

Ph. D. Qualifying Exam for Electrical and Computer Engineering Department

Goal: ECE Department's qualifying exam needs to be a constructive component in the development of a student's research skills and use the course work requirements to identify potential doctoral students.

Exam Structure: The Ph. D. Qualifying Exam has two parts: I) GPA requirement on selected courses, and II) Research potential assessment.

Part I. GPA Course Requirements

ECE Course Requirement: Prequalified doctoral students are required to pass four courses selected from a list of relevant doctoral courses ("core courses") with a GPA of at least 3.5 or higher.

Each research group (Communications, Signal Processing and Microwave; Computer Networking; Computer Architecture, Electronic and Photonic Devices; and Intelligent Systems) has its own list of courses. *Courses are listed at the bottom of this document.*

Part II. Research Potential Assessment Oral Qualifier

The research potential assessment oral qualifying examination must be taken within the first year from the time the student starts the Ph.D. program if he/she has a MS degree. In the case of a student accepted into the BS-Ph.D. track, the exam must be taken within two years from the time the student starts the Ph.D. program. For the students accepted with a MS degree, within the first two semesters from the time the student starts the Ph.D. program the student must complete one Independent Research course in his/her research area of interest. For the Independent Research course, the student registers with a faculty member who may or may not be the student's prospective Ph.D. advisor.

The oral exam committee will be assigned by the Associate Chair for Graduate Studies of the ECE Department. It will be chaired by a faculty member from an area different from the student's area of interest. In addition to the Chair, the committee will include three faculty members in the student's area of interest. The supervisor of the independent research work or the student's prospective advisor may be part of the committee.

A student must send in an official application for taking the oral Qualifying exam to the Associate Chair for Graduate Studies, at least one month before the target date of the oral exam committee. The student is responsible to find a time such that all committee members can attend. In the application, the student should identify the research focus area for the exam and outline how the course requirements (if any) for that focus area have been met.

For the oral exam, the student will prepare a written report to the committee and to the associate chair for graduate studies at least one week before the exam date. The report should be written following the standard format of a conference paper, with 4-6 pages in double column, font size 11. The subject of the oral exam is to be chosen by the student. It is recommended that this choice be made in consultation with a faculty advisor and the ECE associate chair for graduate studies. A suitable basis for the examination may include, but is not restricted to:

- A paper/report (conference, journal, technical report, patent, and/or published or submitted)
- A conference paper submission based on research under the supervision of a faculty advisor.
- An M.S. thesis in preparation or previously completed thesis
- A final project report derived from an ECE Independent Study course.

During the exam the student will make a 30-minute oral presentation of his/her own independent research to the oral exam committee.

The oral presentation will be followed by an open-ended question and answer session that may include questions specific to the research project as well as questions generally relevant to the research area regarding fundamental knowledge underpinning the project topic. In addition, basic questions from various different areas can be asked to determine student's breadth of understanding.

Since this examination will occur in the early stages of research, and since the oral exam is not a doctoral defense, the presented paper need not lead to a Ph.D. thesis proposal. For the examination committee, evaluation of the originality and novelty of the research contribution will be secondary to an evaluation of the student's critical thinking skills. Specifically, the committee will focus on the student's ability to analyze, interpret and articulate both strengths and weaknesses of the work. Outstanding students, who have published several papers prior to starting their Ph.D. program, are encouraged to take the oral qualifying exam during the first semester of the Ph.D. program.

The committee will provide a written evaluation of the student's potential for Ph.D. research (in terms of technical ability, and oral and written communications skill) to the department. The committee members can seek input from the prospective Ph.D. advisor when making such evaluation, but the advisor is excluded from participating in formulating the written evaluation. Each member of the Ph. D. Qualifying committee votes to pass or fail the student. The written report should include the vote. The vote of 3:1 or 4:0 is needed for the student to pass the Ph.D. Qualifying Exam.

The ECE department will make the final decision of pass or fail based on the exam committee's report. The student will be allowed two chances to take the Ph.D. Qualifying Exam. The second attempt must be taken within six months from the time the student made the first qualifying exam. Failure to do so will automatically dismiss the student's qualification for further doctoral study.

The Ph. D. Qualifying Exam is offered year around. Five Areas of the Ph. D. Qualifying Exam

- Communications, Signal Processing and Microwave
- Computer Networking
- Computer Architecture
- Electronic and Photonic Devices
- Intelligent Systems

The students are required to take a minimum of 4 courses out of 6 courses in one of the areas: Students can take additional courses as per the advisement of area. Here are the suggested courses for different areas:

| Communication | Signal Processing | Microwave | Networking | Computer Architecture | Electronic & Photonic | Intelligent Systems |
|----------------------|--------------------------|------------------|-------------------|------------------------------|----------------------------------|----------------------------|
| ECE 725 | ECE 725 | ECE 725 | ECE 725 | ECE 725 | ECE 725 | ECE 725 |
| ECE 726 | ECE 726 | ECE 726 | ECE 726 | ECE 726 | ECE 726 | ECE 726 |
| ECE 742 | ECE 740 | ECE 742 | ECE 783 | ECE 690 | ECE 758 | ECE 609 |
| ECE 744 | ECE 743 | ECE 630 | ECE 681 | ECE 758 | ECE 657 | ECE 666 |
| ECE 776 | ECE 788 | ECE 632 | ECE 744 | ECE 692 | ECE 756 | ECE 605 |
| ECE 777 | ECE 777 | ECE 744 | ECE 639 | ECE 689 | ECE 618 | ECE 618 |