

**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.

**M.S. Degree**

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

***M.S. With Thesis:***

1. At least 30 semester hours of 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 graduate courses.\*\* A total of not more than eight semester hours of the required 30 semester hours may be earned in 55:199 M.S. Thesis Research or other independent study (55:198). At least six semester hours of credit must be earned in 55:199 M.S. Research.
2. Successful completion of a final examination which is 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.

***M.S. Without Thesis:***

1. At least 36 semester hours of credit in a coherent program approved by the Graduate Committee. This program must include at least 18 semester hours from the approved list of graduate courses.\*\* A total of not more than three semester hours of independent study credit (55:198) may be included in the required 36 semester hours total.
2. Successful completion of a comprehensive oral final examination which is conducted by a committee of at least three faculty members. The chair and members of this committee are appointed by the Graduate Committee.
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.

**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.

## **Ph.D. Degree:**

The program of study for the Ph.D. 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 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 graduate courses.\*\* The program must also include a minimum of 18 s.h. of Ph.D. research.
2. Successful completion of the Ph.D. Qualifying Examination. In order to be admitted to the Ph.D. Qualifying Examination the candidate must have a cumulative grade point average of at least 3.25 in all graduate coursework and also in all graduate coursework in Electrical and Computer Engineering. A student may take the Qualifying Examination not more than twice. A student must take the Ph.D. Qualifying Examination at the conclusion of 30 semester hours of graduate work unless a deferral is obtained from the Graduate Committee. Course work taken toward the M.S. degree in Electrical and Computer Engineering here or at another university which have been transferred to the student's program in Electrical and Computer Engineering is included in the 30 semester hours specified in this requirement. A student who fails the Ph.D. Qualifying Examination once, is required to retake the examination on the next occasion that it is offered.
3. Successful completion of the Ph.D. Comprehensive Examination.  
The Ph.D. 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 written examination will be formulated by the advisor and administered by the student's comprehensive examining committee. Both the questions and the student's solutions will be filed with the graduate secretary at least six months prior to the oral part of the examination.  
  
The Comprehensive Examination may not be taken before passing the Ph.D. 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.

The Electrical and Computer Engineering Department offers a Ph.D. Qualifying Exam each spring during the month of April or May. Students taking the exam must select, in advance, a minimum of two subjects from Part 1 and two additional subjects from Part 1 or Part 2 (for a total of four subjects). The examination will consist of two questions from each of the four selected areas. The subject areas are:

<u>Part 1 Subject Areas</u>	<u>Attached Course</u>	<u>Part 2 Subject Areas</u>	<u>Attached Course</u>
Advanced Electromagnetic Theory	55:170	Communication Theory	55:150
Computer Architecture	55:132	Digital Image Processing	55:148
Control Theory	55:160	Electro-optics	55:179
Digital Signal Processing	55:146	Graph Algorithms	55:133
		Physical Electronics	55:172
		Switching Theory	55:130

Since some of the courses in Part 2 may not be offered every academic year, it is important that students plan carefully in preparing for the Exam. The questions for each area will be at a level of difficulty consistent with the contents of the respective attached 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.

### **Scheduling of Oral Exams**

Normally, all oral examinations (M.S. without thesis, M.S. thesis defense, Ph.D. comprehensive, Ph.D. thesis defense) should be scheduled during regular University academic sessions. The M.S. without thesis oral examination **must** be scheduled to occur during the Spring or Fall 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.

### **M.S. and Ph.D. 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 with the graduate secretary. The plan of study will normally designate the specific courses to be taken, but 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 of 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 55:191 (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 of the Electrical and Computer Engineering Program are:

1. For the M.S. program a minimum GPA of 3.0 on a four-point basis is required on all courses in electrical and computer engineering, mathematics and physics. For the Ph.D. 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 M.S. 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 550 on the Test Of English as a Foreign Language 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 M.S. students and 3.25 for the Ph.D. 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:**

With the exception of 55:195, only S (satisfactory) and U (unsatisfactory) grades shall be given in courses numbered 55:19z. 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.

**\*\*List of Approved Graduate Courses:**

55:121	Introduction to Bioinformatics	55:181	Formal Methods in Software Engineering
55:122	Computational Genomics	55:182	Software Engineering Languages and Tools
55:130	Switching Theory	55:183	Software Engineering Project
55:131	Introduction to VLSI Design	55:185	Autonomous Agents and Multiagent Systems
55:132	High Performance Computer Architecture	55:195	Contemporary Topics in Electrical & Computer Engineering*
55:133	Graph Algorithms and Combinatorial Optimization	55:230	Advanced Logic Synthesis
55:134	Computer Communications	55:245	Magnetic Resonance Imaging Systems
55:136	Advanced VLSI Design	55:247	Image Analysis and Understanding
55:138	Testing Digital Logic Circuits	55:248	Advanced Digital Image Processing
55:143	Linear Integrated Electronics	55:272	Quantum Electronics
55:144	Digital Integrated Electronics	55:273	Semiconductor Physics
55:145	Pattern Recognition	55:274	Laser Principles
55:146	Digital Signal Processing	55:276	Nonlinear Optics
55:148	Digital Image Processing	55:291	Seminar Plasma Physics*
55:150	Communication Theory	55:295	Advanced Topics in Electrical and Computer Engineering*
55:152	Introduction to Information and Coding Theories		
55:160	Control Theory		
55:163	Random Processes: Control and Communication		
55:164	Computer-Based Control Systems		
55:170	Advanced Electromagnetic Theory		
55:172	Solid State Physical Electronics		
55:173	Introductory Solid State Physics		
55:177	Electromagnetic Foundations of Optics		
55:178	Optical Signal Processing		
55:179	Electro-Optics		
55:180	Fundamentals of Software Engineering		

\*These courses may be counted toward the required E.C.E. semester hour total only if a letter grade (not S/U) is assigned.