

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 Molinaroli 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/).

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 ¹ (3 hours)

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

INF – Information Literacy ¹ (0 hours)

- ENGL 102

VSR – Values, Ethics, and Social Responsibility ¹ (1 hour)

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

¹ **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 |
|---|--|-----------|
| Foundational Courses | | |
| 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 | |
| Lower Division Computing | | |
| 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 |
| Electrical Engineering | | |
| ELCT 102 | Electrical Science | 3 |
| ELCT 201 | Introductory Electrical Engineering Laboratory | 3 |
| ELCT 221 | Circuits | 3 |
| ELCT 222 | Signals and Systems | 3 |
| Total Credit Hours | | 57 |

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 |
| Total Credit Hours | | 24 |

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 | | |
| Total Credit Hours | | 9 |

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 | |
| Total Credit Hours | | 12 |

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 | |
| Total Credit Hours | | 12 |

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.

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