2.5. PhD Qualifying Examination

2.5.1 Timeline for the Qualifying Exam

- The student must take the qualifying exam before the end of their fifth semester in the PhD program. Students may begin the qualifying exam earlier than this, particularly if they entered the program with a previous graduate degree. Typically, students complete their coursework before taking the Qualifying Exam.

- The student will be notified by the QEC committee chair (appointed by the BME Graduate Studies Committee) that the qualifying exam period has begun. At this stage, they will be notified that a Specific Aims review meeting will occur in one calendar week. The student must produce and distribute the specific aims page to the QEC at least 24 hours in advance of the Specific Aims meeting. The Qualifying Exam should follow the formatting and content sections included in the BME QE Template. This template may be downloaded from the BME Graduate Program Website.

- The Aims meeting is to serve as an opportunity for the student to obtain feedback from the QEC on the style, structure and approach of their proposed Specific Aims. The Aims meeting is scheduled for one hour.

- Three weeks from the Specific Aims meeting, the full proposal is due and is to be distributed to each member of the QEC.

- The Qualifying Exam, which includes a brief (approximately 30 minutes) presentation of the proposed project by the student to the QEC, will be scheduled within two weeks of the proposal due date. The Qualifying Exam is scheduled for two hours.

2.5.2 Rules for Student/Faculty Interaction during the Qualifying Exam

The student is expected to complete the Qualifying Exam independently. Students may not consult their Academic advisor on matters related to the Qualifying Exam from the time that the Specific Aims page is submitted until the Qualifying Exam is complete. Students may contact QEC members to clarify any discussion points that came up during the Specific Aims review meeting, but may not ask for assistance with the written Exam document.

2.5.3 Rules for Student Preparation for the Qualifying Exam

Students may record their Specific Aims meeting, and may refer back to this recording as they work on their QE proposal. Students may prepare a limited number of extra/ supplemental slides to assist them in demonstrating their content knowledge. However, students should remember that the purpose of the QE is to test their knowledge of biomedical engineering concepts and scientific method. Simply showing a slide that was prepared ahead of time will likely not be sufficient to demonstrate this knowledge, although it may be helpful in explaining how to apply a particular concept. Students may not record the Qualifying Exam.

2.5.4 Parameters assessed during the Qualifying Exam

- The successful student is expected to scientifically defend their proposed experimental rationale as well as relate their project into the broader aspects of the chosen field.
- The successful candidate will
demonstrate a core competence in general aspects of physiology, engineering, and mathematics (see below).

- The successful candidate will demonstrate his/her ability to formulate a testable hypothesis and design an appropriate experimental plan.

- Furthermore, the successful candidate will demonstrate an advanced (state of the art) level of competence in a subset of fields encompassing biomedical engineering according to the following scheme: One area of biological science expertise chosen from:
  1. Physiology
  2. Molecular Biology
  3. Cell Biology

Two (2) areas of engineering expertise chosen from:
  1. Tissue engineering
  2. Biomaterials
  3. Biomechanics
  4. Instrumentation
  5. Signal processing
  6. Imaging

One area of mathematical sciences expertise chosen from:
  1. Statistics
  2. Advanced engineering mathematics

Members of the QEC will ask the candidate questions related to the candidate’s chosen topics in each category listed above. The candidate will provide their chosen area of advanced expertise in writing to the QEC at the time of the specific aims meeting.

2.5.5 Possible outcomes of the BME department Qualifying Exam

1. **Unconditional Pass** – The candidate satisfied a majority of the QEC according to all criteria.

2. **Conditional Pass** with specific course work to address a specific deficiency – The candidate satisfied a majority of the QEC with the exception of a particular weakness in a limited number of the areas of specialization. The QEC is confident that the weakness can be corrected by the candidate taking particular course(s) specific to the area(s) of weakness.

3. **Fail with an opportunity to retake within 6 months** - The QEC determined that the candidate lacks fundamental knowledge, had several weaknesses or was not able to scientifically defend their proposed experimental rationale. However, the majority of the QEC determined that the student has the potential to be a successful PhD candidate and could address the weaknesses. In this case, the student will have

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an opportunity to repeat the exam which must be accomplished with 6 months of the original exam. The second exam only has 2 possible outcomes: unconditional pass, or fail without opportunity to retake the exam. The research advisor may elect to suspend funding pending successful completion of the QE by the student.