

**UNIVERSITY OF DELAWARE
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING**

GRADUATE PROGRAM POLICY STATEMENT

2001 REVISION

The following graduate studies policies are in addition to those established by the University.

I. GRADUATE DEGREES OFFERED

Master of Science in Electrical and Computer Engineering (M.S.E.C.E.), Authorized: 2002
(Permanent)

(Replaces Master of Electrical Engineering (M.E.E.), Authorized: 1941)

Doctor of Philosophy in Electrical and Computer Engineering (Ph.D.), Authorized: 2002
(Permanent)

(Replaces Doctor of Philosophy in Electrical Engineering (Ph.D.), Authorized: 1986, which replaced
Doctor of Philosophy in Applied Science [Ph.D.], Authorized: 1960)

II. ADMINISTRATION OF THE GRADUATE PROGRAM

Electrical and Computer Engineering Graduate Committee

The graduate program in Electrical and Computer Engineering is administered by the faculty in Electrical and Computer Engineering through its Graduate Committee. This committee is to have representation from each of the major research concentration areas within the Department. The Department faculty elects members serving on the committee. The chairperson of the Departmental Graduate Committee is responsible for day-to-day administration of graduate programs in Electrical and Computer Engineering.

Faculty Advisors

Each graduate student must have a faculty advisor. For beginning students the faculty advisor works with the student in planning his/her program, monitors student progress, and is available to advise and help the student. The faculty advisor for students who have begun their thesis and/or dissertation research is their research supervisor.

Each student in the thesis M.S.E.C.E. and Ph.D. programs must select, by mutual agreement and shared research interests, a thesis advisor during the first year of study. With the approval of the Graduate Committee, a student may select a qualified individual from outside the Department as his/her research supervisor. Students with a research supervisor outside the Department must also have a co-advisor within the Department. Students in the non-thesis M.S.E.C.E. program must select an advisor within the Department.

III. DEGREE REQUIREMENTS

Rules Applicable to All Degree Programs

A grade of B- or better is required for a course to count toward the credit requirements. A student who receives a grade less than B- must either take the course over to raise the grade, or take another course approved by his/her advisor to replace it in meeting the credit requirements. Graduate students must maintain an overall grade point average of 3.0 or higher for all graduate work. Students with an overall grade point average below 3.0 are not eligible for any form of University financial aid. No course used to meet degree requirements may be taken Pass/Fail.

Master's Degree (*Thesis Program*)

The thesis master's degree program is designed for individuals who want to broaden their electrical and computer engineering foundation knowledge while also conducting an in-depth research project. All master's degree students receiving financial aid must take the thesis option.

Credit Requirements. The master's program requires 30 credit hours including at least 24 graduate course credits and at least 6 credits for master's thesis (ELEG 869). The Graduate Committee must approve each student's program.

The 24-credit course program of each student must include:

- Six credits of foundation electrical and computer engineering courses. (A list of currently offered foundation courses is attached.)
- Eighteen credits of advanced technical courses related to the student's area of interest. At most twelve credits of these can bear non-ELEG/CPEG numbers and at least three credits must be of 800 level electrical and computer engineering courses.

Thesis Requirement. All students in the thesis master's degree program will carry out original publishable research in collaboration with their advisor and, possibly, other collaborators. Masters' candidates must write a thesis describing their contributions to this research. Theses must follow the University's rules and those accepted in the profession for the presentation of original work. Master's theses will have two faculty readers, the advisor and one additional reader approved by the faculty advisor and Graduate Committee. The Department Chairperson, upon recommendation of the readers, approves theses.

All students in residence who have not been given sustaining status must enroll, *each* term, in at least one of the Department's one-credit participatory graduate research seminars. These credits are in addition to the required course and research credits. All students are expected to present their thesis research in one of the departmental seminar series.

Non-Thesis Master's Degree

This program is intended to satisfy the continuing education needs of working engineers and recent graduates who want to broaden their electrical and computer engineering foundation before starting an industrial career. University financial aid is usually not available to students taking this

program. Students originally enrolled in the thesis master's degree program may transfer to the non-thesis option only under special circumstances, and then with the approval of their advisor and the Graduate Committee.

Credit Requirements. The non-thesis master's program requires 30 credit hours of work meeting the following requirements:

- Six credits of foundation electrical and computer engineering courses
- 24 credits of advanced technical courses related to the student's area of interest. At least six credits of these must be 800 level electrical and computer engineering courses and at most twelve credits can bear non-ELEG/CPEG numbers.

Ph.D. Degree

The Ph.D. degree program is designed for individuals interested in fundamental research on novel aspects of electrical and computer engineering. The degree is intended for individuals planning to pursue academic research and/or industrial research and development careers. The requirements for the Ph.D. degree are classified under (1) general, (2) credit, (3) examination, and (4) dissertation requirements. Each of these is detailed below.

General Requirements.

- Candidates are required to complete one continuous academic year of full-time study as a residency requirement.
- Candidates must perform the duties of a teaching assistant for a minimum of one semester.

Credit Requirements.

- Candidates must complete the course requirements for the thesis master's degree, have been awarded a master's degree in electrical or computer engineering, or have similar appropriate qualifications.
- Candidates must take at least two foundation courses outside their area of concentration. These foundation courses must be in at least two different areas of concentration.
- Candidate must complete a course program in his/her area of specialization.
- Candidates in residence who have not been given sustaining status must be enrolled, each regular term, in at least one advanced technical course and the one credit research seminar in their area of concentration.

The candidate's advisor must approve all course selections.

Examinations. Students must successfully complete three examinations: a (1) qualifying examination, (2) pre-thesis examination, and (3) a final oral examination. Upon successful completion of the qualifying and pre-thesis examinations, the student is admitted to candidacy.

- *Qualifying Examination.* The qualifying examination is comprised of written and oral components.

- *Written Component.* The written component assesses comprehensive knowledge of the material covered in foundation courses. Foundation courses are offered in each of the major research areas within the Department. The exam is comprised of four questions in each area. Students must answer three (3) of the four (4) questions in his/her area of concentration and three (3) questions outside his/her area of concentration. The examination is closed book.
- *Oral Component.* The oral component consists of an open presentation of a published research paper. The paper is selected by the advisor, approved by the Graduate Committee, and given to the student no less than two weeks prior to the scheduled presentation. Following the presentation is a closed question and answer session. Questions may cover the presentation and foundation course material. Present in the closed session are the students and oral examination committee. The student, in consultation with their advisor, selects the three-member committee. The committee should represent at least two concentration areas of the Department. The advisor may not be a member of the committee, but may observe the session.

The examination is given once a year. The written and oral components are scheduled at the end of the spring semester and beginning of the fall semester, respectively. The examination must be completed within two years of admission, and can be taken at most twice.

- *Pre-Dissertation Examination.* The pre-dissertation examination is an in-depth presentation of the student's thesis proposal to members of his/her committee. The proposal must present sufficient evidence to justify accepting the proposal as a dissertation topic. The proposal must include, therefore, the need for the proposed research, existing methods and techniques, the proposed new methods and techniques, and the expected benefits. The pre-thesis examination will normally occur in the middle of the first year after the student passes the Qualifying Examination.
- *Final Oral Examination.* In the final oral examination, the student presents the results of his/her dissertation research to members of the faculty. The format of the presentation is that of a seminar in which questions from the audience take the place of formal exam questions. The student's committee meets afterwards to decide if sufficient research progress has been made to warrant the granting of the Ph.D.

Ph.D. Dissertation. Candidates must carry out a program of substantial original research on a topic agreed upon by his/her committee and the departmental Graduate Committee. This research forms the basis of a written dissertation that must be read and approved by the student's committee as adequate for the Ph.D. degree. The dissertation must be prepared in accordance with the rules of the Graduate Office. The dissertation research should form the basis of several research papers in refereed professional journals.

Ph.D. Committee. Candidates must select a Ph.D. committee of at least four individuals approved by the departmental Graduate Committee. This committee is chaired by the student's

faculty research supervisor and includes at least one member from a different academic unit or from outside the university. The committee must be selected and approved before the student takes the Pre-Dissertation Examination.

IV. FINANCIAL AID

A number of fellowships, research assistantships, teaching assistantships, and tuition assistantships are awarded on a competitive basis each year to full-time graduate students in the Department. In addition, the University awards competitive fellowships each year to particularly outstanding students. Both entering and continuing graduate students are eligible for financial aid. If awarded financial aid, students entering with a bachelor's degree may be supported for up to two years for a master's degree, or up to five years total if they continue for a Ph.D. Students entering with a master's degree may be supported for up to four years for a Ph.D. Students in the non-thesis master's option are usually not eligible for financial aid.

V. GRADUATE ADMISSION CRITERIA

The requirements for admission to the master's and/or doctoral program in electrical and computer engineering are:

- (1) Applicants normally will have a B.S. in electrical or computer engineering. However, admission may be granted to applicants with good training in other engineering or related fields, such as math, physics, or computer science. Students without a B.S. in electrical or computer engineering may be admitted with provisional status and may be required to complete prerequisite courses that are deemed necessary for the appropriate preparation for courses in the program.
- (2) All applicants are required to submit Graduate Record Examination (GRE) scores. The Department requires a combined score of the verbal and math sections in excess of 1050 with a mathematics score in excess of 600. (Foreign student applicants with low verbal scores will be considered if the applicant's TOEFL score is acceptable and if the applicant has a high quantitative GRE score.)
- (3) Applicants are expected to have a "B" or better undergraduate record, which is based on the last two years of undergraduate schooling, plus the applicant's record in advanced engineering, mathematics, and science courses. Admission is selective and meeting the minimum requirements of the Department does not guarantee admission. The number and quality of other applicants as well as the availability of faculty supervision and laboratory space affect the number of students offered admission. The Department may find it appropriate to consider admitting an applicant who does not meet all of the admission requirements as stated if it is clear that other strengths identified in the applicant's admission information outweigh the stated minimum requirements for admission.
- (4) Master's degree candidates become Ph.D. candidates when they have successfully completed the master's requirements and the qualifying and pre-dissertation examinations. Students with a master's degree in engineering, math, or relevant science can be admitted directly to

the Ph.D. program, but they must still stand for the Ph.D. qualifying and pre-dissertation examinations.

VI. EVALUATION OF PROGRESS

Candidates for graduate degrees must maintain a cumulative average of 3.0 or better to remain in good standing. The Graduate Committee will review the progress of all master and Ph.D. students at the end of each term. Only students in good standing, and who are making adequate progress on their research, are eligible for financial aid. Although the university establishes a longer time period as a maximum limit, full-time students should complete their master's degree within two years of entering graduate school. Faculty must send the Graduate Committee a written evaluation of the progress of each of their graduate advisees (M.S.E.C.E. and Ph.D.) at the end of each spring semester so that the committee can properly plan for admission of new students.

VII. PUBLICATION OF RESEARCH RESULTS

The thesis master's and Ph.D. degrees in electrical and computer engineering are research degrees. Each student is required to participate in publishable research in one of the areas of departmental concentration, or in some other area with the prior approval of their research advisor and the Graduate Committee.

Publication of all research is an important requirement for graduate thesis and dissertation research. Each candidate shall prepare one or more papers with his/her advisor describing his/her research and submit these papers to appropriate refereed journals. These papers will provide the basis for the student's thesis and/or dissertation.

Each student is also expected to present the results of his/her research in the appropriate departmental research seminar and where feasible present his/her research results at appropriate professional meetings.

11/26/2001