

Department of Biomedical Engineering
Graduate Student Handbook - Policies and Procedures

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Table of Contents

| | |
|--|----|
| PREFACE | 4 |
| 1. GENERAL INFORMATION | 5 |
| Introduction | 5 |
| Initial Advisement and Registration..... | 6 |
| 2. GRADUATE PROGRAMS AND DEGREE REQUIREMENTS | 7 |
| Areas of Study and Degree Options | 7 |
| Core Curriculum..... | 7 |
| Master's Program..... | 8 |
| Suggested Programs of Study | 8 |
| Culminating Experience Requirements | 9 |
| Faculty Advisor..... | 11 |
| Important Milestones During Master's Degree..... | 11 |
| Ph.D. Program..... | 13 |
| Ph.D. Program Coursework..... | 13 |
| Ph.D. Advisory Committee..... | 13 |
| Ph.D. Examination Stages..... | 13 |
| Progress Meeting Requirement..... | 15 |
| Annual Progress Report..... | 15 |
| Oral Dissertation Defense..... | 15 |
| Important Milestones During Ph.D. Program..... | 16 |
| 2. SUMMARY OF GENERAL POLICIES FOR BME GRADUATE STUDENT | 17 |
| Residency | 17 |
| Transfer of credits taken at other universities..... | 17 |
| Informal courses (Independent Study, Individual Problems)..... | 17 |
| Graduate credit for undergraduate courses..... | 18 |
| Thesis/Project/Dissertation credits applicable toward degree..... | 18 |
| Course Sharing & Use of Prior Coursework..... | 18 |
| Nonapplicable Credits..... | 19 |

Grading Policy..... 19

Repeating Courses..... 19

Scholastic Standing..... 19

Application to Candidacy..... 20

Degree Conferral Timetable for Receipt of Paperwork 20

Time limits for degree..... 21

Leaves of absence..... 21

Academic Dishonesty 21

Department of Biomedical Engineering

Graduate Student Handbook – Policies and Procedures

Preface

The policies and procedures were adopted by the Faculty of the Department of Biomedical Engineering in 2012. The School of Engineering and Applied Sciences (SEAS) policies and procedures included in this manual were approved by the SEAS faculty in summer 1988 and revised in March 1991 and 2006. The policies and procedures related to graduate study included in this manual are effective for all graduate students entering the Department of Biomedical Engineering after December 1, 2010. The Department reserves the right to modify the procedures and requirements outlined in this manual. Such modifications generally will not be considered as retroactive.

In accordance with federal and state laws, no person in whatever relationship with the State University of New York at Buffalo shall be subject to discrimination on the basis of age, religion or creed, color, disability, national origin, race, ethnicity, sex or sexual orientation, marital or veteran status.

1. General Information

Introduction

The objective of graduate study programs in the Department of Biomedical Engineering (BME) at the University at Buffalo (UB) is to provide students with the intellectual depth and breadth, and appropriate training necessary to pursue productive professional, teaching and research careers in the field of biomedical engineering and to make a larger contribution to society than would be otherwise possible.

This manual is designed as a general reference for students pursuing graduate degrees in the Department and for their faculty advisors. Policies and procedures of the Department, the School of Engineering and Applied Sciences (SEAS) and the Graduate School of the University at Buffalo (UB) are listed. The following sections of the Manual present:

- Graduate programs and degree requirements.
- Summary of general policies of the School of Engineering and Applied Sciences (SEAS).
- Admissions Information
- Distance Learning Information

For additional information, consider the following:

- [Policy Library – The Graduate School](#)
- [Policies for SEAS Graduate Students](#)

The aforementioned booklets contain information and requirements for the various degrees offered by the Department that augments the material presented in this manual. More detailed information can be accessed at the UB Graduate School website www.grad.buffalo.edu.

Students should be aware that departmental programs may specify more rigorous requirements for a degree than those listed in other University or School of Engineering booklets. Therefore, when there appears to be a conflict in requirements as listed in the various booklets, the more rigorous requirements must be satisfied. Students may want to obtain a copy of Student Rules and Regulations—UB Rules & Regulations from the Division of Student Affairs. This booklet deals with university standards, administrative regulations, and student conduct rules.

A student who wishes to petition for waiver from any of the policies and procedures presented in this manual should consult with his or her advisor first and gain approval for the waiver from the Director of Graduate Studies.

Additional information on the University at Buffalo, the School of Engineering and Applied Sciences (SEAS), and the Department of Biomedical Engineering is available in various electronic formats. URL addresses for some of these sites are:

Biomedical Engineering Department <http://engineering.buffalo.edu/biomedical.html>

School of Engineering and Applied Sciences <http://engineering.buffalo.edu/>

Student Life <https://www.buffalo.edu/studentlife/who-we-are/departments.html>

University at Buffalo <http://www.buffalo.edu>

Initial Advisement and Registration

Graduate study is individual in nature and requires frequent interaction of a student with advisors and other faculty. To initiate this important process, each student begins the program with preliminary advisement done by the department. The purpose of preliminary advisement is to: (1) work with the student to decide coursework that should be taken during the first year of graduate study; (2) help with any general questions a student may have about the program, opportunities for research, or funding; and (3) guide the student on the selection process for a permanent advisor. The Biomedical Engineering department and core faculty might be of assistance to provide counsel in non-curricular matters, such as health, housing, and deficiencies in English comprehension, speaking or writing.

Students enrolling for graduate study for the first time are required to attend the department's orientation. All incoming students must attend the Graduate Student Orientation. This orientation typically is held the week before classes start. After orientation, new students will register for their first semester's classes. International students will receive correspondence from the International Student Services Office regarding International Student Orientation and other requirements prior to the start of the semester.

MS students are initially advised by the BME Graduate Director, until they secure a faculty advisor (if they will be completing a Project or Thesis). If the MS student will complete the All-Course option, then their advisor remains as the BME Graduate Director.

PhD students often have their faculty advisor established during their application/admissions process. If they do not, then they will go through the selection process during their first semester of study.

The Faculty Advisor Selection process is outlined in detail later in this handbook.

2. Graduate Programs and Degree Requirements

Areas of Study and Degree Options

The Department of Biomedical Engineering currently offers Master of Science (M.S), Doctor of Philosophy (Ph.D.), and combined Bachelor of Science and Master of Science (BS+MS) degrees in biomedical engineering. Research areas for students within these degree options include: Molecular, Cellular and Tissue Engineering; Biomedical Devices, Sensors, Instrumentation and Diagnostics; Computational Engineering and Modeling; and Medical Imaging and Analysis.

While graduate students typically pursue degree options within one of the above research areas, graduate study and research programs, by nature, are designed to allow for flexibility to meet student interest. Graduate students, working with their advisor, are responsible for developing the program of study that fits their needs and career goals.

For students wishing to enter the graduate program in Biomedical Engineering without sufficient background courses as an undergraduate may be required to take bridge courses to build their core competencies before taking the graduate courses. These may be 300-level and 400-level engineering, biology, chemistry, physics or life sciences courses. Any 300-level or 400-level courses taken as a graduate student will not be counted toward the Graduate degree. This will be determined by discussion with the student's advisor and the department's Director of Graduate Studies.

Core Curriculum

It is the policy of the Department that all Biomedical Engineering graduate students shall participate in the Departmental core program to the extent specified. The courses comprising the core program are selected to ensure that advanced degree recipients from the Department have knowledge in the basic life sciences and mathematics that are the "fundamental language" of biomedical engineering. The only exception to this rule is when a student can demonstrate that he/she has already taken an equivalent course before entering UB. In this case the student should take an alternative course, as specified by the Director of Graduate Studies. The core graduate courses are listed in Table 1.

Table 1. Required Core Graduate Courses

| Course Name | Cr. Hrs |
|---|---------|
| BE 501- Human Biology for Biomedical Engineers | 3 |
| BE 502- Quantitative Analysis in BE | 3 |
| Total | 6 |

In addition, PhD students enrolled in the Biomedical Engineering Graduate program must document successful completion of "Responsible Conduct of Research" (RCR) training. This training requirement may be fulfilled by either taking a formal course OR completing an online course. If a student chooses to take a formal course, the student must enroll in and pass one of the following courses: LAI 648, RPG 504, BMS 514, or RSC 602. Alternatively, students may complete the Collaborative Institutional Training Initiative (CITI) online Responsible Conduct of Research course with an average score of 80% or higher. To do this online course, you will begin by registering here:

<https://about.citiprogram.org/>. Students will need to complete the Biomedical/Clinical Research courses. Once the student has successfully completed the appropriate version of the CITI RCR program with a passing grade of 80% or higher, he/she should save their "Completion Report" from within the CITI program. When it comes time to submit the Application to Candidacy to the BME Academic Coordinator, this Completion Report needs to be included as documentation of successful completion. This RCR requy must be completed during the first year of enrollment in the graduate program.

MS students are encouraged to complete the RCR training depending on consultation with his/her advisor and the department.

Master's Program

The Department's Master of Science (M.S.) program is intended to serve a variety of people and goals. The M.S. program is designed to provide a fundamental/research-oriented program of advanced study for students wishing to enhance their knowledge and understanding within a specialized discipline. Students are prepared either for careers in engineering practice or for further graduate education.

Suggested Programs of Study

Programs of study are outlined for areas of technical expertise within the Department in Tables 1 to 5. For each program, the core requirements are specified as well as suggested electives and other specific requirements.

Table 2. Plan for MS Program

| | Fall Year 1 | Spring Year 1 | Summer Year 1 | Fall Year 2 | Spring Year 2 |
|---------------------------|----------------|---|---------------------------------|-----------------------------|-------------------------|
| THESIS- 12 Months | 12 cr. courses | 6 cr. courses + 3 cr. BE 596/598 + 3 cr. BE 599 | 3 cr. BE 596/598 + 3 cr. BE 599 | - | - |
| THESIS- 16 months | 12 cr. courses | 9 cr. courses + 3 cr. BE 596/598 | 3 cr. BE 599 | 3 cr. BE 599 | - |
| THESIS- 20 months | 12 cr. courses | 6 cr. courses + 6 cr. BE 596/598 | 2 cr. BE 599 | 2 cr. BE 599 | 2 cr. BE 599 |
| PROJECT- 12 months | 12 cr. courses | 6 cr. courses + 6 cr. BE 596/598 | 3 cr. course + 3 cr. BE 597 | - | - |
| PROJECT- 16 months | 12 cr. courses | 6 cr. courses + 6 cr. BE 596/598 | 3 cr. course | 3 cr. BE 597 | - |
| PROJECT- 20 months | 12 cr. courses | 6 cr. courses + 6 cr. BE 596/598 | - | 3 cr. course + 1 cr. BE 597 | 2 cr. BE 597 |
| C. EXAM- 9 months | 15 cr. courses | 9 cr. courses + 6 cr. BE 596/598 + Exam | - | - | - |
| C. EXAM- 16 months | 12 cr. courses | 12 cr. courses | 3 cr. BE 596/598 | 3 cr. BE 596/598 + Exam | - |
| C. EXAM- 20 months | 12 cr. courses | 12 cr. courses | - | 3 cr. BE 596/598 | 3 cr. BE 596/598 + Exam |

As shown in Table 1, all Master's students must complete the Department's core curriculum as part of their 30 semester credits of approved graduate coursework. Additional course work requirements may be specified by individual program areas and faculty advisors. There are three culminating experiences from which to choose from to earn the Master's of Science degree: thesis, project, and comprehensive exam. Students only complete one culminating experience. Courses taken S/U will not count towards a degree, other than research/thesis hours or Individual Problems (BE 598), or any other S/U course explicitly required by the Department. No more than 6 credit hours of informal courses (e.g. Individual Problems) can be applied to toward the M.S. degree course requirements. Table 2 provides a plan for students for the common program durations (9 months, 12 months, 16 months, and 20 months) in each culminating experience option.

Table 3. Master's Degree Culminating Experience Options

| Option | Minimum Credits of Approved Coursework | Culminating Experience | Expected Time to Completion |
|--------------------|--|--|-----------------------------|
| Thesis | 24-27 | 3 to 6 credits MS Research (BE 599) and Thesis Defense | 12 to 20 months |
| Project | 24-27 | 3 credits Engineering Project (BE 597) | 12 to 20 months |
| Comprehensive Exam | 30 | Comprehensive Exam (0 credit hrs) | 9-20 months |

Culminating Experience Requirements

All students must complete a minimum of 30 credits to earn a degree. The degree culminates in one of three options: Comprehensive Exam (all-course option), the Master's Project, or the Master's Thesis. By default, all entering students are advised by the Graduate Program Director and are in the Comprehensive Exam (all course) option. If a student wishes to pursue an MS with Thesis or Project, they must have agreement with the faculty member who is willing to be their advisor, after going through the Faculty Advisor Selection process. When this is the case, approval must be obtained from the Graduate Director. Only students who are in the Project or Thesis options can take BE 597 Engineering Project or BE 599 Master's Research.

Students may change their track from Thesis to Project, and up to 3 Thesis credits taken can count as Project credits. Students cannot change their track from Project to Thesis.

The minimum coursework requirements, culminating experience and projected time requirements for each different master's degree option are shown in Table 3. The expected time to completion are not guarantees but rather are estimates based on each student's experience.

The requirements for the culminating experience options are outlined below:

Thesis

Students pursuing the Thesis option will complete three (3) to six (6) credits of BE 599 Master's Research. The course is taken under the direction of their permanent advisor, and allows them to earn credit for the time spent conducting their research and preparing their thesis. MS Thesis students must complete at least four (4) Biomedical Engineering (BE) lecture courses, including required courses: BE 501 Human Biology for Biomedical Engineers (3 credit hours) and BE 502 Quantitative Analysis in Biomedical Engineering (3 credit hours).

The MS thesis must be successfully defended before the student's MS thesis committee. The Thesis Committee should be selected by the start of the second semester of study, using the Thesis Committee Selection form located on the department website. The MS thesis committee is chaired by the student's permanent advisor and includes at least one additional graduate faculty member. The student's advisor will help to form the committee. Faculty from other departments also may participate on a student's committee but the permanent advisor must be a core or affiliated faculty member of the Biomedical Engineering Department.

Prior to the MS thesis defense, the student in consultation with his/her advisor will prepare a first draft of the thesis. Upon completion of a "reader's copy," the student's committee members will have two weeks to review the document and decide whether revisions are required or if the defense can be scheduled. If revisions are necessary, then additional time will be needed for further review. The thesis must include a cover page listing the student's advisor and committee members, along with spaces for their signatures. Once the thesis is ready for defense, the student is required to send the department their defense information (Title, Abstract, Committee Members, date, time, and location). The defense

will be announced one week prior to the defense. The defense should consist of an oral presentation open to the public of about 30-45 minutes long, with an additional 10 to 15 minutes for general questions. Immediately after the open session the defense will continue with the student's thesis committee only. After the defense, the committee will determine whether the student has successfully defended the thesis or whether additional work is required. After successfully completing a thesis defense, the candidate must submit to the Graduate School an electronic copy of the thesis. In addition, one electronic copy must be submitted to the Department, as well as the M-form. It also is customary for students to provide copies to their committee members.

Project

Students pursuing the Project option will complete three (3) credits of BE 597 Engineering Project. The course is taken under the direction of their permanent advisor, and allows them to earn credit for the time spent conducting their research and preparing their project. MS Project students must complete at least five (5) Biomedical Engineering (BE) lecture courses, including required courses: BE 501 Human Biology for Biomedical Engineers (3 credit hours) and BE 502 Quantitative Analysis in Biomedical Engineering (3 credit hours).

The Master's Project is generally more applied than that for a thesis, with the student often defining a problem and developing a solution for it. The project may be a scholarly undertaking that results in a tangible outcome - a device prototype, a start-up business plan, a technical report, a computer program, - that does not fit neatly within the framework of a traditional scholarly thesis paper. However, the final project should be accompanied by a paper written by the student that introduces, analyzes, and contextualizes the project, and demonstrates the student's familiarity with the relevant literature of the field. The written report must be a minimum of 20 pages using standard formatting. The Project must be approved by the student's permanent advisor, and one additional core Biomedical Engineering faculty member who will serve as the "Project Reader." The Project Reader is selected by the student's permanent advisor after the student's first semester in the program. A copy of the final paper must be submitted to the department after it is approved by both advisors, along with the Project Approval form.

The scope of the project and the format of the work to be done will be decided, in discussion with the student, by the student's permanent advisor. Students are not required by the department to have a committee to oversee their Master's Project, and the department does not require a defense of the project. However, it is at the discretion of individual faculty members to require either or both of these components for the student with whom they are working.

Comprehensive Exam (All-Course)

Students pursuing the Comprehensive Exam option may receive a Master's degree by completing 30 credits of coursework; they are not responsible for conducting any significant research. When a student submits their Application to Candidacy, they will register to take their Comprehensive Exam near the end of the term in which they will graduate. The Comprehensive Exam is only offered once per Fall term and once per Spring term. The exam will be prepared by the core faculties in the Biomedical Engineering department and will draw from all graduate courses offered in the department in the 12 months prior to the exam. Students completing the Comprehensive Exam (All-Course) option must complete at least six (6) Biomedical Engineering (BE) courses, including required courses: BE 501 Human Biology for Biomedical Engineers (3 credit hours) and BE 502 Quantitative Analysis in Biomedical Engineering (3 credit hours). Students are not required to take every graduate course offered by the department, but they should be aware that material in the Comprehensive Exam may cover aspects from any of those courses.

The student will not be responsible for material from informal courses, and courses not offered within the 12 months prior to the exam. Students may take related courses in other SEAS, JSMB, or CAS departments based on their interests and career goals, but the Comprehensive Exam will be based on the coursework within the department. If a student is unsure whether a course outside of the department is related to the degree in Biomedical Engineering, the student should discuss the course with the Graduate Director prior to enrolling. A student may, upon approval of the Director of Graduate Studies, take additional courses- outside of the required six BE courses – that are not BE courses and apply

them toward their degree requirements. Any courses to be taken outside of the Biomedical Engineering department must be requested using the Outside BME Course Approval Form found on the BME website- <https://engineering.buffalo.edu/bme/education/master-program/graduate-forms.html>

The Comprehensive Exam is a pass/fail exam. If a student does not pass the exam the first time, the student will be allowed to retake the exam once at the immediate subsequent offering. A student who fails both offerings of the exam will not be allowed to continue in the Graduate Program and will not earn their MS degree in Biomedical Engineering. A passing grade will be awarded for a student who achieves total average score of 70% or better and a score of at least 50% on each question answered. All students can request to review their graded exam(s) for up to one year after it is taken; the examination may only be viewed in the Biomedical Engineering offices, and the student may neither make nor keep a copy of their examination. A student who registers for and does not show up for the Comprehensive Exam will be receive a failing grade; exceptions may be made for extraordinary circumstances at the discretion of the Graduate Director.

In the semester that a student finishes the 30 credits of coursework, they are eligible to register for the Comprehensive Exam. The exact date and time of the exam will be set a minimum of 6 weeks in advance. Students may choose to take the exam in the semester in which they finish their 30 credits of coursework or in the immediate subsequent semester. While delaying the examination will allow the student additional time to prepare for the exam, delaying will result in additional tuition fees for any credit hours registered in each semester as students are required to be registered for at least 1 credit in every semester until graduation.

Faculty Advisor

Students who are interested in completing a Master's Thesis or Project, or completing the PhD program, should secure a faculty advisor before the start of the second semester of study. During the first semester of study, students should meet with Graduate faculty members of the Biomedical Engineering department to discuss possible research interests. Master's and PhD advisors should be Biomedical Engineering department faculty, or Biomedical Engineering adjunct faculty members. Graduate faculty outside of the Biomedical Engineering department cannot serve as major advisors for Biomedical Engineering graduate students. A student may choose a permanent faculty advisor as soon as the student and prospective advisor agree. To secure the advisor assignment, students must complete the "Faculty Advisor Agreement" form and obtain their advisors' signature. This form should be submitted to the department before the start of the second semester of study. Once the department has been informed of the advisor/student agreement, the student is required to consult with their permanent advisor to plan their coursework and/or research for each remaining semester, along with the preparation of the Application to Candidacy and for other forms that must be submitted. The permanent advisor provides guidance and helps direct the student's thesis or project. For students completing a thesis, the thesis committee is chaired by the student's permanent advisor. For students completing a project, the project requirements and approval are set by the student's permanent advisor. Students completing their degree requirements by taking the Comprehensive Exam (all-course option) will be advised, as necessary, by the Graduate Director, and still must submit the Faculty Advisor Agreement form.

Important Milestones During Master's Degree

As depicted in Table 4, the student, in consultation with his/her advisor, is required to achieve appropriate milestones as he/she progresses through the program. The targets shown in Table 4 are meant to be general guidance and it is the responsibility of the student to meet the timelines appropriate for their situation. When necessary, an advisor may counsel a student to review academic goals, alter a course of study, or terminate studies at the University.

In addition to the completion of coursework and the culminating experience, there are three important items that must be completed by the student: the Application to Candidacy, the M-Form (Matriculation), Project Approval Form, and any required Exit Surveys (SEAS, BME, the Graduate School). The procedures for the Application to Candidacy are provided in

Section 3 of this manual. When all requirements for graduation have been completed, students must submit a completed M-form to the Department.

Upon completion of all requirements, students are required to complete an Exit Survey administered by the department, and possibly the School of Engineering and Applied Sciences. Data collected in these surveys are used to evaluate program strengths and areas needing improvement, employment benchmarking, and student evaluation of their graduate experiences at UB.

Table 4. Milestones During Master’s Program

| Student Action | Frequency | Process |
|---|---|---|
| Initial Course Registration | First semester of program | Select courses with guidance from Graduate Director and Academic Coordinator during orientation |
| Selection of Faculty Advisor | Before start of second semester of study | Meet individually with at least 3 BME faculty members (core or affiliated) to discuss research interests. Complete Faculty Advisor Selection/Agreement Form and submit to BME office |
| Culminating Experience Choice | While meeting with faculty during the faculty selection process (first semester of study) | By completing the Faculty Advisor Selection/Agreement Form, this will allow students the chance to indicate whether they are completing a Thesis, Project, or Exam. |
| Continuing Registration | Every semester after the first, until graduation | Meet with assigned advisor to select appropriate coursework for Thesis/Project; Exam students may seek guidance from Graduate Director. (If applicable) Submit Individual Problems form, Graduate Internship Proposal & Request to Enroll (BE 597/599/699) form to SEAS Force Registration website. |
| Application to Candidacy (ATC) & Apply for Graduation on HUB | When one or two semesters of study remain | Complete Application to Candidacy Form, obtain signatures, and submit to BME Academic Coordinator. Apply for Graduation via HUB Student Center. |
| Revisions to Application to Candidacy | Any time you change information listed on your ATC | Complete Petition to Change Expected Conferral Date / Amend ATC Form, submit to BME Academic Coordinator |
| Acceptance of Culminating Experience | At end of program | <p>Thesis: After defense submit electronic copy of thesis to graduate school, advisor and committee signs M-form, submit M-form & electronic copy of Thesis to BME Academic Coordinator</p> <p>Project: Submit finished project to advisor as specified, advisor/reader signs Project Approval Form; submit Project Approval form & electronic copy of Project to BME Academic Coordinator</p> <p>Exam: Register for exam at start of final semester, take exam at end of final semester, if successfully passed then BME department approves this milestone in HUB.</p> |

Ph.D. Program

The Ph.D. degree provides an opportunity for students to pursue a program of research in a specialized area and to develop a dissertation that embodies the results of original research and gives evidence of high level independent scholarship. The procedures for satisfying the requirements for the Ph.D. degree in Biomedical Engineering are:

- Successful completion of an approved program of graduate coursework
- Passing the Preliminary Examination
- Passing the PhD Qualifying Examination
- Providing annual updates via the Annual Review Report
- Fulfilling the Progress Meeting Requirement
- Defense and approval of the PhD dissertation

Ph.D. Program Coursework

An approved program of coursework must contain a well-defined area of study and must be approved by the student's Ph.D. advisement committee and the Graduate School. The program of coursework should be formulated by the student and his/her advisor in the first or second semester after admission to the Ph.D. program. The Ph.D. program consists of a minimum of 72 credit hours beyond the Bachelor's degree. Ph.D. students must complete at least four (4) Biomedical Engineering (BE) lecture courses, including required courses: BE 501 Human Biology for Biomedical Engineers (3 credit hours) and BE 502 Quantitative Analysis in Biomedical Engineering (3 credit hours).

Please see **Transfer of Credits Taken at Other Universities**, and **Course Sharing & Use of Prior Coursework** in Section 3 for more information on coursework. Core curriculum requirements, as specified in Table 1, must be satisfied assuming that these courses (or the equivalent) were not taken as part of a Master's program. Ph.D. students will not receive credit for repeating courses taken earlier for the M.S. degree at UB or other institutions. Formal approval of a student's program is obtained through filing the Application to Candidacy as described in Section 3 of this document.

Ph.D. Advisory Committee

Students pursuing the Ph.D. are guided by a dissertation advisory committee. This committee is arranged to oversee all degree requirements for the student, and has the responsibility of evaluating and approving the student's program of coursework as well as advising the Ph.D. dissertation. The committee must be composed of one major advisor who must be core or affiliated faculty member of the Biomedical Engineering department, and at least two additional faculty members who hold the rank of assistant professor or higher in the University Graduate Faculty. Note that Associate Members of the Graduate Faculty may not serve on doctoral committees as one of the three required core committee members, but may serve as additional committee members. The advisory committee must be selected by the end of the second semester of study.

Ph.D. Examination Stages

Each student desiring to be admitted to formal candidacy for the Ph.D. degree will be required to take the two-part examination process conducted by the department.

Part I. Preliminary Examination: This exam is the first step along the path to the Ph.D. The intent of this exam is to evaluate if the student has the ability to formulate a research problem, to state hypotheses or outline design objectives, to propose a research plan using feasible design, experiment and analysis techniques to either test those hypotheses or achieve the design objectives, and to interpret data (if any). It is to be completed after within 12 months after the student enters the PhD program.

For this examination, the student must meet with their advisor to select a research topic, prepare a written research plan and give an oral presentation (30-40 min) on this topic. Format and content of this research plan should be decided

by the faculty advisor and/or PhD committee members. Typically, the research plan includes the background of the research project, the hypotheses, the preliminary results (if any, not required) and the studies to be performed in the following years. The student is strongly recommended to seek general guidance about the format and content of the research plan expected from the advisor and/or PhD committee members, but the preparation of the research plan and the oral presentation must be completed without input from anyone. Students will be given a minimum of one month to prepare their written document and oral presentation. An electronic or hard copy of the written document must be submitted to the committee members at least 1 week prior to the oral presentation.

The oral presentation should be approximately 30 minutes in length and cover, at a minimum, Background on the topic, Hypotheses, Research completed so far (if any, preliminary results are not required), and Research to be completed. Following the presentation, the student will appear for an oral exam by the committee.

Based on the written research plan, the oral presentation, and the oral exam, the committee will decide whether the student passes or needs to redo the exam or fails. Failure means the student is dismissed from the PhD program and can continue to pursue a MS degree, if they desire. The Examination Committee should report the results of the examination to the student and to the Director of Graduate Studies upon completion of deliberations. The results of the examination must be included on the original [BME Preliminary Examination Form](#). The completed and signed form must be submitted to the BME Academic Coordinator within two business days of the completion of the presentation. Upon acceptance of the proposal and signing of the BME Preliminary Examination Form, the student has completed this stage.

Upon passing the Preliminary Exam, the student should fill out and submit the [Application to Candidacy](#) for the PhD degree.

Part II. Qualifying Examination: The Qualifying Exam (QE) is the second step along the path to the PhD. This is to be completed within 12 months of completing the Preliminary Exam. The intent of the qualifying exam is to evaluate student's overall progress and potential for graduate research as well as their ability to develop an organized research, to conduct research with proper planning and to demonstrate their potential to achieve the research goals.

For this examination, the student must prepare a written research proposal and give an oral presentation on this topic. Format and content of this research proposal should be decided by the faculty advisor and/or PhD committee members. Typically, the research proposal is in the form of a grant application (e.g. NIH F31 Individual Predoctoral Fellows format). The research proposal includes two parts: (1) specific aims and (2) research strategy. The specific aims (1 page) state concisely the background, the hypotheses, and the aims of the proposed research. The research strategy (6-12 pages) states in details the significance, the hypotheses, the preliminary results (required), the innovation and the approaches of the research project. The research proposal can be developed based on the research plan submitted in Preliminary Exam. A [template for the research proposal](#) is provided in "[Information for Current Students](#)" section on the BME website. The student is strongly encouraged to seek guidance about the format and content of the research proposal expected from the advisor and/or PhD committee members. The preparation of the research proposal and the oral presentation must be completed without input from anyone. Students will be given a minimum of one month to prepare their written document and presentation. An electronic or hard copy of the written proposal must be submitted to the committee members at least 1 week prior to the oral presentation.

The oral presentation should be 30-45 minutes in length and cover, at a minimum, Background on the topic (significance, innovation, hypotheses), Research completed so far (preliminary results), and Research to be completed (approaches). Following the presentation, the student will appear for an oral exam by the committee.

Based on the written research proposal, the oral presentation and the oral exam, the committee will decide if the student passes or needs to redo or fails the exam. Pass means the student has completed the exam. Fail means the

student is dismissed from the PhD program. The student must turn in a completed and signed [QE Form](#) to the BME graduate office.

Upon satisfactory completion of the qualifying examination, the PhD Dissertation Committee will assume responsibility for directing the dissertation work that will be carried out under the guidance of the candidate's major advisor. The dissertation must be original and must represent a significant contribution to the state of knowledge in the candidate's area of concentration.

A graduate student is officially considered to be a student for the PhD degree only upon successful completion of the departmental PhD qualifying examination.

Progress Meeting Requirement: After successful completion of the Qualifying Exam and before the dissertation defense, PhD students must arrange a Progress Meeting with their PhD advisor/committee members. The Progress Meeting must be completed at least 6 months before the dissertation defense. During the meeting, students will provide the [Progress Meeting Form](#) to the committee. The completed Progress Meeting Form must be submitted to the Academic Coordinator. Students will be unable to defend their dissertation if the Progress Meeting requirement has not been met.

Annual Review Report: The student must meet at least annually (during Summer typically) with their advisor and/or committee to create and update a checklist of what must be completed before the student can defend his/her dissertation. The results of the progress report meeting must be submitted to the BME Academic Coordinator by August 1st each year they are enrolled in the program. These progress reports ensure that the student is making progress toward their degree and are intended to help the student and faculty advisor. The Annual Progress Report is located on the Graduate Forms page of the department's website: <https://engineering.buffalo.edu/bme/education/doctoral-program/graduate-forms.html>

Oral Dissertation Defense: The final academic requirement to be satisfied by a candidate is the oral Ph.D. defense of his/her dissertation. Thus, the defense must consist of three components—presentation by the candidate, open session for questioning by the audience and committee members, and a closed session for more questions by the committee members and any faculty attending the defense. Passing this examination indicates that the Ph.D. committee is satisfied that the student possesses a true understanding of the material related to and contained in his or her dissertation. The results of the defense are Pass, Fail or Redo. Pass can (and normally does) require edits to the written document with no further presentation needed. Fail means the student has failed the defense and is dismissed from the program without a Ph.D. degree. Redo means the student must significantly edit the dissertation document, including possibly redoing experiments, and schedule a second dissertation defense. Only one redo is allowed.

A draft of the completed dissertation must be submitted to the committee at least 28 days prior to the defense date to provide ample time to read the document. Students must work with their advisor to schedule their defense and coordinate this with the Biomedical Engineering Academic Coordinator. One week prior to the defense date, the Academic Coordinator will contact the student for their Title, Abstract, Committee Members, and to confirm the date/time/location for the defense. General announcements for the Ph.D. dissertation defense will be sent to the department faculty and students.

Upon passing the defense, the student must submit a signed Multipurpose Report for Graduate Degree Completion Form, also known as the "M-Form," to the BME Academic Coordinator. The candidate must also submit a digital copy of the dissertation and two online Doctoral Exit Surveys to the Graduate School, and complete the BME Department Exit Survey online. Moreover, the student must submit to the department one electronic copy of the dissertation. A cover page must be included in the copy, listing the Ph.D. advisor and committee members, with spaces for their signatures.

Important Milestones During Ph.D. Program

As depicted in Table 5, the Ph.D. student, in consultation with their advisor, is required to achieve appropriate milestones as he/she progresses through their program. The targets shown in Table 5 are meant to be general guidance and it is the responsibility of the student to meet the timelines appropriate for their situation. When necessary, an advisor may counsel a student to review academic goals, alter a course of study, or terminate studies at the University.

In addition to the completion of coursework, there are three important forms that must be completed by the student: the Application to Candidacy, the M-Form (Matriculation), and the Exit Surveys. The procedures for the Application to Candidacy are provided in Section 3.0 of this manual. When all requirements for the Ph.D. degree have been completed, students must submit a completed M-form to the Department. The M-form provides information on dates for completion of Ph.D. requirements and must be signed by the student's advisor, committee members, and the Department's Director of Graduate Studies or the Chair. The original signed M-form will be submitted by the BME Academic Coordinator to the Graduate School. The student is responsible for submitting other materials (dissertation, exams) to the Graduate School by the published dates for degree conferral. Upon completion of all requirements, students are required to complete an Exit Survey administered by the BME Department, and the School of Engineering. Data collected in these surveys are used to evaluate program strengths and areas needing improvement, employment benchmarking, and student evaluation of their graduate experiences at UB.

Table 5. Milestones During the Ph.D. Program

| Student Action | Frequency | Process |
|---------------------------------------|--|--|
| Initial Course Registration | First semester of program | Meet with preliminary advisor to map out courses and register for first semester. |
| Continuing Registration | Every semester after the first, until graduation | Meet with assigned advisor to select appropriate coursework. (If applicable) Submit Request to Enroll (BE 699) Individual Problems form, and Internship Proposal form to SEAS Force Registration site. |
| Selection of Permanent Advisor | Before the second semester of study | Students should meet with Departmental faculty to identify a permanent advisor who will guide dissertation (if not already determined during admissions process). Once advisor is established, student should complete the Faculty Advisor Agreement form and submit to the BME Academic Coordinator |
| Preliminary Exam | After first 12 months in program | Must have committee established, and a GPA \geq 3.0 to complete this exam. Completion means passing of the exam. Form must be submitted. |
| Application to Candidacy | As soon as possible after passing the Ph.D. Preliminary Exam | Fill out Application to Candidacy (ATC) Form and meet with advisor. Student, advisor and committee members will sign, then give form to BME Graduate Academic Coordinator for further signatures. Most changes to the ATC form can be done with a Graduate Student Petition Form. |
| Qualifying Exam | After ATC is filed, within 12 months of completed the Preliminary Exam | Written proposal and oral presentation required. QE Form must be submitted upon completion. |
| Annual Review Reports | At least once annually (during Summer) | Meet with dissertation committee to draft and/or update progress checklist. Completed reports should be emailed to the BME Academic Coordinator, who will then get the Graduate Director signature. |
| Progress Meeting Requirement | After successful completion of the Qualifying Exam and at least 6 months before the dissertation defense | Students meet with advisor/committee members to complete the Progress Meeting Form |
| Dissertation and Defense | At end of program. | Write and defend dissertation. Written document submitted to committee at least 1 month before defense. Coordinate defense arrangements with BME department. Announcements will be made to the faculty and graduate students. Electronically submit dissertation, 2 PhD Surveys, M-form. |
| Submission of M-form | After you have completed and defended dissertation | Have advisor and committee members sign M- form, then give to BME Graduate Academic Coordinator. Submit electronic dissertation with M-form. All Ph.D. students must fill out the Graduate School exit surveys in order to graduate. In addition, the BME Department Exit Survey is required. |

3. Summary of General Policies for Biomedical Engineering Graduate Students

The following are summaries of SEAS and BME policies, and are applicable to all graduate students in the Department.

Residency

- a) M.S. degree programs require a 24 credit-hour residency requirement at UB.
- b) Ph.D. degree programs require a minimum residency requirement of the equivalent of two complete academic years of full-time study at UB. This includes two semesters of continuous full-time study not already applied to the master's degree.
- c) Students must maintain continuous registration until all degree requirements have been fulfilled. If such registration should be impossible, they must secure a leave of absence.

Transfer of Credits Taken at Other Universities

- Transfer Credits Petition form, official transcripts, and course descriptions of courses intending to transfer are required to be submitted within the student's first year of study.
- Only courses applicable to the engineering degree are acceptable as transfer credit, and the Department must approve all transfer credits.
- Only those graduate courses completed with grades of "B" or better are eligible for consideration as transfer credit. However, the grade of the transferred course will not be counted towards the student's grade point average at UB.

Toward MS:

A maximum of 6 credit hours of graduate coursework may be applied toward the minimum 30 credit hour requirement. The other 24 credits must be unique to the BME MS program.

Toward PhD:

A maximum of 30 graduate transfer credits (this normally comes from a master's degree) may be applied toward the 72 minimum credit hour requirement for the Ph.D. degree— within this 30, only 6 credit hours of thesis or project can be transferred. Accordingly, at least 42 credits must be unique to the BME PhD program of which 18 credits will be course credits. No more than 12 credit hours of informal courses (e.g., Individual Problems, Seminars) can be applied toward the PhD requirements. Note that this includes any informal courses taken as part of the Master's program – e.g. if a student took 6 credit hours of informal courses as part of their MS degree and applied these toward their PhD, the student could take at most 6 more credit hours of informal courses during their PhD.

Note: Transfer of credits beyond the 30 credit limit but up to maximum of 36 credits (according to the Graduate School policy i.e. up to 50% (36 credit hours) of the PhD may be comprised of courses used to complete another degree program at UB or at another institution. Accordingly a minimum of 50% (36 credit hours) must be unique to the BME PhD program) can be considered only under special conditions i.e. these additional 1-6 credit hours can only be applied to the PhD degree if the credits are closely related to your PhD studies and only be approved by the Department after critical evaluation of credits.

Informal Courses (Individual Problems; Internships)

- a) Informal courses usually includes Individual Problems, which is taught on an informal basis and does not have a formal catalog description. Graduate Internships are also considered Informal coursework. These courses require a

complete narrative description which includes the signatures of the student, instructor/supervisor, and the Director of Graduate Studies/Coordinating Instructor.

b) A maximum of 6 credit hours of informal course work may be applied toward the minimum 30 credit hour requirement for the Master's degree.

c) Excluding those credits applied towards the Master's degree, a maximum of 6 additional credit hours of informal course work may be applied towards the minimum 72 credit hour requirements for the Ph.D. degree. No more than 12 credit hours of Informal coursework can be applied toward the 72 credit hour requirement for the Ph.D. degree.

Graduate Credit for Undergraduate Courses

a) A student wishing to use an undergraduate course for graduate credit must submit a petition during the first week of classes to the Graduate School for approval. This petition must include a clear statement from the instructor of the course regarding what special additional work will be required of the student to qualify for graduate credit. Copies of these petitions must be included in the Application to Candidacy. Retroactive approval will not be granted. Remedial courses, taken to make up deficiencies in a student's undergraduate background, will not be considered for graduate credit.

b) Only courses at the 400 level will be considered for graduate credit, and a maximum of two such courses may be applied toward a graduate degree. This maximum limit applies to the entire Master's and Ph.D. program.

c) Undergraduate courses that carry 4 or more credit hours will receive a maximum of 3 graduate credit hours.

Thesis/Project/Dissertation Credits Applicable Toward Degree

The following limits are imposed on thesis, project, and dissertation credits that are applicable toward graduate degree requirements:

a) M.S. degree with thesis: 3 to 6 credit hours for thesis.

b) M.S. degree with project: 3 credit hours for project.

c) Ph.D. degree: Between 12 and 30 credit hours for dissertation must be applied toward the 72 credit hour requirement for the Ph.D. degree. The student is required to plan the actual number of credits for the doctoral dissertation with his or her advisor. Please see Course Sharing & Use of Prior Coursework for more details on coursework.

Course Sharing & Use of Prior Coursework

MS: A minimum of 24 credit hours must be unique to the BME MS program.

PhD: A maximum of 30 credit hours (from a master's degree) can be credited towards the PhD- within this 30, only 6 credit hours of thesis or project can be credited. Accordingly, at least 42 credits must be unique to the BME PhD program of which 18 credits will be course credits. No more than 12 credit hours of informal courses (e.g., Individual Problems) can be applied toward the PhD requirements. Note that this includes any informal courses taken as part of the Master's program – e.g. if a student took 6 credit hours of informal courses as part of their MS degree and applied these toward their PhD, the student could take at most 6 more credit hours of informal courses during their PhD.

Note: Transfer of credits beyond the 30 credit limit but up to maximum of 36 credits (according to the Graduate School policy i.e. up to 50% (36 credit hours) of the PhD may be comprised of courses used to complete another degree program at UB or at another institution. Accordingly a minimum of 50% (36 credit hours) must be unique to the BME PhD program) can be considered only under special conditions i.e. these additional 1-6 credit hours can only be applied to the PhD degree if the credits are closely related to your PhD studies and only be approved by the Department after critical evaluation of credits.

Non-applicable Credits

Credits in the following courses are not applicable towards the minimum requirements for Master's and Ph.D. degree programs:

- a) English Language Courses.
- b) Any course not approved by the academic advisor.
- c) Remedial courses taken to fulfill department admission requirements.

Grading Policy

- a) The grade of "S/U" will be used for Thesis, Project and Dissertations, per UB Policy.
- b) All other grades in courses applicable to the degree must be letter grades ("A," "B", "C", "D").
- c) The grade of "I" automatically changes to "U" if not removed within two semesters, including the intervening summer, as established by the academic calendar. "J" grades (invalid grade) must be changed to letter grades within one semester or they will revert to "F." The student is responsible for the removal of temporary grades such as "I" or "J" within the allowed time period.

Repeating Courses

Graduate school policies on repeating courses are followed by the department, except where indicated. These policies are included below for reference, but please visit this site for up- to-date information:

<https://www.buffalo.edu/grad/succeed/current-students/policy-library.html>

Graduate School policy states "If a graduate student repeats a course that is normally not 'repeatable' ('repeatable' courses include dissertation, research, thesis, project or portfolio guidance; independent study; directed readings, etc.), only the highest grade earned in the course will be counted toward the degree and used to calculate the grade point average associated with the graduate degree program requirements. However, the student's official transcript will record all courses attempted (including repeated courses). All resulting grades earned are calculated in the GPA reflected on the student's final official transcript."

SEAS uniform policies place the additional stipulation that at most two such repeat attempts can be made for courses other than normally "repeatable" courses. This limit can be met in two different ways — by repeating the same course twice or by repeating two separate courses once each. In addition, there is a limit of four courses on which a student can receive an "R" grade.

Scholastic Standing

- a) A Master's student admitted on a provisional basis must demonstrate his or her ability to perform satisfactorily at the graduate level before being admitted to degree program as a matriculated student. The Department will specify the conditions in the letter of admission offering provisional status. A grade point average of 3.0 is required in all remedial courses.
- b) A graduate student is officially considered to be a student for the Ph.D. degree only upon successful completion of the departmental Ph.D. qualifying examination.
- c) A graduate student must earn an average of at least 3.0 for all courses taken for graduate credit which could be applied toward the degree. Accordingly, graduate course work in excess of that applied toward the credit requirement for the degree will be included in the computation of the student's GPA.

d) Satisfactory progress requires a minimum cumulative GPA of at least 3.0. A student is placed on probation if his or her GPA falls below 3.0 at the end of any grading period.

e) The following will constitute grounds for dismissal if:

- a grade of "F" is earned in any course that could be applied towards the degree;
- more than two grades are obtained from among "C," "D," and "U" in courses which could be applied to the degree;
- the conditions of provisional admission have not been satisfied within one semester after admission;
- probationary status has not been removed after one semester;
- the cumulative grade point average for courses which could be applied to the degree falls to below 2.5 at the end of any grading period; or,
- the student is found guilty of academic dishonesty according to existing regulations.

A student who has been officially dismissed and who seeks reinstatement must submit a formal request for appeal, along with a supporting statement of explanation, to the Chair and Graduate Director of the Department. The request shall be reviewed according to the Policies and Procedures of the UB Graduate School.

Application to Candidacy

The primary purpose of the Application to Candidacy (ATC) is to serve as a useful planning document for the student and the student's committee, as well as to indicate to the Graduate School the student's intended degree date. As such, it is important for the student to prepare and submit the Application to Candidacy at an early stage of his or her candidacy, preferably by the end of the 2nd semester of study at UB for an M.S. student, and immediately after completion of the preliminary exam for a Ph.D. student. The Application to Candidacy includes a summary of courses that are yet to be applied toward the degree. The following additional points should be noted with regard to the Application to Candidacy:

a) The Application to Candidacy must be accompanied with a transcript of all coursework listed on the application, and for PhD students – proof of completion of the Responsible Conduct of Research (RCR) requirement.

b) Major revisions which are necessary in the Application to Candidacy (e.g., significant change in topic or abstract, adding and/or deleting more than two courses, changing major advisor, etc.) must be accomplished by resubmitting the Application to Candidacy to the Graduate School for approval by the divisional committee.

c) Minor changes (e.g., adding and/or deleting one or two courses, changing thesis titles, changing committee members other than the major advisor, etc.) may be made using the Petition to Change Expected Conferral Date/Amend ATC form found on the Graduate School website: <https://www.buffalo.edu/grad/succeed/current-students/forms.html>

d) The Application to Candidacy for the Ph.D. degree must be filed within one year of passing the Ph.D. qualifying examination. Later filings may delay the student's graduation.

e) All Applications to Candidacy must be submitted at least six months prior to the expected degree conferral date.

f) An approved Application to Candidacy must be on file before a student may submit a Certification of Full- Time Status Form.

Degree Conferral Timetable for Receipt of Paperwork

It is the responsibility of the student to submit the proper paperwork on time to both the Department and the Graduate School and in all other respects satisfy the general requirements for a degree as specified on the Graduate School Policy library page: <https://www.buffalo.edu/grad/succeed/current-students/policy-library.html>. Each graduate student must

become familiar with these University regulations. The Degree Conferral Timetable for Receipt of Paperwork is summarized online at <https://www.buffalo.edu/grad/succeed/graduate/requirements.html>. Note that before the M-form or Project Approval form will be signed by the BME Director of Graduate Studies, an electronic copy of the project report or thesis must be submitted to the Academic Coordinator.

Time Limits for Degree

a) M.S. - Four years from the first registration date in the graduate program, excluding approved leaves of absence. (For part-time students, the time limit is six years from the first registration date in the graduate program, excluding approved leaves of absence.)

b) Ph.D. - Seven years from the first registration date in the program, excluding approved leaves of absence.

A petition for an extension of time limit requires departmental and SEAS approval through the Director of Graduate Studies. The student must be currently making active progress towards the degree. The petition will be presented to the SEAS divisional committee for approval before being submitted to the Graduate School. The petition must clearly delineate reasons for the extension, present a schedule for progress and set a deadline for completion of the program. The extension of time limit is normally granted for a maximum period of one year.

Leaves of Absence

a) A petition for leave of absence should be filed prior to the start of the semester in which the leave is to begin. b) Leaves of absence will normally be granted for only one year at a time.

c) Leaves of more than one semester require valid justification and documentation from the student and the student's advisor. Documented cases of financial hardship, illness, or compulsory military service constitute valid justification.

d) A student who leaves the program after completion of some graduate work but has not been given an approved leave of absence must reapply and be readmitted as a new student, according to University guidelines.

e) Continued leaves of absence beyond two years will not be granted.

Academic Dishonesty

Academic integrity is at the heart of all academic pursuits. Academic dishonesty includes, but is not limited to, the following:

a) Previously submitted work. Submitting academically required material that has been previously submitted - in whole or in substantial part -- in another course, without prior and expressed consent of the instructor.

b) Plagiarism. Copying or receiving material from any source and submitting that material as one's own, without acknowledging and citing the particular debts to the source (quotations, paraphrases, basic ideas), or in any other manner representing the work of another as one's own.

c) Cheating. Soliciting and/or receiving information from, or providing information to, another student or any other unauthorized source (including electronic sources such as cellular phones and PDAs), with the intent to deceive while completing an examination or individual assignment.

d) Falsification of academic materials. Fabricating laboratory materials, notes, reports, or any forms of computer data; forging an instructor's name or initials; resubmitting an examination or assignment for reevaluation which has been altered without the instructor's authorization; or submitting a report, paper, materials, computer data, or examination (or any considerable part thereof) prepared by any person other than the student responsible for the assignment.

e) Misrepresentation of documents. Forgery, alteration, or misuse of any University or official document, record, or instrument of identification.

f) Confidential academic materials. Procurement, distribution or acceptance of examinations or laboratory results without prior and expressed consent of the instructor.

g) Selling academic assignments. No person shall sell or offer for sale to any person enrolled at the University at Buffalo any academic assignment, or any inappropriate assistance in the preparation, research, or writing of any assignment, which the seller knows, or has reason to believe, is intended for submission in fulfillment of any course or academic program requirement.

h) Purchasing academic assignments. No person shall purchase an academic assignment intended for submission in fulfillment of any course or academic program requirement.

Students and/or faculty who identify infractions of academic integrity should follow the University guidelines for resolving these issues. These guidelines may be found at: <https://www.buffalo.edu/grad/succeed/current-students/policy-library.html>