Computer Science and Engineering, B.S.

The undergraduate program in Computer Science and Engineering is administered by faculty from two academic units: the Department of Computer Science (CS) in the Donald Bren School of Information and Computer Sciences, and the Department of Electrical Engineering and Computer Science (EECS) in The Henry Samueli School of Engineering. Successful completion of the program leads to a B.S. in Computer Science and Engineering.

Program Educational Objectives: Graduates of the program will: (1) establish a productive Computer Science and Engineering career in industry, government, or academia; (2) engage in professional practice of computer systems engineering and software systems engineering; (3) promote the development of innovative systems and solutions using hardware and software integration; (4) promote design, research, and implementation of products and services in the field of Computer Science and Engineering through strong communication, leadership, and entrepreneurial skills.

(Program educational objectives are those aspects of computer science and engineering that help shape the curriculum; achievement of these objectives is a shared responsibility between the student and UCI.)

This program is designed to provide students with the fundamentals of computer science, both hardware and software, and the application of engineering concepts, techniques, and methods to both computer systems engineering and software system design. The program gives students access to multidisciplinary problems in engineering with a focus on total systems engineering. Students learn the computer science principles that are critical to development of software, hardware, and networking of computer systems. From that background, engineering concepts and methods are added to give students exposure to circuit design, network design, and digital signal processing. Elements of engineering practice include systems view, manufacturing and economic issues, and multidisciplinary engineering applications.

Career Paths. Most likely careers will involve building the computer-based infrastructure—computers, networks, embedded devices, as well as operating systems, compilers, and networking software. The focus is on cooperation between hardware and software to yield the highest performance. Examples of such problem areas would be in traffic management, flight control, earthquake monitoring, automotive control, and smart homes.

Change of Major

Students interested in changing their major to Computer Science and Engineering should contact the Student Affairs Office in the Bren School of ICS or The Henry Samueli School of Engineering for information about change-of-major requirements. Information is also available at UCI Change of Major Criteria website (http://www.changeofmajor.uci.edu/).

High School Students: Students must have completed four years of mathematics through pre-calculus or math analysis and are advised to have completed one year each of chemistry and physics. One semester of programming coursework is also advised. That preparation, along with honors courses and advanced placement courses, is fundamental to success in the program.

The Henry Samueli School of Engineering recommends that freshmen applicants in Engineering majors take the SAT Subject Test, Math Level 2.

Transfer Students. Students are encouraged to complete as many of the lower-division degree requirements as possible prior to transfer, including one year of approved calculus; one year of calculus-based physics with laboratories (mechanics, electricity and magnetism); one year of transferable computer science courses[1] involving concepts such as those found in Java, Python, C++, or other object-oriented, high-level programming language, and one additional approved transferable course for the major (an approved math, science, or CSE course).

[1]   Additional computer science courses beyond the two required are strongly recommended, particularly those that align with the major of interest. Java and C++ are used in the curriculum; therefore, transfer students should plan to learn these languages by studying on their own or by completing related programming courses prior to their first quarter at UCI.

Students who enroll at UCI in need of completing lower-division coursework may find that it will take longer than two years to complete their degrees. For further information, contact the Donald Bren School of Information and Computer Sciences at 949-824-5156 or The Henry Samueli School of Engineering at 949-824-4334.

All students must meet the University Requirements (http://catalogue.uci.edu/informationforadmittedstudents/ requirementsforabachelorsdegree/).

Major Requirements

Mathematics and Basic Science Courses	
Mathematics Courses: Students must complete a minimum of 32 units of mathematics including:	
I&C SCI 6B	Boolean Logic and Discrete Structures
I&C SCI 6D	Discrete Mathematics for Computer Science
MATH 2A- 2B	Single-Variable Calculus I and Single-Variable Calculus II
MATH 2D	Multivariable Calculus I
MATH 3A	Introduction to Linear Algebra

MATH 3D	Elementary Differential Equations
STATS 67	Introduction to Probability and Statistics for Computer Science
Basic Science Courses: Students must complete a minimum of 18 units of basic science courses including:	
PHYSICS 7C- 7LC	Classical Physics and Classical Physics Laboratory
PHYSICS 7D- 7LD	Classical Physics and Classical Physics Laboratory
Students select, with the approval of a faculty advisor, two additional basic science courses needed to satisfy school and department requirements from two courses in General Education II, except those offered by Computer Science and Engineering, Economics, Engineering, Information and Computer Sciences, or Math.	
Engineering and Computing Topics Courses	
Students must complete a minimum of 72 units of engineering topics, 24 units of engineering design, and 63 units of computing topics. All courses below qualify as engineering topics; those marked with an asterisk (*) qualify as computing topics also. The following courses must be completed:	
A. Select one of the following course groups:	
I&C SCI 31- 32- 33	Introduction to Programming and Programming with Software Libraries and Intermediate Programming
or	
I&C SCI H32- 33	Python Programming and Libraries (Accelerated) and Intermediate Programming
B. Complete:	
COMPSCI 132/EECS 148	Computer Networks *
COMPSCI 143A	Principles of Operating Systems *
or EECS 111	System Software
EECS 31	Introduction to Digital Systems *
EECS 31L	Introduction to Digital Logic Laboratory *
I&C SCI 45C	Programming in C/C++ as a Second Language *
I&C SCI 46	Data Structure Implementation and Analysis *
EECS 50	Discrete-Time Signals and Systems
EECS 70A	Network Analysis I
CSE 90	Systems Engineering and Technical Communications
CSE 112	Electronic Devices and Circuits
EECS 112	Organization of Digital Computers *
EECS 112L	Organization of Digital Computers Laboratory *
COMPSCI 141	Concepts in Programming Languages I *
COMPSCI 142A	Compilers and Interpreters *
COMPSCI 145	Embedded Software
COMPSCI 161	Design and Analysis of Algorithms *
EECS 159A- 159B	Senior Design Project I and Senior Design Project II
ENGR 190W	Communications in the Professional World
IN4MATX 43	Introduction to Software Engineering *
Students select, with the approval of a faculty advisor, any additional engineering and computer topics courses needed to satisfy school and department requirements.	
Technical Elective Courses: [1,3]	
Students must complete a minimum of two courses (with 3 or more units each) of technical electives. A technical elective may be any upper-division course from the Departments of Computer Science, Electrical Engineering and Computer Science, or Informatics, not otherwise used for the CSE degree, chosen from the following ranges:	
Computer Science: 100–189, except COMPSCI 121	
Electrical Engineering and Computing Science: 100–189; 195; 199 [2]	
Informatics: 100–139	

[1] ENGR 7A and ENGR 7B can be counted as 4 units of Technical Electives. ENGR 7A and ENGR 7B are available only to lower-division students. Both ENGR 7A and ENGR 7B must be taken to be counted as Technical Electives.

[2] Four (4) units of 199 course work count as one technical elective. At most, an aggregate total of 6 units of EECS 199 may be used to satisfy degree requirements; EECS 199 is open to students with a 3.0 GPA or higher.

[3] EECS 118 and COMPSCI 171 may not both be taken for credit toward the degree.

(The nominal Computer Science and Engineering program will require 183 units of courses to satisfy all university and major requirements. Because each student comes to UCI with a different level of preparation, the actual number of units will vary).

NOTE: Students majoring in Computer Science and Engineering may not complete the major in Computer Engineering, the major in Computer Science, the major or minor in Information and Computer Science, or the minor in Informatics.

Freshman		
Fall	Winter	Spring
MATH 2A	MATH 2B	MATH 2D
I&C SCI 31	I&C SCI 32	I&C SCI 33
General Education	PHYSICS 7C- 7LC	PHYSICS 7D- 7LD
General Education	EECS 31	EECS 31L
Sophomore		
Fall	Winter	Spring
MATH 3A	MATH 3D	EECS 50
I&C SCI 45C	I&C SCI 46	I&C SCI 6D
I&C SCI 6B	EECS 70A	Science Elective
	CSE 90	General Education
Junior		
Fall	Winter	Spring
IN4MATX 43	EECS 112L	COMPSCI 143A
CSE 112	COMPSCI 141	COMPSCI 142A
EECS 112	COMPSCI 145	STATS 67
COMPSCI 161	General Education	
Senior		
Fall	Winter	Spring
EECS 159A	EECS 159B	ENGR 190W
EECS 148	Technical Elective	Technical Elective
General Education	General Education	Science Elective
General Education	General Education	General Education

- Bioinformatics, Minor
- Computer Science, B.S.
- Computer Science, M.S.
- Computer Science, Ph.D.
- Master of Computer Science
- Computer Engineering, B.S.
- Electrical Engineering, B.S.

Courses

CSE 90. Systems Engineering and Technical Communications . 2 Units.
Introduces systems engineering concepts, including specifications and requirements, hardware and software design, integration, testing, and documentation. Emphasizes organization and writing of reports and effective presentations.

Restriction: Computer Science Engineering Majors have first consideration for enrollment.

CSE 112. Electronic Devices and Circuits. 4 Units.
A first course in the design of Very Large Scale Integrated (VLSI) systems. Introduction to CMOS technology; MOS transistors and CMOS circuits. Analysis and synthesis of CMOS gates. Layout design techniques for building blocks and systems. Introduction to CAD tools.

(Design units: 4)

Prerequisite: PHYS 7D and (CSE 70A or EECS 70A)

Overlaps with EECS 119, EECS 170D.

Restriction: Computer Science Engineering Majors have first consideration for enrollment.

CSE 199. Individual Study. 1-4 Units.
Supervised independent reading, research, or design for undergraduate Engineering majors. Students taking individual study for design credit are to submit a written paper to the instructor and to the Undergraduate Student Affairs Office in the School of Engineering.

(Design units: 1-4)

Repeatability: May be taken for credit for 8 units.