



# UNIVERSITY OF CALGARY

## Biomedical Engineering Graduate Program

# Policies and Procedures Handbook

Last Update: MAY 2020



[2018 Annual Alberta Biomedical Engineering Conference, Banff, Alberta](#)



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## WELCOME TO THE BIOMEDICAL ENGINEERING (BME) GRADUATE PROGRAM HANDBOOK!

Students in the BME Graduate Program are interested in cutting-edge, multidisciplinary biomedical research. The BME Graduate Program enables graduate students to undertake MEng (Thesis), MSc, or PhD programs that intersect the fields of engineering, kinesiology, medicine, science and veterinary medicine. Faculty based in the University of Calgary’s Schulich School of Engineering, Cumming School of Medicine and Faculty of Kinesiology proposed and developed the BME Graduate Program.

Our research training effort is based on many longstanding, multidisciplinary research strengths. There are currently four identified research priority areas within our program: [1\) Bioelectricity](#), [2\) Biomechanics](#), [3\) Cell and Tissue Engineering \(or Biomaterials\)](#) and [4\) Imaging. Bioinstrumentation represents an area of emerging strength.](#) The objectives of the BME Graduate Program build on and support The University of Calgary’s academic and research plans and are designed to ensure excellence in postgraduate education in areas related to these priority and closely aligned areas.

The University of Calgary Board of Governors approved the BME Graduate Program in 1997, when it was initially funded by a three-year Whitaker Foundation Special Opportunity Award as part of a joint proposal with the University of Alberta. Province-wide activities continue to this day, including the now University of Calgary-led [Alberta Biomedical Engineering Conference](#). This annual meeting now includes participation from the University of Lethbridge, as well as other western Canadian BME programs. It attracts over 170 individuals and has been held every year in October since 2000 in Banff, Alberta.

While the BME Graduate Program is an established program leading and supporting a diverse research community, it continues to evolve in response to new opportunities and changing needs of students and the biomedical community in Alberta.

The BME Graduate Program at The University of Calgary operates as an inter-faculty program jointly coordinated by the [Faculties of Graduate Studies](#) and [Kinesiology, Cumming School of Medicine](#) and the [Schulich School of Engineering](#). For financial matters, the Schulich School of Engineering serves as the administrative home of the program. Operations of the Program rest with the [BME Graduate Education Committee](#) and a BME Graduate Program Executive consisting of a [Director and two Associate Directors](#). The BME Graduate Program Oversight Committee provides accountability for the Program to the Faculties of [Graduate Studies](#), [Cumming School of Medicine](#), and [Kinesiology](#), and the [Schulich School of Engineering](#).

### CONTACT INFORMATION (2020-2021 ACADEMIC YEAR)

<a href="#">Program Director</a>	<a href="#">Dr. John E. A. Bertram</a>		<a href="mailto:bmegrad@ucalgary.ca">bmegrad@ucalgary.ca</a> <a href="mailto:jbertram@ucalgary.ca">jbertram@ucalgary.ca</a>
<a href="#">Associate Directors</a>	<a href="#">Dr. Brent Edwards</a>	403-210-8950	<a href="mailto:wbedward@ucalgary.ca">wbedward@ucalgary.ca</a>
	<a href="#">Dr. Kartik Murari</a>	403-220-6176	<a href="mailto:kmurari@ucalgary.ca">kmurari@ucalgary.ca</a>
<a href="#">Program Coordinator/Office Manager</a>	<a href="#">Lisa Mayer</a>	403-220-3835	<a href="mailto:bmegrad@ucalgary.ca">bmegrad@ucalgary.ca</a> <a href="mailto:lmayer@ucalgary.ca">lmayer@ucalgary.ca</a>
<a href="#">Admin. Assistant</a>	VACANT	403-220-2721	<a href="mailto:bmegrad@ucalgary.ca">bmegrad@ucalgary.ca</a>



### **IMPORTANT NOTICE**

This handbook is meant to supplement information provided by the Faculty of Graduate Studies (FGS) regarding supervision and examinations. As [FGS Policies and Procedures](#) are constantly changing, we have not duplicated those here.

However, it is **VERY IMPORTANT** that all students and supervisors become familiar with the [FGS policies on supervision and examinations](#)

## GRADUATE EDUCATION COMMITTEE

### **Mission**

The BME Graduate Program Graduate Education Committee ([BME GEC](#)) is responsible for monitoring the progress of all students enrolled in MEng (Thesis), MSc, PhD, and Graduate Studies-components of combined MSc/MD and PhD/MD programs, and to promote excellence in every aspect of graduate student training.

### **Accountability**

The [BME GEC](#) is accountable to the BME Graduate Program Oversight Committee, comprised of the Deans (or their delegates) of the [Schulich School of Engineering](#), [Cumming School of Medicine](#) and the [Faculties of Graduate Studies](#), and [Kinesiology](#). The BME Graduate Program Oversight Committee shall meet formally face-to-face not less than once in each of the [Fall and Winter semesters](#) and provide guidance and oversight to the [BME GEC](#).

### **Membership**

The [Program Director](#) and Associate Directors, along with two to four additional faculty members, will form the [BME GEC](#). One member shall be selected from the graduate students within the program. The [BME GEC](#) shall be chaired by the [Program Director](#).

The additional [BME GEC](#) members shall be appointed by the [Program Director](#), upon discussion with the Associate Directors, for renewable three-year terms. They shall be selected to ensure

- 1) Adequate representation of the research priority areas,
- 2) Adequate representation of the Faculties and Schools involved in the program, and
- 3) Representation from both genders.

The student member shall be nominated by the appropriate BME Graduate Student Organization, subject to confirmation by the [Program Director](#), to a renewable one-year term. If the BME Graduate Student Organization is not operational or otherwise unable to nominate an individual, one graduate student shall be appointed to the [BME GEC](#) by the [Program Director](#) by 1 Oct of each year.



All members are voting members. The student member shall be excused at the discretion of the [BME GEC](#) chair when confidential issues relating to a specific graduate student(s) are discussed.

### BME GEC MEMBERS – 2020-2021

<a href="#">John Bertram</a> , PhD – <a href="#">Program Director</a>
<a href="#">Kartikeya Murari</a> , PhD – Associate Director
<a href="#">Brent Edwards</a> , PhD – Associate Director
<a href="#">Elena Di Martino</a> , PhD
<a href="#">Mark Ungrin</a> , PhD ( <b>LEAVE</b> ) – Dr. Michael W. Scott in lieu of Dr. Ungrin
<a href="#">Roman Krawetz</a> , PhD
Michael Kallos, PhD – <a href="#">Director, BME Calgary Research Initiative</a>
Katrin Smith – BMEG Executive / Student Representative

### Responsibilities

The [BME GEC](#) will be responsible for managing the program and be responsible for:

1. Evaluating and updating Policies and Procedures Handbook according to recommendations provided by the Faculty of Graduate Studies;
2. Determining allocation of funds provided from the Faculty of Graduate Studies and the participating Faculties and Schools;
3. Evaluating, ranking and recommending acceptance of new graduate students to the Faculty of Graduate Studies, striking a [BME GEC](#) Admissions subcommittee if required;
4. Evaluating, ranking and recommending nominations for the Faculty of Graduate Studies Open Scholarship and other internal and external competitions, striking a [BME GEC](#) Scholarship and Awards subcommittee if required;
5. Recommend supervisor status to the Dean, Faculty of Graduate Studies and provide periodic review of approved supervisors in the Biomedical Engineering Graduate Program;
6. In conjunction with the Director and Associate Directors, oversee the academic operations of the Program including curriculum development and program scheduling, calendar submissions, admissions, scholarships, and the management of enrolled students' progress;
7. Support graduate student events, such as the BME Graduate Student Organization, the annual Alberta BME meeting, and other conferences and networking events; and
8. Actively promote the Biomedical Engineering Graduate Program.



## Meetings

The [BME GEC](#) shall meet at least quarterly, or more frequently as required. A quorum shall consist of 50% of voting membership. Minutes shall be prepared and distributed to all Committee members and to the members of the BME Graduate Program Oversight Committee.

## PROGRAM EXECUTIVE

The Biomedical Engineering Graduate Program Executive consists of a [Program Director](#) and two Associate Directors. The BME Graduate Program Oversight Committee appoints the executive. Usually, the positions of Director and Associate Directors will be filled to ensure representation from each of the Faculties and Schools involved in initiating the program.

The Director and Associate Directors will liaise with their respective faculties and, where appropriate, belong to appropriate faculty-level graduate education committees. They will communicate and provide information updates to these committees as needed. An important aspect of the roles of Director and Associate Director will be to engage the faculty members within the BME communities in their respective faculties to ensure they are representing the BME community, as will be outlined in their specific duties below. The [Program Director](#) and Associate Directors will be Full-time Board-appointed academic staff members of The University of Calgary and shall be appointed to a three-year, renewable term.

The BME Graduate Program Executive shall:

1. Be responsible for taking preliminary budget plans, and major curriculum changes back to their respective faculties for feedback at their respective faculty council meetings;
2. Take an active role in communication with their respective faculty members;
3. Engage in strategic planning and student recruitment for the program; and
4. Represent the program in larger initiatives with a graduate component including University-, Alberta- or Canada-wide BME Initiatives.

One designated member of the Program Executive (preferably with PEng status) shall have specific responsibility for the MEng (Thesis) program.

## Program Director

The Biomedical Engineering Graduate [Program Director](#) shall:

1. By agreement of his/her Faculty Dean, be appointed by the BME Graduate Program Oversight Committee for a renewable three-year term;
2. Report to the Dean of the Administrative Faculty and have accountabilities to the BME Graduate Program Oversight Committee;
3. With the Associate Directors, undertake the day-to-day administration of the Biomedical Engineering Graduate Program, including development and maintenance of service-level agreements with contributing Departments, Faculties or Schools;
4. Actively look for and recruit teaching resources and supervisors for the program;
5. Represent the program on the Council of the Faculty of Graduate Studies;
6. Chair the [BME GEC](#);



7. Approve all program exceptions on behalf of the [BME GEC](#)
8. Be accountable through the [BME GEC](#) to the BME Graduate Program Oversight Committee for the delivery and administration of the program, and the meetings of enrolment targets;
9. Contribute to the evaluation of faculty members involved with the Biomedical Engineering Graduate Program, at the request of the appropriate Dean(s) or Department Head(s); and
10. Be responsible for the hiring and supervision of support staff for the program.

## Program Associate Directors

The BME Graduate Program Associate Directors shall:

1. By agreement of his/her Faculty Dean, be appointed by the BME Graduate Program Oversight Committee for a renewable three-year term;
2. Report to the [Program Director](#); and
3. Assist in the day-to-day administration of the BME Graduate Program at the request of the Director, and have specific responsibilities with respect to the Faculty or School of their principle appointment.

### **IMPORTANT**

All requests for signatures or letters from the Graduate [Program Director](#) shall be directed to the [Graduate Program Office](#) via [bmegrad@ucalgary.ca](mailto:bmegrad@ucalgary.ca) well in advance of any internal or external deadline.

**A minimum of 3 to 5 business days prior to any student/supervisor deadlines**

## ADMISSION REQUIREMENTS

The BME Graduate program admission review committee, based on the recommendation of the Director and [BME GEC](#), grants admission to the BME Graduate Program. The minimum qualifications required by the program are normally as follows:

1. For [admission into the MEng \(Thesis\) program](#), a four-year baccalaureate of degree in engineering or its equivalent from a recognized institution with a minimum grade-point average of 3.0 on a 4-point system (approximately equivalent to a B on the work of the last two undergraduate years) is required.
2. For [admission into the MSc program](#), a four-year baccalaureate of science degree or its equivalent from a recognized institution with a minimum grade-point average of 3.2 on a 4-point system (approximately equivalent to a B+ on the work of the last two undergraduate years) is required.
3. For [admission into the PhD program](#), a four-year baccalaureate of science degree and an MSc science degree or the equivalents from a recognized institution with a minimum grade-point average of 3.5 on a 4-point system on the MSc degree for admission purposes approximately equivalent to an overall A- grade is required.

The MEng (Thesis) degree is not sufficient for entry into the PhD program. However, MEng (Thesis) students after 12 months can apply and be considered for transfer to the MSc program.



In addition, the following requirements must be met:

4. Proficiency in the English language. Applicants whose **primary language** is not English must fulfill an English language proficiency (ELP) requirement. Please see the graduate calendar for the current acceptable ways to fulfill this requirement as defined by the Faculty of Graduate Studies. GRE testing is not considered in meeting the [ELP requirement](#).
5. Support of a [Biomedical Engineering Graduate Program-Approved Supervisor](#) indicating that they are willing to accept and fund the applicant. A list of approved supervisors is found at

Applicants who do not meet the above grade-point average and ELP requirements will be considered only in exceptional cases with clear written support from a proposed graduate supervisor.

Admission of applicants into the Biomedical Engineering Graduate Program is conditional upon the availability of [internal or external financial support](#); some sources of financial support are outlined on the [FGS Awards website](#)

In some instances, applicants who do not meet the [admission standards](#) may be advised to enroll in graduate-level courses as [Open Studies students](#) in order to improve their undergraduate record to reach acceptable standards. If this is the case, the applicant may be required to meet with the BME Graduate [Program Director](#) and/or potential supervisor prior to enrolling in [Open Studies](#). Completion of recommended courses as an [Open Studies](#) student does not guarantee admission to the Biomedical Engineering Graduate Program.

## [ANNUAL REGISTRATION](#)

Graduate students at The University of Calgary register annually for a period of twelve months. Annual registration deadlines are set out in the Academic Schedule in the Faculty of Graduate Studies Calendar. All BME graduate program students are expected to register as full-time status and renew this status annually. Permission for part-time registration must be approved, in advance, by the BME Graduate Program. Registration ensures continuous standing in the program. Failure to register will result in automatic withdrawal from the BME Graduate Program. Registration must be activated via [myUofC portal](#). [Registration and Fee deadlines information](#) available on the [Registrars website](#). A student who fails to register by the deadline, but wishes to continue in the same program may reactivate his/her registration by paying a reactivation fee and completing a manual [registration form](#). This action must take place within four months of the last valid registration date.

After the first year, and on each subsequent annual registration date, each student must complete an Annual Progress Report as part of the annual registration process. The Annual Progress Report must be completed [online via student centre](#) and submitted for review by your supervisor on or before 15 May.

Once supervisors have reviewed your annual progress report and completed their portion, they must submit online to [Program Director](#) on or before 31 May. If the Progress Report is deemed unsatisfactory by the Supervisor, or the [Program Director](#), the student and/or supervisor, may be required to meet with the [Program Director](#) to discuss the appropriate steps to be taken to ensure that satisfactory progress is resumed.

If you have changes to your supervisor, co-supervisor, supervisory committee members, *etc.*, please ensure you notify the Biomedical Engineering [Graduate Program Office](#), [Program Coordinator](#) immediately.





## SUPERVISORS

The selection of a [supervisor](#) should be by mutual agreement between the student and the faculty member concerned, and must be approved by the Director and endorsed by the [Dean, Faculty of Graduate Studies](#). Each MEng (Thesis), MSc, and PhD student must have a formal supervisor, identified at time of program admission. The criteria to be used in appointing [supervisors](#) are as follows:

1. The supervisor will normally have an full time academic appointment at the University of Calgary and hold supervisory status in the BME Graduate Program;
2. The supervisor must be actively engaged in BME research and have an appropriate level and duration of financial support from external granting agencies;
3. The supervisor must be prepared to make an appropriate time commitment to the training of a graduate student; and
4. During absences, such as Research and Scholarship [leave](#) or another [leave](#), including a lengthy illness (exceeding 4 weeks) the supervisor must ensure that adequate supervision is provided to the graduate student. Under extenuating circumstances, the BME Graduate [Program Director](#) may appoint himself or herself, an Associate Director, or a member of the supervisory committee to fulfill the supervisor role in an interim capacity until such time either the primary supervisor returns back from [leave](#) or another permanent supervisor can be identified.
5. [A new or current University of Calgary board-appointed faculty member](#) may request BME supervisory privileges from the Director and upon approval of the [BME GEC](#), a written recommendation will be submitted to the Dean, Faculty of Graduate Studies, for final assessment and official approval by the FGS. This is achieved by submitting an up to date Curriculum Vitae in the University of Calgary Faculty or School-specified format along with a completed "[BME Approved Supervisory Agreement](#)" form
6. Faculty of Graduate Studies "[Best in practices for supervision](#)"
7. [Student and Supervisor Checklist](#) (Newly admitted students)

Faculty members may be approved as either:

1. Restricted graduate supervisors able to supervise masters students and co-supervise doctoral students, or
2. Unrestricted graduate supervisors able to supervise both masters and doctoral students.
3. [Adjunct professors will be required to seek supervisor status approval](#) from the [Program Director](#).

The GEC will recommend the appropriate supervisory status based on the previous record of graduate student supervision of the prospective supervisor. Typically prospective supervisors, who have not supervised or co-supervised a doctoral candidate, will be granted restricted status. Prospective supervisors who do not hold a full-time board-appointment at the University of Calgary will normally be granted restricted status. Supervisors will be granted supervisory privileges in the BME Graduate Program if they are conducting BME research or research with Biomedical Engineering applications.

All faculty members approved as graduate-level supervisors in the BME Graduate Program must agree to participate in the graduate program. This involvement may include graduate supervision, graduate



committees and teaching. Supervisor participation in program, including attendance at the Annual Conference and other program seminars and events, will be reviewed periodically by the [BME GEC](#).

For more information on good supervisory relationship please see “[Guidelines for Governing the Supervisory Relationship](#)” including a supervisor / [student checklist can be found on the Faculty of Graduate Studies web site](#)

## SUPERVISORY COMMITTEE

The Supervisory Committee is the primary focus for establishing and monitoring all aspects of the training program of the graduate student and therefore should be carefully selected. All MSc and PhD students must have a Supervisory Committee in place within **three (3) months** of initial registration. Supervisor Committees are optional for MEng (Thesis) students, because much of their function in providing research mentorship is found in the compulsory core graduate courses.

The Supervisory Committee should be selected jointly by the student and supervisor. Once this has been established notify the BME GP Office via email. A form will be generated for signatures to be submitted to the BME Graduate Program for final approval. The suggested Supervisory Committee consists of the supervisor, co-supervisor (if appropriate) and two other members who normally hold academic appointment at the University of Calgary. Appointment of individuals who do not hold academic appointments at the University of Calgary is possible but requires the support of the BME Graduate Program and the prior approval of the Faculty of Graduate Studies.

Larger committees are possible (to a maximum of six members *per* Faculty of Graduate Studies), however, the BME Graduate Program strongly discourages committees of more than three (no co-supervisor) or four (supervisor and co-supervisor) members.

Further, to increase interdisciplinary understanding, it is strongly suggested that one member of the Supervisory Committee not be a BME Graduate Program Approved Supervisor. Expertise required to complete the research project should be considered. Consideration in forming Supervisory Committees should also be given to gender balance, as well as rank. The Chair of the Supervisory Committee shall be the supervisor.

Submissions for approval of a Supervisory Committee are sent to the BME Graduate Program who will generate the appropriate form. The student is then required to obtain the required signatures on this form and return it to the BME Graduate Program for approval. Note, any supervisor, co-supervisor or supervisory committee changes must be submitted immediately to the BME Graduate Program for approval.

The Supervisory Committee:

1. Shall approve all aspects of the training of the graduate student, including course selection;
2. Shall approve the research proposal prior to submission to the BME Graduate Program for final approval;
3. Should meet a minimum of once per year to assess the progress of the graduate student. The supervisor shall chair committee meetings. Minutes of these meetings must be recorded in order to clarify specific expectations for the student. Within seven days of each meeting, the Chair should record and provide copies of the minutes to all members of the Supervisory Committee, and to the



student. Signatures or email confirmation are required before providing minutes to the Director. Please note, satisfactory progress during the year requires that a supervisory committee meeting has taken place and that minutes have been provided; and

4. Is expected to provide ongoing critical evaluation to the student as well as to serve as a source of scholarly encouragement. If the student's academic performance is judged to be below an acceptable standard as deemed by the members of the Supervisory Committee, this should be made clear to the student as early in the program as possible. Students may be required to withdraw from the program for reasons of "unsatisfactory progress".

[See also Guidelines on the Supervisory Relationship](#)

## RESEARCH PROPOSAL

The graduate student must normally prepare a research proposal within **twelve (12) months** of the initial registration (or transfer from MSc into the PhD program). MSc and MEng students will typically satisfy this requirement *via* the core course requirements in BMEN 604. PhD students will likely need to expand upon the proposal completed as part of their course-work.

A typical research proposal should consist of the following elements:

1. Background information from the scientific literature, including critical evaluation of previous work;
2. A clear statement of the objectives of the proposed research program including hypotheses to be tested, where appropriate;
3. A detailed description of the proposed methodology;
4. A brief statement of expected findings and potential problems; and
5. A brief indication of the contributions to scientific knowledge that should result from the proposed research.

Research proposals must not exceed the equivalent of twenty (20) typed, double-spaced pages excluding references, figures and tables. A 12-point font should be used. [Graduate Writing Workshops Available.](#)

MEng (Thesis) students who successfully complete the core course requirements will only need approval of their Research Proposal from their Supervisor. After approval from Supervisor, the Research Proposal must then be submitted to the BME Graduate Program along with a [Research Proposal Approval forms](#)

MSc and PhD students will need to have their Supervisor and Supervisory Committee approve their Research Proposal and complete and sign the Research Proposal Approval form. After approval from Supervisor and Supervisory Committee, the Research Proposal must then be submitted to the BME Graduate Program along with a Research Proposal Approval form. Please see the BME Graduate Program website for appropriate forms.

If, during the course of the training program, there are major changes in the direction of the student's research, a short addendum should be added to the original research proposal, approved by the Supervisor and members of the Supervisory Committee (MSc and PhD students only), and a copy provided to the [BME Graduate Program Office](#).



## ACADEMIC MISCONDUCT

Plagiarism and cheating are examples of academic misconduct at The University of Calgary. The BME Graduate Program will not tolerate academic misconduct. The Faculty of Graduate Studies defines plagiarism and cheating as:

*“1. Plagiarism - Plagiarism involves submitting or presenting work as if it were the student’s own work when it is not. Any ideas or materials taken from another source written, electronic, or oral must be fully and formally acknowledged. Plagiarism includes but is not limited to:*

*(a) The work submitted or presented was done, in whole or in part, by an individual other than the one submitting or presenting the work (this includes having another impersonate the student or otherwise substituting the work of another for one’s own in an examination or test),*

*(b) Parts of the work are taken from another source without reference to the original author,*

*(c) The whole work (e.g., an essay) is copied from another source, and/or,*

*(d) A student submits or presents work in one course which has also been submitted in another course (although it may be completely original with that student) without the knowledge of or prior agreement of the instructor involved. While it is recognized that scholarly work often involves reference to the ideas, data and conclusions of other scholars, intellectual honesty requires that such references be explicitly and clearly noted. Plagiarism is an extremely serious academic offence. It is recognized that clause (d) does not prevent a graduate student incorporating work previously done by him or her in a thesis or dissertation.*

*2. Cheating is an extremely serious academic offence. Cheating at tests or examinations includes but is not limited to dishonest or attempted dishonest conduct such as speaking to other candidates or communicating with them under any circumstances whatsoever; bringing into the examination room any textbook, notebook, memorandum, other written material or mechanical or electronic device not authorized by the examiner; writing an examination or part of it, or consulting any person or materials outside the confines of the examination room without permission to do so, or leaving answer papers exposed to view, or persistent attempts to read other students’ examination papers.*

*3. Other Academic Misconduct - Other academic misconduct includes, but is not limited to, tampering or attempts to tamper with examination scripts, class work, grades and/or class records; failure to abide by directions by an instructor regarding the individuality of work handed in; the acquisition, attempted acquisition, possession, and/or distribution of examination materials or information not authorized by the instructor; the impersonation of another student in an examination or other class assignment; the falsification or fabrication of clinical or laboratory reports; the non-authorized tape recording of lectures.*

*4. Any student who voluntarily and consciously aids another student in the commission of one of these offences is also guilty of academic misconduct.”<sup>1</sup>*

Students, particularly those unfamiliar with these definitions, are encouraged to discuss with their supervisor, course instructor or the BME [Program Director](#) (as appropriate) any questions they may have in this regard.

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<sup>1</sup> Refer to current [FGS Graduate Calendar](#)



[TIME LIMITS – Faculty of Graduate Studies Regulations](#)

**PhD CANDIDACY TIME LIMITS**

*If you were admitted directly into BME PhD Degree Program:*

PhD Direct Admissions – Candidacy Timelines			
<u><a href="#">STAGE</a></u> <b>1</b>	<b>Thesis Research Proposal Evaluation</b>	<b>15 Months</b> from your PhD first registration	<b>Final Maximum FGS Deadlines:</b> Within 28 Months both Stage 1 and Stage 2 must be successfully completed as per FGS time limit regulations
<u><a href="#">STAGE</a></u> <b>2</b>	<b>Field of Study (FOS) Evaluation</b>	<b>18 Months</b> from your PhD first registration	

*If you were admitted directly into BME MSc and then transferred into PhD Degree Program:*

BME MSc Internal Transfer to PhD Admissions – Candidacy Timelines			
<u><a href="#">STAGE</a></u> <b>1</b>	<b>Thesis Research Proposal Evaluation</b>	<b>21 Months</b> from your MSc first registration	<b>Final Maximum FGS Deadlines:</b> Within 28 Months both Stage 1 and Stage 2 must be successfully completed as per FGS time limit regulations
<u><a href="#">STAGE</a></u> <b>2</b>	<b>Field of Study (FOS) Evaluation</b>	<b>24 Months</b> from your MSc first registration	

If you have any questions, please consult with the BME Graduate Program Office, [bmegrad@ucalgary.ca](mailto:bmegrad@ucalgary.ca)

**DEFENCE TIME LIMITS**

**MSc Defence – FGS Final Time Limit 4 years**

Students in research- and thesis-based master’s programs must complete all degree requirements within four registration years. It is expected that students completing a master’s degree on a full-time basis will complete the degree within half the time allowed. (2 years)

**PhD Defence – FGS Final Time Limit 6 years**

Students in doctoral programs must complete all degree requirements within six registration years. It is expected that most candidates will complete requirements within four years.

**COURSE REQUIREMENTS**

The course requirements for the [Medical Imaging Specialization](#) will consist of a minimum of two graduate-level courses (for MSc students) and three graduate-level courses (for PhD students). Please note that these requirements are in addition to the requirements of a specific participating graduate program.

Course requirements in the Biomedical Engineering Graduate Program consist of Core Courses and Two half-credit Technical Elective/Option Courses. These requirements are summarized in the following Table and expanded upon in the following sections.



MSc		Course Requirements	
CORE Courses	BMEN 600 (H), GPA	3.00 UNITS	
	BMEN 602 (Q), (credit, no GPA)	1.50 UNITS	
	BMEN 604 (Q), (credit, no GPA)	1.50 UNITS	
Other Courses Required	Two graduate-level technical courses approved by the BME Graduate Program. <a href="#">See FGS Calendar – BME Graduate Program Section</a>		

PhD		Course Requirements	
CORE Courses	BMEN 600 (H), GPA	3.00 UNITS	
	BMEN 602 (Q), (credit, no GPA)	1.50 UNITS	
	BMEN 604 (Q), (credit, no GPA)	1.50 UNITS	
Other Courses Required	Four graduate-level technical courses. <a href="#">See FGS Calendar – BME Graduate Program Section</a>		

Note that BMEN 602 and BMEN 604 are Pass/Fail required Courses. Other various seminar courses do not count towards the overall course requirements. In addition, the course requirements cannot be fulfilled by mandatory training courses, such as MDSC 603 Biology of Laboratory Animals, or other required courses such as Radiation Safety, WHMIS, etc. These training courses do not count for credit towards the program course requirements.

### DIRECTED STUDY COURSE

Not more than one directed study course, or equivalent, will be accepted for credit. At most one 500-level course can be counted towards graduate program course requirements. Directed study and 500-level course **require the prior approval of the BME Graduate Program**, [bmegrad@ucalgary.ca](mailto:bmegrad@ucalgary.ca)

### COURSE CREDIT / REDUCED COURSE LOAD

Courses for which transfer credit or reduced course load is being sought must be from a recognized institution and has **not have been used for any degree or diploma accreditation**. They must be graded, graduate-level courses, and the graded level of performance must be equivalent to a "B" grade or higher standing at the University of Calgary. Course credit must also meet University of Calgary half course equivalent of 3.00 units and hours of instruction. Transfer credit is not granted for courses for which the graded level of performance is equivalent to "B-" or lower.



## MEDICAL IMAGING Specialization Course Requirements

The course requirements for the Medical Imaging Specialization will consist of a minimum of two graduate-level courses (for MSc students) and three graduate-level courses (for PhD students). Please note that these requirements are in addition to the requirements of a specific [participating graduate program](#).

The Medical Imaging Specialization courses are:

- **MSc and PhD students take the following core course**
  1. MDSC 689.01 - Medical Imaging Techniques (required course) - offered at The University of Calgary
- **MSc and PhD students take one of the following two foundational courses:**
  1. MDSC 689.10 - Medical Imaging Theory (for students in the Technology Stream) - offered at The University of Calgary \*
  2. MDSC 689.11 - Medical Imaging Applications and Analysis (for students in the Application Stream) - offered at The University of Calgary \*

## Core Course Requirements

All BME graduate students are required to take BMEN 600, BMEN 602 and BMEN 604.<sup>2</sup>

1. BMEN 600 – Biomedical Engineering Foundations (H 3.00 Units)
2. BMEN 602 – Biomedical Engineering Core I (Q 1.50 Units)
3. BMEN 604 – Biomedical Engineering Core II (Q 1.50 Units)

Typically, these are taken in the first year of graduate study in BME Graduate Program at the University of Calgary. Students in the MEng (Thesis) program have additional core course requirements as specified in the [graduate calendar](#). Current 2018-2019 list of approved BME Graduate Program Courses.

It is intended that most graduate students will take BMEN 600 and BMEN 602 courses in the first Fall term after initial registration. BMEN 604 is intended to be taken in Winter term after initial registration. Exceptions to this sequence may be allowed for students who have their first registration starting in Winter term.

## Course Requirements

### Biomedical Engineering Seminars

Graduate Students are required to complete BMEN 602 and BMEN 604 once per academic degree.<sup>3</sup>

1. BMEN 602 - Biomedical Engineering Core I
2. BMEN 604 - Biomedical Engineering Core II

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<sup>3</sup> BMEN 602 and BMEN 604 may be repeated for credit at the approval of Director.



Typically, this requirement is fulfilled by taking BMEN 602 (Fall term) and BMEN 604 (Winter term) in the first year of their registration. This presentation is typically a research proposal/work in progress seminar.

### **Other Seminars in Biomedical Engineering and Related Research Disciplines**

Regular and ongoing attendance at a research-project related seminar series is recommended for all graduate students. Moreover, students are expected to present their research findings in this seminar series.

1. Normally, each student is required to attend and participate in a regularly scheduled weekly seminar program, such as one sponsored within their relevant research institute or center. Students are also expected to attend BME Graduate Program-sponsored seminars including Public Lectures. Supervisors and/or supervisory committees can provide advice on the most suitable seminar series.
3. If appropriate, attend and participate in a regularly scheduled research group meeting or journal club and present at least once per year.
4. Current regularly scheduled seminar series include those run weekly by Research Institutes, the [Human Performance Laboratory](#), and the [Advanced Imaging Seminars](#).

### **Public Lecture Requirement in Biomedical Engineering Program**

Each student must give a Public Lecture at the conclusion of his or her degree program. This lecture should immediately precede the Oral Thesis Defense Examination, and should be prepared in consultation with the supervisor.

For the MEng (Thesis-based) and MSc, the Public Lecture should be 30 min in duration, including 10 min for questions.

For the PhD, the Public Lecture should be 60 min in duration, including 15 min for questions.

A copy of the seminar notice should be provided to the BME Graduate Program, [bmegrad@ucalgary.ca](mailto:bmegrad@ucalgary.ca) at least two weeks in advance so that the Public Lecture can be appropriately advertised in the weekly BME Graduate Program Director's Cut. All examiners must be present for public lecture.

## **Degree Specific Requirements**

### **Master of Engineering Degree Program**

Students in the MEng (Thesis-based) program are required to complete a minimum of **eight half-courses**, at least seven of which must be at the 600 or 700 level. At most one half-course at the 500 level can be used to meet these requirements. An MEng (Course-based) graduate program is not available in the Biomedical Engineering Graduate Program.

Students in the MEng program are required to complete the following 6 course equivalents:

1. BMEN 600 – Biomedical Engineering Foundations
2. BMEN 602 – Biomedical Engineering Core I
3. BMEN 604 – Biomedical Engineering Core II
4. BMEN 619.03 – Fundamentals of Project Management for Biomedical Engineers
5. MDSC 669 (Clinical Trials and Bio manufacturing) = MDGE 605 + MDGE 606 + MDGE 609
6. MDSC679/ECON 679 – Health Economics I





One half-credit option course is required from the following list:

- MDSC 672 (Biotechnology Business Aspects) = MDGE 601 + MDGE 602 + MDGE 603
- MDSC 668 (Biotechnology Commercialization) = MDGE 604 + MDGE 607 + MDGE 608
- MDSC 659.08 – Health Economics II or equivalent

Two half-credit technical electives at the 600-level are also required. These courses may be selected from BME-approved courses or, upon approval from the [BME Graduate Program](#), other suitable departmental course offerings. Contact BME Graduate Program Office, [bmegrad@ucalgary.ca](mailto:bmegrad@ucalgary.ca) for a current list of approved BME Graduate Program courses.

Students are also required to meet the seminar course requirement (which do not count as one of the four half courses).

Students are encouraged to take as many courses as necessary to obtain the basic knowledge required for their research, with the above-mentioned eight half-courses meeting the minimum requirements of the training program. The [Associate Director](#) with responsibility for the MEng (Thesis) Program must approve the courses taken by the student to ensure relevance to the student's educational requirements and research project.

### Master of Science Degree Program

Students in the MSc program are required to complete a minimum of **four half-courses (minimum of 12 units)**, at least three of which must be at the 600 or 700 level. Elective/Option courses must be BME Technical or BME Science in nature to meet degree requirements. At most one half-course at the 500 level can be used to meet these requirements and one Directed Study course allowed (if applicable).

Students are encouraged to take as many courses as necessary to obtain the basic knowledge required for their research, with the above-mentioned four half-courses meeting the minimum requirements of the training program. For an MSc student with a formal Supervisory Committee, it is suggested that this committee approve the courses required by the student.

Students in the MSc program are required to complete the following:

1. BMEN 600 – Biomedical Engineering Foundations - (H **3.00 Units**)
2. BMEN 602 – Biomedical Engineering Core I - (Q **1.50 Units**)
3. BMEN 604 – Biomedical Engineering Core II - (Q **1.50 Units**)
4. Approved BME Elective Technical/Science I – (H **3.00 units**)
5. Approved BME Elective Technical/Science II – (H **3.00 units**)

***Please contact BME Graduate Program office, [bmegrad@ucalgary.ca](mailto:bmegrad@ucalgary.ca) for course requirement job outline.***

### Doctoral Degree Program

Students in the PhD program are required to complete **six half-courses (minimum of 18 units)** at the graduate level, at least five of which must be at the 600 or 700 level. Only one half-course at the 500 level can be used to meet these requirements. Elective/Option courses must be BME Technical or BME Science in nature to meet degree requirements.

All students in the PhD program are required to complete the following:

1. BMEN 600 – Biomedical Engineering Foundations - (H **3.00 Units**)
2. BMEN 602 – Biomedical Engineering Core I - (Q **1.50 Units**)
3. BMEN 604 – Biomedical Engineering Core II - (Q **1.50 Units**)



## BME PhD Degree – Course Requirements

### Group A Category – MSc Degree in Biomedical Engineering

Student who **completed and defended an MSc with a degree certification awarded in Biomedical Engineering**. Students will be required to complete the CORE BMEN courses required for BME PhD Degree, BMEN 600, BMEN 602, BMEN 604

**NOTE:** If a student has already successfully completed BMEN 600, 602, and BMEN 604 in their BME MSc degree at University of Calgary, they will be required to take an additional two (2) BME approved technical/science electives in order to satisfy BME PhD course requirements. **6.00 units = 2 half courses**

#### BMEN Core Courses

Course Name	Grading	Hours Per Week	Units	Course Type
<b>BMEN 600</b>	Graded	3 hrs per week	3.00	H = Half
<b>BMEN 602</b>	CR / FAIL	2 hrs per week	1.50	Q = Quarter
<b>BMEN 604</b>	CR / FAIL	2 hrs per week	1.50	Q = Quarter

### Group B Category – BME MSc Transfer to BME PhD

Students who have requested an internal transfer from BME MSc degree to BME PhD degree between eight (8) and sixteen (16) months of first graduate registration will be required to complete a total of **18 units**. Course requirements (**MSc 4 + PhD 2 = Total of 6 half courses**) Course requirements must include BMEN 600, BMEN 602, and BMEN 604

#### BMEN Core Courses

Course Name	Grading	Hours Per Week	Units	Course Type
<b>BMEN 600</b>	Graded	3 hrs per week	3.00	H = Half
<b>BMEN 602</b>	CR / FAIL	2 hrs per week	1.50	Q = Quarter
<b>BMEN 604</b>	CR / FAIL	2 hrs per week	1.50	Q = Quarter

#### Additional Technical/Science Elective Courses – Half Course Equivalent (Weight: 3.0)

Course Name	Grading	Hours Per Week	Units	Course Type
<b>XXXX 6XX</b>	Graded	3 hrs per week	3.00	H = Half
<b>XXXX 6XX</b>	Graded	3 hrs per week	3.00	H = Half
<b>XXXX 6XX</b>	Graded	3 hrs per week	3.00	H = Half
<b>XXXX 6XX</b>	Graded	3 hrs per week	3.00	H = Half
<b>TOTAL UNITS to Complete PhD Degree</b>			<b>18.00</b>	<u><a href="#">Calendar a Minimum of 18 Units</a></u>



## Group C Category – MSc Degree certificate not awarded in Biomedical Engineering

Student who has **completed and defended an MSc**. The MSc degree certification is **not** awarded in **Biomedical Engineering**. If the student's completed MSc degree is not in Biomedical Engineering, they must take a further of 12 units.

### BMEN Core Courses

Course Name	Grading	Hours Per Week	Units	Course Type
<b>BMEN 600</b>	Graded	3 hrs per week	3.00	H = Half
<b>BMEN 602</b>	CR / FAIL	2 hrs per week	1.50	Q = Quarter
<b>BMEN 604</b>	CR / FAIL	2 hrs per week	1.50	Q = Quarter

### Additional Technical/Science Elective Courses – Half Course Equivalent (Weight: 3.0)

Course Name	Grading	Hours Per Week	Units	Course Type
<b>XXXX 6XX</b>	Graded	3 hrs per week	3.00	H = Half
<b>XXXX 6XX</b>	Graded	3 hrs per week	3.00	H = Half
<b>TOTAL UNITS to Complete PhD Degree</b>			<b>12.00</b>	<u><a href="#">Calendar a Minimum of 12 Units</a></u>

### IMPORTANT

ALL Technical/Science elective courses must be pre-approved by the BME Graduate Program if not listed on the approved course list sent out in the Director's Cut. If you have any questions, please email the BME Graduate Program Office, [bmegrad@ucalgary.ca](mailto:bmegrad@ucalgary.ca)

Credit may be granted with approval of the Biomedical Engineering Graduate Program, [bmegrad@ucalgary.ca](mailto:bmegrad@ucalgary.ca). Advanced standing will not be granted for Biomedical Engineering 600, 602 or 604, as per FGS BME Calendar regulations.

**Please contact BME Graduate Program office, [bmegrad@ucalgary.ca](mailto:bmegrad@ucalgary.ca) for approved BME Technical Elective list of courses, course requirement job outline, or if you have any questions about course requirements.**

Students are encouraged to take as many courses as necessary to obtain the basic knowledge required for their research, with the above-mentioned six half-courses meeting the minimum requirements of the graduate program. Current 2018-2019 list of approved BME Graduate Program Courses. (MSc 4 + PhD 2 = 6 half courses) Minimum of 18 units.

*Please contact BME Graduate Program office, [bmegrad@ucalgary.ca](mailto:bmegrad@ucalgary.ca) for course requirement job outline.*

The Supervisory Committee must approve prior to the Candidacy Examination, the courses taken by the student to ensure relevance to the research program. All required courses must be completed prior to the Candidacy Examination. The "[BME PhD Preparation Form](#)" must be completed and signed in addition to the Notice of Candidacy Form.

### Passing Grade Requirements

A student who receives a grade lower than a "B-" (*i.e.*, a failing grade at the graduate level) in any one course will be required to withdraw regardless of their GPA, unless the program recommends otherwise. If the program permits the student to retake a failed course, the second grade will replace the initial grade in the



calculation of the GPA, but both grades will appear on the transcript. For all graduate students, while “B-” is the minimum passing grade in any one course for students in the Faculty of Graduate Studies, a **grade point average (GPA) of at least 3.00 must be maintained in each year of program and final graduation GPA.**

Thesis-based students in the Faculty of Graduate Studies, who do not maintain a GPA within the last 12 months of at least 3.00 at the May review period will be required to withdraw from the program, unless the program recommends otherwise. A student must have a cumulative GPA of at least 3.00 in order to graduate.

Please note that the BME Graduate Program may also recommend to the Faculty of Graduate Studies that a student be [required to withdraw for lack of satisfactory progress](#) in either course work or research.

Final grades may be accessed through your Student Centre.

### **Biomedical Engineering Course Offerings**

Current course offerings can be found through Student Centre. Not all courses are offered each year.

All courses carrying the BMEN designation are normally only available for students registered in the Biomedical Engineering Graduate Program. Students from the other graduate departments or [Open Studies](#) students interested in enrolling in a BMEN graduate course must seek permission of the instructor of the course and approval from the [Biomedical Engineering Graduate Program](#). Degree program course elective/option courses must be BME Technical or BME Science in nature and approved by the program.

Graduate courses offered by other departments and programs may also be appropriate for students enrolled in the BMEN. A [list of approved BMEN courses](#) may be found at this website or contact the [BME Graduate Program](#) for a current list. Other graduate level courses may be taken towards the BMEN course requirements with prior approval of the BME Graduate Program (see §2).

✓ [BMEN 600 - Fundamentals of Biomedical Engineering – Core Areas](#)

An introduction to core concepts of Biomedical Engineering including an introduction to biomedical engineering fundamentals. Course allows students to select between a biology focused or an engineering focused fundamental module to complement previous course work (with approval of course instructor). This course should be taken in the first year of program and is intended to be taken with BMEN 602. Course Hours: HALF (4-0) 3.00 UNITS

✓ [BMEN 602 - Biomedical Engineering Core I](#)

Topics may include an introduction to a) biomedical engineering research, research integrity and ethics, b) career paths and progression in biomedical engineering and c) oral research communication skills. This course should be taken in the first year of program and is intended to be taken before BMEN 604. Course Hours: QUARTER (3-0-0) 1.50 UNITS

Credit will not be given for BMEN 605/607 and BMEN 602 NOT INCLUDED IN GPA (Course is Pass/Fail)



✓ [BMEN 604 - Biomedical Engineering Core II](#)

Topics may include an introduction to a) research methodology, including experimental design and b) written research communication skills in biomedical engineering, and c) preparation and review of research proposals. Satisfactory completion of this course within 1 year of first registration will ensure that the Biomedical Engineering Graduate Program Research Proposal requirements are met. Course is intended to be taken in first year of study and after successful completion of BMEN 602.

Course Hours: QUARTER (3-0-0) – 1.50 UNITS

605/607 and BMEN 604 NOT INCLUDED IN GPA (Course is Pass/Fail)

✓ [BMEN 609 - Anatomy and Physiology for Biomedical Engineers](#)

Advanced instruction on human skeletal structure, types of connective tissues, structure of joints, muscle and organ structure and function, cardiac physiology, blood properties and flow, introduction to autonomous nervous system, and disorders of the musculoskeletal system. Other topics will be covered dependent on the interests of the instructor and students.

✓ [BMEN 619 - Special Problems in Biomedical Engineering](#)

Designed to provide graduate students, especially at the PhD level, with the opportunity of pursuing advanced studies in particular areas under the direction of a faculty member. May be repeated for credit.

✓ Other Courses

Should a student wish to take a course at the undergraduate level (500-level or lower) or a course not on the list of [Biomedical Engineering Graduate Program](#) approved list of graduate courses, the [“Change of Course Registration” form](#) must be completed **and** accompanied with an official course outline to the [BME Graduate Program Office](#)

- 1) Initialed by the Course Instructor and
- 2) Approved by department offering course and
- 3) Signed by the Supervisor.
- 4) Once items #1 thru #3 signatures are complete student submits e-copy to the [BME Graduate Program Office](#) for final review and approval. Please note a student may be assessed additional tuition for any course(s) that are not at the graduate level. Note that at most one 500-level course will be accepted for graduate credit by the [BME Graduate Program](#).

## TRANSFER TO DOCTORAL PROGRAM

Appropriately qualified MSc students may [transfer directly into the PhD program](#). Students wishing to transfer must do so **between eight (8) and sixteen (16) months of first registration**. For transfer a minimum GPA of 3.5 (overall GPA, including BMEN 600) is required. Students must have completed 3 of their 4 MSc half-course requirements prior to transfer. [Applications](#) for transfer must be supported by both the supervisor and the supervisory committee. Transfer to the PhD program is not possible for students in the MEng (Thesis) program.

[Transfer](#) will require written recommendations from all members of the Supervisory Committee including the



Supervisor regarding the student's potential for pursuing a more in-depth research program that will lead to a PhD degree. Recorded minutes from a Supervisory Committee Meeting in which the transfer was discussed will also be acceptable in lieu of individual written recommendations. Based upon the recommendations made by all members of the Supervisory Committee as well as the academic record of the student, the [Program Director](#) will review the [transfer request](#) and if approved, submit it to the Dean, Faculty of Graduate Studies, regarding the student's potential for pursuing a more advanced research program that will lead to a PhD degree.

The "[Change of Program or Status](#)" form must be completed and submitted to the [BME Graduate Program Office](#).

A revised **Appointment of Supervisory Committee form** completed and signed by the student and Supervisor is also required. If designated to a [specialization](#), the student should check the specific guidelines as the processes may vary. For [Medical Imaging specialization](#) details please visit Medical Imaging [website](#)

Subsequent to this program change and prior to the Oral Candidacy Examination, additional committee members (to a maximum of six committee members as per FGS regulations however the BME Graduate Program strongly suggests **no more than two (2) additional supervisory committee** members, see §6) may be added and a revised or new research proposal should be presented to all members of the Supervisory Committee. This will ensure that the PhD project is at an appropriate level. At this time, a new form for approval of the research proposal should be completed and signed by all committee members for submission to the [BME Graduate Program Office](#).

## PhD CANDIDACY

### FORMS and ADMINISTRATIVE PROCESS

PhD CANDIDACY	Candidacy Evaluation Category	FORM Type	DEADLINE PRIOR to EXAM DATE	FORM File Name	Completed by
<a href="#">STAGE 1</a>	Thesis Research Proposal Evaluation	FORM 1	4 Weeks	Thesis Proposal-SETUP	Student/Supervisor
		RESEARCH PROPOSAL	3 Weeks	Student Final Research Proposal	Student
		FORM 2	3 Weeks	Individual Examiner Report	BME Grad Office
		FORM 3	3 Weeks	Final Pass/Fail Report	BME Grad Office
<a href="#">STAGE 2</a>	Field of Study (FOS) Evaluation	FORM 4	3 Months	FOS Preparation (Topics)	Student/Supervisor
		FORM 5	4 Weeks	FOS SETUP	Student/Supervisor
		FORM 6	3 Weeks	Final Pass/Fail Report	BME Grad Office
<a href="#">FINAL STAGE</a>	Admission into PhD Candidacy FORM		Peoplesoft System Generated FORM	BME Grad Office	

**CANDIDACY "EXTERNAL" EXAMINER CRITERIA:** does not mean External (outside) to University of Calgary. Candidacy External Examiner must be University of Calgary board appointed Faculty Member.

**POST-DOCS:** FGS regulations state that Post-Docs **are not eligible to be an examiner** for any MSc/PhD exams

Candidacy Examinations are **not open to the public**.



## (DEFENCES) [EXAMINATIONS](#)

An overview of the MEng (Thesis), [MSc and PhD examination process](#) and key details are summarized below. Additional details are provided in the following sections.

FGS Official [Thesis and Thesis Examination Administrative Processes](#)

Students and supervisors are to connect with the BME Graduate Program Office, [bmegrad@ucalgary.ca](mailto:bmegrad@ucalgary.ca) a **minimum of 4 months prior** to tentative exam month/day. Contact the BME Graduate Program Office, [bmegrad@ucalgary.ca](mailto:bmegrad@ucalgary.ca) as soon as you have a tentative month/year. The office will provide you and your supervisor with your own **Personalized Defence Plans and Timelines Job AID** including an overview of Administrative Procedures and what to expect in preparation for your defence.

### “INTERNAL” Examiner Criteria (Defence Exams Only)

- Must be University of Calgary Board Appointed Faculty Member**
- CANNOT be an approved BME Graduate Program Supervisor**
- CAN be from same department as supervisor as long as the following conditions are met:
- Well-established research reputation
- Expertise in area of student’s research
- Experience in evaluating theses at graduate level
- Experience in supervising to completion at graduate level
- Not close personal friend of Supervisor
- Has not collaborated with Supervisor in past five years
- Has not worked with candidate

**POST-DOCS:** FGS regulations state that Post-Docs **are not eligible to be an examiner** for any MSc/PhD exams

## STUDENTS / SUPERVISORS

In preparation and planning of your final MSc or PhD defence, please contact the BME Graduate Program Office, [bmegrad@ucalgary.ca](mailto:bmegrad@ucalgary.ca) for the following **JOB AIDS and FORMS**

1. Personalized Defence Plans and Timelines JOB AID
2. Defence Examiner Roles CHART and Regulations
3. BME MSc or BME PhD Defence CHECKLIST



<b>DEFENCES</b>	<b>MSc Oral Examination (Defence)</b>	<b>PhD Oral Examination (Defence)</b>
<b>Timelines</b>	<b>2 months prior</b> planned exam date Contact BME GP Office <a href="mailto:bmegrad@ucalgary.ca">bmegrad@ucalgary.ca</a>	<b>4 months prior</b> planned exam date Contact BME GP Office <a href="mailto:bmegrad@ucalgary.ca">bmegrad@ucalgary.ca</a>
<b>Defence Details</b> <b>Checklist</b>	6 weeks	9 weeks <b>including External Examiner Request</b>
<b>Neutral Chairs</b>	Appointed by the BME GP	Appointed by the BME GP
<b>Examining Committee</b>	<ul style="list-style-type: none"> <li>Supervisory Committee (including supervisor and co-supervisor)               <ul style="list-style-type: none"> <li>Internal Examiner</li> <li>Internal/External Examiner</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Supervisory Committee (including supervisor and co-supervisor)</li> <li>Internal Examiner-UofC Member</li> <li>Internal/External Examiner-UofC Member</li> <li>External Examiner (Outside UofC)</li> </ul>
<b>Non-participating members of Examining Committee</b>	N/A	N/A
<b>Approved BME Supervisor as Examiner</b>	Yes, at least one of the Supervisory Committee (excluding supervisor and co-supervisor) or the Internal Examiner.	Yes, at least one of the Supervisory Committee (excluding supervisor and co-supervisor) or the Internal Examiner.
<b>Role of Supervisor and/or co- Co-supervisor</b>	Full voting members of examination committee.	Full voting members of examination committee.
<b>Public in Attendance</b>	Yes	Yes
<b>Presentation Duration</b>	30 min public lecture (including 10 min for questions) prior to Oral Examination	60 min public lecture (including 15 min for questions) prior to Oral Examination
<b>Oral Examination Duration</b>	The Oral Examination should not exceed two hours. This does not include the deliberation time of the Committee.	The Oral Examination should not exceed two hours. This does not include the deliberation time of the Committee.
<b>Specific BME Graduate Program Requirements</b>	All MSc course requirements completed	All PhD requirements for PhD Candidacy Examination.

Note in MEng (Thesis), MSc and PhD Oral Examinations supervisor and co-supervisor are both fully participating members of the committee and may ask questions, participate in the deliberations and voting. Oral Thesis Examinations are generally open to the public.





## [MSc and MEng \(Thesis\) Oral Thesis Examination](#)

### **MSc and MEng (Thesis) Oral Thesis Examination Committee**

The MSc and MEng (Thesis) Oral Thesis Examination Committee is comprised of the Neutral Chair (appointed by the [BME Graduate Program Office](#)), the Supervisory Committee (including the supervisor and co-supervisor, if appropriate), and two additional examiners recommended by the supervisor and approved by the [Program Director](#). [Student/Supervisor scheduling checklist available](#) BME Graduate website

- At least one of the Supervisory Committee (excluding supervisor and co-supervisor) or the Internal Examiner must be a BME Approved Supervisor.
- The **second additional examiner** (*i.e.*, the Internal/External Examiner)
  1. Cannot be an Approved BME Graduate Supervisor,
  2. CAN have an appointment in the same department as the Supervisor as long as
  3. Cannot have recently (last five years) worked with the candidate or the supervisor/co-supervisor. The BME [Program Director](#) shall ensure that no conflict of interest exists between the student or the Supervisor and the Internal External member of the examination committee. (See Graduate Studies Conflict of Interest Policy: <http://grad.ucalgary.ca/current/managing-my-program/examinations>).

The Supervisor and Co-supervisor are full members of the Thesis Oral Examination Committee.

It is the responsibility of the **supervisor** to arrange the committee members and seminar/examination room for the exam. Information required to complete the Notice of Examination must be submitted to the at **least six (6) weeks before the scheduled date of the Oral Examination**. This information includes a full list of Committee members, the Department of the primary appointment of all Committee members, and the room for the Public Lecture and examination (to be booked by the Supervisor). A copy of the thesis shall be provided to the examiners no later than **three (3) weeks prior to the examination**.

### **Conduct of Examination**

The MEng (Thesis) and MSc Thesis Oral Examinations are 2 hours in duration and will be immediately preceded by a 30-min Public Lecture (including 10 min for questions), scheduled with the approval of the BME Graduate Program. Generally the examination is open to the public.

Details regarding the examination can be found in the [Handbook of Supervision and Examination Thesis-Based Master's Degree](#).

## [Doctoral Thesis Oral Examination](#)

### **Examination Committee**

The PhD Thesis Oral Examination Committee is comprised of the Neutral Chair (appointed by the BME Program), the Supervisory Committee (including the supervisor and co-supervisor, if appropriate), and three additional examiners recommended by the supervisor and approved by the [Program Director](#). [Student/Supervisor scheduling checklist available](#) BME Graduate website.



- At least one of the Supervisory Committee (excluding supervisor and co-supervisor) or the Internal Examiner must be a BME Approved Supervisor.
- The second additional examiner (*i.e.*, the Internal/External Examiner)
  1. Cannot be an Approved BME Graduate Supervisor,
  2. CAN have an appointment in the same department as the Supervisor as long as
  3. Cannot have recently worked with the candidate or the supervisor/co-supervisor. The BME [Program Director](#) shall ensure that no conflict of interest exists between the student or the Supervisor and the Internal/External member of the examination committee. [See Graduate Studies Conflict of Interest Policy](#)
- The third additional examiner (the External Examiner) must be 1) external to The University of Calgary and 2) cannot have recently worked with the candidate or the supervisor/co-supervisor. The BME [Program Director](#) shall ensure that no conflict of interest exists between the student or the Supervisor and the External member of the examination committee. [See Graduate Studies Conflict of Interest Policy](#)

The Supervisor and Co-supervisor are full members of the Thesis Examination Committee.

### **Funding of External Examiner Travel**

The BME Graduate Program may provide “up to \$1000” towards travel expenses for External Examiners from institutions located outside of Western Canada (Alberta, British Columbia, Saskatchewan, Manitoba) pending available funds. These funds are intended to offset incremental costs associate with overnight accommodation and will be provided only on condition that the **External Examiner gives a BME Graduate Program Seminar**, accessible to the broader Calgary BME Community. Seminar is to be organized by the Supervisor in consultation with the BME Graduate Program Office. Each fiscal year up to ten \$1000 BME awards will be granted. At the discretion of the [BME Graduate Program](#) Director pending available funds.

### **Scheduling**

It is the responsibility of the **supervisor** to arrange the committee members and seminar/examination room for the exam.

At **least nine (9) weeks** before the proposed examination date, the form entitled “Request for Approval of External Examiner/Reader” and a copy of the prospective external examiner’s current curriculum vitae must be submitted to the [Graduate Program Office](#). The proposed External Examiner must be approved by the [Program Director](#) and the Faculty of Graduate Studies (see: Information required to complete the Notice of Doctoral Thesis Oral Examination must be submitted to the at **least six (6) weeks before** the scheduled date of the Oral Examination. This information includes a full list of Committee members, the Department of the primary appointment of all Committee members, and the room for the Public Lecture and examination (to be booked by the Supervisor).

A copy of the thesis shall be provided to the examiners **no later than three (3) weeks prior** to the examination.

### **Conduct of Examination**

The Doctoral Thesis Oral Examination is 2 hours in duration and will be immediately preceded by a 60-min Public Lecture (including 15 min for questions), scheduled with the approval of the [BME Graduate Program](#). Generally the examination is open to the public.



Details regarding the conduct of the examination and the post-exam procedures can be found in the current [Handbook of Supervision and Examination Thesis-Based Doctoral Degree](#).

[Convocation Clearance Form](#)

## LEAVE OF ABSENCE

The [Leave of Absence Policy](#) has been created to assist graduate students who are unable to continue their programs as full-time students. <http://www.grad.ucalgary.ca>

A Leave of Absence may be planned (*e.g.*, parental/maternity leave), or unplanned (*e.g.*, bereavement, medical requirements, family emergency). The student should first discuss the proposed Leave of Absence with his/her supervisor and members of the Supervisory Committee. The student may also wish to meet with the [Graduate Program Director](#) to discuss a Leave of Absence.

When it is determined a Leave of Absence should be pursued, the student must complete the “leave of Absence” form and obtain his/her supervisor’s approval. Written documentation outlining the reasons for the Leave of Absence should be included and the form must be submitted to the [Graduate Program Coordinator](#) for additional review and subsequent approval by the [Graduate Program Director](#).

The Faculty of Graduate Studies requires that periods of leave both commence and conclude in accordance with the [registration deadlines](#) of the University of Calgary’s [official academic terms](#) (September, January, May and July).

The Application for Leave of Absence should be received by the Graduate Program **at least six (6) weeks before** the anticipated start of the leave.

Students returning to graduate study after a Leave of Absence must activate their registration on the MyUofC Student Centre by the registration term’s deadline as indicated in the [Academic Schedule](#).

## WITHDRAWAL FROM GRADUATE PROGRAM

It is recommended that a graduate student experiencing difficulties with any aspect of training should attempt to resolve the situation with his/her Supervisor (and Co-supervisor if applicable) and/or members of his/her Supervisory Committee. If necessary, the student and/or supervisor can also meet with the [Graduate Program Director](#) for additional assistance.

A student who wishes to withdraw from the Biomedical Engineering Graduate Program must complete a Faculty of Graduate Studies “[Withdrawal from Graduate Program](#)” form. The student must complete the form indicating a rationale for withdrawal. The Supervisor should then review and approve the withdrawal. It is also suggested that supporting documentation be attached where further explanation may be required. The form and accompanying documentation must be submitted to the Graduate Program for subsequent review and approval by the [Program Director](#) and the Dean of Graduate Studies, either of whom may request to meet with the student.

Upon occasion, a student will request a withdrawal from program for a predetermined and reasonable period of time with the objective of reapplying at a later date to defend his/her graduate thesis. In these cases, the student and the supervisor must:



1. Complete the “[Withdrawal from Graduate Program](#)” form
2. Draft a plan for completion, addressing the following:
  - Proposed date of reapplication
  - Current status of research project and required coursework
  - Any other specific requirements (specific experiments, coursework, data analysis, writing, *etc.*)
3. Timeframe after readmission in which the student is expected to defend and complete all requirements
4. Whether the student’s readmission will be supported by the Supervisor and members of the Supervisory Committee if the above plan is not followed
5. Include minutes from the meeting of the Supervisory Committee, which clearly outlines their agreement with the withdrawal from program, and plan for completion of program requirements

A student who has withdrawn from program not more than five years previously and wishes to apply for readmission must do so within required admission deadlines. [See current Graduate Calendar for details.](#)

The student must submit an updated application form, a re-application fee (currently \$180), a letter requesting readmission and two letter of reference. One of the references shall be from the student’s graduate supervisor. If the student has been registered at another postsecondary institution since he/she withdrew from program, official transcripts must be submitted in support of the reapplication.

The student’s University of Calgary transcript will permanently reflect the withdrawal from the BME graduate program and the date that the withdrawal occurred.

## [FINANCIAL SUPPORT POLICY](#)

### **Criteria for Level of Support**

The general operating principle is that each student shall be full-time. Full time MSc and PhD students, upon satisfactory progress, shall receive financial support for the duration of graduate training. This rule may not apply to students registered in joint degree programs, such as the Leaders-in-Medicine Program. The BME Graduate Program also reserves the right to not fund students who have exceeded the program completion time-limit guidelines (24 months for MSc, 48 months for PhD, 60 months for students who transfer from the MSc into the PhD).

The minimum stipend levels are established in accordance with national granting agencies, Faculty of Graduate Studies and in alignment with Schulich School of Engineering. Currently the minimum stipends are:

1. \$21,000 per year for MSc Students up to 2 years
2. \$21,000 per year for PhD Students up to 4 years

### **SPECIAL FUNDING POLICY NOTICE**

**Effective January 2020**, in agreement and approval with Faculties of Graduate studies, Schulich School of Engineering, all fully-funded MSc and PhD will receive a minimum funding of \$21,000 per year. At any time during the training program, an eligible student who does not receive a monthly stipend should contact their supervisor and the [BME Graduate Program Office](#) immediately. Please refer to your official funding document received at time of admission offer.



Sources of [financial support](#) include research grants awarded to Supervisors, Graduate Assistantships, Training Programs, and scholarships that may be awarded by numerous local, regional, provincial, national and international granting agencies, many of which are outlined on the [Faculty of Graduate Studies website in an Online Scholarship Database](#).

In addition, the BME Graduate Program has funding that is applied towards academic and research scholarship, program leadership, and conference travel. MEng (Thesis) students are not eligible for stipend support for their degree program. They are eligible for BME Graduate Program awards and prizes.

**Part-time students will require approval from the BME Graduate Program and will be considered financially self-supported.**

### **Internal (University of Calgary) Scholarships**

The University of Calgary offers several annual competitions for graduate scholarships. Please view the [Graduate Awards database](#) for details and check your **university email** for Biomedical Engineering Graduate Program deadlines (which may be in advance of a Faculty of Graduate Studies deadlines). In all cases, incomplete applications will not be considered. It is the applicant's responsibility to confirm whether all documents have been submitted and/or received. Should an award applicant's graduate student file not be complete, he/she will not be considered for an internal competition.

### **External Scholarships**

Students are encouraged to apply for external scholarships. Check your **university email** for Biomedical Engineering Graduate Program deadlines (which may be in advance of a Faculty of Graduate Studies deadline or an external agency deadline). Some external awards are reviewed at the Program and/or University level.

**All requests for signatures from the BME Graduate [Program Director](#) should be directed to the Graduate [Program Coordinator](#) well in advance of any internal or external deadline. A minimum of 3-5 business days.**

In all cases, incomplete applications will not be considered. It is the applicant's responsibility to confirm whether all documents have been submitted and/or received. Should an award applicant's graduate student file not be complete, he/she will not be considered for an external competition.

**Students who receive [external scholarships](#) should notify the [Graduate Program Office](#) immediately upon official notification of receipt of the award.** Most major awards prohibit holding another major award. BME graduate program awards are normally only provided to students who do not hold another major award. All students should provide the [Graduate Program Office](#) with a copy of their submitted applications, even if there is no review done at the Program or University level.

### **[Post-Program Nominations](#)**

The Faculty of Graduate Studies allows each graduate department to nominate one student who has [completed program requirements and who is considered to have achieved excellence for prestigious post-program awards](#). Specifically, on the Examiner's Report on Thesis, there is an opportunity for examiners to indicate whether the student's thesis is worthy of a national or international award. If the "Internal" External



Examiner and/or External Examiner indicate “yes”, the Graduate Director may consider the student for nominations as detailed below:

**[Canadian Associate of Graduate Studies \(CAGS\)/University Microfilms International \(UMI\) Distinguished Dissertation Award](#)** - With the collaboration of University Microfilms International, a division of ProQuest Company, the Association offers the CAGS/UMI Distinguished Dissertation Awards. The awards recognize doctoral students whose dissertations make an original contribution to their academic field. Two awards are offered each year: one in engineering, medical sciences and natural sciences; and one in fine arts, humanities and social sciences.

**[Chancellor’s Graduate Medal](#)** - Open to all students in all programs leading to a graduate degree who graduate in the fall or spring convocations at the University of Calgary. All candidates must have been nominated by their program for the **[Governor General's Gold Medal award](#)**. Candidates cannot receive both a **[Chancellor's Medal](#)** and a **[Governor General's Gold Medal](#)**.

**[Governor General’s Gold Medal](#)** - Candidates who have graduated during the spring or fall convocations of past year. All candidates must have been nominated by their program.

#### **[NSERC Doctoral Prize](#)**

#### **[Western Association of Graduate Schools \(WAGS\)/University Microfilms International \(UMI\) Awards](#)**

- Each member institution may submit one nomination for each award. Innovation in Technology: This award recognizes the innovative application of technology to scholarship.
- Distinguished Master’s Thesis: This award recognizes distinguished scholarly achievement at the master’s level.

### **BME GRADUATE PROGRAM STUDENT AWARDS AND PRIZES**

The BME Graduate Program is allocated funds annually by the Faculty of Graduate Studies based upon enrolment numbers and other criteria. These funds are awarded via an annual Graduate Award Competition GAC to graduate students in the form of BME Graduate Program awards and prizes. Awards are open to full-time MSc and PhD students.

In general, a student in receipt of major award will not be eligible for a BME Graduate Program award unless their major award ends prior to the start of the new award. A “major award” is considered to be a single scholarship equal to or exceeding \$10,000 over a twelve-month interval.

Recruitment and Program Leadership Prizes may be combined with major awards.

The BME Graduate Program also offers International Student Research Awards and **[Conference Travel Awards](#)**.

In all cases, incomplete applications will not be considered. It is the applicant’s responsibility to confirm whether all documents have been submitted and/or received by the published deadline. Should an award applicant’s graduate student file not be complete, he/she will not be considered for an internal competition.



### IMPORTANT NOTICE

BME Graduate Program Award policies and regulations are in alignment with the Faculty of [Graduate Studies Awards office policies and regulations](#). Students who seek full time employment will no longer qualify or be eligible to receive BME GP Award Funding.

Any questions, please consult with the BME GP Office [bmegrad@ucalgary.ca](mailto:bmegrad@ucalgary.ca) and/or refer to the [eligibility and guidelines for awards by visiting the FGS Awards website](#)

### SUMMARY of BME Graduate Program Award / Prize Opportunities

The following table summarizes awards provided by the BME Graduate Program. Details are provided in the sections below.			
Award Type	Number and Size	Application Process	Award Criteria
<a href="#">Academic Scholarship Award</a>	Up to 10 awards at up to \$10,000 per award **Variances in award value determined by the BME Graduate Program	Nomination Award determined by the BME Graduate program	Academic excellence in past academic year (May-April).
<a href="#">Research Scholarship Award</a>	Up to 10 awards at up to \$10,000 per award **Variances in award value determined by the BME Graduate Program	Concurrent with Graduate Studies Open Competition held in January/February each year. Decision will be made at during the Winter term Contact BME Program for deadlines and application forms.	Research excellence in past calendar year.
<a href="#">Director's Prize for Program Leadership</a>	Up to 3 awards at up to \$2,500 per award **Variances in award value determined by the BME Graduate Program	No application form. Letter nominations required. BME Graduate Program will accept nominations prior to February each year.	Demonstrated leadership excellence in the BME Graduate Program over past calendar year.
<a href="#">Conference Travel Awards</a>	<b>Up to \$1000</b>	<b>MSc – 1 application</b> <b>PhD – 2 applications</b>	Must present a talk or a poster at a national or international meeting.



### **Academic Scholarship Award**

Academic Scholarship Awards are available for students in the BME Graduate Program and are intended to reward academic excellence (*e.g.*, success in course work as demonstrated by grade-point average, other non-major academic scholarships/awards/prizes) in the past academic year (May-April). Academic Scholarship Awards cannot be combined with another major award. Current holders of major awards are ineligible. This award is by nomination only. Results will be determined by the BME Graduate Program during the Spring/Summer following the first academic year of the student. Notifications will be provided prior to the Fall / Winter academic term.

### **Research Scholarship Award**

Research Scholarship Awards are available for students in the BME Graduate Program and are intended to reward excellence and productivity in research scholarship (*e.g.*, peer reviewed manuscript publications, peer-reviewed conference proceedings and abstracts, and other podium and poster presentations) over the past calendar year (January-December). Notifications of internal BME Deadlines will be announced in the weekly Director's Cut. Students who submit a GAC Graduate Award Competition Application will be considered.

Research Scholarships cannot be combined with another major award. Current holders of major awards are ineligible to apply unless their award will end in the May-April period immediately following the competition deadline. Applications will be considered concurrently with the Graduate Studies Open Competition held in December-January each year. Please contact the [Graduate Program Office](#) for internal BME Graduate Program deadlines. Announcements also in the weekly BME Director's Cut.

### **Director's Prize for Program Leadership**

Program Leadership Prize(s) will be given each year to a student or students in the BME Graduate Program who display outstanding leadership qualities, as defined by extra-curricular professional activities (*e.g.*, involvement in the BME Graduate Student Association, organization of student run academic, recreational and social events, representation of the program externally, *etc.*) that benefit and promote the BME Graduate Program.

Program Leadership Prizes can be combined with other major awards. Individuals who have made substantial leadership contributions in the past calendar year can be nominated to the [Program Director](#) for this Prize. Nominations will be accepted from BME Graduate Program approved-supervisors, staff, students or either the [BME GEC](#) or BMEG by 1 February of each year. There is no application form, but nominators are asked to provide a succinct summary of the reasons for the nomination. The [Program Director](#) in consultation with the Associate Directors will determine the prize winner(s) with affirmation by the [BME GEC](#).

[All nominations are to be submitted on or before February 1<sup>st</sup> to the BME Graduate Program Office for consideration. \[bmegrad@ucalgary.ca\]\(mailto:bmegrad@ucalgary.ca\)](#)





### Conference Travel Awards

Graduate students may submit an application to the Biomedical Engineering Graduate Program for a travel award to assist with the expenses associated with a recognized conference or meeting relevant to biomedical engineering. The graduate student must make a first-authored presentation. Awards will help support the cost of transportation, accommodation and registration fees and will cover up to \$1,000 of these expenses.

Students can apply as follows and based on the dates of the conference (not when application is received by the BME Graduate Program Office).

BME <b>MSc</b> Degree	ONE (1) per Degree	Full Time Registered BME Grad Program
BME <b>PhD</b> Degree	TWO (2) per Degree	Full Time Registered BME Grad Program

**Please email the BME Graduate Program Office for the most current BME Travel Application FORM**

### **Remission of International Tuition Fees**

The BME Graduate Program policy is to provide funding to help offset the cost of the fee differential recovered from international students. Remission of International Tuition Fees are reviewed and processed term/year by term/year. Remission will occur after the official Faculty of Graduate Studies tuition fee deadline and on the 25<sup>th</sup> day of the 2<sup>nd</sup> month of each term/year. Effective January 1<sup>st</sup>, 2019, BME Graduate Program policy will remit 65% of all students registered full time in the BME Graduate degree program, MSc or PhD.

### **IMPORTANT**

ALL student requests for signatures from the Graduate [Program Director](#) should be directed to the [Graduate Program Office](#) via [bmegrad@ucalgary.ca](mailto:bmegrad@ucalgary.ca) well in advance of any internal or external deadline. **A minimum of 3 to 5 business days.**



## APPENDIX – IMPORTANT WEB SITES

- ✓ [Newly-Admitted](#)
- ✓ [Registration](#)
- ✓ [My GRADSkills](#)
- ✓ [Thesis-Based Students](#)
- ✓ [Biomedical Engineering Graduate Program](#)
- ✓ [BME Internal Forms and Handbook](#)
- ✓ [Faculty of Graduate Studies \(FGS\)](#)
- ✓ [FGS Awards](#)
- ✓ [FGS Award Policy](#)
- ✓ [FGS Forms](#)
- ✓ [FGS Calendar](#)
- ✓ [FGS Contacts](#)
- ✓ [University of Calgary Information Technologies \(UCIT\)](#)
- ✓ [Getting Started as a Graduate Student](#)
- ✓ [Registrar and Enrollment Services](#)