Degree Type – Bachelor of Science in Computer Engineering (BSCE)
Degree Title – Computer Engineering

Computer engineering is a broad field with applications in almost all areas of industry including software and hardware computer systems, and computing electronics. The Department of Computer Science and the Department of Electrical Engineering jointly offers the Bachelor of Science in Computer Engineering (BSCE) degree, accredited by ABET since 2009.

The program awards a Bachelor of Science in Computer Engineering (BSCE). Computer engineering is a discipline that embodies the science and technology of design, construction and implementation of software and hardware components of modern computing hardware and software systems and computer-controlled equipment. The body of knowledge for computer engineering includes algorithms, computer architecture and organization, computer systems engineering, circuits and signals, database systems, digital logic, digital signal processing, electronics, embedded systems, computer networks, operating systems, programming, software engineering and discrete structures. The curriculum was designed following the guidelines of ACM and IEEE model curricula to meet ABET standards.

This degree provides a broad, solid education in computer engineering fundamentals as well as the opportunity for in-depth study in specialized topics. Students completing the program will have a rigorous foundation for software and hardware engineering practice in industry as well as for graduate studies in computer science, computer engineering and other related disciplines. The program has well-equipped, accessible laboratories and extensive computing facilities.

The Computer Engineering Program is a joint program delivered by the Department of Computer Science and the Department of Electrical Engineering. The Computer Engineering program prepares students to pursue advanced study or to enter the dynamic and interdisciplinary field that continues to experience rapid growth and impacts many aspects of human endeavor. The program is designed to provide students with a balanced perspective of hardware and software, and the analysis, design, and implementation techniques for integrated computer systems. The faculty endeavor to be accessible, maintain state of the art instruction and facilities, and to provide liberal access to laboratories and academic support.

STUDENT LEARNING OUTCOMES:
1. **A knowledge of mathematics and basic sciences necessary for the analysis and design of computer software, hardware, and systems.**
2. **An understanding of the principles of computer programming, software engineering, algorithms, data structures, computer organization and architecture, operating systems, and computer networking.**
3. **An understanding of the principles of microprocessor systems, digital electronics, electrical circuits, electronics, and embedded systems, and an understanding of the applications of computer engineering principles.**
4. **An ability to use analysis and design tools to produce integrated systems containing hardware and software.**
5. **A depth and breadth of knowledge that goes beyond the basic skills expected of all computer engineering students with further specialization in either the software track or the hardware track.**
6. **An ability to apply these principles and practices to a variety of computer engineering problems.**
7. **An ability to successfully complete design projects of substantial complexity.**
8. **An ability to understand and learn new technological developments in the field.**
9. **An ability to work effectively in teams.**
10. **An ability to communicate effectively in graphical, oral, and written media.**
11. **An understanding of the professional responsibility of an engineer and how engineering solutions impact safety, economics, ethics, politics, and societal and cultural issues.**

A – GENERAL EDUCATION CORE – 42 HOURS
Students must fulfill the General Education Core requirements. The courses listed below satisfy both degree requirements and General Education core requirements.

Required

Mathematics – 3 hours

MATH 2413 Calculus I (or MATH 2487 Honors) three-hour lecture

Life and Physical Science – 6 hours

PHYS 2425 Physics for Scientists and Engineers I three-hour lecture
PHYS 2426 Physics for Scientists and Engineers II three-hour lecture

Language, Philosophy, and Culture – 3 hours

PHIL 1310 Ethics, Happiness, and the Good Life (Must be Engineering/Computer Science section)

Integrative and Experiential Learning – 6 hours

Choose any course from Humanities, except Professional Ethics, and complete:
CMPE 1370 Engineering Computer Science I (or CMPE 1378 Honors)

B – MAJOR REQUIREMENTS – 65 HOURS (49 advanced minimum)

1 – Computer Engineering Core – 38 hours (25 advanced)

CMPE 1101 Introduction to Computer Engineering
CMPE 1170 Engineering Computer Science I Lab (or CSCI 1178 Honors)
CMPE 2320 Electrical Circuits I
CMPE 2120 Electrical Circuits I Lab
CMPE 2330 Digital Systems Engineering I
CMPE 2130 Digital Systems Engineering I Lab
Choose one:
    CMPE 2380 Computer Science II
    CSCI 2380 Computer Science II
CMPE 3333 Algorithms and Data Structures
CMPE 3334 Systems Programming
CMPE 3340 Software Engineering I
CMPE 3403 Electronics for Computer Engineering
CMPE 4303 Digital Systems Engineering II
CMPE 4334 Operating Systems
CMPE 4335 Computer Architecture
CMPE 4375 Introduction to VLSI Design

2 – Senior Design – 6 hours (6 advanced)

Choose one pair:

CMPE 4371 Senior Design I Software <u>and</u> CMPE 4372 Senior Design II Software
CMPE 4373 Senior Design I Hardware <u>and</u> CMPE 4374 Senior Design II Hardware

3 – Technical Electives – 6 hours (6 advanced)

Choose from (Additional courses available with Advisor or Program Director Approval):
CMPE 4301 Digital Image Processing
CMPE 4327 Compiler Construction
CMPE 4336 Parallel and Distributed Computing
CMPE 4363 Computer and Network Security
CMPE 4341 Topics in Computer Science
CMPE 4350 Artificial Intelligence
CMPE 4365 Digital Signal Processing
CMPE 4366 Image Processing
CMPE 4367 Fiber Optics Communications
CMPE 4378 Signal Integrity and Electromagnetic Compatibility
CMPE 4381 Interactive Systems and User Interface Design

CMPE 4382 Computer Visualization

4 – Concentrations – 15 hours (12 advanced minimum)
Choose one concentration:

a – Software – 15 hours (12 advanced)
CMPE 2333 Computer Organization and Assembly Language
CMPE 3341 Software Engineering II
CMPE 4345 Computer Networks
CMPE 4333 Database Design and Implementation
Choose one:
CMPE 3326 Object Oriented Programming in JAVA
CMPE 3328 Object Oriented Programming in C#

b – Hardware – 15 hours (15 advanced)
CMPE 3322 Signals and Systems
CMPE 3226 Electrical Engineering I Lab
CMPE 3331 Microcontroller and Embedded Systems Lab
CMPE 4390 Communication Networks
CMPE 3437 Microprocessor Systems

C – SUPPORT COURSES – 19 HOURS (6 advanced)

1 – Physics Lab – 2 hours
PHYS 2425 Physics for Scientists and Engineers I one-hour lab
PHYS 2426 Physics for Scientists and Engineers II one-hour lab

2 – Basic Science – 3 hours
Choose one:
CHEM 1311 General Chemistry I
CHEM 1307 Chemistry for Engineers

3 – Mathematics – 14 hours (6 advanced)
MATH 2413 Calculus I (or MATH 2487 Honors) one-hour lecture
MATH 2414 Calculus II (or MATH 2488 Honors)
MATH 2346 Mathematics for Electrical and Computer Engineers
MATH 3341 Differential Equations
MATH 4337 Probability and Statistics I

TOTAL CREDIT HOURS FOR GRADUATION – 126 HOURS

TOTAL ADVANCED HOURS (MINIMUM) – 55 HOURS

ADMISSION, PROGRESSION, AND GRADUATION REQUIREMENTS, if applicable:

Graduation requirements
As part of the degree, all students must complete a two-semester capstone senior design project, represented by CMPE 4371 and CMPE 4372 or CMPE 4372 and CMPE 4374 in the degree plan. This project must be of substantial scope and complexity, demonstrate competencies from across the curriculum (in particular, the ability to design computer software, electronic hardware and integrate the two in systems) and address the social, economic and ethical consequences of the project.