

## Ph.D. Qualifying Exams: Goals, Procedures and Definitions

All Ph.D. students must pass the qualifying exam before the start of the second year to prove their preparedness and capabilities required in the ECE Ph.D. program. The exam will include a literature review, a written report, and an oral presentation on a given research topic followed by questions from the Qualifying Examination Committee.

### 1. Goals of the Ph.D. Qualifying Exam:

- a. Encourage and evaluate the students' basic skills in reading literature, identifying important problems, developing solutions, and presenting ideas orally and in writing.
- b. Encourage students to read literature critically, question assumptions, and find openings for future work.
- c. Evaluate the student's understanding of the relevant coursework to the topic they presented.

2. **Timing:** The graduate coordinator and/or the seminar course coordinator will assign the date/time of the student's qualifying exam to take place within one calendar year of their entry into the program.

3. **Topic:** The student's advisor selects the topic in consultation with the student.

### 4. Procedures:

- a. The student will define the scope of the problem, define research questions and conduct a comprehensive and comparative literature review where they categorize, compare, and contrast different ways of solving the problem. They will identify the holes in the literature and develop plans for future research.
- b. The student will identify five 400-level or above courses that are relevant to the problem at least 1 month before the exam. At least three of these courses must be ECE courses. The graduate coordinator will choose three ECE faculty members who are closest to those courses (excluding the student's advisor) at least 2 weeks before the exam. The graduate coordinator appoints a chair for each Exam Committee.
- c. The student will submit a formal report in the form of a 4 to 6 pages long literature review survey, with enough background material to make it understandable to committee members outside of the field. The references are excluded from this page limit. The report must be submitted to their Qualifying Exam Committee two weeks before the scheduled presentation. A copy of the report must be filed with the graduate coordinator.
- d. The student will make a public presentation and answer relevant questions. The graduate coordinator will strive to schedule these during the ECE Seminar Series.
- e. The student will meet the Qualifying Exam Committee and answer questions at the end of the public presentation.

5. **Literature Review:** All research begins with identifying a problem to be solved and reviewing past research on that topic. A good literature review consists of:

- a. Problem formulation—which topic or field is being examined and what are its component issues?
- b. Literature search—finding materials relevant to the subject being explored.

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- c. Data evaluation—determining which literature makes a significant contribution to the understanding of the topic.
- d. Analysis and interpretation—discussing the findings and conclusions of pertinent literature.
- e. Identification of new research on the chosen topic

After identifying their topic, the student will do a literature review and write a paper on it. The paper must contain the above components. Students must also identify any gaps in their own knowledge and identify courses that will allow them to fill these gaps. The relation of these courses to the topic must be explained.

It is emphasized that *this is a literature review and not a dissertation proposal*. The student is expected only to identify potential topics for future research, not to propose a detailed research plan nor have any preliminary data from their own work at this stage. Those are topics for the Comprehensive Examination, i.e., the dissertation proposal.

6. **Public Presentation and Examination:** The students should prepare a presentation based on their literature review. The presentation should take no more than 25 minutes, followed by a 15-minute public question and answer session. The room will then be vacated, and the student will answer questions from the Qualifying Exam Committee.
7. **Qualifying Exam Committee:** The Exam Committee is composed of three ECE faculty who are closest to the topic and courses proposed by the student, excluding the student's advisor. The committee members are selected by the Graduate Coordinator. The Committee consists of a Chair and two regular Members.
  - a. The Chair coordinates the timing of the qualifying exam with the graduate coordinator. The Chair runs the Qualifying Exam presentation, questions and answers session, the examination by the committee and the deliberations meeting. The Chair will report the outcome of the exam to the Graduate Coordinator via email. This email will state the decision, whether it was unanimous or by majority vote, and any feedback to the student. The Chair will also report the committee's agreed upon rubric scores to the graduate coordinator.
  - b. The committee members should review the written report and score it using the *written report rubric* (attached). They are not required to provide feedback on the report to the student prior to the examination.
  - c. The committee members should score the student's presentation as well as their response to answers to questions in the public and private portions of the exam using the *oral presentation rubric* (attached).
  - d. During the deliberations, the Exam Committee will compile the graded rubrics and deliberate if the student met the goals stated at the start of this document.
8. **Decision:** The decision will be made by the Qualifying Exam Committee with the presence of the student advisor as a non-voting member. The decision must be reported to the graduate coordinator within 24 hours. The Qualifying Exam Committee will use the attached written and oral presentation rubrics which are based on the goals defined in this document. These are the minimum rubrics for evaluation purposes. The Committee may elaborate on these rubrics, but they may not remove any portions. The Committee's decision can have two possible outcomes:
  - a. **Pass:** the student meets the Ph.D. qualifying requirements (requires majority vote)

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- b. Fail:** For students who do not pass the exam on their first attempt, the examination committee will vote whether the student should be allowed to retake the exam. At least one committee member must support allowing the reattempt to allow the student to take the exam a second time. If the student is allowed the reattempt, they must retake the qualifying exam before the end of the following semester. If the committee does not allow the reattempt, or if the student fails to pass on their second attempt, they will be dismissed from the Ph.D. program.
  
- 9. Role of the student's advisor:** The student's advisor will work with them to identify suitable topics for this exam. They are welcome to guide the student in the down-selection of articles they find in a literature search to include in their review. However, all presented work must be the student's own work. The student may not copy from their advisor's proposals or papers. The student may use materials from a paper they are a co-author of. The advisor should not edit or co-author the qualifying exam report. The advisor should not practice the presentation with the student. The advisor is welcome to attend the public presentation and the following Q&A session. The advisor should not be present during the private examination portion. They will attend as a non-voting member during the Qualifying Exam Committee's deliberations.
  
- 10. Promotion and visibility:**

  - a.** A Google Drive folder will contain announcements of upcoming research exams. Examples of well-written reports and presentation slides may be provided.
  - b.** The public presentation portion of the examination will be open to all, and the ECE Department will promote attendance. The ECE Department will allocate specific time slots for all research exams to make it easier for people to track and attend them.