

Electrical Engineering (MS)

Degree Requirements

With the ever-increasing pace of technological development in society, new and challenging opportunities are becoming available that require engineering graduates with increased levels of specialization. To provide for this, the Electrical and Computer Engineering Department offers electrical engineering and computer engineering graduates a cutting-edge program in graduate studies leading to the Master of Science in Electrical Engineering (MSEE) degree.

The program offers advanced level courses and areas of specialization in computer engineering, digital controls, laser-assisted fabrication, microelectronics, networks, image processing, pattern recognition, wireless communications, optical information processing and power systems. Graduate students have wide opportunities to undertake front-line engineering research alongside faculty for both thesis and project work. In addition, a coursework-only program is also offered by the department for those in industry who intend to further their professional development while pursuing a graduate degree.

Admission To The MSEE Program

The following criteria supplement the College of Engineering admission criteria (see Admission to Graduate Programs):

1. Regular Admission
 - a. A B.S. degree in electrical or computer engineering is required.
 - b. A grade-point average of 3.0 or greater (A=4.0) on all undergraduate work is required. This can be relaxed depending on the academic background and experience of the applicant.
 - c. A minimum score of 151 in the quantitative section and a minimum score of 141 in the verbal section of the Graduate Record Examination (GRE) is required. These requirements may be relaxed slightly depending upon special individual circumstances evaluated holistically. GRE scores are not required for ECE students who have graduated from the University of South Alabama.
 - d. For International students whose native language is not English, a minimum score of 550 on the written Test of English as a Foreign Language (TOEFL) or a minimum score of 79 on the Internet-based TOEFL exam, or a minimum score of Band 6.5 on the International English Language Testing System (IELTS) test, is required.
2. Provisional Admission
 - a. A B.S. degree in electrical or computer engineering, or in a field acceptable to the departmental Graduate Admissions Committee, is required. Depending on the student's background, additional undergraduate preparatory courses may be required. These courses will not count toward the MS degree.
 - b. A minimum grade-point average of 2.5 (A=4.0) on all undergraduate work, including a minimum grade-point average of 2.5 over the last 64 course hours of undergraduate work is required. Alternatively, a minimum grade-point average of 2.75 over the last 64 course hours of undergraduate work is required.
 - c. A minimum GRE combined score greater than or equal to 283 (Verbal + Quantitative) is required. GRE scores are not required for ECE students who have graduated from the University of South Alabama.
 - d. For International students whose native language is not English, a minimum score of 525 on the written Test of English as a Foreign Language (TOEFL) or a minimum score of 71 on the Internet-based TOEFL exam, or a minimum score of Band 6.0 on the International English Language Testing System (IELTS) test, is required.

BSEE And BSCpE Accelerated Bachelor's To Master's (ABM) Degree Option

The Department of Electrical and Computer Engineering allows well-qualified EE and CpE undergraduates to follow an "Accelerated Bachelor's to Master's" study plan. This plan permits up to six credit hours of graduate coursework to count towards both the Bachelor's (as Technical Electives) and the Master's degrees, so that the Master's degree is earned faster than usual. (The coursework concerned must individually satisfy the requirements of both degrees.)

Example: the MSEE degree requires 30 total credit hours (for thesis option, 24 credit hours of coursework plus six credit hours of thesis work). ABM students may take up to six of the MSEE coursework credit hours as Technical Electives for their BSEE or BSCpE degrees, leaving only 24 credit hours of coursework (for non-thesis option) or 18 credit hours of coursework plus six credit hours of thesis work (for thesis option) needed to earn the MSEE degree.

Eligibility Requirements:

- Must have at least 3.0 cumulative undergraduate GPA (at USA), and
- Must have completed at least 90 credit hours (i.e., senior status; within two semesters of BSEE or BScpE graduation), and
- Must have completed at least 30 credit hours at USA.

A student who later withdraws or is dismissed from the ABM program may not count graduate coursework towards both degrees. Graduate courses will only be counted towards the MSEE degree if the undergraduate student earns an “A” or “B” grade.

An ABM student must be a full time student and must complete all degree requirements for the Master’s degree within three semesters of the semester in which he or she was admitted to the Graduate School. An exception for a fourth semester may be granted where an additional semester is required for final revisions to and submission of a defended thesis. Thesis option students must form the thesis committee during the second semester of the program the latest. Exceptions to the Electrical and Computer Engineering ABM program policy are at the discretion of the Department Chair and the Dean of the Graduate School.

Procedure:

If you satisfy these eligibility requirements, and wish to be considered for the ABM program:

1. Discuss ABM with the Department Chair and/or your advisor, for course planning;
2. Complete an undergraduate Advising Form at <https://www.southalabama.edu/colleges/engineering/currentstudents/resources/engineeringadvisingform.pdf> incorporating the ABM courses you have chosen;
3. Complete and print the ABM Declaration form at <https://www.southalabama.edu/departments/eforms/graduateschool/abmdeclarationform.pdf> incorporating the ABM courses you have chosen;
4. Submit this printed form to the Department Chair for formal approval and routing;
5. Fill out the Graduate Course Request Form at https://www.southalabama.edu/departments/eforms/registrar/graduate_level_course_for_undergraduate_degree.pdf and submit it to the Department Chair for formal approval and routing;
6. Enroll in the graduate section (500-level) of your chosen ABM Technical Elective(s) (N.B., this will require course overrides).

These 500-level Technical Electives will count towards the MSEE degree after you apply for graduate school (after completing the BS degree) and successfully complete nine additional credit hours of graduate courses.

Graduation Plan

Electrical Engineering (MS): (30 Total Hours)

The minimum credit hour requirements for the three different options for the MSEE degree are:

- Thesis Option: 30 credit hours
- Project Option: 30 credit hours
- Course Option: 30 credit hours

The details of each option are contained in the Electrical and Computer Engineering Department Guidelines for the MSEE program.

The Graduation Plan is an example of course progression. Individual student plans may vary. Students should consult an academic advisor to create a personalized plan.

First Year Thesis/Project Option — Fall Semester

Course ID	Course Description	Hours
EE 5XX	Pure Graduate Class	3
EE 5XX	Graduate Elective Class***	3
EE 5XX	Graduate Elective Class***	3

Total Hours 9

First Year Thesis/Project Option — Spring Semester

Course ID	Course Description	Hours
EE 5XX	Pure Graduate Class	3
EE 5XX	Graduate Elective Class***	3
EE 5XX	Graduate Elective Class***	3

Total Hours 9

Second Year Thesis/Project Option — Fall Semester

Course ID	Course Description	Hours
EE 5XX	Pure Graduate Class	3
EE 599*/EE 594**	Thesis/Project	3

Total Hours 6

Second Year Thesis/Project Option — Spring Semester

Course ID	Course Description	Hours
EE 5XX	Graduate Elective Class***	3
EE 599/EE 5XX	Thesis/Graduate Elective Class***	3

Total Hours 6

First Year Course Option — Fall Semester

Course ID	Course Description	Hours
EE 5XX	Pure Graduate Class	3
EE 5XX	Graduate Elective Class***	3
EE 5XX	Graduate Elective Class***	3
	Total Hours	9

First Year Course Option — Spring Semester

Course ID	Course Description	Hours
EE 5XX	Pure Graduate Class	3
EE 5XX	Graduate Elective Class***	3
EE 5XX	Graduate Elective Class***	3
	Total Hours	9

Second Year Course Option — Fall Semester

Course ID	Course Description	Hours
EE 5XX	Pure Graduate Class	3
EE 5XX	Graduate Elective Class***	3
	Total Hours	6

Second Year Course Option — Spring Semester

Course ID	Course Description	Hours
EE 5XX	Graduate Elective Class***	3
EE 5XX	Graduate Elective Class***	3

Total Hours

6

Notes

Pure Graduate Course is a course not dually listed with a 400 hundred level course

*Thesis course: EE 599

**Project course EE 594

***Graduate elective classes must be approved by the departmental graduate coordinator

Some classes from other disciplines are available for graduate students: these must be approved by the departmental graduate coordinator

No more than 18 hours of dual-listed courses (400-and 500-level listing for the same course) may be counted toward meeting the minimum hours required for a degree.

Other ECE Requirements are as specified in the Departmental policies

Graduate level instruction in research integrity and professional ethics is required in all graduate programs

BSEE And BSCpE Accelerated Bachelors – Masters (ABM) Degree Option

The Department of Electrical and Computer Engineering allows well-qualified EE and CpE undergraduates to follow an “Accelerated Bachelor’s to Master’s” study plan. This plan permits up to six credit hours of graduate coursework to count towards both the bachelor’s (as Technical Electives) and the master’s degrees, so that the master’s degree is earned faster than usual. (The coursework concerned must individually satisfy the requirements of both degrees.)

Example: the MSEE degree requires 30 total credit hours (for thesis option, 24 credit hours of coursework plus 6 credit hours of thesis work). ABM students may take up to six of the MSEE coursework credit hours as Technical Electives for their BSEE or BSCpE degrees, leaving only 24 credit hours of coursework (for non-thesis option) or 18 credit hours of coursework plus 6 credit hours of thesis work (for thesis option) needed to earn the MSEE degree.

Eligibility Requirements:

- Must have at least 3.0 cumulative undergraduate GPA (at USA), and
- Must have completed at least 90 credit hours (i.e., senior status; within two semesters of BSEE or CpE graduation), and
- Must have completed at least 30 credit hours at USA.

A student who later withdraws or is dismissed from the ABM program may not count graduate coursework towards both degrees. Graduate courses will only be counted towards the MSEE degree if the undergraduate student earns an “A” or “B” grade.

An ABM student must be a full time student and must complete all degree requirements for the master’s within three semesters of the semester in which they were admitted to the Graduate School. An exception for a fourth semester may be granted where an additional semester is required for final revisions to and submission of a defended thesis. Thesis option students must form the thesis committee during the second semester of the program the latest. Exceptions to the Electrical and Computer Engineering ABM program policy are at the discretion of the Department Chair and the Dean of the Graduate School.

Procedure:

If you satisfy these eligibility requirements, and wish to be considered for the ABM program:

1. Discuss ABM with the Department Chair and/or your advisor, for course planning;
2. Complete an undergraduate Advising Form at <https://www.southalabama.edu/colleges/engineering/currentstudents/resources/engineeringadvisingform.pdf> incorporating the ABM courses you have chosen;

3. Complete and print the ABM Declaration form at: <https://www.southalabama.edu/departments/eforms/graduateschool/abmdeclarationform.pdf> incorporating the ABM courses you have chosen;
4. Submit this printed form to the Department Chair for formal approval and routing;
5. Fill out the Graduate Course Request Form and submit it to the Department Chair for formal approval and routing
6. Enroll in the graduate section (500-level) of your chosen ABM Technical Elective(s) (N.B., this will require course overrides).

These 500-level Technical Electives will count towards the MSEE degree after you apply for graduate school (after completing the BS degree) and successfully complete nine additional credit hours of graduate courses.

Department Information

Department of Electrical and Computer Engineering Administrative Staff		(251) 460-6117
Chair	Hulya Kirkici	
Professors	Kirkici, Steadman, Woods	
Associate Professors	El-Sharkh, Gong, Khan, Latif, Russ, Spencer, Thomas, Wang	
Assistant Professors	Shaban, Touma	
Emeritus Professors	Bosarge, Gungor, Sakla	
Part-time Instructor	Gholson, Sakla	

Department of Electrical and Computer Engineering website
<https://www.southalabama.edu/colleges/engineering/ece/index.html>

The Department of Electrical and Computer Engineering offers the degrees of Bachelor of Science in Electrical Engineering (BSEE) and Bachelor of Science in Computer Engineering (BSCpE), both granted by the College of Engineering. The BSCpE program is administered by the ECE Department in collaboration with the School of Computing. The ECE Department also offers the degree of Master of Science in Electrical Engineering.

BSEE Program Educational Objectives

The program educational objectives (PEOs) of the Electrical Engineering Degree Program are to produce graduates who, during their first few years after graduation, will:

1. Achieve professional advancement with increasing responsibility, leadership, and mentorship.
2. Function effectively on multidisciplinary teams, and individually, to develop and apply electrical engineering solutions within a global, societal, and environmental context.
3. Communicate effectively and manage resources skillfully as members and leaders of their profession.
4. Advance professional competence through continuous learning such as studying for advanced degrees, professional registration, and leadership through ethical standards and professionalism.

BSEE Student Outcomes

By the time of graduation from the Electrical Engineering Program, students should attain the following outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

The BSEE curriculum is designed to ensure the attainment of the student outcomes.

The Bachelor of Science in Electrical Engineering program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>

Electrical Engineering is among the fastest evolving disciplines in our technological society. Engineering developments in electrical technology have provided, in a substantial way, improvement in the standard of living of humanity. The domain of the electrical engineer reaches from massive electrical energy systems to microscopic integrated circuits; from life studies in bioengineering to satellite communications systems; and from the control of electromagnetic radiation to the control of information flow in this field.

The highly diverse and rapidly evolving characteristics of this field requires a thorough understanding of fundamentals as well as flexibility in the design of individualized programs of study.

Therefore, emphasis is placed on mathematics, physics, humanities, social sciences, basic sciences and engineering sciences during the first two years. Sufficient flexibility is provided at the senior level to allow a student, in consultation with an advisor, to prepare a specialized course of study in six main concentration areas from the broad field of electrical engineering: 1 – Control Systems, 2 – Communications and Networks, 3 – Digital Systems, 4 – Electromagnetics and Optics, 5 – Electronics, and 6 – Power Systems. In addition, means are provided, through the Electrical and Computer Engineering Design Laboratory, for a student to pursue a design topic outside of, but related to, the formal coursework.

Students are required to take general education (GenEd) elective courses in four broad areas: (i) Literature, (ii) Humanities and Fine Arts, (iii) Natural Science and Mathematics and (iv) History, Social, and Behavioral Sciences. These courses provide breadth to the educational experience of Electrical Engineering and Computer Engineering students. They must be planned, in consultation with an academic advisor, to reflect a rationale appropriate to the educational objectives of the Departmental Programs, while conforming strictly to the requirements of the Articulation and General Studies Committee of the State of Alabama.

All students are required to successfully complete EH 101 and EH 102, English Composition I and II from area (i), plus a minimum of 18 semester hours of general education courses from areas (ii) and (iv). In area (ii), Public Speaking (CA110) is required for all Electrical and Computer Engineering students. Of the two remaining courses, one course must be in literature and one course must be in the fine arts. In area (iv), at least one course must be in history and at least one course must be from disciplines in the social and behavioral sciences.

Students in Electrical Engineering are required to become Student Members of the Institute of Electrical and Electronics Engineers (IEEE) when they enroll in EE 401 and EE 404. Through participation in the activities of such technical organizations the student becomes aware of the activities of electrical and computer engineers in society. An excellent opportunity is provided to students for contact with practicing professionals as well as fellow students.

Any Electrical Engineering student interested in pursuing a career in medicine or bioengineering should consult with an advisor for an appropriate sequence of courses which will meet the minimum requirements for entry into a medical school or the necessary life sciences background to enter a graduate program in bioengineering.

The award of the BSEE degree will allow the graduate to enter the professions of electrical engineering directly, or to continue his/her education at the graduate level.

BSCpE Program Educational Objectives

The program educational objectives (PEOs) of the Computer Engineering Degree Program are to produce graduates who, during their first few years after graduation, will:

1. Achieve professional advancement with increasing responsibility, leadership and mentorship.

2. Function effectively on multidisciplinary teams, and individually, to develop and apply computer engineering solutions within a global, societal, and environmental context.
3. Communicate effectively and manage resources skillfully as members and leaders of their profession.
4. Advance professional competence through continuous learning such studying for advanced degrees, professional registration, and leadership through ethical standards and professionalism.

BSCpE Student Outcomes

By the time of graduation from the BSCpE program, a student will have demonstrated attainment of the following outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

The BSCpE curriculum is designed to ensure the attainment of the student outcomes.

The Bachelor of Science in Computer Engineering program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>

The Computer Engineering program is geared to students who are interested in the design of digital computing systems, integrating both hardware and software design components.

In the Computer Engineering Degree Program, sequences of courses are chosen from Electrical and Computer Engineering and from Computer Science that produce an in-depth treatment of digital logic and systems theory. In addition, means are provided through the Electrical and Computer Engineering Design Laboratory, for a student to pursue a design topic outside of, but related to, the formal coursework.

Students are required to take general education (GenEd) elective courses in four broad areas: (i) Literature, (ii) Humanities and Fine Arts, (iii) Natural Science and Mathematics and (iv) History, Social, and Behavioral Sciences. These courses provide breadth to the educational experience of Electrical Engineering and Computer Engineering students. They must be planned, in consultation with an academic advisor, to reflect a rationale appropriate to the educational objectives of the Departmental Programs, while conforming strictly to the requirements of the Articulation and General Studies Committee of the State of Alabama.

All students are required to successfully complete EH 101 and EH 102, English Composition I and II from area (i), plus a minimum of 18 semester hours of general education courses from areas (ii) and (iv). In area (ii), Public Speaking (CA 110) is required for all Electrical and Computer Engineering students. Of the two remaining courses, one course must be in literature and one course must be in the fine arts. In area (iv), at least one course must be in history and at least one course must be from disciplines in the social and behavioral sciences.

Students in Computer Engineering are required to become members of either the Institute of Electrical and Electronics Engineers (IEEE) or the Association for Computing Machinery (ACM) when they enroll in EE 401 and EE 404. Through participation in the activities of such technical organizations the student becomes aware of the activities of electrical and computer engineers in society. An excellent opportunity is provided to students for contact with practicing professionals as well as fellow students.

Any Computer Engineering student interested in pursuing a career in medicine or bioengineering should consult with an advisor for an appropriate sequence of courses which will meet the minimum requirements for entry into a medical school or the necessary life sciences background to enter a graduate program in bioengineering.

The award of the BSCpE degree will allow the graduate to enter the professions of electrical engineering or computer engineering directly, or to continue his/her education at the graduate level.

BSEE And BSCpE Accelerated Bachelor's To Master's (ABM)

Degree Option

The Department of Electrical and Computer Engineering allows well-qualified EE and CpE undergraduates to follow an "Accelerated Bachelor's to Master's" study plan. This plan permits up to six credit hours of graduate coursework to count towards both the Bachelor's (as Technical Electives) and the Master's degrees, so that the Master's degree is earned faster than usual. (The coursework concerned must individually satisfy the requirements of both degrees.) See a departmental advisor for specific details.
