEW:***

- Masters Students require 3 half term courses to complete their MASc degree.
- MASc that complete their degree at McMaster and then move on to a PhD will need 2 half term courses at the PhD level.
- McMaster BME MASc that transfer to the PhD program without completing their MASc will need a total of 5 half term courses to complete their PhD degree (3 of which needed to be completed while they were still in the MASc).
- PhD students transferring from a different university will need 3 half term courses to complete their degree.

### **Completion of Course Requirements**

Graduate students who have finished all courses must still use the course selection screen to select non coursework activities: Research, Project or Thesis to indicate their current study status. For graduate students selecting non course work activities the following rules apply:

- Project and thesis are mutually exclusive and cannot be selected at the same time
- Students with discounted fees may only select thesis.

### **SGS Policy: Course Registration & Withdrawal Dates**

There is a deadline date for both registration and changes (drop and add) for courses. The drop and add dates are posted in the SGS Graduate Calendar. It is the student's responsibility to drop and add courses from their academic record.

Drop and Add Dates: <http://graduate.mcmaster.ca/current-students/graduate-calendar.html>  
In certain circumstances, it is possible to change course selection after the deadline date. Please note that students will require approval from their supervisor, Director of the School and the School of Graduate Studies. To request the change, the student must complete a Petition for Special Consideration which can be completed electronically through this link:  
<http://graduate.mcmaster.ca/current-students/forms/140-current/forms/570-student-forms.html>

### **Biomedical Engineering Symposium and Seminars**

The School of Biomedical Engineering runs an annual 3 day Biomedical Engineering Symposium (in January). Attendance of all registered Masters and Ph.D. students in the Biomedical Engineering program is mandatory. Students are also required to present one seminar on the research they have carried out while enrolled in the program. Students can present their seminar during one of the following events: 1) The BME symposium (January); 2) The summer seminar day (in June); or 3) the fall seminar day.

### **Master's Program**

An M.A.Sc. candidate is required to complete at least three (3) one-term courses and present a thesis embodying an original contribution to biomedical engineering. The thesis must be defended in an oral examination. M.A.Sc. students must complete one of the biomedical core programs (BME \*701 Biomedical Engineering – Core I for students from a health/life sciences background or BME \*706 Biomedical Engineering – Core II for students from an Engineering background). At least two of the courses must be at the 700 level.

A twenty-four (24) month period with funding has been set for our research based M.A.Sc. program. The maximum time for completion of the degree is three (3) years from initial registration, 5 years for part-time students.

## **Master's Thesis**

The administration of the M.A.Sc. thesis defence is the responsibility of the School. The School recommends that the thesis follow the format described by Graduate Studies in their booklet "Guide for the Preparation of Theses". The student is responsible for ensuring that the format satisfies the University requirements. The sequence of events is as follows:

- The student's supervisor gives permission to prepare the thesis. The student is responsible for submitting the thesis either hard copy or electronic copy, reasonably free of grammatical, typographical and technical errors to the examiners and to the Chair of the defense. If the thesis is found to contain an excessive number of errors, it will be returned to the student and the oral examination postponed until a satisfactory thesis has been submitted.
- The student's supervisor(s) and two other faculty members, one of whom may be from a department other than Biomedical Engineering, sit as an examining committee for the thesis. The supervisor usually acts as Chair of the examination committee.
- The committee will be approved by the Director. The Administrator will prepare the appropriate forms and provide them to the Chair of the examination committee.

After a successful examination and all requested changes have been made, the student will upload the final e-thesis to MacSphere (see section 2.8 of School of Graduate Studies Calendar). Students must submit their final thesis within four weeks of a successful defence when only minor changes are required of the student by the examining committee. When major revisions are required by the examining committee, the student will have one term (4 months) to complete those changes.

If some of the research undertaken expressly for the degree has previously been published or prepared for publication by the student as one or more journal articles, or parts of books, those items may be included within the thesis subject to the School of Graduate Studies' regulations and to obtaining permission from the supervisory committee. Please consult the "Guide for the Preparation Theses" for more detailed information on Sandwich Theses.

The student is required to submit the following forms with the completed thesis to Graduate Studies:

Final Thesis Submission Form

[http://graduate.mcmaster.ca/images/FinalThesisSubSheetPhD\\_12.pdf](http://graduate.mcmaster.ca/images/FinalThesisSubSheetPhD_12.pdf)

License to McMaster University Form:

[http://graduate.mcmaster.ca/images/files/graduate/forms/thesis\\_forms/licence.pdf](http://graduate.mcmaster.ca/images/files/graduate/forms/thesis_forms/licence.pdf)

## **Transfer from M.A.Sc. to Ph.D. without completion of Master's Thesis**

Students enrolled in the M.A.Sc. program may be transferred to the Ph.D. program prior to the completion of the M.A.Sc. degree. Transfer to the Ph.D. without completion of the M.A.Sc. is intended to expedite the student's progress towards the Ph.D. by not requiring the preparation of the formal M.A.Sc. thesis and allowing the research carried out during enrollment in the M.A.Sc. program to be used in the Ph.D. thesis. The expectation for transfer to Ph.D. is that the research progress at the M.A.Sc. level should be exemplary. The candidate will be expected to have completed a minimum of two (2) half courses with a grade average of B+ or better. The possibility of transfer to Ph.D. should be discussed by the student and the research supervisor early in the M.A.Sc. program and then the following procedure should be followed:

- After a minimum of one year in the M.A.Sc. program at McMaster students may request in writing to the Director to be transferred to the Ph.D. program.
- The Director will then appoint an Examining Committee comprising of two (2) faculty members, in addition to the student's research supervisor(s).

- The student will provide four (4) copies of a formal written transfer report, which summarizes the student's research work to date, to the School office no later than ten (10) days before the scheduled examination date.

The transfer report is not a thesis and need not follow the M.A.Sc. thesis preparation requirements since the report will not be kept for archival purposes. The maximum length is 25 single-spaced pages. The transfer report must address the following:

- Definition of the research problem.
- Brief critical review of the relevant literature.
- Summary of the completed work including: experimental equipment built, experimental techniques developed, experimental data gathered and analyzed. The summary must clearly show the Examining Committee some contribution to biomedical engineering research.
- Scope of the completed work as a basis for future Ph.D. studies. The emphasis is on research progress and completed work and not on the research plan for the Ph.D.
- The examination will consist of an oral presentation, 20-30 minutes in duration, summarizing the research progress to date. The candidate will then have a session of questioning by the Examining Committee members only.
- The Examining Committee will evaluate the student's course standings, transfer report, oral presentation of the research progress and the answers provided during the examination.

The outcome of the examination is that the School recommends to the Committee on Graduate Admissions and Study one of the following:

1. admission to Ph.D. studies following completion of the requirements of the M.A.Sc. degree
2. admission to Ph.D. studies without completion of an M.A.Sc. program
3. admission to Ph.D. studies but with concurrent completion of all requirements for an M.A.Sc. degree within two months from the date of reclassification
4. refusal of admission to Ph.D. studies

### **Ph.D. Program**

The minimum course requirement for this degree is at least six (6) half courses beyond the baccalaureate degree or two (2) half courses beyond the M.A.Sc. degree.

A forty-eight (48) month period with funding has been set for our Ph.D. program. The maximum time for completion of the degree is six (6) years from initial registration, 8 years for part-time students.

### **Supervisory Committee**

In accordance with the regulations of the School of Graduate Studies (Sections 1.2.4, 2.6 and 4.5 of the Graduate Calendar), all Ph.D. students will have a Supervisory Committee which should meet at least once every year and provide the student with feedback regarding his/her coursework and research. Each student (Masters or Ph.D.) is responsible, together with their supervisor, to select and organize their supervisory committee. The committee will consist of the research supervisor(s) and two other professors in the School.

The School of Graduate Studies requires students to complete a progress report form which becomes part of the overall Ph.D. Supervisory Committee report. The Committee is required to meet with the candidate at least once each academic year. A report from the meeting must be

submitted to the Administrator before August 31 of each year (the form can be found at <http://graduate.mcmaster.ca/current-students/forms/department-forms>).

### **Comprehensive Examinations for Ph.D. Students**

The comprehensive examination is a requirement of the PhD program. This examination normally takes place between 12 and 20 months after the start of the program. In all cases, this must be completed within 24 months after their start date. This will be scheduled by the supervisory committee at a mutually convenient time.

The format will resemble a committee meeting except it will be based on a written research proposal. The supervisory committee will meet to determine the written proposal topic and scope of the oral examination. The topic will be related to, but not the same as, the PhD research topic. The chosen topic is then submitted to the Director for approval. Additional candidate information is to be provided including start date in the program, number of committee meetings and progress to date.

The proposal will be up to 10,000 words plus references in length. Once the candidate receives their topic they have 21 days to submit their proposal. An official letter is sent to the candidate outlining the proposal topic, examination procedures and guidelines. The oral examination will be one week after submission of the report. The examination will include an oral presentation, not more than 15 minutes in length. This is followed by a question period from the examination committee. The first round of questions is on the actual proposal and the second round will be related to general Biomedical Engineering. The total examination will normally be 2 hours in length, but no more than 3 hours.

The comprehensive results form is to be completed by the chair and submitted to the Director for approval. This form can be found at <http://graduate.mcmaster.ca/current-students/forms/department-forms>. The exam will be graded as either pass (P), pass with distinction (P+), or fail (F). The completed form is then submitted to the administrator who will forward to Graduate Studies and update the candidate's departmental file. If a failure is noted the student will be given one further attempt at passing. The new exam will be with a new topic, but same examining panel. A second failure will result in automatic dismissal from the program.

### **Structure of the Examining Committee**

The examination committee consists of an examination chair, 2 members of your supervisory committee, and one additional member whose area is relevant to the examination topic. Suggestions for the additional member will be provided by your supervisory committee and approved by the Director. During the initial committee meeting the chair of the committee will also be determined. The supervisor is present for the examination but is not part of the official panel. The roll of your supervisor will be to assess and convey the degree of fairness of the exam to the examining committee. They will not have any vote on the outcome of the exam.

### **Format of the Examination**

The Comprehensive Examination will consist of a written report and an oral presentation.

The candidate will be required to submit a proposal, 10,000 words of text plus references, on a research topic related to, but not the same as the Ph.D. research topic. The candidate will be required to prepare this report within 21 days of receiving the proposal topic.

The written report must include:

- proposal objectives: both short and long term
- literature pertinent to the proposal
- methods and proposed approach

- milestones for specific objectives and tasks
- anticipated significance of the work

The oral examination will be conducted in two parts. In the first part, the candidate will be required to make a brief presentation of the report, maximum of 15 minutes, followed by questions directly related to the report. The second part of the oral examination will probe the candidate's general comprehension of the research field and peripheral areas. The oral examination will normally require two (2) hours to complete but in no case will continue for more than three (3) hours.

It is the responsibility of the Chair of the Examining Committee to call a meeting of the Committee at least five (5) weeks in advance of the examination date to review the candidate's records and background to determine an appropriate research topic and scope of background examination.

A candidate who fails the comprehensive examination will be given a second opportunity to retake the portion(s) of the exam deemed to have been failed. There is no opportunity for a third attempt.

The Chair of the Examining Committee will communicate the results of the examination, in writing, to the Director of the School who will communicate the result, in writing, to the candidate.

### **Ph.D. Thesis**

Students close to submitting their Ph.D. thesis (approximately 2 months) should complete the on-line Thesis Defence System (TDS) found at:

<http://graduate.mcmaster.ca/current-students/completing-your-degree/step2-defend#Planning/scheduling%20PhD%20defence>

This will begin the thesis defence schedule. Candidates will be asked for a thesis title and estimated date to submit the thesis. Under separate cover, the supervisor will be asked to submit the name of an external examiner which must be approved by the supervisory committee and School. A final date and time of the defence will be scheduled and approved by the student, supervisory committee and external examiner.

Doctoral students and their supervisors should note that theses of extraordinary length are to be discouraged. As a general rule, doctoral students are urged to limit theses to no greater length than three hundred (300) manuscript pages. In cases where students and their supervisor(s) believe that responsible scholarly treatment of the thesis topic requires substantially greater length than that specified above, they are expected to receive written approval from the Associate Dean of Graduate Studies before the thesis is submitted for the defence.

If some of the research undertaken expressly for the degree has previously been published or prepared for publication by the student as one or more journal articles, or parts of books, those items may be included within the thesis subject to the School of Graduate Studies' regulations and to obtaining permission from the supervisory committee. Please consult the "Guide for the Preparation Theses" for more detailed information on Sandwich Theses.

After a successful defense, the candidate must correct any errors detected by the readers to the satisfaction of the Supervisor and then submit an electronic copy to the School of Graduate Studies via MacSphere (see Section 2.8.3 of School of Graduate Studies Calendar - Publication of Electronic Theses at McMaster University). The fee for archiving the thesis is paid by the student. Students must submit their final thesis within four weeks of a successful defence when only minor changes are required of the student by the examining committee. When major revisions are required by the examining committee, the student will have one term (4 months) to complete those changes.

### **Deadlines**

A thesis may be submitted at any time. However, there are two deadlines for the submission of the Ph.D. thesis to Graduate Studies electronically and complete degree requirements for Autumn or Spring Convocation. For 2014-2015, the dates can be found here <http://graduate.mcmaster.ca/current-students/graduate-calendar.html>

### **Costs of Preparing Thesis**

Arrangements for typing and printing of the thesis and expenses involved therein are the responsibility of the student.

### **Departmental & University Thesis Procedure**

The School of Graduate Studies (SGS) has forms, regulations and information regarding thesis preparation, these are available from the SGS website:

[http://graduate.mcmaster.ca/sites/default/files/resources/thesis\\_defence\\_process.pdf](http://graduate.mcmaster.ca/sites/default/files/resources/thesis_defence_process.pdf)

I confirm that I have received the Biomedical Engineering Graduate Student Handbook, 2016-17.  
Please return a copy to Tina Thorogood, Administrative Coordinator, ETB 109 upon receipt.

In the case of discrepancy between this guide and other University policy, students are advised to consult the Graduate Calendar published by the School of Graduate Studies.

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Name

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Date