

# COMPUTER ENGINEERING, B.S.E.

## Accreditation

The BSE Computer Engineering program is accredited by the Engineering Accreditation Commission of ABET, <https://www.abet.org>, under the General Criteria and the Electrical, Computer, Communications, Telecommunication(s) and Similarly Named Engineering Programs Criteria.

## Learning Outcomes

1. Students will demonstrate an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. Students will demonstrate 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. Students will demonstrate an ability to communicate effectively with a range of audiences.
4. Students will demonstrate 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. Students will demonstrate 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. Students will demonstrate an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. Students will demonstrate an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

## Academic Standards

### Program GPA

Program GPA requirement policies are described in the College of Engineering and Computing section of this bulletin. For the purpose of these policies, the following courses are used to determine the Program GPA for the Computer Engineering B.S.E. program: all Lower Division Computing courses, Computer Engineering Major, Computer Engineering Electives, Electrical Engineering courses, and CSCE 390.

### Exclusions

No Computer Engineering course may be counted toward a minor. All other required courses and electives may be used for a minor as appropriate. CSCE 101 and CSCE 102 are not major courses and may not be used for degree credit.

### Minimum Course Grades

The Computer Engineering B.S.E. program requires that a grade of "C" or better be earned in each of the following courses: ENGL 101, ENGL 102, MATH 141, MATH 142, MATH 374, PHYS 211, PHYS 211L, and all CSCE courses applied to the degree.

## Admissions

### Entrance Requirements

Admission requirements and processes for freshman, transfer students, and former students seeking readmission are managed by the Office of Undergraduate Admissions ([http://sc.edu/about/offices\\_and\\_divisions/undergraduate\\_admissions/](http://sc.edu/about/offices_and_divisions/undergraduate_admissions/)).

Transfer applicants from regionally accredited colleges and universities must have a cumulative 2.75 GPA on a 4.00 scale to enter the College of Engineering and Computing. In addition, transfer applicants for the Aerospace Engineering, Biomedical Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, or Mechanical Engineering majors must also have completed a four semester-hour calculus course equivalent to MATH 141 with a grade of "C" or better.

Current University of South Carolina students who wish to enter the College of Engineering and Computing, and former students seeking readmission, must have an institutional GPA of 2.50 or better on at least 15 hours earned at USC. In addition, such applicants for the Aerospace Engineering, Biomedical Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, or Mechanical Engineering majors must also have completed a four semester-hour calculus course equivalent to MATH 141 with a grade of "C" or better.

## Degree Requirements (125-134 hours)

See College of Engineering and Computing (<https://academicbulletins.sc.edu/undergraduate/engineering-computing/>) for progression requirements and special academic opportunities.

### Program of Study

Requirements	Credit Hours
1. Carolina Core	35-41
2. College Requirements	0
3. Program Requirements	57
4. Major Requirements	33-36

### Founding Documents Requirement

All undergraduate students must take a 3-credit course or its equivalent with a passing grade in the subject areas of History, Political Science, or African American Studies that covers the founding documents including the United State Constitution, the Declaration of Independence, the Emancipation Proclamation and one or more documents that are foundational to the African American Freedom struggle, and a minimum of five essays from the Federalist papers. This course may count as a requirement in any part of the program of study including the Carolina Core, the major, minor or cognate, or as a general elective. Courses that meet this requirement are listed here (<https://academicbulletins.sc.edu/undergraduate/founding-document-courses/>).

## 1. Carolina Core Requirements (35-41 hours)

### CMW – Effective, Engaged, and Persuasive Communication: Written (6 hours)

*Must be passed with a grade of C or higher.*

- ENGL 101
- ENGL 102

### ARP – Analytical Reasoning and Problem Solving (8 hours)

*Must be passed with a grade of C or higher.*

- MATH 141
- MATH 142

### SCI – Scientific Literacy (8 hours)

- CHEM 111 & CHEM 111L
- PHYS 211 & PHYS 211L - *must be passed with a grade of C or higher*

### GFL – Global Citizenship and Multicultural Understanding: Foreign Language (0-6 hours)

Score two or better on foreign language placement test; or complete the 109 and 110 courses in FREN, GERM, LATN or SPAN; or complete the 121 course in another foreign language.

- CC-GFL courses (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

### GHS – Global Citizenship and Multicultural Understanding: Historical Thinking (3 hours)

- any CC-GHS course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

### GSS – Global Citizenship and Multicultural Understanding: Social Sciences (3 hours)

- any CC-GSS course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

### AIU – Aesthetic and Interpretive Understanding (3 hours)

- any CC-AIU course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

### CMS – Effective, Engaged, and Persuasive Communication: Spoken Component <sup>1</sup> (3 hours)

- any CC-CMS course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

### INF – Information Literacy <sup>1</sup> (0 hours)

- ENGL 102

### VSR – Values, Ethics, and Social Responsibility <sup>1</sup> (1 hour)

- CSCE 390 - *must be passed with a grade of C or higher*

<sup>1</sup> Carolina Core Stand Alone or Overlay Eligible Requirements – Overlay-approved courses offer students the option of meeting two Carolina Core components in a single course. A maximum of two overlays is allowed. The total Carolina Core credit hours for this program must add up to a minimum of 35 hours.

## 2. College Requirements (0 hours)

*No college-required courses for this program.*

## 3. Program Requirements (57 hours)

### Supporting Courses (57 hours)

Course	Title	Credits
<b>Foundational Courses</b>		
MATH 241	Vector Calculus	3
MATH 242	Elementary Differential Equations	3
MATH 344	Applied Linear Algebra	3
MATH 344L	Applied Linear Algebra Lab	1
MATH 374	Discrete Structures (must be passed with a grade of C or higher)	3
PHYS 212	Essentials of Physics II	3
PHYS 212L	Essentials of Physics II Lab	1
STAT 509	Statistics for Engineers	3
ENGL 462	Technical Writing	3
or ENGL 463	Business Writing	
<b>Lower Division Computing</b>		
Must be passed with a grade of C or higher:		
CSCE 145	Algorithmic Design I	4
CSCE 146	Algorithmic Design II	4
CSCE 190	Computing in the Modern World	1
CSCE 211	Digital Logic Design	3
CSCE 212	Introduction to Computer Architecture	3
CSCE 215	UNIX/Linux Fundamentals	1
CSCE 240	Advanced Programming Techniques	3
CSCE 274	Robotic Applications and Design	3
<b>Electrical Engineering</b>		
ELCT 102	Electrical Science	3
ELCT 201	Introductory Electrical Engineering Laboratory	3
ELCT 221	Circuits	3
ELCT 222	Signals and Systems	3
<b>Total Credit Hours</b>		<b>57</b>

## 4. Major Requirements (33-36 hours)

*Must be passed with a grade of C or higher.*

Course	Title	Credits
CSCE 311	Operating Systems	3
CSCE 313	Embedded Systems	3
CSCE 350	Data Structures and Algorithms	3
CSCE 416	Introduction to Computer Networks	3
CSCE 490	Capstone Computing Project I	3
CSCE 491	Capstone Computer Engineering Project	3
CSCE 492	Capstone Computing Project II	3
CSCE 611	Advanced Digital Design	3
<b>Total Credit Hours</b>		<b>24</b>

### Major Electives (9 hours)

Students must complete 9 hours of Major Electives below. Students may choose to complete a 12-hour concentration in Artificial Intelligence or Cybersecurity in place of the Major Electives.

Course	Title	Credits
Select from the following:		9
CSCE 330	Programming Language Structures	
CSCE 355	Foundations of Computation	
ELCT 321	Digital Signal Processing	
ELCT 331	Control Systems	
Other approved CSCE courses numbered 510 and higher		
<b>Total Credit Hours</b>		<b>9</b>

## Concentrations (12 hours)

Students may choose to complete a 12-hour concentration below in place of the 9 hours of Major Electives.

### Artificial Intelligence Concentration (12 hours)

Course	Title	Credits
CSCE 580	Artificial Intelligence	3
Select three courses from the following:		9
CSCE 555	Algorithms in Bioinformatics	
CSCE 567	Visualization Tools	
CSCE 574	Robotics	
CSCE 578	Text Processing	
CSCE 582	Bayesian Networks and Decision Graphs	
CSCE 585	Machine Learning Systems	
CSCE 587	Big Data Analytics	
<b>Total Credit Hours</b>		<b>12</b>

### Cybersecurity Concentration (12 hours)

Course	Title	Credits
CSCE 201	Introduction to Computer Security	3
CSCE 522	Information Security Principles	3
CSCE 548	Building Secure Software	3
Select one course from the following:		3
CSCE 520	Database System Design	
CSCE 557	Introduction to Cryptography	
<b>Total Credit Hours</b>		<b>12</b>

## Major Map

A major map is a layout of required courses in a given program of study, including critical courses and suggested course sequences to ensure a clear path to graduation.

Major maps are only a suggested or recommended sequence of courses required in a program of study. Please contact your academic advisor for assistance in the application of specific coursework to a program of study and course selection and planning for upcoming semesters.

**Computer Engineering, B.S.E.**