University of Vermont
Biomedical Engineering Graduate Program
M.S. and Ph.D. Student Handbook

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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 program 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. Examples of possible courses are listed in Table 2 (see Appendix). Students may take courses not included on this list with prior approval from their adviser or the BME Graduate Director. 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) 2xxx, 3xxx, or 4xxx level coursework to their M.S. degree requirements.

Students can choose, in consultation with their graduate advisor, 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 must have a BME designation and at least 6 credits must be at the (3XX) 6000-level.		
BME Courses	≥15 credits of engineering coursework (Prefix BME, EE, ME, CEMS, EGMT, or CE) at the (2XX) 5000-level and above, selected with guidance from faculty advisor.		
Elective Courses Selected from BME or related courses in STEM	≥9 credits	≥12 credits	15 credits; no thesis 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 supervised by BME graduate program faculty member	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*	Receive B+ or better in all BME Courses or pass an oral exam at the B+ level or better on ≥2 BME courses*	Receive B+ or better in all BME Courses or pass an oral exam at the B+ level or better on ≥2 BME courses*
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 and Coursework Option Comprehensive Exam

Any M.S. project and coursework student who demonstrates mastery in the BME core and completes their BME coursework requirements with a grade of B+ or better in all of the courses that meet this requirement, meets the requirements for a comprehensive exam. 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.

Project Poster Presentation

The project topic is selected by the student in consultation with a 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 project must be completed under the supervision of a faculty member, typically spans one to two semesters, and can vary in scope based on a research experience, design project, or data analysis. The 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 with attendees. At least 2 BME faculty members will evaluate the poster and presentation to assess quality. If deemed unsatisfactory, the student must successfully complete an oral examination on the project, administered by the supervising faculty member and one BME graduate faculty.

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 (200) 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 2xxx, 3xxx or 4xxx level coursework toward their M.S. degree requirements.

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 options 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, PBIO 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)

Examples of possible elective courses are listed in Table 2. 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

Table 2. Electives appropriate for BME graduate programs of study

Engineering	***Biosciences and other***
BME/EE 227 (3710) Biomedical Instrumentation	MPBP 310 (6100) Molecular Control of the Cell
BME/EE 229 (3720) Biosignal Decoding	MPBP 330(6300) Biomedical Grantsmanship
BME 240 (3740) Wearable Sensing	BIOC 205 (3005) Biochemistry I
BME 241 (3750) Biomedical Signal Processing	BIOC 206 (3006) Biochemistry II
BME 250 (5150) Nanobiomaterials	BIOC 275 (3075)Adv Biochemistry of Human Disease
BME 396 (6990) Special Topics	BIOC 301 (6001) General Biochemistry I
ME/BME 201 (3410) Biomaterials Engineering	BIOC 302 (6002) General Biochemistry II
ME/BME 204 (5440) Biothermodynamics	BIOC 372 (6072) Cancer Biology
ME/BME 206 (3460) Biomechanics of Human Motion	MMG 211 (3110) Prokaryotic Molecular Genetics
ME/BME 208 (3480) Biomechanics: Tissue Engineering	MMG 222 (3220) Advanced Medical Microbiology
BME 6710 Brain-Computer Interfaces	MMG 223 (3230) Immunology
ME 249 (3530) Computational Fluids Engineering	MMG 231 (3310) Bioinformatics & Data Analysis
ME 252 (5110) Mechanical Behaviors of Materials	MMG 232 (3320) Advanced Bioinformatics
ME 255 (5120) Advanced Engineering Materials	MMG 320 (6200) Cellular Microbiology
ME 257 (3180) Composite Materials	BIOL 261 (3505) Neurobiology
ME 271 (5370) Micro and Nano Systems	BIOL 270 (4265) Speciation and Phylogeny
ME 312 (5410) Advanced Bioengineering Systems	BIOL 271 (3165) Evolution
ME 338 (6120) Advanced Dynamics	CLBI 295(5990)Adult Stem Cells & Regenerative Med
ME 336 (5160) Continuum Mechanics	CLBI 301 (6010) Cell Biology
EE/ME 210 (3320) Control Systems	CLBI 401 (7010) Critical Reading and Analysis
EE 221 (5410) Real Time Control Systems	CLBI 402 (7020) Biomedical Data Analysis
EE 228 (3920) Sensors	PHYS 301 (5125) Mathematical Physics
EE 275 (3530) Digital Signal Processing	PHYS 333 (6700) Biological Physics
CE 201 (4710) Sustainable Eng Materials	HLTH 241 (3410) Exploring Healthcare Systems
CE/ME (5980) 218 Numerical Methods for Engineers	
CE 256 (5560) Biol Proc Water/Wastewater Treatment	
Computational Science and Mathematics	***Statistics***
CS 228 (3280) Human-Computer Interaction	STAT 200 (3000) Med Biostatistics & Epidemiology
CS 253 (3530) QR: Reinforcement Learning	STAT201(3010)StatisticalComputing & Data Analysis
CS 254 (3540) QR: Machine Learning	STAT 3210 Advanced Statistical Methods
CS/CSYS 302 (6020) Modeling Complex Systems	STAT 231 (5310) Experimental Design
CS/CSYS 352 (6520) Evolutionary Computation	STAT 5210 Advanced Stat Methods and Theory
CSYS/CE 395(6990) Applied Artificial Neural Networks	STAT 235 (5350) Categorical Data Analysis
CSYS/STAT/CE 369 (7980) Applied Geostatistics	STAT 241 (3410) Statistical Inference
MATH 237 (3737) Numerical Methods	STAT 251 (5510) Probability Theory
MATH 337 (6737) Numerical Diff Equations	STAT 253 (5530) Applied Time Series & Forecasting
ME 304 (5040) Adv Engineering Analysis I	STAT/CS/CSYS 287 (3870) Data Science I
ME 305 (6040) Adv Engineering Analysis II	
MATH 266(3766) Chaos, Fractals & Dynamical Systems	
MATH 268 (5788) Mathematical Biology & Ecology	
MATH 303 (6713) Complex Networks	

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