

# Electrical and Computer Engineering

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Graduate study is offered in the Department of Electrical and Computer Engineering leading to the degrees of Master of Science and Doctor of Philosophy in Electrical and Computer Engineering. Both the M.S. and Ph.D. are available via BCoE Learning (online). Major areas of study include, but are not limited to

- Communications,
- Controls,
- Computer Architecture and Digital Computing,
- Electromagnetics,
- Power and High Voltage,
- Microelectronics and VLSI, and
- Signal, Image, and Speech Processing.

Research facilities include

- High Performance Computing Collaboratory (HPCC),
- Geosystems Research Institute (GRI),
- Center for Advanced Vehicular Systems (CAVS),
- MSU High Voltage Laboratory,
- Emerging Materials Research Laboratory, and
- Microsystems Prototyping Laboratory.

Note: Effective Fall 2012 semester, the Department of Electrical and Computer Engineering no longer offers separate electrical engineering (EE) or computer engineering (CPE) degrees at the graduate level.

## Admission Criteria

In addition to meeting the requirements set forth by the Graduate School in the admission section of this publication, the basic requirements of the department for admission to the graduate program include

- a 3.00/4.00 GPA on a B.S. degree for admission to the M.S. degree program;
- a 3.50/4.00 GPA on a B.S. or M.S. degree for admission to the Ph.D. degree program;
- a 550 PBT TOEFL score (79 iBT) or 6.5 IELTS score for the student whose native language is not English (unless he/ she earned a degree from a U.S. institution); and
- a satisfactory performance on the GRE for students with a degree from a program that is not EAC/ABET accredited.

In addition to the requirements set forth by the Department for admission to the graduate program, highly qualified undergraduate students may be directly admitted to the Ph.D. program. Such direct admission requires a minimum undergraduate equivalent GPA of 3.50/4.00 on the last 60 credit hours of undergraduate courses, or a first class with distinction degree classification for students whose degrees are from institutions where no GPA is reported, and a satisfactory performance on the GRE for students with a degree from a program that is not EAC/ABET-accredited.

ECE M.S. students who wish to transfer to the Ph.D. program prior to completing the requirements for the Master of Science degree must submit a new application provided that they have a minimum graduate GPA of 3.80 on the first 15 credit hours of graduate courses taken at MSU.

## Provisional Admission

Provisional admission is not typically available to applicants to the Department of Electrical and Computer Engineering.

## Conditional Admission

Students who are fully funded by some external source (typically a scholarship program sponsored by the government of the student's home country) and who meet all other admission requirements, but lack only the TOEFL/IELTS score required for admission, may apply to be admitted conditionally, provided that the student's funding source will cover one year of English as a Second Language (ESL) study. After one year of ESL study, the student can apply for regular admission into the graduate program in Electrical and Computer Engineering providing that a TOEFL/IELTS score meeting admission requirements (79 TOEFL, 6.5 IELTS) has been obtained. Conditional admission is available only for the fall semester. During the time of ESL study, a conditionally admitted student may only take ESL courses; a conditionally admitted student may not take courses other than ESL courses, or engage in research activities, during the time of ESL study. To be considered for conditional admission, the student must include in their statement of purpose submitted with their application for admission a statement that they wish to be considered for conditional admission. Documentation of the source of funding indicating that the funding will cover a year of ESL study must also be submitted with the application materials.

## Accelerated Program

Highly qualified MSU undergraduates in the Department of Electrical and Computer Engineering are encouraged to consider applying to the Accelerated Program. This program permits students to earn up to 9 hours of graduate-level coursework during their final year of undergraduate studies. Students in the Accelerated Program take graduate-level courses and earn both undergraduate credit and graduate credit simultaneously. Students need to consult with a potential graduate advisor to ensure graduate credit could be applied to a program of study for the graduate degree. Application to this program is made in the junior year (i.e., after completion of 60 or more hours of graded undergraduate courses). Students interested in applying to the Accelerated Program should contact the department's graduate coordinator, Dr. James E. Fowler, for more details.

Requirements for admission into the Accelerated Program requires the following:

- A GPA of 3.50 or higher on a 4.00 system for all undergraduate work; and
- A minimum of 60 hours toward the Bachelor's degree.

For students enrolled in an Accelerated Program the MSU Graduate Council has established these guidelines in cooperation with the Registrar's Office.

- Once the student is accepted into the Accelerated Program, the student and the advisor may select up to 9 hours that will satisfy both undergraduate and graduate requirements. These courses may be split-level (i.e., 4000-6000) or 8000 level classes. The student should take the courses for graduate credit (i.e., 6000-level or higher). The combination of undergraduate and graduate credit hours may not exceed 13 hours within a semester.
- The student should use the Undergraduate Enrollment in Accelerated Degree Program form (<http://www.grad.msstate.edu/forms/pdf/accel.pdf>) to (i) receive from the Office of the Graduate School a level override that enables the student to enroll in the graduate course(s) and (ii) activate a process with the Registrar's Office to obtain both undergraduate and graduate credit for the course. After successfully completing the graduate-level class(es), the Registrar will grant credit for the undergraduate course with the same grade as received for the graduate course. For a split-level class, the transcript will show credit for both the 4000- and 6000-level on the transcript. In the case of an 8000 level class, a special topics undergraduate course of the same title will be entered on the transcript to allow dual credit.
- Students are permitted to opt out of the accelerated program at any time, at which point they would complete only the undergraduate portion of the program. No additional dual counting of courses would occur after the student opted out of the accelerated degree program.
- Students are expected to apply to the graduate degree program during the last semester in which they are enrolled in the bachelor's program. Application to the graduate degree program would be made through the standard application process via the Office of the Graduate School. Students will receive the bachelor's degree once the requirements for the bachelor's degree are met. Students will be required to complete all of the requirements for both the bachelor's and graduate degrees in order to receive both degrees and those requirements will be identical to the requirements for students enrolled in traditional bachelor's and graduate degree programs. Students will be classified as undergraduates until they fulfill all the requirements for the undergraduate degree. At that time, upon admission to graduate school, they will be classified as graduate students and will be subject to all the guidelines pertaining to the graduate degree.

## Academic Performance

To be in good academic standing, a student is expected to maintain a cumulative graduate GPA of 3.00 after admission to the program. If a graduate student's cumulative GPA falls below 3.00, the student will be placed on probation. While on probation, a student will not receive any type of financial support (TA, RA, fellowships, wages, etc.) and is required to raise his/her cumulative GPA to 3.00 by the end of the following semester of enrollment. While on probation, the student must enroll in 9 credit hours of coursework; Directed Individual Study courses are excluded.

A student will be dismissed from the graduate program if

- in any semester subsequent to being on probation, the student's cumulative GPA falls again below a 3.00;
- a student makes grades of D, F, U, or more than two Cs;
- a student fails twice the oral examination (M.S. level) or the preliminary examination (Ph.D. level);
- a student does not pass the Ph.D. qualifying exam in four attempts, within the first four semesters;
- a student receives an unsatisfactory evaluation of a thesis or dissertation;

- a student fails to take a remedial course in the required semester.

In case of a dismissal from the graduate program, a student may appeal his/her academic dismissal according to the following procedure:

- Within four weeks of being notified of the official dismissal, the student must present the request and related explanation in writing to the department head and/or graduate coordinator. The department head/coordinator will review the appeal with the departmental graduate committee and render a recommendation.
- If the appeal at the departmental level is unsuccessful, a student may then appeal to the college dean.
- If the appeal at the college level is unsuccessful, the student may then appeal to the Provost and Vice President for Academic Affairs.

## Prerequisite and Core Courses

It is required that all graduate students take the following courses for credit as required remedial undergraduate coursework unless the transcript shows equivalent credit. Additional courses may be required.

ECE 3413	Introduction to Electronic Circuits	3
ECE 3424	Intermediate Electronic Circuits	4
ECE 3443	Signals and Systems	3
ECE 3714	Digital Devices and Logic Design	4
ECE 3724	Microprocessors	3-4
or ECE 4743	Digital System Design	

## Program of Study

It is the responsibility of each graduate student to develop a suitable program of graduate study in conjunction with the student's major advisor and graduate advisory committee. Minimum requirements for the M.S. is 30 credit hours past the B.S. Minimum requirements for the Ph.D. is 48 credit hours past the M.S. or 66 credit hours past the B.S. for direct-admit Ph.D. students.

## Master of Science in Electrical and Computer Engineering - Thesis

Graduate coursework with a minimum of 12 credit hours at the 8000 level	24
ECE 8000 Thesis Research/ Thesis in Electrical and Computer Engineering	6
Total Hours <sup>1</sup>	30

- <sup>1</sup> Students can also take up to 6 hours in ECE 7000, and a minor area outside the department is optional (9 credit hours with a minimum of 3 credit hours at the 8000 level).

Students are required to orally defend their thesis. The thesis document (finished, not a draft) must be read and approved by the major professor and presented to the remaining committee members one week before the scheduled oral defense.

## Master of Science in Electrical and Computer Engineering - Non-Thesis

Graduate coursework at the 8000 level	15
Other graduate-level coursework	15
Total Hours <sup>1</sup>	30

- <sup>1</sup> Students can also take up to 6 hours in ECE 7000, and a minor area outside the department is optional (9 credit hours with a minimum of 3 credit hours at the 8000 level.)

Students in the non-thesis program must pass an oral examination. The oral examination consists of a comprehensive exam related to all the graduate level courses taken toward the degree.

## Doctor of Philosophy in Electrical and Computer Engineering

ECE 8XXX	Graduate-level coursework	12
ECE XXXX	Additional graduate-level coursework <sup>1</sup>	12
ECE 9000	Dissertation Research /Dissertation in Electrical and Computer Engineering	24
Total Hours <sup>1</sup>		48

- <sup>1</sup> Students can also take up to 6 hours in ECE 7000, and a minor area outside the department is optional (12 credit hours at the Ph.D. level with a minimum of 3 credit hours at the 8000 level).

A doctoral student is required to orally defend his or her dissertation. The dissertation document (finished, not a draft) must be read and approved by the major professor and presented to the remaining committee readers two weeks before the scheduled oral defense.

## Doctor of Philosophy in Electrical and Computer Engineering - Direct-Admit

ECE 8XXX	Graduate-level coursework	21
ECE XXXX	Graduate-level coursework	21
ECE 9000	Dissertation Research /Dissertation in Electrical and Computer Engineering	24
Total Hours <sup>1</sup>		66

<sup>1</sup> Students can also take up to 6 hours in ECE 7000, and a minor area outside the department is optional (12 credit hours at the Ph.D. level with a minimum of 3 credit hours at the 8000 level).

A doctoral student is required to orally defend his or her dissertation. The dissertation document (finished, not a draft) must be read and approved by the major professor and presented to the remaining committee readers two weeks before the scheduled oral defense.

## Completion Requirements

### Examinations

All students enrolled in the doctoral program in Electrical and Computer Engineering are required to pass a written qualifying examination. The purpose of this qualifying examination is to assess the student's broad background in ECE and ensure their capabilities for conducting doctoral work. This exam covers undergraduate ECE coursework. Students who are classified as doctoral students must pass the qualifying examination within the first two years of full-time doctoral enrollment. Students enrolled in the doctoral program part-time have two years to pass the qualifying examination after completing 9 credit hours of coursework.

Additionally, doctoral students are required to pass the oral preliminary examination (dissertation-proposal defense). The oral preliminary examination may be taken only after the student has passed the qualifying examination; in addition, the student must have completed or be within 6 hours of completing the coursework. The oral preliminary exam consists of a presentation of current research activities toward the student's dissertation.