

The University of Iowa
Department of Electrical and Computer Engineering
GRADUATE MANUAL

The primary emphasis of graduate education in Electrical and Computer Engineering is to allow the student to master a particular area of interest and acquire maturity in the general area of electrical and computer engineering. To aid in planning the student's course of study, certain broad outlines are presented here. In addition to the requirements stated in the University Graduate Manual, the student must satisfy all applicable items given in this manual.

MS Degree

Two options are available, a thesis option and a non-thesis option. The requirements which must be satisfied are:

MS with Thesis

1. At least 30 semester hours of graduate-approved credit^{^^} in a coherent program acceptable to the advisor and approved by the Graduate Committee. This program must include at least 12 semester hours from the approved list of ECE graduate courses.** A total of not more than eight semester hours of the required 30 semester hours may be earned in ECE:5999 MS Thesis Research or other independent studies (ECE:5998). At least six semester credit hours must be earned in ECE:5999 MS Research. All graduate students must take the 1 s.h. Engineering Ethics ENGR:7270 course.
2. Successful completion of a final examination conducted by a committee of at least three faculty members, of which the advisor is chair. One part of the final examination must consist of an oral defense of the thesis. A comprehensive examination of the student's program is also recommended.
3. At the time of graduation, the cumulative grade point average for all graduate courses counting toward the degree must be 3.00 or higher.

MS Thesis Committee

The ECE department follows Graduate College guidelines for MS thesis committee composition. Committee composition specifics are outlined here: <https://grad.uiowa.edu/academics/manual/academic-program/section-x-masters-degrees> under section K.

MS without Thesis

1. At least 30 semester hours of graduate approved credit^{^^} in a coherent program approved by the Graduate Committee. This program must include at least 18 semester hours from the approved list of ECE graduate courses.** A total of not more than three semester hours of independent study credit (ECE:5998) may be included in the required 30 semester hours total. All graduate students must take the 1 s.h. Engineering Ethics ENGR:7270 course.
2. At the time of graduation, the cumulative grade point average for all graduate courses counting toward the degree must be 3.00 or higher.

Advisor

For students electing the thesis option, the advisor, or at least one of the co-advisors, must be a member of the Electrical and Computer Engineering faculty. The chairman of the Graduate Committee is advisor to all students selecting the non-thesis option.

PhD Degree

The program of study for the PhD degree in Electrical and Computer Engineering requires successful completion of minimum course requirements, a graduate qualifying examination, a comprehensive examination, an original research contribution, and defense of a written dissertation.

1. At least 72 semester hours of graduate approved credit^{^^} in a coherent program acceptable to the advisor and approved by the Graduate Committee. At least 45 semester hours must be earned in formal courses (not thesis or other independent study) including 30 semester hours from the approved list of ECE graduate courses.** The program must also include a minimum of 18 s.h. of PhD research (ECE:7999). All graduate students must take the 1 s.h. Engineering Ethics ENGR:7270 course.
2. Successful completion of the PhD Qualifying Process. The PhD Qualifying Process consists of two parts, the PhD Qualifying Examination and the Breadth Course Requirement. In order to be admitted to the PhD Qualifying Examination the candidate must have a cumulative grade point average of at least 3.25 in all graduate coursework and also in graduate coursework in Electrical and Computer Engineering. A student may take the Qualifying Examination not more than twice. A student must take the PhD Qualifying Examination during their first full academic year in the PhD program, unless a deferral is obtained from the Graduate Committee. A student who fails the PhD Qualifying Examination once, is required to retake the examination on the next occasion that it is offered. The candidate must also complete two breadth courses with a grade of A- or higher as described in the ECE PhD Qualifying Process section below. These courses must be completed within the first four semesters of graduate study (not counting summer sessions).
3. Successful completion of the Ph.D. Comprehensive Examination.
The PhD Comprehensive Examination will consist of *two* parts: a written research proposal, and an oral examination. *The written research proposal must include a thorough literature survey that provides the motivation and background for the proposal.*

The Comprehensive Examination may not be taken before passing the PhD Qualifying Examination. It must be completed no later than three calendar years after passing the Qualifying Examination. Failure to meet this deadline will require retaking of the Qualifying Examination. The Qualifying Examination and the Comprehensive Examination may not be taken in the same semester.
4. Successful completion of a final oral defense of the thesis. At least six months must elapse between the completion of the Comprehensive Examination and the final thesis defense.
5. At the time of graduation, the cumulative grade point averages for all graduate courses and the graduate courses counting toward the degree must be 3.25 or higher.

PhD Thesis Committee

Committees must consist of no fewer than five members, of which four must be tenure-track faculty. At least two faculty members must be from the major department. One member of the committee must be a member of the Graduate Faculty who does not hold a primary appointment in the major department.

ECE PhD Qualifying Process

The process of qualifying for the PhD program in Electrical and Computer Engineering consists of two parts: 1) passing the PhD qualifying examination, and 2) completion of the breadth coursework requirement.

PhD Qualifying Examination

The Department of Electrical and Computer Engineering offers the PhD qualifying examination each spring during the month of April or May. Students taking the exam must select, in advance, two subjects from the following list of areas and subjects:

Area 1: Systems

<u>Subject</u>	<u>Primary Course</u>	<u>Secondary Course</u>
Controls	ECE:5600 Control Theory	ECE:3600 Control Systems
Communications	ECE:5500 Digital Communications	ECE:3500 Communication Systems
Signal Processing	ECE:5460 Digital Signal Processing	ECE:3400 Linear Systems II

Area 2: Computer Systems

<u>Subject</u>	<u>Primary Course</u>	<u>Secondary Course</u>
Software Systems	ECE:5820 SE Languages & Tools	ECE:3330 Intro. to Software Design
Computer Architecture	ECE:5320 High Perf. Computer Arch.	ECE:3350 Comp. Arch. and Org.

Area 3: Applied Physics & Electronics

<u>Subject</u>	<u>Primary Course</u>	<u>Secondary Course</u>
Electromagnetic Theory	ECE:5700 Advanced EM Theory	ECE:3700 EM Theory
Solid State Devices	ECE:4728 Solid State Physics	ECE:3720 EE Materials & Devices
Electronics	ECE:5410 Adv. Circuit Techniques	ECE:3410 Electronic Circuits

Area 4: Data Science

<u>Subject</u>	<u>Primary Course</u>	<u>Secondary Course</u>
Machine Learning	ECE:5450 Machine Learning	ENGR:2995 Intro to AI & ML in Engr

The subjects selected for the exam may be in the same or different areas. The student will be given two questions on each subject. These questions will be based on material covered by the primary and secondary courses associated with the subject. The questions for each area will be at a level of difficulty consistent with the contents of the respective courses. Registration for this exam begins in March. To register for this exam you need to complete a registration form and return to the Graduate Secretary in room 4016 SC.

Breadth Course Requirement

In order to complete the breadth coursework requirement, the student must complete two additional primary courses from the PhD qualifying examination list of subjects. No more than two of the four subjects chosen for the combined PhD qualifying examination and breadth requirement can be from the same area. Students must receive a grade of at least A- in the breadth courses. Further, the breadth courses must be completed within the first four semesters of graduate study. Students not completing the breadth courses as specified above will automatically fail the PhD Qualifying Process.

Requests to satisfy the breadth coursework requirement with transfer credit will be considered on a case-by-case

basis by the Graduate Committee. All such requests must include detailed supporting information regarding the content of the transfer course(s) and be filed with graduate secretary prior to completion of the first semester of graduate study.

Scheduling of Oral Exams

Normally, all oral examinations (MS thesis defense, PhD comprehensive, PhD thesis defense) should be scheduled during regular University academic sessions. If a thesis defense or comprehensive exam must be scheduled during an interval between academic sessions, explicit prior approval must be obtained from all members of the examining committee well in advance of the examination date.

MS and PhD Plans of Study

In order to guide graduate students toward coherent course selection, but still permit individualized tailoring of plans of study for the diversity of research interests of the discipline of Electrical and Computer Engineering, a formal filing of a plan of study is required with the following properties:

1. After being admitted to the graduate degree program, each student must select an advisor and formulate a Plan of Study before being permitted to register for his/her second semester. An advisory committee need not be formed at this time.
2. The Plan of Study will clearly specify the course requirements to be satisfied before graduation and must be consistent with other provisions of the Graduate Manual. This plan must be approved by the advisor and be placed in the student's file. The plan of study will normally designate the specific courses to be taken, but it may also include specifiers such as: "Student must complete n of the following m courses" where a list of m courses is then specified.
3. Changes to the Plan of Study will be allowed with the approval of the advisor. The change must be approved prior to the student taking a course not on the current Plan of Study.
4. Changing advisors requires consultation among the previous advisor, the proposed new advisor, and the student. The Graduate Committee must be immediately notified in the event of such a change.
5. All students currently enrolled in the Electrical and Computer Engineering graduate program, but not yet having satisfied the formal course requirements for their currently approved degree objective, must file a Plan of Study according to the above-stated policies.

Courses in Other Departments

Students at all levels are encouraged to strengthen their plans of study with appropriate courses in other areas such as mathematics, computer science, statistics, and physics. The advisor's assistance and approval should be sought in choosing these courses.

Graduate Colloquium

All Electrical and Computer Engineering Graduate students enrolled on a full-time basis and/or holding assistantships must enroll each semester in the course ECE:5000 (Graduate Seminar: Electrical and Computer Engineering) for 0 semester hours of credit. Students who miss more than a third of the regularly scheduled Electrical and Computer Engineering Graduate Colloquia will receive a grade of W for this course. Exemptions to this requirement will be granted only under exceptional circumstances by the chairperson of the Electrical and Computer Engineering Graduate Committee.

Entrance Standards

The entrance standards for the Electrical and Computer Engineering Graduate Program are:

1. For the MS program a minimum GPA of 3.0 on a four-point basis is required. For the PhD program, in addition to the minimum GPA of 3.0 for the MS program, if applicable, a minimum graduate GPA of 3.25 is also required.
2. An MS student with a GPA less than 3.0, but better than 2.5 on courses in electrical and computer engineering, mathematics, and physics may be admitted on a probationary status.
3. Students with baccalaureate degrees and strong credentials in related areas (e.g., physics, mathematics, and computer sciences) may be admitted. In such cases, additional course work without graduate credit may be required.
4. All new foreign students scoring less than 79 on the Test of English as a Foreign Language (iBT) score range are required to take an examination administered by the Linguistics Department upon arrival. Any remedial courses recommended by the Linguistics Department upon the result of this examination must be completed at the earliest opportunity.

Probation and Dismissal

A student shall be placed on probation if the student's cumulative grade point average on graduate work done at the University of Iowa falls below 3.00 for the MS students and 3.25 for the PhD students. After one year or the completion of 8 more semester hours of graduate work at this university, whichever comes first, the grade point average will be re-examined. If it remains below the minimum requirement, the student shall be denied permission to re-register; otherwise, the student shall be restored to good standing.

Professional Training Assignments

All students in advanced degree programs are required to complete professional research and/or teaching assignments, regardless of whether they receive financial aid, before being awarded an advanced degree.

Special Credit Situations

Only S (satisfactory) and U (unsatisfactory) grades shall be given in courses numbered ECE:5000, ECE:5998, and ECE:5999. Credit earned through extension and Guided Self-Study Program courses may not be applied toward satisfying course requirements unless the student was an off-campus student at the time the courses were taken.

Graduate Assistantships

In the absence of special arrangements to the contrary, every student is expected to be registered as a full-time student during each term in which the student receives an assistantship.

Exceptions

Exceptions to the regulations in this manual are allowed only on the basis of a written petition by the student and the approval of the Graduate Committee.

****Approved ECE Graduate Courses**

All formal ECE courses numbered ECE:5001 and higher are automatically on the list of the approved ECE graduate courses. In addition, the following course is also considered approved for ECE graduate courses:

- ECE:4720 Introductory Optics (cross listing of PHYS:4720)
- ECE:4728 Introductory Solid State Physics (cross listing of PHYS:4728)

Contemporary Topics courses (ECE:5995 and ECE:7995) with different content may be counted more than once.

All courses used to meet the ECE semester hour total must be taken for a letter grade (not S/U).

^^ Guidelines for graduate approved course credit

In addition to the approved ECE graduate courses**, courses from other departments may be taken to fulfill graduation requirements. To obtain credit toward your graduate degree, all of the following criteria must be met:

1. The course must be accepted as a graduate level course for majors in the home department from which it is offered.
2. All courses used to meet the semester hour total must be taken for a letter grade (not S/U).
3. The course must contribute to a coherent focused training program acceptable to the advisor and approved by the Graduate Committee. For example, graduate level courses in other engineering, computer science, math, or physics departments that support your coherent training program are appropriate for graduate course credit.

In rare circumstances courses not meeting the approved ECE graduate course** or graduate approved course^^, requirements may be requested on the basis of a written petition by the student and approval of the Graduate Committee.