MICHIGAN STATE UNIVERSITY

College of Engineering

BIOMEDICAL ENGINEERING

Graduate Studies Handbook

Spring 2022

Contents

BIOMEDICAL ENGINEERING
GRADUATE HANDBOOK

DEPARTMENT OF
BIOMEDICAL ENGINEEERING
MICHIGAN STATE
UNIVERSITY

I. OVERVIEW OF THE GRADUATE PROGRAM IN BME

A. The Ph.D. Program

The Ph.D. program in BME at Michigan State University is designed to provide sufficient experience in the performance of original research in a supervised setting to produce graduates who can carry out research independently and who can judge worthwhile research in a field. Such students have been a partner in the advancement of knowledge and can be expected to have a deep understanding of that extraordinarily important human activity. As a by-product, the training received is essential for a career in higher education and is required for many research positions in industry or government.

Performance of original research in BME requires substantial background knowledge in Engineering and in related scientific disciplines such as mathematics, physics, and biology. Therefore, the Ph.D. program in BME at MSU includes course work in addition to that normally expected in the typical 4-year bachelor's degree course program in an Engineering discipline. The program also includes examination procedures to ensure that sufficient background is available to carry out the intended research. These procedures include oral examinations of descriptions of previous work and a proposal for future research.

An essential component of original research is communication of the results of the research to the scientific community and to the world at large. Therefore, the Ph.D. program in BME at MSU includes requirements for the writing of a dissertation that is a detailed description of the research performed and for the presentation of one or more manuscripts suitable for publication in refereed scientific journals.

B. The M.S. Programs

The "Plan A" M.S. program in BME is designed to strengthen the knowledge and research competence of students entering after completion of the equivalent of the typical 4-year bachelor's degree in an Engineering discipline. The program may include written examinations in graduate courses and presentations demonstrating sufficient background to engage successfully in original research. In addition to the written examinations, a final public oral presentation and committee-based oral examination is designed to test the student's understanding of the research performed. A written thesis is required to communicate the results of the research to the scientific community.

The "Plan B" coursework M.S. program in BME is a course-heavy program that is designed to strengthen the knowledge base of students who have completed the equivalent of the typical 4-year bachelor's degree in an engineering discipline. Courses are selected to improve understanding in the areas of weakness and to increase knowledge in the areas of interest of the student.

Ph.D. Program Requirements Time Line for Students Entering Fall 2021

Item#	Year#	Term No.	Term	Requirement	Description
1	1	1	FS21	I-9 Form	Complete electronic I-9 form with Graduate Office (no I-9: no pay!).
2	1	1	FS21	Social Security Number	Provide Graduate Office with Social Security Number.
3	1	1	FS21	MSU-ID	Go to 190 International Center to get your MSU-ID.
4	1	1	FS21	Orientation Program	Sign Attendance Sheet. Attendance is required for the entire week, so please plan accordingly.
5	1	1	FS21	Integrity Form	Read the Guidelines for Integrity in Research information and return signed acknowledgment form to the Graduate Office.
6	1	1	FS21	Online RCR Modules	Complete the 4 Responsible Conduct of Research (RCR) Program CITI online modules. *https://ora.msu.edu/CITI-RCR-registration*
7	1	1	FS21	RCR Workshops	Register for RCR Program workshops. All 6 sessions must be completed to receive the Graduate School Certificate in RCR. *https://grad.msu.edu/rcr*
8	1	1	FS21	Building Access	Present your MSU ID to Graduate Office so they can set up Building Access for your ID-card.
9	1	1	FS21	EHS Safety Certification	Certification required: training/certification is on last day of Orientation. Otherwise, contact EHS.
10a	1	1	FS21	RVSM Training	Complete mandatory, online training on Relationship Violence and Sexual Misconduct (RVSM). Find at https://ora.msu.edu/train/index.html
10b	1	1	FS21	DEI Foundations	Complete online training Diversity, Equity, Inclusion (DEI) Foundations. Find at https://ora.msu.edu/train/index.html
11	1	1	FS21	Enroll	If on Graduate Assistantship (TA or RA), 3 to 9 credits; if on fellowship, check with Graduate Office. Meet with an advisor during Orientation Week to determine your courses.
12	1	1	FS21	Rotations	Set up at least 2, but no more than 3, rotations with potential faculty advisors. When you have these settled, inform the graduate coordinator.
13	1	1	FS21	Choose Advisor	Following the completion of your rotations, turn in "Research Advisor Selection" form to Graduate Office by Friday before Thanksgiving (end of November).
14	1	2	SS22	Enroll	If on Graduate Assistantship (TA or RA), 3 to 9 credits; if on fellowship, check with Graduate Office.
15	1	2	SS22	Guidance Committee Selection	In consultation with your PI, assemble Guidance Committee at the start of second semester. Student will be informed of approval of the composition of the committee by the Associate Chair of the Graduate Program.
16	1	2	SS22	GradPlan – your official degree plan	Select Guidance Committee members, marking advisor as "Chair". "Save" your plan. Students will meet with Grad Coordinator after passing Comprehensive Exams to finish.
17	1	3	US22	Enroll	Graduate Assistantship, 3 to 4 credits; fellowship, check with Graduate Office; Student Payroll for summer, enroll for Fall but not for Summer. Consult with Grad Office.
18	2	4	FS22	Enroll	If on a Graduate Assistantship (TA or RA), 3 to 9 credits; if on a fellowship, check with Graduate Office.
19	2	4	FS22	Online RCR Modules	Complete 3 additional RCR CITI online modules. *https://ora.msu.edu/CITI-RCR- registration*
20	2	4	FS22	1st GC Meeting	Meeting to occur by . Objective is to assemble GC, evaluate courses taken and performance and to give a brief synopsis of research that is likely to be presented and defended at the comprehensive exam.
21	2	5	SS23	Enroll	If on a Graduate Assistantship (TA or RA), 3 to 9 credits; if on a fellowship, check with Graduate Office.

Item#	Year#	Term No.	Term	Requirement	Description
22	2	5	SS23	Comprehensive Exams (written and oral)/Final Draft of GC Report	Oral exam in Spring of second year, with written document due to GC two weeks prior. Student will defend document, progress to date, and future plans. Prepare final draft of the Report of the Guidance Committee for GC to review at oral exam meeting
23	2	5	SS23	Report of Guidance Committee/GradPlan	Upon passing Comprehensive Exam, schedule a meeting with the graduate coordinator to review, complete and submit your GradPlan. The Report of the GC will be signed by committee members, and, as part of GradPlan, will serve as your official degree program until graduation.
24	2	5	SS23	Degree Program Change	If student fails one or both components of Comprehensive Exam, their guidance committee may recommend moving them to MS program. See graduate coordinator for appropriate paperwork/steps in this situation.
25	2	5	SS23	RCR completion of modules and workshops	Responsible Conduct of Research workshops and all online modules should be completed by the end of 2nd year.
26	2	6	US23	Enroll	Graduate Assistantship, 3 to 4 credits; fellowship, check with Graduate Office; Student Payroll, enroll for Fall but not for Summer. Student is only required to enroll in 1 credit after passing Comprehensive Exams, though 24 research credits are necessary to fulfill PhD requirement for graduation.
27	3	7	FS23	RCR Refresher	Complete annual RCR refresher training as necessary.
28	3	7	FS23	Enroll	See Line 26 above.
29	3	8	SS24	Enroll	See Line 26 above.
30	3	9	US24	Enroll	See Line 26 above.
31	4	10	FS24	Enroll	See Line 26 above.
32	4	11	SS25	Enroll	See Line 26 above.
33	4	13	US25	Enroll	See Line 26 above.
34	5	13	FS25	Enroll	See Line 26 above.
35	5	14	SS26	Enroll	See Line 26 above.
36	5	15	US26	Enroll	See Line 26 above.
37	5	15	US26	Apply for Graduation	See graduate coordinator after consultation with PI.
38	5	15	US26	Check Graduate School Rules/Deadlines	The Graduate School has formatting rules for dissertations, and deadlines for graduating this term.
39	5	15	US26	Distribute Unbound Dissertation	Submit 2 weeks before defense: form for Distribution of Unbound copy of Dissertation/ Thesis to Graduate Coordinator.
40	5	15	US26	Defense Announcement	Submit the Defense Announcement to the Graduate Coordinator, which will include the date/ time/location.
41	5	15	US26	Final Defense	Public presentation and oral examination by GC.
42	5	15	US26	Approval Form	Have your advisor sign your Approval Form for Theses/Dissertation and Institutional Review Board/IACUC Approval. Form can be found on MSU Graduate School website.
43	5	15	US26	Dissertation Approval by Graduate School	Submit Dissertation/Thesis and above Approval Form to the Graduate School for approval before semester deadline to receive degree certification that semester.
44	5	15	US26	Order hard-bound copies of Dissertation	BME Graduate Office requires 1 copy. Your Advisor should also get a copy.
45	5	15	US26	Check-Out form	Submit Check-Out Form to Graduate Coordinator: must have before processing degree; requires many signatures; forms are on IQ website.
46	5	15	US26	Final Certification for Degree	To be processed once hardbound copy of dissertation received, along with Check-Out Form.

II. DEGREE REQUIREMENTS

A. Ph.D. Degree

Introduction

The Ph.D. Program in BME at MSU has a number of components that are described in this section.

1. Admission

The intent of the admission procedure is to admit only those students whose background and performance in undergraduate work is sufficient to ensure that they can complete the Ph.D. requirements at MSU in an acceptable time period. Students with course deficiencies may be admitted if warranted by an otherwise excellent academic record.

a) Admission Requirements

Each application for admission to the Ph.D. program is considered individually by the members of the Admissions Committee. It is expected that incoming students will have some combination of: a) a Bachelor's or Master's degree in an engineering discipline b) at least 2 semesters of Calculus c) at least 2 semesters of a complimentary course in the physical, life, or computer sciences.

b) Removing Undergraduate Deficiencies

If International students are found by the English Language Center (ELC) to have deficiencies in the English language, they may be required to take ELC courses in their first year at MSU. It is expected that they remove these deficiencies by the end of the first semester.

Other undergraduate deficiencies will be identified and discussed by the PI and the student's guidance committee, in consultation with the Associate Chairperson for the Graduate Program

c) Dual Major Degree

Students who wish to get their Ph.D. in BME and at the same time get a Ph.D. or M.S. degree in another department need to make the Graduate Coordinator and the Associate Chair of the Graduate Program aware prior to the first guidance committee meeting. The BME department must send a request for approval of the dual degree to the Dean of the Graduate School. The Guidance Committee Report must clearly define the course requirements for both degrees.

All dual major Doctoral degrees must be approved by the Dean of the Graduate School and the Graduate Programs in both units involved. A request for the dual major degree must be submitted within one semester following its development and within the first two years of the student's enrollment at Michigan State University. A copy of the Guidance Committee Report must be attached. See Academic Programs (*https://reg.msu.edu/academicprograms/Text. aspx?Section=111#s407*) for details.

2. Placement Exams

Placement exams are not administered to incoming BME graduate students. However, as described above, student admission may be contingent upon certain collateral courses ensuring proper preparation for ensuing required program courses.

3. Coursework

All graduate students MUST meet the University Residency Requirement to qualify for graduation. In order to meet this requirement, a Ph.D. degree student must be enrolled for a minimum of six credits for two consecutive semesters. The optimum time for meeting this requirement is in the student's first and second semester in the BME Graduate Program.

In order to further prepare for independent research, an individual program of coursework is prescribed for

each student. The required courses include a semester course on "research design, methods, and ethics" (BME 803), two semesters of BioDesign (BME 840 and 841) and 1 semester of seminar (BME 892), totaling 10 credits. The remaining 12 credits taken to meet the required 22 credits should be chosen in discussion with PI and/or guidance committee. Students must take at least one 3-course with emphasis in each of the following: life sciences, statistics/math/computer science, and engineering, as outlined below. One additional course is an elective that is chosen by the student in consultation with their PI or guidance committee The department maintains a list of recommended courses. While at least 22 credits are required, additional courses are encouraged to enrich studies.

a) Course Requirements

All graduate students are expected to take:

i. Any designated undergraduate courses required to remedy an admission deficiency.

ii. The BME core courses, which include (1) BME 803 (3 credits), (2) BME 840 (3 credits), (3) BME 841 (3 credits) and BME 892 (1 credit).

iii. The BME required elective credits. The BME coursework program requires that students take at least one 3-credit course in each of the following areas (1) engineering, (2) life sciences, (3) statistics/math/computer science.

iv. The BME elective credits. Each student, in consultation with their PI or perhaps their assembled guidance committee, will select at least one 3-credit elective course at the 800 level or above from the list of approved courses.

b) Enrolling for Research Credits

Ph.D. Students may enroll for BME 999, for which a deferred grade is automatically assigned by the Registrar's Office. The deferred grades in BME 999 are changed to "pass" at the time of graduation. **All doctoral students must accrue a minimum of 24, but no more than 36 credits of BME 999!**

Requests for overrides to exceed the maximum of 36 must be directed to the Office of the Registrar. To do so, access the "Request for RNR Override" at the Registrar's Online Forms Menu at *https://www.reg.msu.edu/Forms/FormsMenu.aspx*. Select the RNR override form and fill in the requested information. Should the total number of credits go above 45, the Registrar will confer with the Graduate School before considering the request for an override.

c) A Typical Course Schedule – Enrollment Ideas

A typical schedule for the first two years for a graduate student who is admitted in the Fall Semester with no deficiencies in undergraduate courses or English language is as follows:

YEAR #1

FALL

BME 892, 1 credit
BME 803, 3 credits
BME 841, 3 credits

SPRING

BME 842, 3 credits
Graduate Course, 3 credits as directed by PI
BME 999, 3 credits

SUMMER

BME 999, 1 or 4 credits (if necessary, depending on the source of support)

YEAR #2

FALL

Graduate Course, 3 credits as directed by PI/Guidance Committee
Graduate Course, 3 credits as directed by PI/Guidance Committee
BME 999, 3 credits

SPRING

Graduate Course, 3 credits as directed by PI/Guidance Committee
BME 999, 6 credits

SUMMER

BME 999, 1 or 4 credits (if necessary, depending on the source of support)

Students who are admitted with undergraduate course or English language deficiencies must adjust their schedules accordingly.

YEAR #3 AND BEYOND

Course and Research credits to be determined in consultation with your PI. Reminders: 24 research (999) credits needed for Ph.D. certification. Please contact your PI, graduate coordinator, or Associate Chair for the Graduate Program with any enrollment questions.

Be aware of enrollment deadlines for each semester, as late fees are assessed by the Registrar's Office. This information can be found at: *www.reg.msu.edu/ROInfo/Calendar/academic.aspx*.

d) Deferred Grades (ET)

The required work must be completed and a grade reported within two semesters after the term of enrollment with the option of a single six-month extension. If the required work is not completed within the time limit, the ET will be changed to U-Unfinished on the transcript even if the work is eventually completed. The University strictly enforces this policy, so it is best to avoid ET grade status if possible. This rule does not apply to graduate thesis or dissertation work (BME 999).

e) Minimum Grade Point Average

The University considers the maintenance of a 3.00 cumulative GPA as an academic standard for Doctoral Programs. Graduate assistantships are available only to graduate students who are actively pursuing graduate degree programs and who are making satisfactory progress toward their degree, including maintaining at least a 3.00 GPA. If a graduate student in BME accumulates grades below 3.0 in more than three courses, (s)he is removed from candidacy for the degree by the University and moved to non-degree status. Students with non-degree status are ineligible for TA or RA appointments.

f) In-State Tuition Rate/Fellowships

Receipt of externally funded fellowships by students who have written their own grant applications and worth at least $20,000 (direct costs) now makes the students eligible for in-state tuition rate. The in-state tuition rate applies only to the semesters during which the student is supported by the fellowship. This policy applies only to grants funded through a competitive process by a US institution/agency/foundation. Funds obtained through non-competitive processes (e.g., need-based fellowships) or from international sources do not qualify the students for in-state tuition rates. For more information contact Melissa Del Rio (*mdelrio@msu.edu*) at the Graduate School.

g) Full Time Status

Full time status for doctoral students is defined as a minimum of 1 credit for those students who:

1) Have successfully completed all comprehensive examinations and are actively engaged in dissertation research (BME Graduate Students should continue to enroll for more than one credit until they

attain the 24 credits of BME 999 (Ph.D. Research Credits) required by MSU to graduate.

2) Are doing department-approved off-campus fieldwork related to preparation of their dissertation.
3) Additional coursework beyond the 1 credit may be needed based on fellowship requirements, VISA requirements (consult https://oiss.isp.msu.edu/), or based on requests from the PI or guidance committee, etc.

4. Teaching

A major component of graduate education involves service to our undergraduate or graduate courses as teaching assistants. This is not a requirement in the BME program, but if students are interested, they should let their PI know early on in their development. Furthermore, MSU candidates for TA appointments who were required to demonstrate English proficiency as a condition for regular admission to Michigan State University must also demonstrate that they meet a minimum standard of proficiency in spoken English before they can be assigned teaching work that involves oral communication with undergraduate students.

Those international teaching assistants (ITAs) may meet this requirement in one of the following ways:

- Presenting a TOEFL iBT speaking section score of 27 or higher.
- Receiving a score of 50 or higher on the MSU Speaking Test
- Taking AAE 451 or AAE 452 (ITA language support courses) and receiving a score of 50 or higher on the ITA Oral Interaction Test (ITAOI).

Those ITAs who received a waiver of the TOEFL or of other accepted tests of English proficiency for admission, must also meet the requirement of proficiency in spoken English before they are assigned to teaching work that involves oral communication with undergraduate students. To meet this requirement, those ITAs may use any of three options listed above. Individual exceptions from these requirements (on a case-by-case basis in rare circumstances) will be considered by the Graduate School in consultation with the ELC upon the request of the department and with the endorsement of the Associate Dean of the College.

TA assignments are not made by the BME Associate Chair of the Graduate Program nor the Chair of BME or the Graduate Coordinator. Notification of TA assignments are sent by e-mail to the Teaching Assistants as well as by a letter in which the TA can decline or accept the position being offered to them (please refer to Article 11 of the MSU and the Graduate Employee Union contract located at the following URL: *http://grad.msu.edu*). The current MSU-GEU contract for TAs, effective 2019-2023, is available online at (*https://hr.msu.edu/contracts/documents/geu- 2019-2023.pdf*). Due to unforeseen developments, a TA assignment may change after the initial assignment has been made and the TA will be informed of this change.

Students in their first year are appointed as Level 1 TAs, unless they have sufficient documented TA experience, or a Master's Degree. Students appointed as TAs in their second year are Level 2 TAs, and once they have completed their Comprehensive Examinations, they are appointed as Level 3 TAs. If there is a question relating to appointment level, the GEU contract should be consulted.

At the end of the semester, the instructor for each course is asked to complete an evaluation of the Teaching Assistants assigned to their course. TAs receive a copy of this evaluation. Teaching Assistants are also evaluated by the students in the recitation or lab sections they are assigned to. The student evaluations are a requirement of the University and are distributed to the TAs prior to the last week of classes for the students to complete. These evaluations are returned to the Teaching Assistant after the Registrar's Office has entered the data into their records.

As a Teaching Assistant you are not allowed to act as a paid tutor for a student in the course you are assigned to. Such behavior would constitute a conflict of interest because you are being paid by the Department to provide office hours and direct contact support (recitation, lab, etc.) to students for that course. You may act as a paid tutor for any BME course to which you are not assigned as a TA in any given

semester.

5. Student, Advisor, and Guidance Committee: Steps, Roles, Expectations

Research, which is the essential component of the Ph.D. degree, is carried out under the supervision of a Research Advisor, who also serves as the Chairperson of the student's Guidance Committee. The Guidance Committee consists of the Research Advisor and three (or more) additional faculty. The Guidance Committee administers the Comprehensive Examinations and the Dissertation Defense and reads and approves the Dissertation. Details concerning the Guidance Committee are provided below.

a) Choice of Research Advisor

All first year graduate students must choose a research advisor by the end of their first semester in the program after performing at least 2, but preferably 3 rotations with potential advisors. After these rotations, the student will submit the Advisor Selection Form to the Graduate Office, thereby providing a list of their top 3 choices for Advisor. Advisor assignments will be announced within a week after the deadline for submission (Friday before USA Thanksgiving, typically).

Research advisors for BME graduate students must be either: BME Faculty with 20% or greater appointments, or BME faculty with 0-20% appointments who are currently vested in the department. The definition of vested faculty is outlined in a BME policy document.

b) Selection of Guidance Committee

In conjunction with the PI, the student will form a Guidance Committee by the end of their second semester. The Guidance Committee, of which the research advisor is Chairperson, is composed of at least four MSU faculty members. Faculty from other Departments are allowed when the dissertation research is allied with other disciplines. The Chairperson of the Guidance Committee must be a member of the regular faculty of the BME Department or be recognized as jointly-appointed faculty who are allowed to be advisors for BME graduate students. Additional faculty members beyond the minimum of four may be invited to join the Guidance Committee. One member of the Guidance Committee will serve as the second critical reader of the dissertation, and this Second Reader will Chair the Comprehensive Examination meeting. If the research advisor has a 0% BME appointment, the second reader must be a regular faculty member with a BME appointment above 10%. At least 2 members of the Guidance Committee must have appointments (0% or higher) in BME. The procedure for the approval of non-regular MSU faculty, academic specialists, and external members to serve on graduate student guidance committees *https://grad.msu.edu/non-regular-faculty-committees/* is as follows: The proposed guidance committee member will need to send a letter/e-mail indicating a commitment to serve for the guidance committee. Graduate students meet with their Guidance Committees at least three times; at their First Committee Meeting, their Comprehensive Examinations, and their Dissertation Defense. Other meetings of the Committee may be called at any time by the Student, Committee member(s), or the Associate Chair for the Graduate Program. The Associate Chair of the Graduate Program has final approval of all Guidance Committees.

Additionally, students must log into GradPlan - *gradplan.msu.edu* - and enter their assigned committee members, marking their Advisor as "Chair". GradPlan should then be "saved" and will be re-visited when student passes their Comprehensive Examinations.

c) Guidelines for Graduate Student Advising and Mentoring Relationships

Graduate education, research, and creative activities take place within a community of scholars where constructive relationships between graduate students and their advisors and mentors are essential for the promotion of excellence in graduate education and for adherence to the highest standards of scholarship, ethics, and professional integrity. The effective advising and mentoring of graduate students is the joint responsibility of the graduate degree-granting and program units (henceforth referred to as academic units), the faculty advisors, and the students. The following guidelines are intended to foster faculty-graduate

student relationships that are characterized by honesty, courtesy, and professionalism and that provide students with intellectual support and guidance. These guidelines recognize that good advising and mentoring of graduate students entail a considerable commitment of time and effort on the part of the faculty and the academic unit. The academic unit forms the community of scholars responsible for cultivating a stimulating intellectual environment and, through the joint efforts of all faculty members of the unit, for mentoring of graduate students.

The responsibilities of the academic unit include:

i. Preparing and maintaining a graduate handbook that includes the information outlined in the Graduate Handbook Template (*http://grad.msu.edu/handbooktemplate/*), as well as academic unit and college requirements for degree completion

ii. Providing opportunities for graduate students to interact with a wide array of colleagues from within and outside the University through such activities as speaker series, colloquia, and other formal and informal events

iii. Creating opportunities for graduate students to become familiar with the various forms of scholarship in the field

iv. Sharing responsibility with guidance committees and faculty advisors in fostering the professional and career development of graduate students, for example, by providing venues for honing professional writing and presentation skills and organizing seminars or courses on such issues as ethics, professional integrity and grantsmanship

The responsibilities of the chair or director of the academic unit and/or associate chair of graduate studies include:

i. Knowing University and academic unit rules, procedures and policies applicable to graduate study, research, and creative activities, including those in Academic Programs (*http:// www.reg.msu.edu/AcademicPrograms/*), Graduate Student Rights and Responsibilities (*http://grad.msu.edu/gsrr/*), or Medical Student Rights and Responsibilities *(http:// splife.studentlife.msu.edu/medical-student-rights-and- responsibilites-mssr*), and Academic Freedom for Students at Michigan State University (*http://splife.studentlife.msu. edu/academic-freedom-for-students-at-michigan-state- university*) and ensuring that they are followed in the academic unit

ii. Distributing to incoming graduate students the academic unit's Graduate Handbook

iii. Organizing orientation sessions for incoming graduate students

iv. Ensuring that required courses and examinations are scheduled on a regular basis, thereby enabling graduate students to make timely progress in their degree programs

v. Providing advice on matters such as course selection until a permanent faculty advisor and guidance committee are selected, or appointing a committee or temporary advisor to assume that role

vi. Facilitating selection of a faculty advisor and guidance committee and facilitating changes of faculty advisor and/ or guidance committee should this become necessary

vii. Monitoring at least annually the progress of students in the graduate program and the quality of their research or creative activity, as well as the standards and fairness of examinations

viii. Monitoring the performance of faculty advisors and guidance committees to ensure that graduate students are receiving appropriate mentoring

ix. Working toward fair resolution of conflicts between graduate students and faculty

The responsibilities of the faculty advisor include:

i. Ensuring that graduate students receive information about requirements and policies of the

graduate program

ii. Advising graduate students on developing a program plan, including appropriate course work, research or creative activity, and on available resources

iii. Advising graduate students on the selection of a thesis or dissertation topic with realistic prospects for successful completion within an appropriate time frame and on the formation of a guidance committee

iv. Providing training and oversight in creative activities, research rigor, theoretical and technical aspects of the thesis or dissertation research, and in professional integrity

v. Encouraging graduate students to read the literature and cutting-edge ideas in the field

vi. Helping graduate students to develop professional skills in writing reports, papers, and grant proposals, making professional presentations, establishing professional networks, interviewing, and evaluating manuscripts and papers

vii. Providing regular feedback on the progress of graduate students toward degree completion, including feedback on research or creative activities, course work, and teaching, and constructive criticism if the progress does not meet expectations

viii. Helping graduate students develop into successful professionals and colleagues, including encouraging students to participate and disseminate results of research or creative activities in the appropriate scholarly or public forums

ix. Facilitating career development, including advising graduate students on appropriate job and career options, as well as on the preparation of application materials for appropriate fellowship, scholarship, and other relevant opportunities

x. Writing letters of reference for appropriate fellowship, scholarship, award, and job opportunities

xi. Providing for supervision and advising of graduate students when the faculty advisor is on leave or extended absence

The responsibilities of the guidance committee include:

i. Advising graduate students on course work, research, or creative activities

ii. Providing at least annually feedback and guidance concerning progress toward the degree

iii. Administering exams in a fair and professional manner

iv. Reviewing the thesis or dissertation in a timely, constructive and critical manner

The responsibilities of the graduate student include:

i. Learning and adhering to University and academic unit rules, procedures, and policies applicable to graduate study and research or creative activities, including those outlined in Academic Programs (*http://www.reg.msu. edu/AcademicPrograms/*), Graduate Student Rights and Responsibilities (*http://grad.msu.edu/gsrr/*), or Medical Student Rights and Responsibilities (*http://splife.studentlife. msu.edu/medical-student-rights-and-responsibilites-mssr*), and Academic Freedom for Students at Michigan State University (*http://splife.studentlife.msu.edu/academic- freedom-for-students-at-michigan-state-university*)

ii. All TAs and RAs must complete the on-line training about the Relationship Violence and Sexual Misconduct Policy. To access the training, log in to ORA training website at:

https://ora.msu.edu/ train/. Click "Register", complete registration, and "launch" to begin the Relationship Violence and Sexual Misconduct (RVSM) Policy – Faculty, Staff Training. (If it indicated that you have already registered, use "In Progress Training", then "launch".) You will want to reserve approximately 30 minutes to complete all assignments. If you need assistance, contact the Help Desk at 517-884-4600 or train@ora.msu.edu.

iii. Meeting University and academic unit requirements for degree completion

iv. Forming a guidance committee that meets University and departmental requirements as well as requirements that are outlined in the Graduate Handbook of the academic unit

v. Following disciplinary and scholarly codes of ethics in course work, thesis or dissertation research, and in creative activities

vi. Practicing uncompromising honesty and integrity according to University and federal guidelines in collecting and maintaining data

vii. Seeking regulatory approval for research in the early stages of thesis or dissertation work where applicable

viii. Keeping the faculty advisor and guidance committee apprised on a regular basis of the progress toward completion of the thesis or dissertation

RESOURCES

"*Adviser, Teacher, Role Model, Friend: On Being a Mentor to Students in Science and Engineering*", National Academy Press, Washington, D.C., 1997, 84 pp (*http://www.nap.edu/ catalog.php?record_id=5789*).

"*Integrity in Scientific Research: Creating an Environment that Promotes Responsible Conduct*", National Academies Press, Washington, D.C., 2002, 216 pp (*http://www.nap.edu/ books/0309084792/html/*).

"*On Becoming a Scientist: Responsible Conduct in Research*", Third Edition, National Academy Press, Washington, D.C., 2009, 63 pp (*http://www.nap.edu/catalog.php?record_ id=12192*).

"*On the Right Track: A Manual for Research Mentors*", M.F. King; D.D. Denecke (Ed.), Council of Graduate Schools, Washington, D.C., 2003, 26 pp.

d) First Guidance Committee Meeting

No later than October 15th of year two, each graduate student must meet with his/her Guidance Committee. The student will present progress to date (in classes and research), and present their anticipated thesis project to the Guidance Committee. The purpose of the meeting is to review student progress and establish expectations for the Comprehensive Exams. It is important for the Guidance Committee to keep in mind that this is not a graded examination, although they may ask questions of the student. Critical evaluation provided by the Guidance Committee is intended to serve as a guide in preparation for the Comprehensive Exams. This meeting can have four possible outcomes:

i. Student continues in the Program and prepares for Comprehensive Exams;

ii. Student addresses any deficiencies then prepares for Comprehensive Exams;

iii. Student is moved to the M.S. Program (Plan A or Plan B);

iv. Immediate dismissal from the Program.

e) Comprehensive Examinations

The Comprehensive Examinations shall be conducted in the Spring semester of the second year of study and consist of two parts: an oral examination and a written document based on the current NIH R21 proposal format. The purposes of both the oral and written components of this exam are to evaluate the candidate's knowledge of the field and relevant literature, their research progress to date, and their potential

to develop into independent scientists. These parts should evaluate the student's preparedness and ability to continue to the Ph.D.. The written document will be submitted to the Guidance Committee two weeks prior to the oral exam. The oral exam will be conducted in a closed session (only student and guidance committee present). During the oral exam, the Second Reader will chair the exam and the advisor will remain in the exam but silent unless information is requested by the other Guidance Committee members. At this meeting, the Report of the Guidance Committee is finalized.

The written document and the oral examination will be evaluated separately. Both the oral examination and the written document can be determined by the Guidance Committee at the time of the oral examination to be of sufficient quality to satisfy the comprehensive examination requirement. If either the oral or written portion of the exam are deemed insufficient, critical commentary will be provided to the student in writing by the Guidance Committee following the conclusion of the oral exam, and the student may be required to address the issues raised at a subsequent meeting, to be determined by the Guidance Committee, but to occur no later than the end of the fall semester of the third year.

The Comprehensive Examination meeting has four possible outcomes, determined by the student's Guidance Committee:

i. Student passes both the oral and written component and is moved into Ph.D. candidacy.

ii. Student fails the written component of the comprehensive examination but passes the oral component. The student is given 4 weeks from the date of the oral comprehensive examination to make modifications to the document. Re-evaluation by the Guidance Committee occurs within 2 weeks of the student turning in the revision. If the written component receives a passing grade, the student is moved to the Ph.D. program. If the written component is still deemed unacceptable, the student is moved to M.S, Plan A program and must defend the M.S. degree with a written dissertation and oral examination. If the student passes both components of the M.S. Plan A degree, the student may seek re-admittance to the Ph.D. program utilizing the Master's degree as a substitute for successful completion of the comprehensive examination. If the student defends the M.S. Plan A dissertation after a failed comprehensive examination, the exam must be completed by the 6th semester in the program.

iii. Student fails the oral component of the comprehensive examination but passes the written component. The student is moved to M.S, Plan A program and must defend the M.S. degree with a written dissertation and oral examination. If the student passes both components of the M.S. Plan A degree, the student may seek re-admittance to the Ph.D. program utilizing the Master's degree as a substitute for successful completion of the comprehensive examination. If the student defends the M.S. Plan A dissertation after a failed comprehensive examination, the exam must be completed by the 6th semester in the program.

iv. Students who fail one or both components have the option to move to the M.S. Plan B program, finishing as soon as possible.

6. Graduate Student Reporting Requirements

All graduate students in the MSU College of Engineering are required to submit an annual report each year once they have completed at least 9 credits as a graduate student. As part of this report, students will report their progress during the previous year, review their academic and professional goals, and communicate with their adviser(s) about their plans and progress toward degree completion. Students who do not complete the annual reporting process will have a hold placed on their accounts. Details at https://www.egr.msu.edu/graduate/graduate-student-annual-reporting-requirements

In addition, students must use the university-wide system to create and store their Ph.D. Degree Plans and subsequent graduate program activities. Any changes to a student's plan must be submitted and approved through this system available at https://student.msu.edu.

7. Responsible Conduct of Research (RCR) Plan

Training in the Responsible Conduct of Research is essential in the preparation of future scholars and professionals. An understanding of the issues concerning the conduct of research in an increasingly complex world has become critical in successfully navigating the research landscape. To help prepare Michigan State University graduate students for their future scholarly work, a plan for providing the foundation of responsible conduct has been developed in coordination with the Graduate School, the Vice President for Research and Graduate Studies Office, and college associate deans for graduate education. The plan is predicated on the principles that a basic understanding of issues is necessary through didactic training and a periodic reinforcement of the principles through discussion. It is the belief that this plan will provide a foundation for all graduate students as well as others pursuing a career in research and will offer the basic information to meet most, if not all, federal agency granting requirements.

a) Students who are supported by NSF, NIH, or USDA grants may be required to complete additional specific training; they must meet the timeline and content requirements of training for that grant.

b) Students engaged in research involving human subjects or animal use must complete the Michigan State University training modules for those subjects.

c) Students should use the ABILITY information management system at *http://ora.msu. edu/train/* to complete their on-line RCR training. This is the system that must be used for proper documentation of training. This system has replaced SABA effective December 2018.The plan below represents a combination of departmental and university-level requirements and is effective for all BME graduate students whose enrollment began Fall of 2016 and beyond. Those students who began before this point have the same requirements minus the online modules.**At Orientation:** Introduction to RCR — All new students will be introduced Responsible Conduct of Research during the graduate student orientation week prior to the start of the fall semester. Because students have not joined research groups, the presentation is general and is based on a document called "Guidelines for Integrity in Research and Creative Activities. The students will sign an Acknowledgment Statement at the end of the session that is kept in their student file.

ALL GRADUATE PROFESSIONAL, MASTER'S (plan A & B) and DOCTORAL STUDENTS:

d) Year 1

All new graduate and graduate professional students will complete 4 CITI online modules within the first year of enrollment in their program: *Completion of this requirement will be tracked by the Office of Regulatory Affairs (ORA,* http://Train.ORA.msu.edu*).*

i. Introduction to the Responsible Conduct of Research
ii. Authorship
iii. Plagiarism
iv. Research Misconduct

e)Discussion-Based Training

All graduate and graduate professional students must complete a minimum of 6 hours of discussion-based training prior to receiving their degrees. Completion of the Graduate School's RCR (face-to-face) Workshop Series will fulfill this requirement and should be done during the student's first two years in the BME Graduate Program. Workshop completion can be tracked in the ORA "Ability" training system (links available at *ora.msu.edu)*. For master's Plan A and PhD students, completion of this requirement will be recorded by the department in GradInfo as "Initial" training.

MASTER'S PLAN A and DOCTORAL STUDENTS:

In addition to two sections directly above, master's plan A and doctoral students will complete:

Within the first 2 years of enrollment in their program, master's plan A and doctoral students will complete 3 additional MSU online training modules, to be selected from the following list. Specific requirements for module selection should be discussed with the student's advisor or Associate Chair of Education.

Completion of this requirement will be tracked in "Ability" training system:

i. CITI Collaborative Research
ii. CITI Conflicts of Interest
iii. CITI Data Management
iv. CITI Financial Responsibility
v. CITI Mentoring
vi. CITI Peer Review
vii. IACUC Tutorial for Animal Care Training (in http://Train.ORA.msu.edu)
viii. Human Research Protection/ IRB Certification (in http://Train.ORA.msu.edu)
ix. Rigor and Reproducibility Course (in production)

Doctoral students will complete annual refresher training

In addition to the above requirements, starting in year 3, all doctoral students must complete 3 hours of annual refresher training. One group meeting will be set aside each semester to discuss RCR issues pertinent to the student's research group. Each research advisor will receive a reminder from the Graduate Office regarding their obligation to hold these meetings and they will be given a form to complete confirming completion of this training (one meeting during fall, spring, and summer semesters – 3 hours total). Completion of this requirement will be recorded by the department in GradInfo as "Annual" training.

8. Conflict Resolution

While the graduate experience is typically a smooth one, there are certain circumstances where conflicts can arise between students and other students, advisors, or course instructors. The Graduate Program in BME at MSU has experience in achieving conflict resolution in a variety of circumstances. In all cases the Graduate Program works at achieving conflict resolution in a manner that is fully consistent with the procedures articulated by the Graduate School. The keys to success in conflict resolution are open communication between the parties involved and the graduate office, and a clear sense of what the appropriate expectations are for the specific situation.

The University has established a judicial structure and process for hearing and adjudicating alleged violations of recognized graduate student rights and responsibilities.

Conflict involving a graduate student may be handled informally or, at the request of a party or parties, formally. The document Student Rights and Responsibilities contains details of students' rights and responsibilities as well as grievance procedures. Information specific to graduate students is contained in the section Graduate Student Rights and Responsibilities. The College of Engineering's Hearing Board follows specific procedures to deal with such issues which can be found here. The Office of the Ombudsperson is a resource for additional information.

Any student who believes that there has been an infringement upon his/her academic or professional rights should first seek redress from the individual(s) involved, and the Graduate Office should be made aware of the situation. If a satisfactory conclusion is not reached with the aid of the Graduate Office, the student should present the problem to the Department Chairperson. If the grievance involves the Department Chairperson, an alternate faculty member, not involved in the conflict, should be contacted. If the problem cannot be resolved at this stage, it may be referred to a departmental judiciary committee comprised of both faculty and student representatives (two faculty members and two graduate students, selected by the Department Chairperson or the alternate faculty member if the Chairperson is a party to the grievance). The functions of the judiciary committee are as specified in the relevant articles of the Graduate Student Rights and Responsibilities document. Subsequent appeal procedures are given in Article 5 of the Graduate Student Rights and Responsibilities document. For further information, please see "The Graduate Student Academic Grievance Hearing Procedures". The Office of the University Ombudsperson provides assistance to students, faculty, and staff in resolving University-related concerns. Such concerns include: student-faculty conflicts; communication problems; concerns about the university climate; and questions about what options

are available for handling a problem according to Michigan State University policy. The University Ombudsperson also provides information about available resources and student/faculty rights and responsibilities. The office operates as a confidential, independent, and neutral resource. It does not provide notice to the University - that is, it does not speak or hear for the University. Contact the Ombudsperson at any point during an issue when a confidential conversation or source of information may be needed. The Ombudsperson will listen to your concerns, give you information about university policies, help you evaluate the situation, and assist you in making plans to resolve the conflict. As part of the professional development program, the MSU Graduate School regularly conducts workshops on conflict resolution.

9. Research

All graduate students MUST have EHS (Environmental Health and Safety) training prior to working in a lab. This training is provided during the Department of Biomedical Engineering Graduate Orientation Program. Please contact EHS (Web: *http://www.ehs.msu.edu*) to arrange training outside of the orientation program.

a) Dissertation and Final Oral Examination

The Ph.D. in Biomedical Engineering is a research degree. The student is expected to perform significant, original research and to write a dissertation. The format of the dissertation is standardized found at the Graduate School website *http://grad.msu.edu/etd/*. Follow the instructions there for the preparation and electronic submission of your Dissertation. Once the advisor and the student reach agreement on the Dissertation, it must be approved by the Second Reader before it is distributed to the Guidance Committee. The Dissertation must be defended before the Guidance Committee in an Oral Examination.

At least two weeks before a Final Oral Examination for the Ph.D. degree in BME, the candidate must present an acceptable copy of the dissertation to each member of the Guidance Committee together with reprints of one or more refereed papers based on the dissertation research. If at least one reprint is not provided, a manuscript that has been submitted for publication to a refereed journal must be included. All changes in the dissertation suggested by the Guidance Committee after the Oral Examination must be made before the candidate is certified for the degree. In addition to the unbound copy of the dissertation that is required by the Graduate School for the University Library, one **HARDBOUND** copy of the dissertation should be given to the student's research advisor and one hardbound copy must be provided to the BME Graduate Office, which will maintained with all of the Ph.D. dissertations. All hardbound copies must have a black cover with gold lettering.

b) Research Evaluation

After the student completes the Comprehensive Examination, the only course enrolled in for research is BME 999. No grade is received for these credits, The Graduate Office will request an evaluation of each student's research progress at the end of each semester. A copy of the evaluation will be provided to the student. If successive semesters of "unsatisfactory" research evaluations are reported, the student will be required to call a meeting of the Guidance Committee to review her/his progress.

c) Research Involving Human and/or Animal Use

University and Federal policies and procedures require that all research involving human or animal subjects receive prior approval from the appropriate review board. At Michigan State University, that Board is the University Committee on Research Involving Human Subjects (UCRIHS). Specific information regarding procedures for obtaining appropriate review of proposed research projects involving human subjects is available from the Office of the Vice President for Research & Graduate Studies (232 Administration Building; Web: *http://hrpp.msu.edu/*).

10. Financial Support and Time Limits

a) Limits for Financial Support

The BME Department faculty have established that students should be able to complete the requirements for the Ph.D. degree within a 5-year period. This is meant to include time spent in the University/Department. Semesters during which a student is supported by funds from outside the University or is paid on student labor payroll are included in this time period if the student is working on their research project.

b) Graduate Assistantships

All Ph.D. students who receive a Graduate Assistantship must be enrolled for a minimum of three credits for the Fall and Spring Semesters (with a tuition waiver of nine credits available) and a minimum of three credits for Summer Term (with a tuition waiver of five credits available) until the semester following completion of their Comprehensive Exams; after this point, only one credit is required (though keep in mind that 24 research credits in BME 999 are required to graduate). As stated above, additional credits may be necessary to meet fellowship or VISA requirements. Students must be enrolled for at least one credit during the Semester in which they will defend their dissertation. Please check with your PI and the Graduate office to confirm credits to be taken each semester.

c) Continuing Support in the Graduate Program

Paragraph 4.2.3. of the *Graduate Students Rights and Responsibilities* document requires that each student be notified by April 22 for the subsequent Fall semester, December 1 for Spring semester, and March 31 for Summer semester, of the status of his/her graduate assistantship. Ph.D. students in the second, third, and fourth years of their program will be notified that their assistantship support for the next academic year will be renewed provided:

i. the student remains in good standing (GPA of at least 3.0)

ii. the student continues to make satisfactory progress toward his/her degree; and

iii. the University provides funding for TA stipends that is at least equivalent to past years'.

Students who are in the Plan A M.S. program, or who started in the graduate program in a Spring semester, may be notified that their support will be renewed for a portion of the upcoming academic year, consistent with the time limits established for support. Students entering their sixth year and beyond will be notified that they are no longer eligible to receive a Teaching Assistantship for the year, since they will have exceeded the time limit for support established by the faculty for their program.

d) Medical Leave Policy

A graduate assistant (TA or RA) unable to fulfill the duties of his/her appointment because of illness, injury, pregnancy, or childbirth, shall notify the Associate Chair of the Graduate Program or the Graduate Program Administrator of his/her appointing unit as promptly as possible. Similarly, a graduate assistant unable to fulfill the appointment duties due to pregnancy shall notify the Associate Chair of the Graduate Program or the Graduate Program Coordinator as soon as circumstances permit.

During a medical leave, the appointing unit shall adjust (reduce, waive, or reschedule) the graduate assistant's duties as those duties and the assistant's physical circumstances reasonably dictate. If total absence from duties becomes necessary and the graduate assistant is still enrolled, the appointing unit shall maintain the stipend of the appointment, provided for a period of two months or to the end of the appointment period or the semester, whichever occurs first. Additional unpaid leave may be arranged on an *ad hoc* basis.

The graduate assistant shall have the right to return to the assistantship, with the original terms of the appointment, at such time as he or she is able to resume their duties.

Teaching Assistants should refer to Article 18 of the GEU Contract for information on Graduate assistant Leave Time (*i.e.*, bereavement leave, adoption and parental leave, and jury duty).

e) Adoption and Parental Leave Policy

Adoption and parental leave may be undertaken following guidelines established by Michigan State University and the College of Engineering.

f) Grief Absence Policy (as approved by the University Council)

For Master's (Plan A) and Master's (Plan B) with research responsibilities, and doctoral students, it is the responsibility of the student to: a) notify their advisor/major professor and faculty of the courses in which they are enrolled of the need for a grief absence in a timely manner, but no later than one week from the student's initial knowledge of the situation, b) provide appropriate verification of the grief absence as specified by the advisor/major professor and faculty, and c) complete all missed work as determined in consultation with the advisor/major professor and faculty. It is the responsibility of the advisor/major professor to: a) determine with the student the expected period of absence - it is expected that some bereavement processes may be more extensive than others depending on individual circumstances, b) receive verification of the authenticity of a grief absence request upon the student's return, and c) make reasonable accommodations so that the student is not penalized due to a verified grief absence. If employed as a RA or TE, the graduate student must also notify their employer. Both employer and student will swiftly communicate to determine how the student's responsibilities will be covered during their absence. Graduate teaching assistants (TAs) should refer to the bereavement policy in the MSU GEU CBU Article 18. Students who believe their rights under this policy have been violated, should contact the University Ombudsman.

g) During the course of the calendar year, graduate assistants are allowed a total of two weeks of paid vacation time.

A period of absence beyond two weeks MUST have the approval of the student's research advisor; however, an absence of one month or more constitutes a leave of absence and requires the approval of the BME Graduate Office. The specific period(s) of vacation are to be arranged by mutual consent with the research advisor and the instructor of the course for which the student is assigned as a TA, if applicable, and approved by him/her. Additional absences for vacation purposes may not be granted with pay. An absence beyond a period of three weeks will be treated as a Leave of Absence. Requests for a Leave of Absence must be made to the BME Graduate Office prior to the absence. Such situations will be considered on a case-by-case basis, and final authority rests with the Associate Chair for the Graduate Program.

International students are cautioned about returning to their home country, which could result in visa-related problems that could hamper a return to the U.S. Such an absence will have a negative impact on research productivity, create an inability to fulfill the responsibilities of a Teaching Assistantship and can result in a reduction in support for the semester of the absence.

h) All graduate assistants must be present during the period of their appointment.

Absence without specific permission from the Graduate Office may result in loss of pay or, in some cases, termination of the Graduate Assistant Appointment. (Appointment Periods: Fall Semester = August 16 to December 31; Spring Semester = January 1 to May 15; Summer Semester = May 16 to August 15.)

i) Continuation in the Graduate Program after Five Years

The Guidance Committee of every student beginning their sixth year of study and every year thereafter must meet during the first semester of the year. The purpose of the meeting will be to assess the progress of the student and could be the Final Oral Examination. The meeting will normally be called by the Guidance Committee Chairperson with the student making the arrangements for time and room reservation. If the Committee does not meet during the first semester of the year, the Associate Chair for the Graduate Program will call a meeting of the Committee during the first month of the following semester.

University rules state that all requirements for the Ph.D. degree must be completed within eight years from the time of a student's first enrollment as a doctoral student. If the requirements are not completed within this eight-year period, the comprehensive examinations must be passed again.

11. Two Additional Considerations

Changing Research Groups

Students may decide to change their research advisor at some point in the graduate program. Such a decision must be approved by the Associate Chair for the Graduate Program. A decision to change research advisors does not change the student's overall eligibility for financial support in the Ph.D. program in the Department, which is a period of no more than 5 years. The decision to change a research group may require additional action, depending on when the decision is made. Some possibilities include:

a) Change **before** beginning of 4th semester in program.

   Action required: None.

b) Change of advisor during the 4th semester in the program.
   Action required: The student should immediately select a new Guidance Committee and hold a Comprehensive Examination during the 5th semester.

c) A student in the Ph.D. program decides to change advisors after completing the Comprehensive Examination.

   Action required: The Student may use the comprehensive exam as the MS plan A defense (if the exam was passing). The student should select a new Guidance Committee and schedule a meeting analogous to the First Committee Meeting, to ensure there will be sufficient discussion of the research plan with a Guidance Committee before the final defense.

Relationship Between the M.S. Program and the Ph.D. Program

A student may enter MSU as a Ph.D. candidate, may decide to move to the M.S. program, or may be moved, by the Faculty or the Guidance Committee, to the M.S. program.

The M.S. degree is normally considered to be a terminal degree. In unusual cases, a student may be admitted into the Ph.D. program at their Plan A M.S. Thesis Defense. This would require a strong record in terms of GPA and commendable performance in research and at the defense.

If a student is admitted into the Ph.D. program at the M.S. thesis defense, that student will be eligible for an additional 8 semesters of support (including summer semesters) for completion of the requirements for the Ph.D. Degree. The additional 8 semesters of support will be available only after all requirements for the M.S. degree have been met (Thesis Defense, submission of unbound copy of the thesis to the Graduate School, and submission of hardbound copies of the thesis to the BME Graduate Office and to the research advisor).

12. Student Records

Every graduate student has an academic student file, which is located in the BME Graduate Office. This file contains all academic forms required by the BME Graduate Program and the University (e.g., Research Advisor Selection, Selection of Guidance Committee, First Committee Meeting Report, Comprehensive Examination Report, Report of the Guidance Committee, etc.) plus copies of graduate appointments, fellowship forms, BME Department Status Reports, grade reports, evaluations, and admissions material.

At the end of the Fall and Spring Semesters, students will receive a Status Report which lists all of the academic information pertaining to a student's progress in meeting the BME Ph.D. and/or M.S. degree requirements. Students are encouraged to review this information and any discrepancies in this information should be indicated on the report and returned to the BME Graduate Office for review. A revised Status Report will be issued after the correction(s) has been confirmed and made.

Possession of an academic student file and/or TA file, by the graduate student is not allowed;

however, a student may ask to review their file by making a request to the Graduate Office Administrator. The file cannot be removed from the Graduate Office; all reviews will take place in the Graduate Office under the supervision of Graduate Office Personnel. It is important to remember that students receive copies of all forms, graduate appointments, evaluations, most correspondence, and RA and TA evaluations. Students can review their admissions material with the exception of letters of reference, which are confidential.

13. ELECTRONIC SUBMISSIONS OF THESES & DISSERTATIONS:

MSU only accepts electronic theses and dissertations submitted via ProQuest. The instructions for electronic submissions are available from *http://grad.msu.edu/etd/*.

The target date for the **FINAL APPROVAL** of an electronic Thesis or Dissertation to the Graduate School for graduating the semester of that submission is FIVE working days prior to the first day of classes for the next semester (see future target dates below). Be aware that a submission via ProQuest does not mean that the document has been ACCEPTED. The review process is interactive and final approval can take anywhere from a few hours to weeks, depending upon the extent of the necessary revisions and how diligent the author is when making the necessary revisions.

The Graduate School has hard due dates for submission of Thesis/Dissertation materials which need to be met for graduation in a specific Semester. Refer to the Graduate School website for the specific due dates.

Graduation in the semester of the electronic submission is only guaranteed if the document is APPROVED on or before the target date for that semester.

1. Requests for hold/embargo on publication of documents submitted to ProQuest:

Students submitting a thesis/dissertation to ProQuest now can request a hold/embargo of publication by ProQuest by contacting the Graduate School at msuetds.approval@grd.msu.edu or calling 517 353 3220. In response to the request, the Graduate School will send directly to the student a form that needs to be completed and turned to the Graduate School prior to the document submission to ProQuest. The form needs to be signed by the student's major professor and by the Associate Dean of the student's college. The request for the hold/embargo may be for six months, one year or two years. Requests for a period longer than six months must include a brief justification for the length of the requested hold/embargo.

2. Creating an Open Researcher and Contributor ID (ORCID) at the time of submission of electronic documents to ProQuest:

At the time of submission to ProQuest, authors now have the opportunity to create an ORCID that provides researchers with a unique identifier for linking their research outputs and activities. An ORCID:

- Improves recognition of research contributions
- Reduces form-filling (enter data once, re-use it often)
- Works with many institutions, funders, and publishers
- Is a requirement of many journal manuscript submission systems and grant application forms.

To learn more about ORCID go to: *https://vimeo.com/237730655*

B. M.S. Degree

Two Plans

The Department of BME offers a Master of Science Degree in BME through two programs: Plan A, which is the normal program and requires a research thesis, and Plan B, a terminal graduate program composed of graduate course work.

1. Admission Requirements

Candidates for the M.S. program are expected to have completed the equivalent of a Bachelor's degree in BME. Deficiencies in specific areas at the undergraduate level must be removed by passing undergraduate courses in those areas.

2. Foreign Language Requirement

The BME Department has no formal foreign language requirement.

3. Credit Requirements

The University requires 30 semester hours of graduate work beyond the Bachelor's degree for the M.S. degree. Courses numbered 400 or higher are acceptable as graduate credit toward the degree, but at least 15 semester credits must be from courses at the 800 or 900 level. Plan A requires 8 credit hours and permits up to 15 credit hours of research, BME 899, and enough course credits to equal 30 semester credit hours. A Plan B M.S. degree can be obtained with 30 semester credits of course work. Credits of BME 999 cannot be counted in the 30 credit requirement for the M.S. degree. Students who enrolled for BME 999 and then moved to the M.S. program should contact the Graduate Office to address the situation. Credits in BME 999 and BME 899 cannot be applied toward completion of a Plan B course work M.S. program. Graduate Students in a Plan B program can be involved in research; however, it must be done as BME 890.

4. Placement Exams

BME does not have placement exams

5. Minimum Grade Point Average

Candidates for the Master's degree are expected to maintain a minimum grade point average of 3.0 for all course work. If a Master's candidate accumulates grades below 3.0 in more than three courses, (s)he is removed from candidacy for the degree by the College of Natural Science. A final GPA of at least 3.0 is required for the M.S. degree.

6. Seminar

Candidates are not required to present a seminar.

7. Oral Examination

The Oral Examination Committee for the Plan A Master's degree will include the student's advisor (as Chairperson) and at least one other faculty member from the BME department. The composition of the committee requires the approval of the Associate Chair for the Graduate Program. Students electing Plan A will defend their research thesis and may be questioned on course work. Those electing Plan B will not be examined. For the Plan A student, the Oral Examination Committee determines whether the student must terminate at the M.S .level or is recommended to the faculty for admission to the Ph.D. program. If the student wishes to be recommended for admission to the Ph.D. program, they must have, as part of their oral presentation, a plan for future research work in the Ph.D. program. The decision will be based on performance in the Oral Examination, quality of the M.S. research and performance in graduate courses. If a positive recommendation is made, the Committee may further recommend that the M.S. Plan A Oral Examination be accepted in lieu of the Ph.D. Comprehensive Examination. The Plan A candidate must present an acceptable copy of the thesis to the Oral Examination Committee at last one week before the date scheduled for the Oral Examination.

Students preparing for the Final Oral Exam should address the following issues:

a. Apply for graduation through the Registrar's Office.

b. Navigate to the Graduate School website *http://grad.msu.edu/etd/* and follow the instructions there for electronic submission of your Thesis.

c. For the BME Department you must complete an M.S. Oral Exam Announcements (located on the BME Department web site, *https://www.BME.msu.edu/ graduate-program/current-students/registration-of-oral-examinations/*) and submit the form electronically to the BME Graduate Office. This process informs the Graduate Office of your Final Oral Exam. The announcement should be submitted five working days prior to the exam.

d. A completed "Distribution of Unbound Copy of Thesis form, signed by the members of the Evaluation Committee, must also be submitted to the Graduate Office five days in advance of the Final Oral Exam.

    i. In order for the Final Certification of a degree to be approved by the BME Department and submitted to the Registrar's Office, students **MUST** submit a **HARDBOUND** (black cover with gold lettering) copy of their dissertation to the BME Graduate Office, along with completed "Check Out Form." Degree approval will not occur until these requirements are met.

    ii. Students must be registered for one credit in the semester in which they hold their Final Oral Exam. Exams can be held on the last day prior to the start of the next semester. For example, if a student is enrolled for one credit for Fall semester, they have until the start of Spring semester to defend and be considered a Fall semester graduate and, hence, not have to enroll for Spring semester. Students must deliver the final, unbound copy of their thesis to The Graduate School by their deadline in order to be considered a graduate for that particular semester.

9. Limit for Financial Support

Plan A M.S. candidates are eligible for financial support from their PI for up to 2 years plus one semester (7 semesters total, including summer semesters). Plan B M.S. candidates are not eligible for financial support from the department.

10. Financial Support Prioritization

The department prioritizes support in the following manner. Ph.D. students in good standing receive top priority for support, and Plan A M.S. students in good standing receive second priority. In rare circumstances and solely at the discretion of the department, Ph.D. students beyond their fifth year in the program or Plan A M.S. students beyond their seventh semester may receive support from the department. In such instances, Ph.D. students in good standing who are beyond their fifth year in the program receive higher priority than Plan A M.S. students beyond their support. Plan B M.S. students are not eligible for support.

III. GRADUATE EXAMINATIONS

A. Second Year Comprehensive Examinations

1. Philosophy and Student Preparation

The purposes of these examinations are to allow the student to demonstrate his or her preparedness for thesis research and ability to think critically and independently, and to evaluate their research progress. The examinations will test general knowledge as well as specific research results and goals. Some suggestions are given below.

a. *General knowledge*:
   1) General awareness of literature in the field.
   2) Place of proposed research in the overall scheme of science.
   3) Adequacy of theoretical background.
   4) Knowledge of common instrumental techniques.
   5) Familiarity with available aids at MSU; library, computer, instruments, research help from others, etc.
   6) Information from seminars and colloquia.

b. *Specific preparedness*:
   1) Information on research progress to date.
   2) Specific goals and plan of attack for continued research.
   3) Details of previously published work on the subject.
   4) Demonstration of sufficient background in the research area with suitable plans to strengthen this background where needed.
   5) Knowledge of experimental and/or theoretical techniques which have been or will be used in the research.
   6) Demonstration of readiness to deal with unexpected results; alternate plans or follow-up.

2. Timing of the Examinations

The examinations are to be taken by the end of the fourth semester (excluding summer). In order to avoid schedule conflicts during spring semester, students are encouraged to take the examinations as early in their second year as possible. Since the student begins research during the first year, he or she will have research experience prior to the examination.

Postponement of the examination beyond the end of the fourth semester (excluding summer) may be granted if reasons are submitted in writing to the Associate Chairperson by the student and the Advisor along with a specified deadline for the examination. The following guidelines should be observed in recommending a postponement:

a. "Poor background" is not an acceptable reason for delay.

b. Inadequate research progress is not an acceptable reason for delay.

c. Failure does not necessarily mean automatic termination of the student's graduate program.

d. If the examination has not been taken by the end of the fourth semester or by the specified deadline, the Guidance Committee shall be required to initiate a review of the student's program.

e. In the case of failure, the examination committee will specify the deadline for re-examination. Re-examination should be as performed as early as possible, but in no event shall it be postponed beyond the end of the fifth AY Semester.

3. Administration of the Examinations

The examinations will be administered by the student's Guidance Committee; the second reader will serve as chairperson for the examinations. The following procedures should be followed:

a. Since this examination is one of the most important functions of the Guidance Committee, any substitutions made will be permanent.
b. Any interested faculty member may be present at the examination, whether or not he or she is a member of the Guidance Committee. However, only members of the Guidance Committee will vote on the results of the examinations.
c. It is the responsibility of the student, in consultation with the second reader, to schedule the examinations and to provide required information to the committee, as well as informing the Graduate Office of the date, time and location of the examination.

d. The graduate student is to prepare and defend before the Committee a written document which describes his or her research. The document should:

    1. Present the project and explain its context and significance.

    2. Present research progress to date.

    3. Describe the plan for future research.

The proposal must be presented to the members of the Committee no later than two weeks prior to the scheduled date of the examinations. Any of the Committee members not satisfied with the scientific merit of the proposal or the quality of the student's writing must inform the second reader no later than one week prior to the scheduled examination date. The second reader may direct the student to address the specific concerns before the examinations will proceed.

4. Grading Philosophy and Practice

The committee may give passing grades for the written and oral components, or may deem one or both of the components unsatisfactory, as discussed earlier.

The results of the examination will be determined by majority vote.

a. The chairperson of the examination committee will complete the Comprehensive Examinations form and submit it to the Associate Chairperson along with the recommendation of the committee. In the case of failure, reasons for the failure should be specified and areas which need to be strengthened prior to re-examination should be enumerated. A copy will be given to the student.

b. The chairperson of the examination committee will also submit a form signed by the members of the committee indicating acceptance of the written document. This form must be received by the Associate Chairperson for completion of the Comprehensive Examinations requirement.

Important: Upon successful completion of the comprehensive examinations, the student must complete the Guidance Committee Report. No grade will be reported for the Comprehensive Examinations until the completed Guidance Committee Report has been submitted to GradPlan.

B. Final Oral Examination

1. Preparing For Defense and Graduation

The Final Oral Examination is the final formal step in the progress toward the Ph.D. degree. This examination is administered by the Guidance Committee with the Guidance Committee Chairperson presiding. After the Final Oral Examination, the only requirement remaining is to edit the dissertation according to the Guidance Committee recommendations and have the dissertation printed.

The Final Oral Examination is based on the research described in the dissertation and in any published or submitted manuscripts. The dissertation and at least one published or submitted manuscript must be given to Guidance Committee members at least two weeks before the examination. The dissertation must be approved by the Guidance Committee Chairperson and by the Second Reader before submission to the Committee.

The format of the Final Oral Examination is determined by the Guidance Committee. Normally, the student presents the results of the research to the Committee and public as an informal seminar. The Committee members may interrupt with questions at any time. The presentation is followed by an oral question period with the public, then a closed question period with only the Guidance Committee members asking the questions.

The Guidance Committee may accept the dissertation and recommend that the student pass; they may recommend that the student be passed after an acceptable rewrite of portions of the dissertation; they may recommend that the student be re-examined after additional research and writing of the dissertation; or they may fail the student and recommend a review of the student's progress.

Students preparing for the Final Oral Exam should address the following issues:

1. Apply for graduation through the Registrar's Office.
2. Navigate to the Graduate School website *http://grad.msu.edu/etd/* and follow the instructions there for electronic submission of your Dissertation.
3. For the BME Department you must complete an Ph.D. Oral Exam Announcement (located on the BME Department web site, *https://www.BME.msu.edu/ graduate-program/current-students/registration-of-oral-examinations/*) and submit the form electronically to the BME Graduate Office. This process informs the Graduate Office of your Final Oral Exam. The announcement should be submitted five working days prior to the exam.
4. A completed "Distribution of Unbound Copy of Dissertation" form, signed by the members of the Guidance Committee, must also be submitted to the Graduate Office five days in advance of the Final Oral Exam.

In order for the Final Certification of a degree to be approved and submitted to the Registrar's Office, students MUST submit a hardbound copy of their dissertation to the BME Graduate Office and one hardbound copy to their research advisor, along with a completed Exit Survey (see below). Degree approval will not occur until these two requirements are met.

Students must be registered for one credit in the semester in which they hold their Final Oral Exam. Exams can be held on the last day prior to the start of the next semester. For example, if a student is enrolled for one credit for Fall semester, they have until the first day of classes for Spring semester to defend and be considered enrolled for the semester in which they defend. Submission of the final unbound dissertation to The Graduate School will determine a student's semester of graduation.

2. Publishing Agreement for Theses/Dissertations

The new publishing agreement for theses/dissertations with ProQuest now provides an "Open Access Publishing Option" as alternative to the traditional publishing option available to students. The Open Access option gives ProQuest the authorization to make the electronic version of the document accessible to all *via* the internet, including the selling of the document by commercial retailers and the accessibility to the work via search engines. A student selecting the Open Access option will not be eligible to receive royalties. For more information visit: *http://media2.proquest.com/documents/ open_access_faq.pdf*

3. Exit Survey

Completion of a short online exit survey for all students graduating with a Plan A or Plan B M.S. or with a Ph.D. is required. Only students who have applied for graduation will have access to the survey. The survey asks questions about educational experiences in MSU graduate programs, as well as about immediate professional plans. The Graduate School uses data from this survey when reviewing graduate programs and to guide decisions about services and initiatives for graduate students.

The identity of all respondents will be kept confidential and only aggregate (group) information will be made available to faculty and administrators. The students will receive an e-mail message from the dean of the graduate school with

a link to the survey. However, students do not need to wait
for that e-mail message to complete the survey after applying for graduation. It takes about 5-10 minutes to complete the online survey. Below are the instructions for completing the survey and they are also available from *http://grad.msu.edu/etd/*

Instructions:

- Access the following website:
  Doctoral Students: *https://www.egr.msu.edu/doctoral/survey/*
  Master's Students: *https://www.egr.msu.edu/masters/survey/*
- Enter your MSU NetID (Login Name) and Password
- Complete all the items on the survey. When finished, click Submit.

If you cannot open this survey, please contact the Graduate School by email at *exitsurvey@grd.msu. edu*, and include your name, student ID #, degree level (PhD, MA/MS) and semester of graduation. You will then be notified when you are able to complete the survey.

IV. OPERATIONAL PROCEDURES IMPORTANT TO GRADUATE STUDIES

A. University-Related Travel Information

A Michigan State University Pre-Trip Authorization (PTA) must be completed whenever a University related trip will be taken (i.e., attendance at a conference, seminar, etc., which is located off-campus). **The PTA Form must be completed even if the travel does not involve reimbursement (this is for insurance purposes only; see Travel Secretary for details).** Described below is the procedure for completing an MSU PTA Form.

1. A Michigan State University Pre-Trip Authorization Form can be accessed on-line at the following URL: *http://ctlr.msu.edu/download/forms/TVLExpenseWkst.xls*
2. **Prior to the trip, the "Section A: Travel Authorization" portion of the form must be completed (an account number must be provided)** and submitted to the Travel Secretary in the BME Business Office (Room 322 BME) for approval.
3. After returning from the trip, submit your receipts to the Travel Secretary for completion of the "Reimbursement" portion of the Travel Voucher. University Guidelines for reimbursement must be followed, and any arrangements that the student and research advisor have agreed upon must be taken into account. **Special note should be taken of requirements for receipts. In most cases an original receipt showing what form of payment was used (cash, credit card, etc.) is required — under certain circumstances, a charge card receipt is acceptable**. The student's research advisor needs to approve the expenses being claimed before the completed Travel Voucher is submitted to the Business Office (Room 324 BME Building) for processing through the University.
4. Graduate Students are eligible to receive a travel fellowship through The Graduate School. Applications can be acquired on the 2nd floor of Chittenden Hall.
5. Graduate Students traveling abroad should:

   a) Check with the MSU Travel Clinic! They will let you know of any health risks or immunizations: *http://www.travelclinic.msu.edu*. When students appointed as TAs or RAs travel outside the U.S. to conduct required thesis or dissertation research or to collaborate with investigators conducting research abroad, the department or research grant supporting the work will be required to pay for all needed vaccinations and or medications (e.g., anti-malarials) as determined by the MSU Travel Clinic. Students may include those costs in applications for funds from the Research Enhancement or Travel Grant programs administered by the

Graduate School.

b) Check the "Travel Smart" website (*http://grad.msu.edu/travel/*) before their trip.

c) Check the International Studies Programs website for issues related to safety around the world. *http://studyabroad.isp.msu.edu/safety/*

d) Apply for assistance with travel funding via the Graduate School. If the Graduate School provides funding, they will also provide a MEDEX emergency card.

For additional information regarding University travel, please refer to the following web site: *http:// www.ctlr.msu.edu/COTravel/***.**

Appendix A: Graduate Student Forms

All original forms can be downloaded via the electronic version of the BME Graduate Program Guide, which is available on the BME Department website.

Ph.D. Degree Forms

M.S. Degree Forms

Evaluation and Status Report Forms

Application for Graduation and Check Out Form

Appendix A