



TO: Examiners and Students, Department of Biomedical Engineering (BME)
FROM: Graduate Education Committee (GEC)
RE: BME Qualifying Examination

This memo describes the [Qualifying Examination \(QE\)](#) procedure for the [BME Department](#). Questions about the QE should first be directed to [Maria Steele](#) with follow up from the GEC as necessary.

1. The qualifying exam consists of a single oral exam conducted by the student's QE Committee. In the exam, the student will present his/her doctoral research proposal to the Committee and respond to their questions and comments. The student should allow approximately 2 hours for the exam – 30 minutes for his/her presentation and 1.0 – 1.5 hours for questions from the Committee. 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 core faculty member must be on the Committee, (2) For the purposes of administering the exam, the Chair of the QE cannot be the student's research advisor, but it must be a [core faculty member](#) or an associate faculty member included on the list below, and (3) The student's research 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 and all members must sign the [QE Committee Form](#). This form needs to be returned to Maria no later than one month prior to the date of the exam. The student's research advisor(s) and Chair of the QE must complete the [QE Evaluation Form](#) and email the completed form to Maria after the exam.

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

Arruda, Ellen	Giannobile, William	Moon, James
Ashton-Miller, James	Hernandez-Garcia, Luis	Patil, Parag
Baker, James	Kozloff, Kenneth	Shih, Albert
Eniola-Adefeso, Omolola	Lahann, Joerg	Shore, Susan
Fessler, Jeffrey	Larkin, Lisa	Stacey, William
Fowlkes, J. Brian	Liu, Allen	Wang, Thomas
Franceschi, Renny	Ma, Peter	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, research 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 one week prior to the date of the exam.
4. *Timing*. Students who enter without a prior M.S. degree are required to achieve candidacy within two years of entering the Ph.D. program. Students who enter with a prior M.S. degree are required to achieve candidacy within one year of making their prior M.S. degree relevant. If a student is unable to meet this deadline, the student must submit a [petition](#) to the GEC to delay the exam. Note that students are allowed to take the exam in the term in which they will meet the requirements for their M.S. degree or make their prior M.S. degree relevant, but not earlier. The student will not achieve candidacy until the requirements for their M.S. degree or making their prior M.S. degree relevant have been fulfilled.
5. *Eligibility*. The student must have a research advisor and be working in a relevant laboratory. The student's research advisor must commit to be willing to support (academically and financially) the student during his/her doctoral work. The student must form his/her QE Committee. The student must meet the minimum

requirement of a 3.5 GPA. If the student does not meet the GPA requirement, the student will need to submit a [petition](#) and the student's research advisor will need to attend a GEC meeting to discuss the petition. 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 research 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 exam. 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 exam:

- 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 Chair of the QE the 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 exam, the Chair of the QE will email the QE Evaluation Form, which has been approved by all Committee members, to Maria and she will then forward a copy to the student. The form will include:

- 1- Brief summary of the student's academic and research performance to be filled in by the student's research advisor.
- 2- Brief summary of the student's performance at the exam and recommendation to the student to be filled in by the Chair of the QE.
- 3- Decision of the Committee to be filled in by the Chair of the QE.

Within six months of passing the 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 the Chair of the QE, as the Chair of their Dissertation Committee. Students must adhere to [Rackham's guidelines](#) for their Dissertation Committee.

If the student does not pass the QE, the student will be discontinued from the BME Ph.D. program at the end of the term in which the QE is taken.

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, research 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 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 Membership 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 could 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 complete the QE Evaluation Form.

Most 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 Examiners and Students for each of their Committee members and giving the copies to the Chair of the QE on the day of their exam. The Chair of the QE 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.

If the student does not pass the QE, the student will be discontinued from the BME Ph.D. program at the end of the term in which the QE is taken.

Materials due to Maria at least **one week** prior to the date of the exam.

- Proposal

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

- [QE Committee Form](#)
signed by the student's QE Committee

Form due to Maria **after** the exam.

- [QE Evaluation Form](#)
completed by the student's research advisor(s) and Chair of the QE