

Computer Engineering and Computer Science, BSCmpE (Oakland)

This intercollege combined major serves students who are interested in both computer hardware and software. This program provides a well-rounded computing education that includes engineering design principles, computational thinking, proper program design, and a solid background in mathematics and science. The degree is fully accredited as a Bachelor of Science in Computer Engineering and adds the computer science depth.

Because of the large body of shared knowledge between computer engineering and computer science, an integrated combined major between these two disciplines is a logical course of study and can be accomplished without requiring course overloading in any semester. A student graduating from this program will have a solid foundation in both computer hardware and software principles and should be prepared for a wide range of career paths in the computing field or any related field that relies on the application of engineering or computing principles.

Students interested in this program should contact the Department of Electrical and Computer Engineering or the Khoury College of Computer Sciences as early as possible, preferably prior to registering for first-year courses.

Visit the department website (<https://ece.northeastern.edu/academics/undergraduate-studies/ece-accreditation/>) for educational objectives.

Program Requirements

Complete all courses listed below unless otherwise indicated. Also complete any corequisite labs, recitations, clinicals, or tools courses where specified and complete any additional courses needed beyond specific college and major requirements to satisfy graduation credit requirements.

Universitywide Requirements

All undergraduate students are required to complete the Universitywide Requirements (<https://catalog.northeastern.edu/undergraduate/university-academics/university-wide-requirements/>).

NUpath Requirements

All undergraduate students are required to complete the NUpath Requirements (<https://catalog.northeastern.edu/undergraduate/university-academics/general-education-requirements/#nupathtext>).

NUpath requirements Interpreting Culture (IC), Understanding Societies and Institutions (SI), Engaging Differences and Diversity (DD), and Integrating Knowledge and Skills Through Experience (EX) are not explicitly satisfied by required engineering coursework. Successful completion of a cooperative education experience fulfills the EX requirement. Students are responsible for satisfying unfulfilled NUpath requirements with general elective coursework.

Engineering Requirements

Code	Title	Hours
Required Courses		
EECE 2140	Computing Fundamentals for Engineers	4
EECE 2150	Circuits and Signals: Biomedical Applications	5
EECE 2160	Embedded Design: Enabling Robotics	4
Computer Engineering Fundamentals		
CS 2700 and CS 2701	Data Structures and Analysis and Lab for CS 2700	5
EECE 2322 and EECE 2323	Fundamentals of Digital Design and Computer Organization and Lab for EECE 2322	5
EECE 2540	Fundamentals of Networks	4
Electrical Engineering Fundamentals		
Complete one of the following:		4
EECE 2412 and EECE 2413	Fundamentals of Electronics and Lab for EECE 2412	
EECE 2520	Fundamentals of Linear Systems	
EECE 2530 and EECE 2531	Fundamentals of Electromagnetics and Lab for EECE 2530	
Computer Engineering Capstone Courses		
If taking EECE 4791 in Summer Session A, EECE 4792 must be taken in Spring. If taking EECE 4791 in Summer Session B, EECE 4792 must be taken in Fall.		
EECE 4791	Electrical and Computer Engineering Capstone 1	1
EECE 4792	Electrical and Computer Engineering Capstone 2	4
EECE Technical Electives		

Students can register for EECE 4991/EECE 4992 more than once. For these courses combined, a maximum of 8 semester hours will be allowed to satisfy the requirement of technical electives. An additional 4 semester hours will be allowed as a general elective. At most, one of these courses (4 semester hours) can be taken in a semester.

Though students may register for EECE 2750 more than once, only 4 semester hours will be allowed to satisfy the requirements of technical electives. An additional 4 semester hours will be allowed as a general elective.

EECE 2310 is not an approved course option for ECE majors to select for a technical elective. It is only for Khoury students.

If more than one electrical engineering fundamentals course is taken, it can count as a technical elective.

If CS 4530 is taken, EECE 4520 is not an acceptable technical elective.

If more than one electrical engineering fundamentals course is taken, it can count as a technical elective.

Complete two of the following: 8

EECE 2412 to EECE 2530	
EECE 2750	Enabling Engineering
or EECE 3324	Computer Architecture and Organization
EECE 4991	Research
EECE 4992	Directed Study
EECE 5115 to EECE 5699	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage

Khoury Approved Electives

With ECE department approval, directed study, research, project study, and appropriate graduate-level courses may also be taken as upper-division electives.

Complete 8 semester hours from within the following options: 8

CS 2300 or higher, except CS 5010	
CY 2000 or higher, except CY 4930	
DS 2500 or higher, except DS 4900	
MKTG 4606	Digital, Analytics, Technology, and Automation Research Practicum

Supplemental Credit

2 semester hours from the following course count toward the engineering requirement: 2

GE 1501	Cornerstone of Engineering 1 ¹
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3 semester hours from the following course count toward the engineering requirement: 3

GE 1502	Cornerstone of Engineering 2 ¹
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2 semester hours from the following course count toward the engineering requirement: 2

EECE 3468	Analysis of Random Phenomena in Electrical and Computer Engineering
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Computer Science Requirements

Code	Title	Hours
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Computer Science Introductory Courses

All students can take a self-assessment to attempt to place out of CS 2000 and CS 2001. Students who place out of CS 2000 and CS 2001 will instead substitute 4-5 semester hours of CS, CY, or DS coursework at the 3000 level or higher not otherwise required in the degree.

CS 2000 and CS 2001	Introduction to Program Design and Implementation and Lab for CS 2000	5
CS 2100 and CS 2101	Program Design and Implementation 1 and Lab for CS 2100	5
CS 2800	Logic and Computation	4

Computer Science Upper-Level Courses

CS 3100 and CS 3101	Program Design and Implementation 2 and Lab for CS 3100	5
CS 3650	Computer Systems	4
CS 4530 or CS 4535	Fundamentals of Software Engineering Professional Practicum Capstone	4

Supporting Courses: Mathematics/Science

Complete all mathematics/science courses with a minimum of 30 semester hours.

Code	Title	Hours
Required Mathematics/Science		
CHEM 1151 and CHEM 1153	General Chemistry for Engineers and Recitation for CHEM 1151	4
CS 1800	Discrete Structures	4
MATH 1341	Calculus 1 for Science and Engineering	4
MATH 1342	Calculus 2 for Science and Engineering	4
MATH 2341	Differential Equations and Linear Algebra for Engineering	4
PHYS 1151 and PHYS 1152 and PHYS 1153	Physics for Engineering 1 and Lab for PHYS 1151 and Interactive Learning Seminar for PHYS 1151	5
PHYS 1155 and PHYS 1156 and PHYS 1157	Physics for Engineering 2 and Lab for PHYS 1155 and Interactive Learning Seminar for PHYS 1155	5
Supplemental Credit		
1 semester hour from the following course counts toward the mathematics/science requirement:		1
GE 1501	Cornerstone of Engineering 1 ¹	
2 semester hours from the following course count toward the mathematics/science requirement:		2
EECE 3468	Analysis of Random Phenomena in Electrical and Computer Engineering	

Professional Development

Code	Title	Hours
Required Professional Development		
GE 1000	First-Year Seminar	1
ENCP 2000	Introduction to Engineering Co-op Education	1
ENCP 3000	Professional Issues in Engineering	1
Additional Required Courses		
1 semester hour from the following course counts toward the professional development requirement:		1
GE 1501	Cornerstone of Engineering 1 ¹	
1 semester hour from the following course counts toward the professional development requirement:		1
GE 1502	Cornerstone of Engineering 2 ¹	

Writing Requirements

Code	Title	Hours
A grade of C or higher is required.		
ENGW 1111	First-Year Writing	4
ENGW 3302 or ENGW 3315	Advanced Writing in the Technical Professions Interdisciplinary Advanced Writing in the Disciplines	4

Required General Electives

Code	Title	Hours
Complete 8 semester hours of academic, nonremedial, nonrepetitive courses.		8

Integrative Courses

Code	Title	Hours
The following courses are already required above and also fulfill the integrative requirement:		
CS 1800	Discrete Structures	
EECE 3468	Analysis of Random Phenomena in Electrical and Computer Engineering	
EECE 4791	Electrical and Computer Engineering Capstone 1	
EECE 4792	Electrical and Computer Engineering Capstone 2	
MATH 1341	Calculus 1 for Science and Engineering	
MATH 1342	Calculus 2 for Science and Engineering	
PHYS 1151 and PHYS 1152	Physics for Engineering 1 and Lab for PHYS 1151	

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¹ Students can substitute Engineering Design (GE 1110) and Engineering Problem Solving and Computation (GE 1111) for Cornerstone of Engineering 1 (GE 1501) and Cornerstone of Engineering 2 (GE 1502) .

Major GPA Requirement

2.000 minimum GPA in EECE courses

Program Requirement

140 total semester hours required