COMPUTER SCIENCE AND ENGINEERING (BSE)

Bachelor of Science in Engineering

The Computer Science and Engineering major requires a total of 126 credits. Computer Science and Engineering majors are required to complete the following:

Course	Title	Credits
Required Courses		
CSE 1010	Introduction to Computing for Engineers	3
CSE 2050	Data Structures and Object-Oriented Design	3
CSE 2301	Principles and Practice of Digital Logic Design	4
CSE 2500	Introduction to Discrete Systems	3
CSE 3000	Contemporary Issues in Computer Science and Engineering	1
CSE 3100	Systems Programming	3
CSE 3140	Cybersecurity Lab	2
CSE 3150	C++ Essentials	3
or CSE 3160	Functional Programming Fundamentals	
CSE 3500	Algorithms and Complexity	3
CSE 3504	Probabilistic Performance Analysis of Computer Systems	3
CSE 3666	Introduction to Computer Architecture	3
CSE 4939W & CSE 4940	Computer Science and Engineering Design Project I and Computer Science and Engineering Design Project II	6
ECE 2001	Electrical Circuits	4
Computer Science majors must complete one of the following concentrations:		12
	Algorithms and Theory (p. 1)	
	Bioinformatics (p. 2)	
	Computational Data Analytics (p. 2)	
	Cybersecurity (p. 2)	
	Individually Designed (p. 3)	
	Naval Science and Technology (p. 3)	
	Software Design and Development (p. 2)	
	Software Design for Mobile Computing (p. 2)	
	Systems and Networks (p. 1)	
	Unspecialized (p. 3)	
Additional Required Courses		
MATH 2110Q	Multivariable Calculus	4
MATH 2210Q	Applied Linear Algebra	3
MATH 2410Q	Elementary Differential Equations	3
Select one of the following:		3
	MATH 3160	Probability	
	STAT 3025Q	Statistical Methods	
	STAT 3345Q	Probability Models for Engineers	
	STAT 3375Q	Introduction to Mathematical Statistics I	
Additional CSE Courses and Electives		

Additional CSE courses as required to reach 49 credits in CSE courses	
Elective courses to reach a minimum of 126 credits	

Concentrations

Algorithms and Theory

Course	Title	Credits
CSE 3502	Theory of Computation	3
or CSE 5503	Theory of Computation	
Select three of the following:		9
	CSE 3802	Numerical Methods in Scientific Computation	
	CSE 4100	Programming Language Translation	
	CSE 4412	Introduction to Quantum Computing, Cryptography, and Networking	
	CSE 4502	Big Data Analytics	
	or CSE 5717	Big Data Analytics	
	CSE 4702	Introduction to Modern Cryptography	
	CSE 4820	Introduction to Machine Learning	
	or CSE 5819	Introduction to Machine Learning	
	CSE 5500	Algorithms	
	CSE 5506		
	CSE 5512	Introduction to Quantum Computing	
	CSE 5820	Machine Learning	
	CSE 5854	Modern Cryptography: Primitives and Protocols	
	CSE 6512	Randomization in Computing	
Total Credits		**12**

Systems and Networks

Course	Title	Credits
CSE 3300	Computer Networks and Data Communication	3
or CSE 5299	Computer Networks and Data Communication	
Select three of the following:		9
	CSE 3250	Introduction to Cloud Computing	
	CSE 3400	Introduction to Computer and Network Security	
	or CSE 5850	Introduction to Cyber-Security	
	CSE 4300	Operating Systems	
	or CSE 5305	Operating Systems	
	CSE 4302	Computer Organization and Architecture	
	or CSE 5302	Computer Architecture	
	CSE 4412	Introduction to Quantum Computing, Cryptography, and Networking	
	CSE 4709	Networked Embedded Systems	
	or CSE 5309	Networked Embedded Systems	
	CSE 5300	Advanced Computer Networks	
	CSE 5306		
	CSE 5312	Architecture of Internet of Things	
Total Credits		**12**

Cybersecurity

Course	Title	Credits
CSE 3400	Introduction to Computer and Network Security	3
or CSE 5850	Introduction to Cyber-Security	
Select three of the following:		9
CSE 3300	Computer Networks and Data Communication	
or CSE 5299	Computer Networks and Data Communication	
or CSE 3502	Theory of Computation	
or CSE 5503	Theory of Computation	
or CSE 4300	Operating Systems	
or CSE 5305	Operating Systems	
CSE 3550	Blockchain Technology	
CSE 4400	Computer Security	
or CSE 5400	Computer Security	
CSE 4402	Network Security	
or CSE 5402	Network Security	
CSE 4412	Introduction to Quantum Computing, Cryptography, and Networking	
or CSE 5512	Introduction to Quantum Computing	
CSE 4702	Introduction to Modern Cryptography	
or CSE 5852	Modern Cryptography: Foundations	
CSE 5854	Modern Cryptography: Primitives and Protocols	
CSE 5910	Information Ecosystem Threats	
Total Credits		**12**

Bioinformatics

Course	Title	Credits
CSE 3800	Bioinformatics	3
or CSE 5800	Bioinformatics	
Select three of the following:		9
CSE 3810	Computational Genomics	
or CSE 6800	Computational Genomics	
CSE 4502	Big Data Analytics	
or CSE 5717	Big Data Analytics	
CSE 4820	Introduction to Machine Learning	
or CSE 5819	Introduction to Machine Learning	
CSE 4830	Computer Vision and Machine Learning for Image Analysis	
CSE 5810	Introduction to Biomedical Informatics	
CSE 5815		
CSE 5820	Machine Learning	
CSE 5825	Bayesian Machine Learning	
CSE 5830	Probabilistic Graphical Models	
CSE 5840	String Algorithms and Applications in Bioinformatics	
CSE 5860		
Total Credits		**12**

Software Design and Development

Course	Title	Credits
CSE 2102	Introduction to Software Engineering	3
Select three of the following:		9
CSE 3150	C++ Essentials [1]	
or CSE 3160	Functional Programming Fundamentals	
CSE 3200	Mobile Application Development	
CSE 3250	Introduction to Cloud Computing	
CSE 4100	Programming Language Translation	
CSE 4102	Programming Languages	
or CSE 5102	Advanced Programming Languages	
CSE 4300	Operating Systems	
or CSE 4701	Principles of Databases	
or CSE 5305	Operating Systems	
CSE 5095	Special Topics in Computer Science and Engineering (as Social Media Mining and Analysis)	
CSE 5103	Performance Engineering	
Total Credits		**12**

[1] That was not used to meet core requirements.

Software Design for Mobile Computing

Course	Title	Credits
CSE 3200	Mobile Application Development	3
Three of the following:		
CSE 2102	Introduction to Software Engineering	3
CSE 3150	C++ Essentials [1]	3
or CSE 3160	Functional Programming Fundamentals	
CSE 3250	Introduction to Cloud Computing	3
CSE 3300	Computer Networks and Data Communication	3
or CSE 5299	Computer Networks and Data Communication	
CSE 3400	Introduction to Computer and Network Security	3
or CSE 5850	Introduction to Cyber-Security	
CSE 4502	Big Data Analytics	3
or CSE 5717	Big Data Analytics	
CSE 4701	Principles of Databases	3
CSE 4705	Artificial Intelligence	3
CSE 4820	Introduction to Machine Learning	3
or CSE 5819	Introduction to Machine Learning	

[1] That was not used to meet core requirements.

Computational Data Analytics

Course	Title	Credits
CSE 4502	Big Data Analytics	3
or CSE 5717	Big Data Analytics	
Select three of the following:		9
CSE 5520	Data Visualization and Communication	3
or BADM 3302	Data Visualization	
CSE 4701	Principles of Databases	

CSE 4705	Artificial Intelligence	
CSE 4820	Introduction to Machine Learning	
or CSE 5819	Introduction to Machine Learning	
CSE 4830	Computer Vision and Machine Learning for Image Analysis	
CSE 5095	Special Topics in Computer Science and Engineering (as Social Media Mining and Analysis)	
CSE 5820	Machine Learning	
CSE 5825	Bayesian Machine Learning	
or CSE 5830	Probabilistic Graphical Models	
or CSE 5835	Machine Learning for Physical Sciences and Systems	
CSE 5707	Discrete Optimization	
or BADM 3301	Spreadsheet Modeling for Business Analysis	
CSE 5713	Data Mining	
or BADM 3203		
CSE 5910	Information Ecosystem Threats	
Total Credits		**15**

Naval Science and Technology

The concentration in Naval Science and Technology is designed to expose students to engineering concepts and topics of importance to the Navy and industries that support naval science and technology. It is focused on facilitating interactions between students and naval professionals as well as hands-on and experiential activities related to senior design projects or independent study projects that have naval science and technology connections.

All Computer Science and Engineering majors must also complete nine credits of Naval Science and Technology Coursework topics, distributed as follows:

Course	Title	Credits
ENGR 3109	Navy STEM Professional Development Seminar (at least three credits)	3
Select six credits from the following with at least one course outside the senior design sequence: [1]		6
CSE 4095	Special Topics in Computer Science and Engineering	
CSE 4099	Independent Study in Computer Science and Engineering	
CSE 4939W	Computer Science and Engineering Design Project I	
CSE 4940	Computer Science and Engineering Design Project II	
Total Credits		**9**

Students electing to complete the concentration must do so in their primary major, and as such select elective coursework from their primary discipline. Students electing to use their Senior Design course sequence must have their project topic approved by both their departmental senior design coordinator and either the director of the Navy STEM Program or the Associate Dean for Undergraduate Education.

Students electing to use Special Topics courses or Independent Study/Research courses must have the course or research topic approved by both their department and either the director of the Navy STEM Program or the Associate Dean for Undergraduate Education. Other courses relevant to naval science and technology may be considered for the concentration by petition to the director of the Navy STEM Program or the Associate Dean of Undergraduate Education. Students may not apply courses used in this concentration to fulfill requirements for other concentrations or minors. The concentration in Naval Science and Technology is restricted to U.S. citizens.

Unspecialized

Course	Title	Credits
Select three credits from the following:		9
CSE 2102	Introduction to Software Engineering	
CSE 3200	Mobile Application Development	
CSE 3300	Computer Networks and Data Communication	
or CSE 5299	Computer Networks and Data Communication	
CSE 3400	Introduction to Computer and Network Security	
or CSE 5850	Introduction to Cyber-Security	
CSE 3502	Theory of Computation	
or CSE 5503	Theory of Computation	
CSE 3800	Bioinformatics	
or CSE 5800	Bioinformatics	
CSE 4502	Big Data Analytics	
or CSE 5717	Big Data Analytics	
Any other 2000-level or higher CSE course not used to fulfill another major requirement		3
Total Credits		**12**

Individually Designed

Students may propose an individually designed concentration to fit their academic or career interests. This will be a minimum of 12 credits at the 2000+ level, proposed by the student and approved by the student's advisor and the CSE Department Undergraduate Committee. The expectation is that such a concentration will have a strong unifying theme. This may include non-CSE courses, but the student will still be subject to the required 49 CSE credits.

Additional Notes

Further details and course sequences are given in the Computer Science and Engineering Guide to Course Selection.

The Computer Science and Engineering program combines a rigorous education in computer science with added emphasis on the physical and architectural underpinnings of modern computer system design. With a background that spans computer science and computer engineering, the graduates are able to address computing systems across the hardware-software spectrum.

The Computer Science and Engineering undergraduate program educational objectives are that our alumni/ae: practice and grow as computing professionals, conducting research and/or leading, designing, developing or maintaining projects in various technical areas of computer science; utilize knowledge and skills in Computer Science and Engineering effectively for improving the society; and use new technical advancements of Computer Science and Engineering to produce tangible contributions in the profession.

The Computer Science and Engineering program is accredited by the Engineering Accreditation Commission and the Computing Accreditation Commission of ABET, www.abet.org (https://www.abet.org).

University General Education Requirements

Every student must meet a set of core requirements to earn a baccalaureate degree, in addition to those required by the student's major course of study and other requirements set by the student's school or college. For more information about these requirements, please see General Education Requirements (https://catalog.uconn.edu/undergraduate/gen-ed-requirements/).

College of Engineering Degree Requirements

Students must meet a set of requirements established by the college in addition to the University's General Education requirements. For more information, see the College of Engineering (https://catalog.uconn.edu/undergraduate/engineering/#requirementstext) section of this catalog.