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INTRODUCTION
The Department of Biomedical Engineering at the University of Michigan has a graduate program in the Horace Rackham School of Graduate Studies that grants MS and PhD degrees in Biomedical Engineering. The Department is jointly supported by the College of Engineering and the Medical School. Under the guidance and counsel of faculty associated with the department, a student may plan a course of study in a wide variety of areas. The educational experience can be broadly or narrowly directed and is limited only by the range of teaching and research activity currently conducted by the University.

This handbook contains information to guide the Biomedical Engineering graduate student. Please keep in mind that this is intended as a supplement to, and not a substitute for, the Rackham Graduate School Academic Policies which contains the general rules and regulations that govern graduate study in Rackham programs. The Rackham Graduate School Academic Policies are available at http://www.rackham.umich.edu/policies/academic_policies/.

UNIVERSITY OF MICHIGAN GUIDELINES FOR QUALIFYING FOR IN-STATE TUITION
You may qualify for in-state tuition in any of the following three ways:
1) Residence. By demonstrating that you are a permanent legal resident of the State of Michigan as defined by these Guidelines;
2) Attendance. By demonstrating that you attended an accredited Michigan high school and accredited Michigan middle or junior high school; OR
3) Service. By demonstrating that you or a family member are serving or have served in the U.S. military or Public Health Service.
You may meet the criteria under more than one Part of these Guidelines. However, if you meet the criteria under one of the three Parts, you are not required to determine eligibility under the other two.

Complete information is available at http://www.umich.edu/~regoff/resreg.html.

OFFICIAL TRANSCRIPT
If a student has not already done so, the student must send their official transcript with the degree posted to the Admissions Office in Rackham. If they do not have this transcript on file, the student will not be able to receive their degree in BME or be able to make their previous degree relevant. Please note that an official transcript is not required if a student received their previous degree from the University of Michigan. The Admissions Office in Rackham’s contact information is available at http://www.rackham.umich.edu/about_us/contact_us/-offices.

GPA REQUIREMENT
To maintain satisfactory academic standing, students must make satisfactory progress toward the degrees, receive a B or better in each letter graded course applied toward the MS degree, making a prior MS degree relevant, and the PhD degree, and have a minimum Rackham cumulative GPA of B (3.00 on a 4.00 point scale). Students who fall below the GPA requirement of their graduate program or Rackham may be placed on academic probation or withdrawn from the BME Department. Courses in which grades of D or E are earned cannot be used to fulfill degree requirements. Additional information is available at http://www.rackham.umich.edu/policies/academic_policies/.

GRADING SCALE
A+ = 4.3  B+ = 3.3  C+ = 2.3  D = 1.0
A  = 4.0  B  = 3.0  C  = 2.0  E  = 0.7
A-  = 3.7  B-  = 2.7  C-  = 1.7
COURSE PLAN OF STUDY FORMS
The student’s completed form is due no later than three weeks after the start of the term in which the student entered. Please note that a student will not be able to submit a petition, proposal, etc. to the Graduate Education Committee (GEC) if a student’s form is not on file. The forms are available at http://www.bme.umich.edu/programs/graduate/current_forms.php.

PREREQUISITES
Prerequisites need to be listed on the Course Plan of Study Form. If a student has already met the requirements or will take the course(s) at the University of Michigan, the course information needs to be listed next to the requirement. If a student plans on submitting a petition to waive the requirement, the words "will submit petition to waive" should be written next to the requirement. Incomplete sections of this form can cause delays in receiving the degree.

REGISTRATION

Late Registration Fee
Beginning the first day of the term a $50.00 late registration fee will be assessed for students who have not previously registered for that term. The late registration fee is increased by $25.00 at the beginning of each subsequent month. Additional information is available on the Office of the Registrar's website at http://www.ro.umich.edu/tuition/.

Registering for BIOMEDE Courses
When registering for BIOMEDE courses that are cross-listed with other departments, the student must register under BIOMEDE and not the other department.

If a student is going to elect BIOMEDE 590, 990 or 995, the faculty member must approve for the student to take the course and the student will need to obtain a class permission from me. The student will need to email their UMID, the course number, section number, faculty member’s name and the term to me so that I can issue the class permission. Once the class permission has been issued, the student will receive an email message which includes information on registering for the course. If a student has forgotten the section number, the list of section numbers (also called independent study numbers) for the faculty is available at http://www.bme.umich.edu/programs/graduate/curriculum_research.php.

If a student would like to enroll in a BIOMEDE course other than the ones listed above and discover that it is closed, please contact me for class permission information.

Visit Enrollment Option Information
If a student would like to enroll in a course as "visit", please follow these instructions. Please note that the tuition rate for visit is the same for a student that registers to take the course for a grade.

1) Register for the course via Wolverine Access.
2) Obtain an election worksheet from the BME Department (they are on the table outside of 1111/1113 Carl A. Gerstacker) and complete the top section (LAST NAME through GRADUATE/PROFESSIONAL) and the lower left side section (modify section). The student will need to put a line through NEW HRS and write VIS in the MODIFIER box.
3) Obtain the signature of the Department Chair from me. If I am not in my office, please put the form in my mailbox (1133 Carl A. Gerstacker) and I will email the student once the form has been signed and is ready for pick up.
4) Obtain the signature of the course instructor.
5) Take the completed form, with photo identification, to the Office of the Registrar for processing. The Registrar’s contact information is available at http://ro.umich.edu/knowledgebase.php?ansid=1425.
NOTE: Coursework may be required if a student enrolls in a course as a visit. The student will need to discuss the course requirements with the instructor. If a student does not complete the course to the satisfaction of the instructor, the student may receive an "E" or "ED" (unofficial drop).

Funding and Graduate Credit Hours
Following is a list which includes several types of funding awarded to graduate students in the BME Department and the minimum number of graduate credit hours that are required in the terms in which the student receives the funding. It is the responsibility of the student to make sure that they are registered for the correct number of graduate credit hours. If a student is not registered for the correct number of graduate credit hours the award (tuition, health insurance and/or stipend) may be withdrawn. If a student is supported as a GSI or GSRA and a fellowship in the same term, the student should register for the funding which requires the higher number of graduate credit hours. For example, if a Precandidate is supported as 25% GSI and 25% GAANN in the same term, the student should register for a minimum of 9 graduate credit hours. If a student does not know the type of funding that they are receiving for the term, they should either ask their Research Advisor or the staff member that processes their appointment.

<table>
<thead>
<tr>
<th>TYPE OF FUNDING</th>
<th>MINIMUM # GRADUATE CREDIT HOURS PER FULL TERM (FALL AND WINTER)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BME Fellowship *</td>
<td>8 – MS, Precandidate and Candidate</td>
</tr>
<tr>
<td>External Fellowship **</td>
<td>Please check with the organization that awarded the fellowship</td>
</tr>
<tr>
<td>GAANN *</td>
<td>8 – MS, Precandidate and Candidate</td>
</tr>
<tr>
<td>GSI *</td>
<td>6 – MS and Precandidate; 8 – Candidate</td>
</tr>
<tr>
<td>GSRA *</td>
<td>6 – MS and Precandidate; 8 – Candidate</td>
</tr>
<tr>
<td>Rackham Merit Fellowship ***</td>
<td>9 – MS and Precandidate during first year only; 8 – MS, Precandidate and Candidate after the first year</td>
</tr>
</tbody>
</table>

* Undergraduate courses and courses that are “visited” do not count toward the minimum credit hour requirement for students that are funded by a BME Fellowship, GAANN, GSI or GSRA.
** Students that are funded by an external fellowship should contact the organization that awarded their fellowship for their rules regarding undergraduate courses and courses that are “visited”.
*** Undergraduate courses count toward the minimum credit hour requirement for students that are funded by Rackham, which includes the Rackham Merit Fellowship, but courses that are “visited” do not count.

For International Students Only:
Courses that are “visited” do not count towards full-time enrollment for immigration purposes.

Drop/Add Deadlines
The Drop/Add deadlines for each term are available on the Office of the Registrar's website at http://www.ro.umich.edu/calendar/. Locate the term under Student Registration Deadlines. If a student drops a course after the stated deadline, the student will receive a "W" on their transcript and there will be no reduction in tuition.

GRADUATE EDUCATION COMMITTEE (GEC)
The dates of the GEC Meetings for the fall and winter terms will be emailed to all BME graduate students once they are available. Agenda items must be turned in at least one week before the date on which they are to be reviewed. If I am not in my office, please put it in my mailbox. Incomplete petitions will be returned to students which will cause delays in receiving a decision. The student’s BME Course Plan of Study Form be on file if a student submits an agenda item. After a decision has been made on a petition it will be relayed to the student via email.
PETITIONS
Petition forms to waive prerequisites, special consideration of grades, modify course requirements, and extension of time to take the Qualifying Examination are available at http://www.bme.umich.edu/programs/graduate/current_forms.php. The forms must be signed by the student’s advisor(s). A list of the current BME Graduate Academic Advisors is available at http://www.bme.umich.edu/programs/graduate/current_advising.php. Incomplete petitions will be returned to students.

NOTE: Petitions for special consideration of grades to take the BME Qualifying Examination (QE) must be signed by the student’s Research Advisor and their BME faculty surrogate advisor (if applicable), not their Academic Advisor.

MS PROGRAM

Courses Required for MS Program
In order to obtain a MS degree in Biomedical Engineering, students must satisfactorily complete (B or better for courses that are issued letter grades, and S for courses that are graded S/U) a minimum of 30 credits of graduate study beyond the bachelor's degree. Within this requirement, a group of core courses, or their equivalents in the biological sciences, as well as several graduate-level engineering and physical science courses, must be completed. Directed research work is required to familiarize the student with the unique problems associated with biological systems research.

Advanced Engineering is defined as a graduate-level engineering course which is listed or cross-listed in a College of Engineering department. Courses which are cross-listed with an engineering department, that are used to fulfill a core course requirement (i.e., Advanced Math, Bioinstrumentation, etc.) do not count toward the 8 credits of advanced engineering requirement.

Students who have completed courses equivalent to any of the core courses prior to entering the master's degree program may take graduate-level biological science or engineering courses in their place. A petition must be submitted to the GEC for approval of substitutions. The petition to modify core course requirements is available at http://www.bme.umich.edu/programs/graduate/current_forms.php.

Students who fails to complete degree requirements within five years may be withdrawn and required to apply for readmission. Information is available at http://www.rackham.umich.edu/policies/academic_policies/section6/#.

Technical Electives
If a student would like to count a course as a technical elective and it is not listed in the concentration for the term/year that the student entered or it is not listed on their BME Course Plan of Study Form which was given to me, I need an email message from the student’s advisor(s) stating that they accept the course as a technical elective. If the advisor(s) approve of the course as a technical elective there is no need to submit a petition to the GEC. If the advisor(s) do not approve of the course as a technical elective or if they are unsure, the student will need to submit a petition to the GEC.
BIOMEDE 590 Directed Research

A student’s 590 report must be turned in to me before the end of the term to complete the project. An additional page, referred to as the cover page or comments page, from the project director must be included. Students who have not turned in their report may receive an "Incomplete" (I) on their transcript. An "I" will remain on the transcript even if an "S" is received at a later date. If a student plans on registering for BIOMEDE 590 the following term, the student will need to remind their project director to give the student a "Y" grade (which means continuing) and not an "I" grade. If the report is not turned in on time, the student will not be able to graduate.

The following guidelines are also available at http://www.bme.umich.edu/programs/graduate/curriculum_research.php.

(1) Project Selection: Whereas a student goes to a particular faculty member presumably to learn more about the faculty member's area of research interest, generally it will be the faculty member who presents the student with a choice of possible research projects rather than the other way around. In certain cases the student may suggest possible projects that may be acceptable to the project director.

Projects may consist of one or more of the following: (i) an in-depth library search of an area, (ii) the design and/or construction of hardware, (iii) the collection and/or analysis of experimental data, (iv) the generation of computer software.

The project should require some creativity and/or independent work by the student. The faculty member should not expect the student to be a free helper and consequently the project should not require excessive menial work.

(2) Academic Credit: Once a project has been agreed upon, the faculty member and student should establish the credit to be received. Typically, three to four hours per week of actual "work" time is expected for each credit hour given in a normal term. In a half-term, this should be doubled. The "work" time should include the library-search time, the laboratory time, and the final report writing time. Typically, a directed research project is for two (2) credit hours per term. The student may elect up to four (4) additional hours of directed research as a continuation of the two (2) hour core requirement for the MS degree. These additional hours may be applied towards meeting the eight (8) hours graduate engineering credit requirement. No more than six (6) hours of directed research may be applied toward the MS degree. If (4) four or more hours of directed research are applied toward the masters degree, a MS thesis is required. All directed research credit is to be granted under BIOMED E 590.

(3) Final Report: A final report must be written by the student to complete the project. The student's report should be a minimum of two typewritten pages explaining the project and what was accomplished. All circuit diagrams, final software, and a list of references should be included with the report. This report will become a part of the student's file. In addition a third page will be added by the project director. The standard report form in Appendix A is to be used to provide uniformity.

(4) Course Grade: Grades of S and U are only to be given for directed research. Since the written report will become a part of the student's file for future reference and will require specific comments by the project director, a letter grade, if deemed necessary, may be indicated on the written report only.

(5) Report Form Access: The information contained in the written report is intended for use by: (1) members of the Biomedical Engineering faculty who want information about a students research experience and ability; (2) the Graduate Education Committee for student evaluation; and (3) faculty members asked to write letters of recommendation for students. The student will receive a copy of this report.
(6) Financial Remuneration: Directed research credit will not ordinarily be given for work done for financial remuneration.

(7) Non-Faculty and Non-Biomedical Engineering Faculty Project Director: Students may wish to work with project directors who do not hold a faculty appointment (e.g., research associates and research scientists) or with a non-Biomedical Engineering faculty member. In order for proper credit to be given, however, the student must present the Graduate Education Committee with a petition (see Appendix B for suggested format) detailing the project to be done and with whom it is to be done. In order for Rackham to accept a grade, a faculty member must sign a grade sheet. Thus, the petition also must include the name of a Biomedical Engineering faculty member who will serve as surrogate and sign the student's grade sheet. It is expected that the faculty member will read the project report and receive from the project director a verbal recommendation before a grade of S or U is given.

(8) The final report must be returned to Maria Steele upon completion of the project. A student will not be granted a Master's degree without a copy of the report in said student's file.

Note: Not all students who register for four (4) to six (6) credits of BIOMED E 590 have to write the Master's Thesis. Only those who wish to apply the four (4) to six (6) credits of research toward the minimum 30 credit requirement in place of graduate engineering coursework must write the Master's Thesis.

Master's Degree/Diploma Application
If a student expects to receive a MS degree in BME, they will need to apply for graduation via Wolverine Access. If a student has an undergraduate engineering degree, the student can apply for either a MS or MSE degree. There is no difference in the degrees, it is a preference. If a MSE option is not available, please let me know. It is very important that the student informs me once they have applied for the degree so that I can do the audit to ensure that all requirements have been met for the degree. I can complete the audit before a student applies for the degree if a student asks.

If a MS degree is not listed as an option in Wolverine Access and the only option listed is PhD, the student will need to let me know which degree they are applying for. I will then contact the Office of the Registrar and ask them to add the embedded degree. Please do not wait until the deadline or a few days before the deadline to submit the request because it can take the Office of the Registrar several days to add the embedded degree.

Students who have applied for degree by the master's and certificate deadline will have their names printed in the commencement program. Applications for graduation will be accepted until the last day of classes of the term in which you wish to receive your degree/diploma; however, your name will not appear in the commencement program. It is your responsibility to see that all requirements are met and recorded by the last day of classes in the term you have applied for degree/diploma.

Master's Degree Diploma Application Deadlines
Master's Degree/Diploma Application Deadlines are available at http://www.rackham.umich.edu/help/graduating/masters_degree_diploma_application_deadlines/.

Courses Required to Make a Previous Degree Relevant (for students that entered with a prior MS degree)
Students who have received a Masters degree that includes graded graduate level course work including bioinstrumentation laboratory, life science, mathematics, and statistics have a "relevant" Masters degree and do not need to take additional course work.
Students who have received a Masters degree that does not include graded graduate level course work including bioinstrumentation laboratory, life science, mathematics, and statistics will need to take additional course work to make their prior Masters degree "relevant."

Students that need to make their Masters degree relevant will need to submit their BME Course Plan of Study Form and petitions, if applicable, to the GEC to determine equivalency. This form and petitions are available at http://www.bme.umich.edu/programs/graduate/current_forms.php.

If the courses that a student is required to take in order to make their prior MS degree relevant do not equal at least 6 credit hours of letter graded graduate level coursework (didactic or laboratory, but not seminars), the student will need to satisfactorily complete (receive a B or better) additional coursework such that at least 6 credit hours of letter graded graduate level courses (decided upon between the student and their Research Advisor) have been completed before the student can take the BME Qualifying Examination (QE). Students must also meet the other requirements to take the BME QE (see BME Qualifying Examination). In addition, students need to make sure that they meet Rackham’s candidacy requirements which includes coursework in residence and cognate requirement (see Candidacy Requirements).

All students that enter the PhD program with a MS degree from another institution should register for BIOMEDE 590 as their research credits and not BIOMEDE 990 until their prior MS degree has been made relevant unless the student needs to take at least 9 credit hours of letter graded graduate level courses to make their prior MS degree relevant. Once the student has taken at least 9 credit hours of letter graded graduate level courses or BIOMEDE 590, the student can register for BIOMEDE 990 as their research credits. This is necessary because Rackham’s policy states that a precandidate must complete at least 18 credit hours of graded graduate coursework (BIOMEDE 590 included) as a Rackham student. Courses elected as visit (VI) and BIOMEDE 990 do not meet this requirement. The remaining 9 credit hours of graded graduate coursework can come from the student’s PhD course work (see Courses Required for PhD Program below).

**PHD PROGRAM**

**Entrance Requirements for PhD Program**

The entrance requirement for the doctorate is an MS degree in Biomedical Engineering or the equivalent to the stated requirements for this degree, or the degree of M.D., D.D.S., or D.V.M. The individual with an engineering or physics background may have deficiencies in science, whereas the individual with a life science background may have deficiencies in mathematics, physics, and engineering subjects. In either case, the individual should present or include in the program those prerequisite courses outlined in the Entrance Requirements section (see above).

Students who have received a master's degree from the Biomedical Engineering Department at the University of Michigan or have entered the department with a prior master's degree must have a cumulative GPA of at least 3.5 in order to take the Biomedical Engineering Qualifying Examination (QE). Under extenuating circumstances, a student with a GPA of lower than 3.5 may submit a petition to the GEC for special permission to take the exam. The student's Research Advisor must attend the GEC meeting when the petition is reviewed. The petition for special consideration for grades is available at http://www.bme.umich.edu/programs/graduate/current_forms.php.

**Courses Required for PhD Program**

Students in the PhD program must satisfactorily complete (receive a B or better) a minimum of 9 credit hours of letter graded coursework (any electives with Rackham credit) beyond those which are required for a MS degree including making a prior MS degree relevant. There is no actual form to complete for these credits like there is for the MS degree, which is the Course Plan of Study Form. All I need is an email message from the student’s Research Advisor stating that he/she approves of the courses (the
student will need to list the course) as their credits that are required for the PhD program. Please note that a student’s advisor may require them to take more than 9 credit hours.

PhD Degree – Maximum Time Limit of Seven Years

Students are expected to complete the degree within five years of achieving candidacy, but no more than seven years from the date of the first enrollment in their Rackham doctoral program. Graduate programs should conduct annual reviews of candidates to assess progress toward completion of the degree. Students who entered their program prior to the fall of 2007 and have not completed their degree within the seven year limit should petition Rackham OARD for an extension of time to degree with a plan for completion. Effective for students entering in the fall of 2007 and later, graduate programs may request an unconditional one-year extension for students deemed to be making satisfactory progress toward the degree, providing a plan and timeline for completion. A program may request an additional one-year extension, but a student who does not complete the degree after two years of extension may be returned to precandidacy status and required to meet candidacy requirements again. Rackham will notify graduate programs of students who have not completed their degree within the stipulated period. Additional information is available at http://www.rackham.umich.edu/policies/academic_policies/.

Advancement to Candidacy Status and the Qualifying Exam (QE)

The following information describes the BME QE procedure. They are also available at http://www.bme.umich.edu/programs/graduate/curriculum_qual.php.

1. The qualifying exam consists of a single oral examination conducted by the student’s Dissertation Committee. In the exam, the student will present his/her doctoral research proposal to the Committee (typically a talk of approximately 20-30 minutes) and respond to their questions and comments. In the course of the exam, the Committee will question the student about the content and plan of the proposal, as well as general didactic knowledge in the engineering and biology areas relevant to the proposed research.

2. The Committee must conform to the standard Rackham Dissertation Committee and BME guidelines for committees with three additional requirements: (1) At least one faculty member must be on the Committee, (2) For the purposes of administering the examination the Examination Chair cannot be the student’s advisor, but it must be a core faculty member or an affiliated faculty member included on the list below, and (3) The student’s advisor must be on the Committee as a voting member. The student must meet with their entire Committee, either as a group or individually, at least one time prior to taking the exam. The student’s advisor(s) must fill out the Qualifying Examination and Candidacy Student Evaluation Form and return the completed form to Maria no later than one month prior to the date of the exam. The student must also have their Committee sign the Qualifying Examination Form which states that the student has met with the members of their Committee. This form also needs to be returned to Maria no later than one month prior to the date of the exam.

Affiliated faculty that meet the requirements to serve as the Chair of the BME QE, but are not required to serve as Chair and can turn down a request from a student:

- Arruda, Ellen
- Banaszak Holl, Mark
- Barald, Kate
- Burns, Mark
- Carson, Paul
- Ferris, Daniel
- Fessler, Jeffrey
- Fowlkes, J Brian
- Giannobile, William
- Hernandez-Garcia, Luis
- Huggins, Jane
- Kopelman, Raoul
- Kotov, Nicholas
- Krebsbach, Paul
- Lahann, Joerg
- Larkin, Lisa
- Ma, Peter
- Patil, Parag
- Shih, Albert
- Sienko, Kathleen
- Stacey, William
- Wang, Thomas
- Yoon, Euisik

3. A written proposal must be submitted to the Committee at least two weeks prior to the exam. This proposal must be in the general form of an NIH R01 proposal. The proposed research project can be either hypothesis driven or design driven, without prejudice. Hypothesis-driven plans must include
specific testable hypotheses. Design-driven plans must have well-defined outcome measures and success criteria. It is expected that the student, advisor and the Committee go through several iterations of the proposal and that the student discuss the proposal with each Committee member prior to taking the exam. The student must email a copy of their proposal to Maria at least two weeks prior to the date of the exam.

4. **Timing.** BME’s program deadline for achieving candidacy is within two years of completion of the M.S. degree in BME or of making their M.S. degree relevant. The GEC recommends that the QE be completed within one year of completion of the M.S. degree or within one year of entry into the program for students who enter with an equivalent M.S. degree.

5. **Eligibility.** The student must complete the M.S. degree requirements or if entering with an M.S., fulfill any requirements to make his/her M.S. equivalent prior to taking the exam. The student must have a research advisor and be working in a relevant laboratory. The student’s advisor must commit to be willing to support (academically and financially) the student during his/her doctoral work. The student must form his/her Dissertation Committee. The student must meet the minimum requirement of a 3.5 GPA, with any petition argued by the student’s advisor in person at a GEC meeting. The GEC requires that students who enter the BME Department with an equivalent M.S. degree satisfactorily complete a minimum of 6 credit hours of letter graded graduate level courses (didactic or laboratory, but not seminars) before taking the exam. If the student’s advisor approves, this course work can be counted toward the student’s Ph.D. course work. Note that the student is required to complete training in responsible conduct of research and scholarship before advancing to candidacy.

6. **Roles and Responsibilities of the Committee.** The Committee decides the student’s advancement to candidacy based on both the written proposal and the oral examination. The Committee is expected to maintain a high standard for evaluating the written proposal in terms of both content (knowledge in engineering/scientific areas), and the plan itself. It is also expected to evaluate deficiencies in the student’s background (e.g., poor grade in a course or lack of coursework in an area vital to the student’s area of research).

The Committee’s recommendation for candidacy must be **unanimous and unconditional.** Any agreements must be fulfilled by the student and approved by the Committee prior to recommendation for advancement to candidacy. The Committee is expected to work to reach a consensus among its members.

The Committee may take the following actions as a result of the outcome of the examination:

1- Recommend the student be advanced to candidacy without further conditions.

2- Recommend the student be advanced to candidacy conditionally – i.e. the student will not be advanced to candidacy until completion of
   a. change in the focus or scope of the proposal.
   b. re-write of all or part of the proposal.
   c. the student takes extra course(s).
   d. the student reads and/or reviews additional material (books, papers, etc) to fulfill notable deficiencies in his/her background.
   e. the student takes additional preliminary data, or re-analyzes existing data.
   f. any other action that the committee feels is in the best interests of the student.

3- Recommend that the student discontinue their doctoral work at UM.

The Committee may also:

4- Require a subsequent e-mail vote among the Committee on the acceptability of further work, or

5- Give the Committee Chair authority to certify that the Committee recommendations are completed, or,

6- Require that the student reconvene the Committee after a set period of time.

After the examination, the Examination Chair will submit a memo, which has been approved by all Committee members, to Maria and she will then forward a copy to the student. The memo will include:

1- A summary of the required action to be taken by the student, if any.
2- A brief summary of the results of the examination.
3- When applicable, a draft of the agreement to be carried out by the student. This agreement must be explicit with quantitative values where appropriate (time limits, minimum GPA requirements for additional course work, etc.).

Within six months of passing the BME QE, or earlier if the student plans to defend their Ph.D. within a few months, the student must email the list of their Dissertation Committee members (names and role of each member) to Maria. The list is for the student’s Dissertation Committee and the student should list his/her research advisor, not their QE Chair, as the Chair of their Dissertation Committee. Students must adhere to Rackham’s guidelines for their Dissertation Committee.

The GEC has observed several common “red flags” or conditions that students needed to address before they were advanced to candidacy. These non-inclusive items are listed below, and it is recommended that students, advisors and Committee members familiarize themselves with these.

- Too ambitious a plan – need to narrow scope/eliminate an aim
- Need to clearly state your hypothesis
- Need to better develop experiments to address testable hypotheses
- Sparse knowledge of relevant literature
- Limited understanding of <some topic, typically a biology sub-topic>
- Need to develop command of known methods for analyzing … and articulate why techniques are used and impact of technique
- Need to link aims to biological measures and explore biological relevance of technique
- Incomplete research plan
- Describe specifically how … will be determined
- Need greater detail in experimental protocols, data analysis
- Need to clearly define metrics for success
- Need meaningful control experiments
- Prepare summary of factors known to affect <biological process>
- Clarify statistical methods to be used; perform power analysis
- Distinguish what is your independent work
- Need to improve quality of written proposal

Notes/Reminders for the Student:
The student should email the list of their proposed QE Committee members and their roles to Maria at least two months prior to the exam so that she can check to make sure that the Committee meets the requirements. If the Committee does not meet the requirements, the student will either need to revise their Committee or get approval from the BME Department (via Maria) to submit Special Memberships on the Dissertation Committee materials to Rackham. The Deans in Rackham review the special membership paperwork and a staff member in Rackham relays their decision to the student. It should be noted that it can take more than one month to receive a decision on the materials. If the Committee does not meet the requirements, the student will need to revise their Committee or submit additional materials to Rackham which could result in a delay taking the exam.

If a student has more than one research advisor both advisors must submit a Qualifying Examination and Candidacy Student Evaluation Form, or if they prefer they can both complete and sign the same form. Students are responsible for reminding their research advisor to keep a copy of this form and bring it with them to the exam in case other Committee members have questions or would like to see it.

Most QE Committees have members who are not primarily appointed in BME. To better ensure that all Committee members understand the exam process, the student is responsible for printing off hard copies of the QE Memo for each of their Committee members and giving the copies to the Chair of the
Committee on the day of their exam. The Chair will then distribute copies to the other Committee members before the student takes the exam, and summarize the document so that all members understand the exam process.

Remember that students are required to complete training in responsible conduct of research and scholarship before advancing to candidacy.

Materials due to Maria at least two weeks prior to the date of the exam.

• Proposal

Forms due to Maria at least one month prior to the date of the exam.

• Qualifying Examination and Candidacy Student Evaluation signed by the student’s research advisor(s)
• Qualifying Examination signed by the student’s QE Committee

Candidacy Requirements

The precandidacy stage of the doctoral program prepares students for undertaking original independent research, and allows them to acquire knowledge and tools needed to be successful in an academic or research position. Students learn about their field of study and gain familiarity with standards of evidence, argument, practice and methods in preparation for candidacy when they focus intensively on a narrower area of research.

Students should demonstrate readiness to undertake independent dissertation research by achieving candidacy no later than three calendar years after the first enrollment in their Rackham doctoral program. Faculty determine candidacy requirements, and may set earlier deadlines. A student who does not achieve candidacy within three years will be placed on academic probation, unless the graduate program petitions Rackham OARD to request additional time because of extenuating circumstances.

This information is available at http://www.rackham.umich.edu/policies/academic_policies/section5/#51/.

Cogitate Requirement

Rackham recognizes the value of intellectual breadth in graduate education and the importance of formal graduate study in areas beyond the student’s field of specialization. Cognate courses are those that are in a discipline or area different from a student’s field of study but are related or connected with some aspect of this field. All cognate coursework must be approved by the graduate program. Cognate requirements may be satisfied in three ways:

1) By completing 4 credit hours of cognate coursework in approved graduate-level courses with a grade of B- or better (certain graduate programs may have additional cognate requirements).*

2) By using coursework within the same graduate program but in a subfield different from the student’s own. A course in a student’s program that is cross-listed as a course in another program may satisfy the cognate requirement. In this case, the graduate program should notify Rackham OARD.

3) By completing graduate coursework at another institution that meets the expectation of the cognate requirement, without transferring the credit to the transcript. This coursework must be completed no more than 5 years before admission to the current Rackham doctoral program. The student must provide Rackham OARD with an official transcript, and the graduate program should notify Rackham OARD that the coursework fulfills the cognate requirement. These courses do not apply toward the minimum 18 credit hours required for the degree and do not appear on the University transcript.

* The BME Department requires students to receive a B or better in all courses that are counted toward their MS degree and PhD degree, including the prerequisites for the MS degree (see Grade Requirement).

This information is available at http://www.rackham.umich.edu/current-students/policies/academic-policies/section5#52/.
Responsible Conduct of Research and Scholarship Training
Integrity in research and scholarship is a fundamental value of the University of Michigan. It is the responsibility of all students to conduct research and scholarly activities in an ethical manner at all times. An indispensable part of graduate education is for students to become knowledgeable about the responsible conduct of research and scholarship appropriate to their discipline or field of study.

Effective for new students in the fall 2014 term, all Ph.D. students are required to complete training in the responsible conduct of research and scholarship before advancing to candidacy. Each graduate program determines the content and methods for providing students with this education and for ensuring its successful completion. Requirements may take the form of a course, workshop, or be part of a larger professional development seminar, but must include at least eight hours of face-to-face contact between students and faculty members, with more than one faculty member involved.

The Graduate Chair must certify that each student who applies to advance to candidacy has completed the required training.

Training in the responsible conduct of research and scholarship is optional, but strongly recommended, for students in master’s and DMA programs.

This information is available at [http://www.rackham.umich.edu/current-students/policies/academic-policies/section5#53](http://www.rackham.umich.edu/current-students/policies/academic-policies/section5#53).

Candidacy Deadlines
The candidacy deadlines are available at [http://www.rackham.umich.edu/current-students/policies/doctoral/phd-students/candidacy-deadlines](http://www.rackham.umich.edu/current-students/policies/doctoral/phd-students/candidacy-deadlines).

When candidacy is approved, the Registrar’s staff will change all 990 enrollments to 995 for the student. Tuition will then be reassessed at the candidacy rate; only 990 registrations will be changed to 995; other courses would require an official drop/add form initiated by the student if changes are needed.

Guidelines for Dissertation Committee Service

The Graduate Faculty
For dissertation committee purposes, “The Graduate Faculty” consists of person who are tenure or tenure-track instructional faculty holding an “unmodified” (i.e., not visiting, adjunct, etc.) appointment at the University of Michigan as Professor, Associate Professor, or Assistant Professor with an earned Doctorate from an accredited institution.

Composition of the Dissertation Committee
Dissertation committees must have at least four members, three of whom are members of the Graduate Faculty (see definition above), and two of whom are from the doctoral candidate’s home program. Furthermore, each committee
- Must have a sole chair or two co-chairs;
- Must have a cognate member who is familiar with the standards for doctoral research and holds at least a .50 appointment in a Rackham doctoral program, other than the student's home department/program (except IDP programs.)
- May include a University faculty member who is not Graduate Faculty (see definition above), a University staff member, or a qualified individual outside the University to provide expertise in the candidate’s discipline.
Roles of the Chair (or Co-chairs) and Cognate Member

The chair (or each co-chair) is responsible for guiding and encouraging the candidate’s design and execution of an original, high quality, doctoral-level research project. The end result of this effort is expected to be a dissertation that makes a substantive contribution to the candidate’s discipline.

The cognate member’s role is to broaden the scholarly representation of the dissertation committee beyond the candidate’s home program. The cognate member also serves the Graduate School and its Faculty by providing a non-specialist’s perspective on the quality of the dissertation.

Eligibility for Service on Dissertation Committees

Nominations for dissertation committee service are made by means of the Dissertation Committee form found on the Rackham OARD website, which must be signed by the chair of the doctoral candidate’s program. All nominations must be approved by the Graduate School and are subject to the following guidelines:

1. Graduate Faculty (see definition above) —i.e., Professors, Associate Professors, and Assistant Professors—affiliated with a Rackham doctoral program and who hold an earned Doctorate from an accredited institution may serve as a member of the committee, or as sole chair, co-chair, or cognate member.

2. Graduate Faculty (see definition above) not affiliated with a Rackham doctoral program may serve on dissertation committees. They may also serve as co-chair with a member of the Graduate Faculty (see definition above) affiliated with a Rackham doctoral program, but not as sole chair or cognate member.

3. Instructors and Lecturers who have no appointment as members as Graduate Faculty (see definition above) may serve on dissertation committees if they hold an earned Doctorate from an accredited institution. They may also serve as co-chair with a member of the Graduate Faculty (see definition above) affiliated with a Rackham doctoral program, but not as sole chair or cognate member.

4. Retired and emeriti Professors who were affiliated with a Rackham doctoral program may serve on dissertation committees. They may also serve as co-chair or, by special arrangement (see Special Membership form), as sole chair or cognate member.

5. Research Professors (RP, i.e., Research Professors and Research Associate Professors) who are affiliated with a Rackham doctoral program may serve on dissertation committees if they hold an earned Doctorate from an accredited institution. They may serve as a co-chair, regular member or by special arrangement as a sole chair.

6. Research Scientists (RS, i.e., Research Scientists, Associate Research Scientists, Assistant Research Scientists, Research Assistant Professors, and Research Investigators) who are affiliated with a Rackham doctoral program may serve on dissertation committees if they hold an earned Doctorate from an accredited institution (see Special Membership form). They may not serve as sole chair or cognate member.

7. All those who do not have an earned Doctorate, whether affiliated with a Rackham doctoral program or not, must be approved for dissertation committee service on a case by case basis. If approved, they may serve as a member of the committee, as the sole chair, co-chair, or cognate member.

8. University faculty and staff not included in the preceding categories and qualified individuals outside the University whose service is desirable may serve on dissertation committees, subject to review on a case by case basis. They may also serve as co-chair with a member of the Graduate Faculty (see definition above) affiliated with a Rackham doctoral program, but not as sole chair or cognate member.

N.B. No person working toward a doctoral degree may serve on a dissertation committee until all requirements for the degree have been met.

N.B. University faculty who were approved to serve as sole chair or cognate member but who are no
longer affiliated with the University may not continue to serve as the sole chair or as the cognate member. The faculty member may serve as a co-chair or as a regular member based upon the eligibility guidelines for dissertation committee service.

**Special Membership on the Dissertation Committee**

University faculty and staff who are not Graduate Faculty (see definition above) and qualified people from outside of the University of Michigan who may or may not hold academic appointments and whose service on the Dissertation Committee would contribute significantly, may be nominated for special membership by submitting:

- Dissertation Committee form
- A memo detailing the nominee’s expertise in the dissertation topic
- A Vita or resume
- For a retired Professor, a memo confirming he/she has:
  a) Experience in serving on, and chairing dissertation committees (decision-making experience as chair is required)
  b) Service as a teacher of formal courses or seminars
  c) Served as a counselor or advisor for doctoral students

* Previous experience as a cognate is not required for nomination as cognate (cognate criteria must be met).

Some programs require students to submit the Dissertation Committee Worksheet to them before the committee can be approved.

**Dissertation Resources**

A student’s primary sources of information about policies and procedures related to the doctoral dissertation are the Doctoral Students section of Rackham's website, Grad Tools, and the professional staff at the OARD. In addition, Rackham's website links students to numerous resources. The website also offers a wealth of information for doctoral students. In addition, the professional staff members in OARD are available to answer questions and assist students. Please send inquiries to OARD.questions@umich.edu.

**Final Oral Examination**

The student will need to email their BME Final Oral Examination information to me at least 2 weeks before their scheduled defense so that I can forward it to the BME community.

**COMMENCEMENT AND UNIVERSITY GRADUATE EXERCISES**

Commencement is a ceremony that is held in honor of the completion and/or in anticipation of your fulfilling all academic requirements at the University of Michigan. The University Graduate Exercises is a ceremony held only for master’s or doctoral graduates who received their degrees through the Rackham Graduate School. Schools and colleges may also have separate ceremonies for their graduating students.

Graduate students can participate in both the University Graduate Exercises and Commencement. However, undergraduate students can only participate in Spring Commencement.

**Graduation**

Graduation is the term used when the University awards you an actual degree and diploma upon completion of all academic requirements. Your name appearing in the Commencement Program and/or participating in the Commencement Ceremony does not denote graduation from the University.
Eligibility
Many graduate students track their progress with their departments to ensure they have met eligibility requirements to participate in commencement. Master’s and doctoral candidates are welcome to contact Rackham’s Office of Academic Records and Dissertations (OARD) at (734) 763-0171 for more information.

This information is available at http://www.rackham.umich.edu/help/graduating/commencement_and_eligibility/.

REQUESTS
If a student needs a letter stating that they are a student in good standing, official transcript (usually for travel grants), etc., please give me at least 48 hours notice. If I am out of the office or the system/my computer is down, it may take me some time to process the request.

CONTACT INFORMATION
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