

University of Vermont

Biomedical Engineering Graduate Program

M.S. and Ph.D. Student Handbook

Approved 10/30/2023

CONTENTS	PAGE
I. Program personnel	1
II. Introduction	2
Requirements for Admission	2
Retention in the Program	2
III. The Biomedical Engineering M.S. Curriculum	3
Program of Study	3
Thesis Option Introduction	3
Thesis Option Comprehensive Exam	4
Thesis Defense	4
Project Option Comprehensive Exam and Final Poster Presentation	5
Coursework Option Comprehensive Exam	5
Accelerated Master's Program	5
IV. The Biomedical Engineering Ph.D. Curriculum	7
Program of Study	7
Comprehensive Exam	7
Dissertation Proposal	9
Dissertation Defense	9
V. Appendix	
Ph.D. Student Check Sheet	11

I. PROGRAM PERSONNEL

Graduate Director:

David Jangraw, MS, Ph.D.
Assistant Professor of Engineering
David.Jangraw@uvm.edu

Affiliated Faculty:

Jason H.T. Bates, Ph.D., DSc
Professor of Medicine
Jason.H.Bates@med.uvm.edu

Christopher Berger, Ph.D.
Professor of Molecular Physiology &
Biophysics
Christopher.Berger@uvm.edu

David Bernstein, Ph.D.
Assistant Professor of Engineering
David.Bernstein@uvm.edu

Bruce Beynnon, Ph.D.
Professor of Orthopedics and Rehabilitation
Bruce.Beynnon@uvm.edu

Michael Brasino, Ph.D.
Assistant Professor of Engineering
Michael.Brasino@uvm.edu

Matthew Caporizzo, Ph.D.
Assistant Professor of Molecular Physiology &
Biophysics
Matthew.Caporizzo@uvm.edu

Marilyn Cipolla, Ph.D.
Professor of Medicine, Department Chair
Marilyn.Cipolla@uvm.edu

Amber L. Doiron, MS, Ph.D.
Assistant Professor of Engineering
Amber.Doiron@uvm.edu

Niccolo Fiorentino, Ph.D.
Assistant Professor of Engineering
Niccolo.Fiorentino@uvm.edu

Rachael Floreani, Ph.D.
Associate Professor of Engineering
Rachael.Floreani@uvm.edu

Dev Majumdar, Ph.D.
Assistant Professor of Surgery
Dev.Majumdar@uvm.edu

Peter Spector, MD
Professor of Medicine
Peter.Spector@uvm.edu

David Warshaw, Ph.D.
Professor of Molecular Physiology &
Biophysics
David.Warshaw@med.uvm.edu

Dan Weiss, MD, Ph.D.
Professor of Medicine
Daniel.Weiss@uvm.edu

II. INTRODUCTION

This document is intended as a guide for BME graduate students but does not include the full detail of the University of Vermont (UVM) Graduate College requirements. Consult the Graduate College for further information, <https://www.uvm.edu/graduate>.

The Biomedical Engineering (BME) program at UVM offers programs of study leading to Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in BME. Areas of research expertise in biomedical engineering include digital health, neuroengineering, biomaterials, biomechanics, and computational modeling.

This guide to the graduate program in BME at UVM is designed to help each student plan a program of graduate study leading to their degree. Any unanswered questions should be addressed to your faculty advisor, the BME Graduate Director, or the Graduate College. It is the Graduate College that awards each graduate degree so [their rules](#) must either be satisfied or subsumed by program rules.

Requirements for Admission

Prospective students must apply to the BME graduate program through the UVM Graduate College. Three letters of reference are required. Letters from research advisors or supervisors are highly desirable and should attest to the applicant's ability to work independently in an academic setting. In addition, if you are interested in financial support in the form of a Graduate Research Assistantship (GRA) or a Graduate Teaching Assistantship (GTA) you should email the program faculty members whose research interests align with yours. Completed applications for Fall admission will be reviewed on a rolling basis, but applications received before January 15 will be given priority. For Spring admission, applications received before October 1 will be given priority.

Admission into the BME M.S. degree program requires an accredited Bachelors' degree in engineering, physics, mathematics, computer science, or a similarly appropriate field. Students entering the BME Ph.D. program should have an accredited Bachelor's or Master's degree in an appropriate field of study. Admission into the graduate program requires that the applicant have an undergraduate grade point average above 3.0 (based on a 4.0 scale), that their BME course grades are strong (B average or better), and that their letters of recommendation are positive. Graduate Record Examination (GRE) scores are not required, but applicants may submit them for consideration with the application if desired. We evaluate non-native English speakers' testing scores according to UVM Graduate College guidelines (https://www.uvm.edu/graduate/international_students). Prior coursework in engineering, computational science, and/or the life sciences is highly desirable. The ideal applicant will have a broad technical background encompassing engineering, mathematics (including differential equations and linear algebra), and science (including physics and chemistry). Specific remedial coursework may be required of those who lack a sufficiently strong background in certain areas.

Retention in the Program

For complete requirements, students must read the UVM Graduate College resources (<https://www.uvm.edu/graduate/resources>) and the Graduate College Requirements for the Ph.D. or M.S. (<https://catalogue.uvm.edu/graduate/degreerequirements/requirementsforthedoctorofphilosophydegree/> or <https://catalogue.uvm.edu/graduate/degreerequirements/requirementsforthemastersdegree/>). For retention, students must maintain good academic standing (GPA 3.00) and continue to progress towards their degree requirements. In addition, students must participate in seminars or reading clubs, as appropriate.

III. MASTER OF SCIENCE IN BIOMEDICAL ENGINEERING

Program of Study

The M.S. degree in BME requires, at a minimum, 30 credit hours at the (2xx) 5xxx level or higher and the completion of a comprehensive examination. To bolster background knowledge and with pre-approval from the Graduate College and the student's advisor, a student may apply up to three credits of (1xx) 3xxx or 4xxx level coursework to their M.S. degree requirements.

Students can choose, in consultation with their graduate advisor or the BME Graduate Director, between the Thesis, Project, or Coursework options. M.S. students are rarely funded, and only Thesis option students are eligible for GTA or GRA funding, which requires approval from a thesis advisor and a signed offer letter from the EBE Department. Table 1 summarizes the requirements for the three M.S. BME degree options.

Table 1. M.S. Requirements for thesis, project, and coursework options.

Requirement	M.S. Thesis	M.S. Project	M.S. Coursework
Total Credits	≥30 credits, selected with guidance from faculty advisor. At least 6 credits of coursework must have a BME designation and at least 6 credits must be at the (3xx) 6xxx-level.		
BME Courses	≥15 credits of engineering coursework (Prefix BME, EE, ME, CS, CEMS, EMGT, or CEE) at the (2xx) 5xxx-level and above, selected with guidance from faculty advisor and/or the BME Graduate Director.		
Elective Courses Selected from BME or related courses in STEM	≥9 credits	≥12 credits including exactly 3 credits of BME (394) 6995 Independent Graduate Research taken in next-to-last semester of project work	15 credits; no thesis or research credits permitted
Thesis or Project credits	≥ 6 credits of BME (391) 6391 supervised by BME graduate program faculty member	Exactly 3 credits of BME (392) 6993 MS Project, taken in final semester of project work, supervised by 2 faculty*	N/A
Comprehensive Exam*	Orally present a proposal for thesis research to thesis committee at least 3 months prior to semester's last day of classes*	Written proposal for project submitted in BME 6995. Requires approval by the 2 supervising faculty*	Present at Spring BME Student Symposium. Presentation must meet requirements as assessed by BME faculty*
Degree Capstone	A thesis must be completed, under the supervision of a BME graduate program faculty member. The written thesis must meet Graduate College requirements and be defended orally in a public forum.*	A poster must be presented at Spring BME Student Symposium on the project. Poster presentation must meet requirements as assessed by BME faculty.*	N/A
Forms Required	Comprehensive Exam, Defense Committee Membership, Defense Notice, Thesis and Dissertation Rights and Permission, Intent to Graduate	Comprehensive Exam, Intent to Graduate	Comprehensive Exam, Intent to Graduate

*See below for additional details

Thesis Option Requirements

Students will select a primary research advisor from the list of affiliated Biomedical Engineering faculty by the end of the first semester of enrollment and form a graduate studies committee by the end of the first year of enrollment. The student's graduate studies committee will be comprised of three UVM faculty members, at least two of whom must be regular members of the graduate faculty. Ordinarily, two

committee members will be from the BME program, including the thesis advisor. The third member, who acts as chair of the committee, must be a member of the graduate faculty, must be from a different program and department than the candidate and advisor, and must be approved by the Graduate College. Committee members external to UVM must be approved by the Graduate College prior to serving. It is the responsibility of the graduate studies committee to supervise the graduate student's program of study and to review progress at regular intervals. The defense examination committee and the graduate studies committee do not have to be the same but frequently are.

Thesis Option Comprehensive Exam

The comprehensive exam for M.S. BME thesis students is an orally presented research proposal and must be completed at least 3 months prior to the last day of classes of the semester in which the candidate intends to graduate. The proposal will take place in front of the candidate's committee, and it will be open to UVM students and faculty. The proposal meeting will begin with a statement of the ground rules for the meeting given by the committee chair and a brief introduction from the candidate's supervisor. The candidate will then give a presentation (typically 30 minutes) in which their research progress to date is outlined and plans for the completion of the thesis are described. The candidate must present a tentative table of contents for the thesis as well as an estimated timeline of completion of their degree. The candidate's presentation will be followed by questions from the audience and then questions from the committee in closed session. The committee will then deliberate in private after which its recommendations will be passed to the candidate. The entire thesis proposal meeting will take roughly 90 minutes.

The purpose of the proposal is to satisfy the committee members that the candidate is on track toward the completion of their thesis and that the research contained within it will meet the standards of scholarship required for the M.S. degree. One re-examination is permitted for a failed comprehensive examination. The Proof of Successful Completion of Comprehensive Exam form should be submitted, and the BME Graduate Director should be informed of the successful completion.

Thesis Defense

The Graduate College resources must be carefully utilized during this process; specifically, the Defense Committee Membership form, Intent to Graduate form, and Defense Notice form must be submitted in addition to conducting a format/record check. The Thesis/Dissertation Guidelines and Timetable, which are available on the Graduate College website, must be closely followed.

The defense of a M.S. thesis will take place at the discretion of the candidate and their supervisor at a point when the thesis is complete and has been distributed (at least 2 weeks prior) to the members of the committee. A Public Notice of the defense is required at least 3 weeks prior to the scheduled defense date in order for the student to defend.

The defense will begin with a statement of the ground rules for the meeting given by the committee chair and a brief introduction from the candidate's supervisor. The candidate will then present their research in about 45 minutes. This will be followed by questions from the audience and then questions from the examining committee in a closed session. The committee will then deliberate in private after which its recommendations will be passed to the candidate. The entire dissertation defense will take approximately 2 hours. If a student's defense examination performance is not satisfactory, then one reexamination, and one only, is permitted.

Project Option Comprehensive Exam and Final Poster Presentation

A project is defined for the purposes of the M.S. Project degree path as an engineering product with a needs statement, an iterative approach, testing, and a design goal or output that can be evaluated by faculty mentors as meeting the standards of scholarship. The product that results can be a physical object, code, or any other product that fits the definition above.

The project topic is selected by the student in consultation with a supervising faculty member and must not be the same as any project performed as part of a paid position. If the faculty supervising the project is not a BME graduate faculty, approval for the topic should be sought from the BME Graduate Director. The proposal and project must be approved by 2 faculty mentors, one of whom is the supervising faculty and at least one of whom must be BME faculty. The project spans two semesters. The student must register for “BME 6995 Independent Graduate Research” during the next-to-last semester and “BME 6993 Independent Study: MS Project” in the last semester.

For the comprehensive exam, the student must write a proposal for the M.S. project, which is one of the requirements of BME 6995. The proposal must be evaluated by the 2 faculty project mentors, one of whom will directly supervise the project, and at least one of whom must be a BME faculty member. The student will be evaluated as to whether they have a reasonable plan to complete a project that meets the M.S. standards of scholarship. If failed, one re-examination is permitted. Upon passing, the Successful Completion of Comprehensive Exam form should be submitted.

The completed project must be presented in the form of a poster in a public forum, most typically the Spring BME Student Symposium. A poster presentation at a substantially similar venue may meet this requirement, but an assessment plan must be pre-approved by the BME Graduate Program Director. The student must present the work and discuss it with attendees. The poster presentation must take place at least 1 week before the last class day of the semester in which the student intends to graduate. At least 2 BME faculty members will view the poster, ask questions, and evaluate the poster presentation to assess quality. If unsatisfactory, the student must successfully complete an oral examination on the project, administered by the 2 faculty project mentors and the BME Graduate Program Director.

Coursework Option Comprehensive Exam

The M.S. Coursework students must give a presentation in a public forum, most typically the Spring BME Student Symposium, on how their BME coursework has prepared them for their career goals. A presentation at a substantially similar venue may meet this requirement, but an assessment plan must be pre-approved by the BME Graduate Program Director. The presentation must take place at least 1 week before the last class day of the semester in which the student intends to graduate. The student must present the work and discuss it with attendees. At least 2 BME faculty members will evaluate the presentation to assess quality and ask questions about course content. If the student does not meet this threshold, the Graduate Program Director and the student's advisor will jointly select two or more courses at the level of BME (2xx) 5xxx or above and will provide the student with an oral exam on this course material. The student must complete this exam at the B+ level or better.

Accelerated Master's Program

Qualified UVM undergraduate students who would like to earn a M.S. degree in BME may apply for the program's [Accelerated M.S. Degree Program \(AMP\)](#). This program enables the student to begin working on a master's degree while still an undergraduate student. The basic requirements for admission to and completion of this program are as follows:

- Interested students may apply to the AMP beginning in the first semester of their junior year and are encouraged to apply by April 15th of spring semester of junior year.

- In order to be admitted to the AMP, the student must have a cumulative grade point average of at least 3.2 at the time of application, and they must include a statement indicating which BME graduate program faculty member has agreed to serve as their graduate advisor in the cover letter of their application.
- Upon being admitted into the AMP, the student may take up to 9 credit hours of courses for graduate credit while still an undergraduate. Of these, up to 6 credit hours of (2xx) 5xxx level or higher courses can be counted toward both the B.S. and M.S. degrees, subject to the approval of the student's graduate advisor.
- AMP students are not permitted to count 3xxx or 4xxx level coursework for graduate credit prior to earning their B.S. degree. They can count up to 3 credits of 3xxx or 4xxx level coursework for graduate credit once they have earned their B.S. degree and the MS is their primary curriculum.

All other requirements for the M.S. degree apply, and students must select the Thesis, Project, or Coursework option. AMP students are not typically eligible for GTA or GRA funding. While the AMP M.S. Coursework and Project options are typically completed in one year, the MS Thesis is the same rigorous research pathway as the traditional M.S. Thesis and should be expected to take more than one academic year. Students who pursue the AMP Thesis option may begin work toward their master's thesis as early as the summer following their junior year. All thesis requirements delineated above must be met.

IV. DOCTOR OF PHILOSOPHY IN BIOMEDICAL ENGINEERING

Program of Study

Students will have a primary research advisor from the list of affiliated Biomedical Engineering faculty, and they must form a graduate studies committee by the end of the first year of enrollment. The student's graduate studies committee will be comprised of four regular members of the graduate faculty from both the *College of Engineering and Mathematical Sciences* and the *Larner College of Medicine* and should bridge both experimental and computational expertise. The chair of the graduate studies committee serves as the student's academic advisor and also as the dissertation advisor or supervisor. The committee should be approved by the BME Graduate Director and the Dean of the Graduate College. Committee members external to UVM must be approved by the Graduate College prior to serving. It is the responsibility of the graduate studies committee to supervise the graduate student's program and to review progress at regular intervals. Students must take at least 75 credits in courses and dissertation research including 14 credits of Core Courses, at least 16 credits of Technical Electives, and a minimum of 20 credits of dissertation research. To bolster their background in a particular area and with pre-approval from the Graduate College and the student's advisor, a Ph.D. student may apply up to six credits of (1xx) 2xxx, 3xxx, or 4xxx level coursework to their Ph.D. degree requirements.

Students are required to develop an **Individual Development Plan** (uvm.edu/graduate/resources) annually and discuss it with their primary advisor and graduate studies committee.

Biomedical Engineering Core Courses 14 credits

The core courses required of all Biomedical Engineering Ph.D. students are:

- Domain-Specific Courses (e.g., Adv. Bioeng. Systems, Complex Sys, or Biomaterials) (6 credits)
- Human Physiology (e.g. MPBP 301 (6010) Human Physiology & Pharmacology) (or equivalent) (4 credits)
- Mathematics or Statistics Course (3 credits)
- Research Ethics Course or equivalent (e.g. CEMS 301 (6010) Research Methods, Ethics, and Communication, NSCI 327 (6270) Responsible Conduct in Biomedical Research, P BIO 295 (3990) Ethics in Graduate Research, NFS 362 (6362) Intro to Research Methods) (1+ credit)

Note that students may pursue alternatives to any of the above core courses as befits the goals of their graduate training, but this requires approval from the BME Graduate Director. A student wishing to make a substitution should submit a justification in writing to the BME Graduate Director who will then seek approval from the BME Curriculum Committee and transmit this back to the student. The student should provide the following documentation when submitting their request: current copies of the syllabi of the course they are proposing to replace and its proposed replacement as well as a statement about why the proposed course would be more suitable for their research area. Ethics and rigor in research are paramount and cannot be overstated; advice on equivalent options if listed courses are not available should be sought from the BME Graduate Director.

Technical Electives (at least 16 credits)

Any BHSC, BIOC, BIOL, BME, CEE, CEMS, CHEM, CLBI, CS, CSYS, DPT, EE, EMGT, ENGR, ENSC, EXSC, HLTH, MATH, ME, MLS, MMG, MPBP, NSCI, OT, PATH, PH, PHRM, PHYS, RAD, or STAT course at the 5xxx-level or above. Students may take courses in areas germane to their research that are *not* included on this list with prior approval from their graduate studies committee.

Ph.D. Comprehensive Exam

The comprehensive exam for the Biomedical Engineering Ph.D. is typically taken by the end of a candidate's fourth semester of study and will consist of a written exam and an oral exam. Should the candidate fail the examination, only one reexamination is permitted.

The Written Exam

The written part of the examination will be a report written in the form of a research grant proposal (7-12 pages) and delivered to the student's graduate studies committee at least 2 weeks before the oral exam. The proposal will be based on a research idea in the candidate's dissertation work area and will comprise three Specific Aims. The first two aims will be focused on the area of the candidate's Ph.D. research and will be expected to include some preliminary data and a research plan that is grounded in techniques that the candidate understands well. The third aim will be a "stretch aim" that extends beyond the scope of the candidate's research. In this third aim, the candidate will be expected to exhibit evidence of an ability to generate imaginative and thoughtful hypotheses and to think laterally about how their Ph.D. research area could be developed in a new direction. The candidate should gain the approval of their graduate studies committee regarding the general area of the proposal before beginning work on it.

The report will follow the format of the research plan for an R01 grant submission to the NIH, although it is not expected that as much preliminary data will be included as would be expected for a typical R01. Detailed instructions about R01 proposals can be found at: <https://grants.nih.gov/grants/how-to-apply-application-guide/forms-g/general-forms-g.pdf>. However, for the purposes of the comprehensive exam, the R01 components that must be included in the report are:

- A. Specific Aims (1 page): This gives an overview of the proposal and will typically provide an overarching hypothesis and/or goal, together with a maximum of 3 specific aims that are to be accomplished over a projected 5-year period of research.
- B. Research Strategy (6-12 pages): This section provides a detailed description of the research that will be undertaken, including any figures and tables, and is divided into 3 sections.
 - a) **Significance.** Describe how the proposed research is significant to the field of investigation as well as to bioengineering in general. Give appropriate background as needed to make the case.
 - b) **Innovation.** Explain how the proposed research is novel. The Significance and Innovation sections are typically not more than 1 page together.
 - c) **Approach.** This is the main body of the proposal and provides the preliminary data and experimental design necessary to support each specific aim. The Approach should address the hypothesis(es) and/or goal(s) put forward in the Specific Aims page. Appropriate statistical methods should be described, including calculations to justify sample sizes (i.e., power analysis) for experiments involving replicates.
- C. References (no page limit)

These components must be prepared on 8.5 x 11-inch pages with 0.5-inch margins. The text should be in 11-point Arial font and line spacing set at 12 points. The proposal must deal substantively with both the engineering and the biological aspects of the proposed research. The engineering component will include a description of the project's design, analysis, and/or modeling aspects and must include appropriate attention to mathematical and statistical details. The biological component of the proposal should be hypothesis-driven and will explain the historical context of the project, the biomedical background that is appropriate, and the potential significance of the work. The proposal will also include:

- a) alternative engineering methods that could be used on their biological question of interest (i.e., methods other than those to be used in the dissertation), and
- b) alternative biological systems (other than those in the dissertation project) that could be studied using the engineering methods of the dissertation project.

These latter two aspects of the report will allow the student to demonstrate an ability to generalize both in terms of the application of engineering methods and approaches to biological problem-solving.

The Oral Exam

The oral part of the comprehensive examination will be a formal seminar by the student in front of their graduate studies committee, to take place after the committee members have had a chance to review the written proposal, which should be submitted at least 2 weeks before the oral presentation. The student will be asked to defend the proposal and to answer any additional questions the committee members feel appropriate after the seminar. It is expected that there will be specific questions directly associated with broad engineering and biomedical sciences.

After the oral part of the exam, the committee will meet to discuss both written and verbal components. The committee will then decide if the student can proceed to complete the Ph.D.; if the exam needs to be retaken, or (in the case of repeat failure), the student may be allowed to complete work for a master's degree. If successful, the [Proof of Successful Completion of Comprehensive Exam](#) form must be submitted to the BME Graduate Director and Graduate College.

Dissertation Proposal

Students will present a proposal around the end of the 6th semester (i.e., third year) of study. The proposal will take place in front of the candidate's dissertation committee, and it will be open to UVM students and faculty. Committee membership must meet the Requirements for the Doctor of Philosophy degree stipulations (<https://catalogue.uvm.edu/graduate/degreerequirements/>). The proposal meeting will begin with a statement of the ground rules for the meeting given by the committee chair and a brief introduction from the candidate's supervisor. The candidate will then give a presentation (typically 45 minutes) in which their research progress to date is outlined and plans for the completion of the dissertation are described.

The candidate must prepare a tentative table of contents for the dissertation with a brief paragraph describing what they anticipate will be the subject of each major chapter (including the focus of their literature review) and forward this to the committee at least 1 week prior to the meeting.

The candidate's presentation will be followed by questions from the audience and then questions from the dissertation committee in closed session. The committee will then deliberate in private after which its recommendations will be passed to the candidate. The entire dissertation proposal meeting will take roughly 90 minutes.

The purpose of the dissertation proposal is to satisfy the dissertation committee members that the candidate is on track toward the completion of their dissertation and that the research contained within it will meet the standards of scholarship and originality required for the Ph.D. degree. Note that the purpose of the dissertation proposal is not to conduct an in-depth examination of the candidate's research nor to make significant adjustments to the direction or nature of their research. The BME Graduate Director should be informed of the successful completion of the dissertation proposal.

Dissertation Defense

The Graduate College resources must be carefully utilized during this process; specifically, the Defense Committee Membership form, Intent to Graduate form, and Defense Notice form must be submitted in addition to conducting a format/record check. The Thesis/Dissertation Guidelines and Timetable, which are available on the Graduate College website, must be closely followed.

The dissertation defense examination committee consists of a minimum of 4 members of the graduate faculty. If a student has co-advisors, they count as one defense committee member. At least two graduate faculty members must be from inside the department or program. The chair must be both a member of the

graduate faculty and from outside the candidate's and advisor's department and program. The dissertation defense examination committee must be approved by the Graduate College prior to the defense. The dissertation defense examination committee and the graduate studies committee do not have to be the same.

The defense of a Ph.D. dissertation will take place at the discretion of the candidate and their supervisor at a point when the dissertation is complete and has been distributed (at least 2 weeks prior) to the members of the committee. A Public Notice of the defense is required at least 3 weeks prior to the scheduled defense date in order for the student to defend.

The defense will begin with a statement of the ground rules for the meeting given by the committee chair and a brief introduction from the candidate's supervisor. The candidate will then present their research in about 1 hour. This will be followed by questions from the audience and then questions from the examining committee in a closed session. The committee will then deliberate in private after which its recommendations will be passed to the candidate. The entire dissertation defense will take 2-3 hours. If a student's defense examination performance is not satisfactory, then one reexamination, and one only, is permitted.

V. APPENDIX

Biomedical Engineering Ph.D. Degree Check Sheet

Revised: 02-20-23

Student Name: _____

Committee Membership:

Name	Department	Signature	Date
Chair	_____	_____	_____
Member	_____	_____	_____
Member	_____	_____	_____
External member	_____	_____	_____

Core Courses (14 credits)

The following courses are required. Write the course number, name, and semester taken.

1. Domain-Specific Courses (6 credits): _____
2. Human Physiology (4 credits): _____
3. Math or Statistics Course (3 credits): _____
4. Ethics Course (1 credit) or equivalent: _____

Committee Chair Signature Date

Technical Electives (≥16 credits)

A minimum of 16 credits of approved course work in engineering, math, physics together with anatomy, physiology, biology, biochemistry, biophysics or other approved courses at or above the 200 level as necessary to round out the student's pursuit of graduate level competence in both quantitative methods and biomedical systems. These courses will be decided by the student in consultation with the Studies Committee, and the Committee Chair will sign off when each course is successfully completed.

1. Course: _____
2. Course: _____
3. Course: _____
4. Course: _____
5. Course: _____

Committee Chair Signature Date

Teaching requirement

Complete one of the following:

1. Present at three research seminars at UVM,
2. Give one oral presentation at a scientific conference, or
3. Serve as a GTA for one semester

Advisor Signature Date

Comprehensive Examination

(Typically complete by the end of the 4th semester of study)

Committee Chair Signature Date

Dissertation (≥ 45 credits)

Proposal

(Complete around the end of the 6th semester of study)

Committee Chair Signature Date

Defense

Committee Chair Signature Date

Turn in the completed form to the BME Graduate Director