Computer Engineering and Computer Science, BSCmpE (Boston)

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 within a student's usual five-year program (including three co-op placements) 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/nupath/).

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 3000	Algorithms and Data	4
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 first-half summer, EECE 4792 must be taken in spring. If taking EECE 4791 in summer second-half, 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 2500 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]	
3 semester hours from the following course count toward the engineering requirement:		3
GE 1502	Cornerstone of Engineering 2 [1]	
2 semester hours from the following course count toward the engineering requirement:		2
EECE 3468	Analysis of Random Phenomena in Electrical and Computer Engineering	

Computer Science Requirements

Code	Title	Hours
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	Fundamentals of Software Engineering	4
or CS 4535	Professional Practicum Capstone	

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 and CS 1802	Discrete Structures and Seminar for CS 1800	5
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		
ENCP 2000	Introduction to Engineering Co-op Education	1
ENCP 3000	Professional Issues in Engineering	1
GE 1000	First-Year Seminar	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	Advanced Writing in the Technical Professions	4
or ENGW 3315	Interdisciplinary Advanced Writing in the Disciplines	

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	

[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

2.000 minimum GPA required in all CS, CY, DS, and IS courses

Program Requirement

140 total semester hours required

Plan of Study

Sample Plans of Study

FOUR YEARS, TWO CO-OPS IN SUMMER SECOND HALF/FALL

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 (ND)	4	GE 1502 (ER)	4	MATH 2341	4	General elective	4
CHEM 1153	0	CS 2000 and CS 2001 (ND, FQ)	5	PHYS 1155 (ND)	3	General elective	4
ENGW 1111 (WF)	4	MATH 1342 (FQ)	4	PHYS 1156 (AD)	1		
GE 1000	1	PHYS 1151 (ND)	3	PHYS 1157	1		
GE 1501	4	PHYS 1152 (AD)	1				
MATH 1341 (FQ)	4	PHYS 1153	1				
	17		**18**		**9**		**8**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CS 1800 (FQ)	4	CS 2800	4	CS 3000	4	Co-op	0
CS 1802	1	EECE 2160	4	Khoury elective	4		
EECE 2140	4	EECE 2540	4				
CS 2100 and CS 2101 (ND, AD)	5	EECE 3468	4				
EECE 2150 (AD)	5	ENCP 2000	1				
	19		**17**		**8**		**0**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op	0	EECE 2322	4	EECE 4791 (EI, WI, CE)[1]	1	Co-op	0
		Khoury Elective	4	CS 3100 and CS 3101 (ND, AD)	5		
		EECE 2323	1	EECE technical elective	4		
		ENCP 3000	1				
		ENGW 3302 or 3315 (WD)	4				
		EE fundamentals	4				
	0		**18**		**10**		**0**

Year 4

Fall	Hours	Spring	Hours
Co-op	0	CS 4530 or 4535	4
		EECE 4792 (EI, WI, CE)[1]	4
		CS 3650	4
		EECE technical elective	4
	0		**16**

Total Hours: 140

FOUR YEARS, TWO CO-OPS IN SPRING/SUMMER FIRST HALF

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 (ND)	4	GE 1502 (ER)	4	MATH 2341	4	General elective	4
CHEM 1153	0	CS 2000 and CS 2001 (ND, FQ)	5	PHYS 1155 (ND)	3	General elective	4
ENGW 1111 (WF)	4	MATH 1342 (FQ)	4	PHYS 1156 (AD)	1		
GE 1000	1	PHYS 1151 (ND)	3	PHYS 1157	1		
GE 1501	4	PHYS 1152 (AD)	1				
MATH 1341 (FQ)	4	PHYS 1153	1				
	17		**18**		**9**		**8**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CS 1800 (FQ)	4	Co-op	0	Co-op	0	CS 3000	4
CS 1802	1					Khoury elective	4
CS 2100 and CS 2101 (ND, AD)	5						
EECE 2140	4						
EECE 2150 (AD)	5						
ENCP 2000	1						
	20		**0**		**0**		**8**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CS 2800	4	Co-op	0	Co-op	0	EECE 4791 (EI, WI, CE)[1]	1
EECE 2160	4					EECE technical elective	4
EECE 2540	4					Khoury elective	4
EECE 3468	4						
ENCP 3000	1						
	17		**0**		**0**		**9**

Year 4

Fall	Hours	Spring	Hours
EECE 2322	4	CS 3650	4
CS 3100 and CS 3101 (ND, AD)	5	CS 4530 or 4535	4
EECE 2323	1	ENGW 3302 or 3315 (WD)	4
EECE 4792 (EI, WI, CE)[1]	4	EECE technical elective	4
EE fundamentals	4		
	18		**16**

Total Hours: 140

FIVE YEARS, THREE CO-OPS IN SUMMER SECOND HALF/FALL

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 (ND)	4	GE 1502 (ER)	4	Vacation		Vacation	
CHEM 1153	0	MATH 1342 (FQ)	4				
ENGW 1111 (WF)	4	PHYS 1151 (ND)	3				
GE 1000	1	PHYS 1152 (AD)	1				
GE 1501	4	PHYS 1153	1				
MATH 1341 (FQ)	4	General elective	4				
	17		**17**		**0**		**0**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CS 1800 (FQ)	4	CS 2800	4	Vacation		Co-op	0

CS 1802	1	CS 2100 and CS 2101 (ND, AD)	5				
CS 2000 and CS 2001 (ND, FQ)	5	EECE 2160	4				
EECE 2140	4	ENCP 2000	1				
MATH 2341	4	PHYS 1155 (ND)	3				
		PHYS 1156 (AD)	1				
		PHYS 1157	1				
	18		**19**		**0**		**0**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op	0	EECE 2150 (AD)	5	ENGW 3302 or 3315 (WD)	4	Co-op	0
		CS 3000	4	CS 3100 and CS 3101 (ND, AD)	5		
		EECE 2322	4				
		EECE 2323	1				
		EECE 2540	4				
	0		**18**		**9**		**0**

Year 4

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op	0	ENCP 3000	1	EECE 4791 (EI, WI, CE)[1]	1	Co-op	0
		EECE 3468	4	CS 3650	4		
		EE fundamentals	4	General elective	4		
		Khoury elective	4				
		Khoury elective	4				
	0		**17**		**9**		**0**

Year 5

Fall	Hours	Spring	Hours
Co-op	0	CS 4530 or 4535	4
		EECE 4792 (EI, WI, CE)[1]	4
		EECE technical elective	4
		EECE technical elective	4
	0		**16**

Total Hours: 140

FIVE YEARS, THREE CO-OPS IN SPRING/SUMMER FIRST HALF

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 (ND)	4	GE 1502 (ER)	4	Vacation		Vacation	
CHEM 1153	0	MATH 1342 (FQ)	4				
ENGW 1111 (WF)	4	PHYS 1151 (ND)	3				
GE 1000	1	PHYS 1152 (AD)	1				
GE 1501	4	PHYS 1153	1				
MATH 1341 (FQ)	4	General elective	4				
	17		**17**		**0**		**0**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CS 1800 (FQ)	4	Co-op	0	Co-op	0	Vacation	
CS 1802	1						
CS 2000 and CS 2001 (ND, FQ)	5						
EECE 2140	4						
ENCP 2000	1						

MATH 2341	4						
	19		**0**		**0**		**0**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CS 2800	4	Co-op	0	Co-op	0	ENGW 3302 or 3315 (WD)	4
CS 2100 and CS 2101 (ND, AD)	5					EECE 3468	4
EECE 2160	4						
PHYS 1155 (ND)	3						
PHYS 1156 (AD)	1						
PHYS 1157	1						
	18		**0**		**0**		**8**

Year 4

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
EECE 2150 (AD)	5	Co-op	0	Co-op	0	CS 3000	4
CS 3100 and CS 3101 (ND, AD)	5					EECE 4791 (EI, WI, CE)[1]	1
EECE 2540	4					EECE technical elective	4
ENCP 3000	1						
Khoury Elective	4						
	19		**0**		**0**		**9**

Year 5

Fall	Hours	Spring	Hours
EECE 2322	4	CS 4530 or 4535	4
EECE 2323	1	EE fundamentals	4
EECE 4792 (EI, WI, CE)[1]	4	EECE technical elective	4
Khoury elective	4	General elective	4
CS 3650	4		
	17		**16**

Total Hours: 140

[1] The capstone design courses are taken as follows:

- Electrical and Computer Engineering Capstone 1 (EECE 4791) in summer first half and Electrical and Computer Engineering Capstone 2 (EECE 4792) in spring or
- Electrical and Computer Engineering Capstone 1 (EECE 4791) in summer second half and Electrical and Computer Engineering Capstone 2 (EECE 4792) in fall.