

Guidance to Students Preparing for the Ph.D. Qualifying Exam

The Ph.D. Qualifying Exam is a written and oral exam that students admitted to our Ph.D. program take during the second semester of enrollment. The written portion of the exam is intended to assess the student's undergraduate training in the areas of electrical engineering most directly relevant to the proposed area of research. The oral portion of the exam assesses the student's understanding after reading an assigned research journal article and summarizing its relevance and importance.

In the event of a failed first attempt, the student may take the Ph.D. Qualifying Exam a second time at the next exam opportunity. A student who does not pass the Qualifying Exam at an acceptable level in two attempts cannot continue in the Ph.D. program. A student in this situation may petition the ECE Graduate Student Progress Committee to be allowed to transfer into the M.S. or the M.Eng. degree program.

Written Qualifying Exam

This is a 72-hour take-home exam with two questions covering basic concepts of math and electrical engineering tailored to the student's intended research area (e.g., biosystems, computer engineering, signal processing, controls, power, and optics). The purpose is to assess the student's undergraduate training in those areas most directly relevant to their proposed research area.

The written exam problems are created by a special exam committee comprising the student's advisor and at least two colleagues from the relevant area of research. The special exam committee determines the topical area of the exam, and the general body of knowledge to be examined is made known to the student at least two weeks before the exam date.

The written exam is ordinarily offered at the end of the third week of classes, or at a later time determined by the ECE Graduate Student Progress Committee. The student will pick up the exam at noon on Friday, and turn the results in by noon the following Monday (72 hours total). Assuming the student is well prepared, the solution of each problem is expected to require approximately 3 hours of effort (~6 hours for the two problems).

Because the written exam is a take-home test, the exam problems are intended to examine engineering interpretation and problem-solving skills, not rote memorization of facts and formulae. The written exam problems assume that the student will have time to locate and utilize basic reference material, such as common mathematical formulae and contemporary undergraduate EE textbooks.

The written exam is an individual exam: students may not collaborate in preparing the exam solution. Any questions regarding the written exam problems must be addressed only to the exam committee.

Upon completion, the exam score is determined by the exam committee and reported to the ECE Graduate Student Progress Committee. The score and the graded written exam is kept confidential, and is not returned to the student.

Oral Qualifying Exam

This is a 1-hour oral exam with 3 faculty members and the student. One week prior to the oral exam, the exam committee will assign the student a relevant research journal article to read and understand. In addition to studying the assigned article, the student will also identify one related journal article for greater depth in the area of the assigned article. The article identified by the student is provided to the exam committee prior to the date of the oral exam.

For the oral exam itself, the student gives a 10-minute scholarly presentation about the research paper assigned by the faculty, the related paper the student chose, and how the papers relate to each other and the larger field of research. Following the brief presentation of the papers and the significant methods and results, the faculty members will explore the student's understanding of the material, how the ideas flow in the papers, and the student's understanding and ability to communicate clearly the fundamental principles of the research area. The exam committee may, at its discretion, also ask questions pertaining to the written portion of the exam.

The date of the Oral Qualifying Exam is selected by mutual convenience of the student and the exam committee. Ordinarily the Oral Exam should be within a few weeks of the Written Exam, but in any case, the Oral Exam needs to be completed by the end of the 12th week of the semester.

Assessment

Upon completion of the written and oral portions of the exam, the administering faculty committees will report the results of the exam to the ECE Graduate Student Progress Committee. The Graduate Student Progress Committee will consider the results of the exam and formulate a recommendation to the ECE faculty. The ECE faculty will in turn review the recommendations of the committee and determine the outcome of the exam (pass or fail). This result will be reported to the student at the conclusion of this review process (which can take 2–3 weeks). Note that the student will only receive an overall pass/fail result, and will not be given scores or feedback on individual parts of the exam.

Relevant sections from the ECE Graduate Handbook

2.4.1 Ph.D. Qualifying examination

The Ph.D. Qualifying Exam is a written and oral exam taken in their second semester by students admitted for PhD studies. A student may retake the exam a 2nd time in the event of a failed first attempt.

2.4.1.1 Written qualifying exam

This is a 72-hour take-home exam with 2 questions covering basic concepts of math and electrical engineering tailored to the student's intended research area (e.g., biosystems, computer engineering, signal processing, controls, power, and

optics). The purpose is to assess the student's undergraduate training in those areas most directly relevant to their proposed research area.

2.4.1.2 Oral qualifying exam

This is a 1-hour oral exam with 3 faculty members and the student. The student gives a 10-minute oral presentation about one research paper assigned by the faculty 1 week before the oral exam and one related paper the student finds. Following the brief presentation of the papers, their related methods and results, the faculty members will explore the student's understanding of the material, how the ideas flow in the papers, how the papers relate to each other, and the student's understanding and ability to clearly communicate the fundamental principles of the research area.

A student who does not pass the exam the first time will be offered a second opportunity to take the exam the next time it is offered. A student who does not pass the Qualifying Exam at an acceptable level in two attempts cannot continue in the Ph.D. program. A student in this situation may petition the ECE Graduate Student Progress Committee to be allowed to transfer into the M.S. or the M.Eng. degree program.