

**University of Massachusetts at Amherst**  
**Department of Electrical and Computer Engineering (ECE)**  
**Ph.D. PRELIMINARY COMPREHENSIVE EXAMINATION POLICY**  
**REVISED June 28, 2021<sup>1</sup>**

There are two parts to the Ph.D. Preliminary Comprehensive Examination. A student must successfully pass both parts, as specified below, to pass the examination.

**I. Core Requirement**

Every Ph.D. student is required to choose and take one four-course core curriculum (either EE or CSE option) while in the ECE Ph.D. program at UMass-Amherst.

**A. Options**

**1. EE Option:** The student takes three courses from the EE core and the fourth course from either the EE or CSE core (total of four courses).

**2. CSE Option:** The student takes three courses from the CSE core and the fourth from either the CSE or EE core (total of four courses).

**3. Course choices:**

**EE Core:**

1. ECE 603: Probability and Random Processes (Fall)
2. ECE 606: Electromagnetic Field Theory (Fall)
3. ECE 609: Semiconductor Devices (Spring)
4. ECE 608: Signal Theory (Spring), OR ECE 604: Linear Systems (Fall): No more than one of these two will count.

**CSE Core:**

1. ECE 665: Computer Algorithms (Spring)
2. ECE 658: VLSI Design Principles (Fall)
3. ECE 668: Computer Architecture (Spring)
4. COMPSCI 677: Operating Systems (Spring), OR ECE 671: Networking (Fall): No more than one of these two will count.

**Notes:**

1. Each of the ten courses above will be offered once per year.
2. The student must complete the core requirement **within 24 months of entry into the program**. The core course 24-month requirement can be relaxed by 6 months at the request of the research adviser.

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<sup>1</sup> This revised policy applies to all ECE Ph.D. students who schedule their first RQE attempt after December 1, 2015. Note that only to the Research Qualifying Exam portion of this policy has been revised; the Core Requirement is unchanged.

## **B. GPA and Grade requirements**

1. The student must obtain an average grade of 3.47/4.0 or better for the four courses. In calculating this average grade, all courses are weighed equally, regardless of the actual number of credits assigned to them, and
2. A grade of **at least B** must have been obtained in each of these courses.

**NOTE:** There will be no exceptions granted (example: taking a similar course at another university does not result in an exemption).

## **C. Completion of a core course (or multiple core courses) at UMass-Amherst with the required grade (minimum “B”) as part of another degree:**

1. Such course/courses can be counted toward the core *with the grade counting towards the 3.47 required GPA in the core.*
2. For each such course, the student must take another 600-level course or a 700 level course either inside or outside the ECE department. These must be taken while in residence.
3. Each such course must be approved in writing for inclusion in the core requirement by the student’s faculty advisor. The student need only have a C or better in these substitute courses.

## **II. Research Qualifying Exam (RQE)**

Every Ph.D. student must complete the *Research Qualifying Exam*, which will consist of a *written RQE* document and *oral* presentation of a research project performed under the direction of the student’s advisor. The purpose of the Research Qualifying Exam (RQE) is to test a student's readiness to conduct Ph.D.-level research, as demonstrated by their (a) engagement in a research project under the supervision of an ECE advisor, (b) effective communication and defense of their contribution to this project, presented in the context of the broader project objectives, and (c) ability to answer questions about related principles and technical background.

### **A. Expectations**

At the qualifying exam, the student is to:

1. Provide a clear definition of the problem
2. Demonstrate a comprehensive understanding of the area (including related research)
3. Present preliminary results at the level of a conference or workshop paper.

The research work pertaining to the exam must have been performed at UMass while the student was enrolled in the ECE Ph.D. or M.S./Ph.D. degree program.

### **B. RQE Committee and Exam Scheduling**

The student will be examined by a committee consisting of four faculty members: the student’s ECE advisor, two faculty members close to the research area (chosen by the advisor in consultation with the student), and one ECE faculty facilitator who works outside the student’s research area (chosen by the ECE Graduate Program Director (GPD) without input from the student and/or advisor; all graduate faculty who are not on leave will be assumed to be available for service as facilitators.). The student or the student’s advisor makes a request to the GPD to initiate the process. A minimum of two weeks’ advance notice is required for the GPD to appoint the ECE faculty facilitator. Upon appointment, the GPD will provide the faculty facilitator this set of policies detailing the conduct of the exam since the

faculty facilitator will be responsible for running the exam. Up to one committee member—not including the advisor or faculty facilitator—may be from outside the ECE department, but all four members must be faculty at UMass-Amherst.

### C. Documentation

At least one week prior to the oral presentation<sup>2</sup>, the student will provide a four-page two-column document, in the standard format for conferences in their area, to all committee members. The student will also provide a copy of this document to the ECE Graduate Program Office in 210 Marcus Hall for their permanent file. The quality of the RQE document is expected to be high—“submission ready” or nearly so—meaning that it should be clear, well organized, and carefully edited so it is relatively free of mechanical deficiencies (e.g. in spelling, grammar, usage).

If the work presented was performed in conjunction with other researchers (other students or/or the advisor), a footnote on the first page of the document should indicate the respective contributions of each member of the team. In addition to this written declaration of the student’s role in the research presented, which is of course expected to be substantial and meaningful, questions about the nature and level of the student’s involvement and their contribution may also be asked at the oral examination. The quality of the submitted RQE document is the student’s responsibility, even when the student is not its sole author.

### D. Oral Presentation

As per the above, the ECE faculty facilitator will run the oral examination. When all are present, the faculty facilitator will remind the student and the other committee members of the exam format and ground rules specified herein. The student will then give a 30-minute presentation describing their research work. After the presentation, the committee will ask questions: (a) directly about the research work (as would be typical at a conference), and (b) in the general area of the research (to test the student's grasp of the problem area). While other members of the committee are asking questions, the student’s advisor is to remain silent. This “advisor prohibition” includes, but is not limited to: (1) helping the student answer a question; (2) rephrasing a question for the student; (3) providing any indication that the student is on the right or wrong track in answering a question. Once the other committee members have completed all of their questions, the advisor is then welcome (and expected) to ask questions. When the committee is finished asking questions, the four committee members will meet in closed session to discuss and vote on whether the student passed the oral exam. The student is considered to have passed the oral exam if at least 3 out of 4 committee members vote to pass. After the exam, the faculty facilitator will communicate the result to the ECE Graduate Programs Office (ecegrad@ecs.umass.edu) along with the date and time of the exam and a list of all those present.

### E. Timeline

**The student must attempt the Qualifying Exam within 30 months of entry.**<sup>3</sup> Failure to do so may jeopardize the student’s candidacy. If the student fails the first attempt at the RQE, he/she must take the exam a second (and last) time within three (3) months of that failure. No more than two attempts will be allowed.

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<sup>2</sup> Any committee member may require that the exam be rescheduled if the student has not provided (the final copy of) the RQE document to the committee at least one week prior to the exam date.

<sup>3</sup> Note that, with this revision, students may take the RQE before they complete the Core Requirement, provided that the advisor approves and communicates this approval to the ECE Graduate Program Director. This differs from past policy.