**PhD Qualifying Exam in Biomedical Engineering**

**Updated: April 25, 2022**

**Qualification Exam (Overview)**

The following requirements must be satisfied within 2 years of matriculation in accordance with rules set by the Grad College. Each requirement must be attempted within the 1 year of matriculation (this allows time for second chance opportunities if any requirement is not met on the first attempt).

1. Receive a passing grade in the following courses (Students must take these courses in their first year):
   1. BME 553 or comparable course in physiology
   2. BME 522 or comparable course in mathematics
   3. BME 500
   4. BME 501
2. Receive a passing grade in the BME PhD Qualifying Exam (details below)
   1. The student will be provided a topic relevant to their thesis along supported by 3 or more papers and a list of concepts selected by the student’s qualifying exam committee (selected by the student’s primary mentor).
   2. Over 4 months of preparation with mentor guidance the student will present a >2000-word written document and a 30-min oral presentation on the topic to their committee, and must further demonstrate their understanding through a 30- to 60-min oral defense led by the committee

***BME PhD Qualifying Exam***

* Within 3 months of a student’s matriculation, the student’s mentor will submit the following to the BME PhD Curriculum Committee for review:
  + A title of a **topic** they feel is relevant to the foundational training of the student
  + at least 3 scientific **articles** that cover the key concepts in the proposed topic
  + and a proposed qual exam **committee:**
    - Committee must include at least 3 Category I faculty (not including the mentor)
    - The mentor will act as a non-voting member. Mentor input should be weighed in committee decisions
    - It must include 1 voting member from the PhD Curriculum committee
    - It must include at least 2 voting members with a primary appointment in BME
* Evaluation and approval of **topic**, **articles**, and **committee** membership by the *PhD Curriculum Committee* will consider scope of the **topic**, distinctive nature of the selected **articles**, and that there is coverage of sufficient technical and biomedical application depth by the **committee**. At least 3 of the selected **articles** should not include the mentor as an author.
* Approved **topic** and **articles** will be shared with the approved qual exam **committee**, who will meet to define a list of specific **concepts** relevant to the **topic**, and that are at least partially covered by the articles for which they would like to see the student demonstrate understanding and technical competency. Emphasis should be placed on ensuring sufficient depth in engineering is covered by the **concepts**. The **concepts** are to be shared with the student, along with the **topic** and **articles**, so they understand what is expected of them. The qual exam **committee** must complete this at least 2 weeks prior to the end of the student’s first semester.
* At the end of the student’s first semester, the student will be provided the approved **topic**, list of **articles**, and list of specific **concepts** they are expected to demonstrate thorough understanding and technical competency.
* The student then has ~5 months to:
  + prepare a >2000-word document (figures are encouraged)
  + and prepare a 30-minute presentation

each of which aims to summarize the selected **topic** with special consideration of the **articles** and **concepts** provided.

* The student’s mentor(s) is encouraged to provide guidance to the student in preparing the written and oral presentations. Students starting in Summer or Fall (May-August) will be expected to present in May of their first year, while students starting the PhD program in Spring (January) will be expected to present in September.
* The oral presentation will be immediately followed by a 30-60 min oral defense, led by the qual exam **committee**. The oral defense must explore all defined **concepts** and may include undefined concepts covered in the provided **articles** and the references found in those **articles**. While the oral presentation may be open to the public, the oral defense must be carried out with only the student and qual exam **committee** present. It is expected that each member will have 10-15 min of time to question the student.
* Methodology of pass/fail evaluation is entrusted to the qual exam committee; however, evaluations should predominantly focus on the student’s demonstrated understanding and critical thinking in terms of the pre-defined **concepts**. Evaluations should also address written and oral communication; however, these should not drive the decision of pass or fail, rather they are useful for mentor understanding to guide their subsequent mentoring.
* A detailed **summary** of the student’s strengths and areas where improvement is needed will be drafted by the student’s primary mentor and with approval of the qual exam committee, will be shared with the student.
* In the event of a failure in this component of the qualifying exam, the student has 4 months, with **mentor** and **committee** support, to prepare for a second presentation of the same **topic**, **articles**, and **concepts**. They will be provided the **summary** to help guide them on how to improve. A second failure will result in removal from the PhD program.
* The *PhD Curriculum Committee* members will present an overview of each student’s presentation and results of their evaluation to the full BME faculty at the end of each examination cycle.

\*\*The BME PhD Curriculum Committee is aware that the thesis topic and/or mentor may change in the evolution of the PhD. A change in topic or mentor after the successful completion of the qualifying exam will not require a new process. If a mentor change occurs within the first 8 months of a student’s matriculation, a new process will be initiated by the new mentor, and the student’s examination clock will be restarted.