EE: Systems
Qualifying Exam
**What are Quals 1 & 2?**

**Quals 1** is an oral examination to evaluate the student’s basic knowledge in the field as well as his/her ability to:

- interrelate various topics and concepts
- analyze problems
- synthesize solutions

Questions are based on material from the Doctoral Qualifying Courses taken by the student in the first year and any courses for which equivalency has been obtained. Questions are typically asking for application rather than memorization of information.

**Quals 2** is an oral examination to evaluate the student’s research capabilities. The exam consists of two parts:

- the student makes a short presentation describing his/her research-oriented directed study
- the presentation is followed by a question-and-answer period with the faculty examiners

The student must demonstrate an understanding of his/her chosen research area. In addition, some preliminary results (positive or negative) must be obtained.

**When to apply to take the Qual exam**

Students will be notified by email when it is time to submit a Quals Exam Application Form. Permission to take the exam will be granted provided the student is making satisfactory academic progress based on performance in the course work taken during the first academic year, the overall academic record, and English proficiency.

The student must submit a Qual 1 application which is signed by the EECS faculty member with whom research has either begun or is about to begin and who is offering the student financial support.

During the first academic year, the student must complete a set of courses known collectively as the Doctoral Qualification Course Work. This course work is a subset of the course work required for Candidacy and consists of a total of 4 kernel courses that can be divided either as:

- 4 courses in the Major area of study
- or
- 3 courses in the major area of study and one course in a minor area of study provided the minor is within EE:Systems

For a list of acceptable courses, refer to theEE:S Course List and the EE:S Graduate Program Manual.

It is the student’s responsibility to submit the Quals Application Form by the deadline.

The maximum number of times a student may attempt to take the Quals 1 or 2 exam is **two**. Waiving the exam counts as one attempt.
Committee Assignments

The EE:S Graduate Committee assigns each student a Quals Exam Committee consisting of 3 faculty members. Faculty members are selected to match the student’s qualification course work. Students are notified of their committee 7 to 10 days prior to the beginning of exam days.

The student then contacts his/her committee members to schedule a meeting time for the exam. For Quals 1, the student meets with each of the three faculty individually in the faculty’s office. Exam time is 40 to 60 minutes.

For Quals 2, the faculty and student meet at one time in a small conference room. Exam time is 60 to 90 minutes.

The department reserves the right to make changes in committee assignments, if necessary, due to illness, last minute scheduling problems, etc.

Exam Preparation

In addition to the material taken in the graduate kernel courses during the first year of study, students are expected to have a basic understanding of undergraduate material in the major area. Students may wish to review materials from the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>Communications</td>
<td>EECS 455</td>
</tr>
<tr>
<td>Control</td>
<td>EECS 460</td>
</tr>
<tr>
<td>Signal Processing</td>
<td>EECS 451</td>
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</tbody>
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Equivalency:

If a student has received equivalency approval for a kernel course, he/she may be examined on that course material. It is the student’s responsibility to make sure he/she understands the course material as it is taught in the EE:S graduate program.

Practice before going into the exam. You may find it helpful to “practice” verbalizing information from your course work.

Evaluation

Factors taken into consideration:

-- Exam Evaluation Forms

After each exam, the exam committee member completes and submits an exam evaluation form. Areas of evaluation include communication skills, ability to relate material from different courses, knowledge of major field, and knowledge of minor field, if applicable.

-- Cumulative GPA

-- GPA for courses in the major area of study
-- Difficulty of courses selected, number of courses taken per semester, and participation in lecture, group projects, and office hours.

-- English proficiency

As part of the Qualifying process, the student’s English proficiency is also evaluated. Students deemed to have minor deficiencies in English, but who are otherwise qualified for the Doctoral Program, may be required to perform satisfactorily in specified English language courses. Students deemed to have major deficiencies in English will be judged not qualified for the Doctoral program. Non-native English speakers are expected to complete any courses Rackham has recommended.

**Exam Results**

At the end of the Quals Exam period, a Quals Decision Meeting is held. All EE:S faculty meet as a group to discuss each student’s performance. After deliberation, a vote is held by secret ballot.

Possible decisions:

-- Pass - Approved for continued doctoral study

-- Fail - Not approved for doctoral study with the opportunity to retake the exam (if student has not passed his/her exam deadline).

-- Fail - Not approved for doctoral study with no opportunity to retake the exam.

The student is notified of the results by email.

**What if I do not pass the Qual 1 exam?**

Faculty may permit a student who fails the exam and has not passed his/her final Qual exam deadline to take the exam one more time.

A student who fails the exam and is not given the opportunity to retake, or who has failed the exam two times will be required to terminate studies in EE:Systems at the completion of the MS degree (if the student does not have a relevant MS degree).

**Relevant Master’s Degree:**

When a student who has already completed a MS degree is admitted to the EE:S program, the Admissions committee makes a thorough evaluation of the MS transcript to determine whether the MS degree is “relevant.” The MS degree is deemed relevant if the coursework is very closely aligned with the EE:S MS degree requirements.

A student with a relevant MS degree cannot earn a MS degree in EE:Systems at the University of Michigan. Failing Quals 1 or Quals 2 with a relevant MS degree means the student will not be permitted to continue in the EE:S program. He/she must terminate studies in EE:S without receiving any official degree in the EE:S program.
**I passed the Qual 1 exam. What’s next?**

Upon passing Quals 1, the student must continue research with a Research Advisor, who is usually a member of the EE:Systems Faculty. If a student’s Research Advisor is outside the EE:S faculty, the student must periodically consult with his/her academic advisor to be certain the EE:S guidelines are being met. It is the student’s responsibility to find a faculty member willing to serve as his/her research advisor. This work is called the Research-Oriented Directed Study. It should include background study in the selected topic area as well as the beginning of original research.

A Master’s student who passes Quals 1 may apply for the EE:S PhD program via the Rackham application website. The decision to accept will be based on the student’s performance in coursework and research, as well as the commitment of his/her advisor to work with and support the student. Such an application must be made within 15 months of entry into the EE:S MS program. If the student’s advisor is outside EECS, the student may be advised to apply for the PhD in the advisor’s department.

**Future steps:**

- Continue research
- Check your deadline for taking the Quals 2 exam
- Apply for Quals 2 at the appropriate time
- Prepare a concise report summarizing your work for the Quals 2 exam
- Pass the Quals 2 exam
- Complete course work and all requirements for candidacy
- Advance to Candidacy
- Prepare for the Thesis Proposal

For additional information, refer to the EE:S Graduate Program Manual and the Rackham Student Handbook.

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