Computer Engineering and Physics, BSCmpE

This intercollege combined major serves students who would like to explore their interest in physics while earning the benefit of an accredited Bachelor of Science in Computer Engineering degree. The combined major integrates study within the College of Engineering's Department of Electrical and Computer Engineering with study within the College of Science's Department of Physics.

Because of the large body of shared knowledge between computer engineering and physics, an integrated combined major between these two disciplines is a logical course of study and can be accomplished within either a four-year plan of study or a five-year plan of study (including three co-op placements in the latter), without requiring course overloads in any semester. A student graduating from this program will have studied both physics fundamentals and computer systems.

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

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 (http://catalog.northeastern.edu/undergraduate/university-academics/university-wide-requirements/).

NUpath Requirements

All undergraduate students are required to complete the NUpath Requirements (http://catalog.northeastern.edu/undergraduate/university-academics/nupath/).

NUpath requirements Interpreting Culture (IC), Societies and Institutions (SI), and Differences and Diversity (DD) are not explicitly satisfied by required engineering courses. Students are responsible for satisfying these requirements through general electives.

Engineering

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		
EECE 2322 and EECE 2323	Fundamentals of Digital Design and Computer Organization and Lab for EECE 2322	5
EECE 2540	Fundamentals of Networks	4
EECE 2560	Fundamentals of Engineering Algorithms	4
Electrical Engineering Fundamentals		
If more than one electrical engineering fundamentals course is taken, it can count as a technical elective.		
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		
EECE 4791	Electrical and Computer Engineering Capstone 1	1
EECE 4792	Electrical and Computer Engineering Capstone 2	4
Technical Electives		
Students can register for EECE 4991/EECE 4992/EECE 4993 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.		
Complete two of the following:		8

EECE 2412 to EECE 2530		
EECE 2750	Enabling Engineering	
EECE 3324 to EECE 4698		
EECE 4991	Research	
EECE 4992	Directed Study	
EECE 4993	Independent Study	
EECE 5115 to EECE 5698		
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
One CS/CY/IS course from the following approved list may be taken toward the EECE technical elective requirement:		
CS 3200	Database Design	
CS 3500	Object-Oriented Design	
CS 3540 to CS 3800		
CS 4100 to CS 4770		
CS 4850	Building Game Engines	
CY 2550	Foundations of Cybersecurity	
IS 4200 to IS 4700		
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]	

Mathematics/Science

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 2321	Calculus 3 for Science and Engineering	4
MATH 2341	Differential Equations and Linear Algebra for Engineering	4
MATH 3081	Probability and Statistics	4
Complete one of the following:		5
PHYS 1151 and PHYS 1152 and PHYS 1153	Physics for Engineering 1 and Lab for PHYS 1151 and Interactive Learning Seminar for PHYS 1151	
PHYS 1161 and PHYS 1162 and PHYS 1163	Physics 1 and Lab for PHYS 1161 and Recitation for PHYS 1161	
Complete one of the following:		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	
PHYS 1165 and PHYS 1166 and PHYS 1167	Physics 2 and Lab for PHYS 1165 and Recitation for PHYS 1165	
PHYS 2303	Modern Physics	4
PHYS 3600	Advanced Physics Laboratory	4
PHYS 3602	Electricity and Magnetism 1	4
PHYS 4115	Quantum Mechanics	4
PHYS 4305	Thermodynamics and Statistical Mechanics	4
Advanced Physics Elective		
Complete one of the following:		4

MATH 4606	Mathematical and Computational Methods for Physics	
PHYS 3600 to PHYS 7999		
Supplemental Credit		
1 semester hour from the following course counts toward the mathematics/science requirement:		1
GE 1501	Cornerstone of Engineering 1 [1]	

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	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, nonrepetitve courses.		8

Integrative Requirement

Code	Title	Hours
This course is already required above and also fulfills the integrative requirement:		
EECE 4791	Electrical and Computer Engineering Capstone 1	1

Major GPA Requirement

2.000 minimum GPA required in EECE courses

Program Requirement

133 total semester hours required

[1] Students can substitute GE 1110 and GE 1111 for GE 1501 and 1502 in approved situations.

Plan of Study

Four Years, One Co-op in Spring/Summer 1

Year 1							
Fall	**Hours**	**Spring**	**Hours**	**Summer 1**	**Hours**	**Summer 2**	**Hours**
CHEM 1151 (ND)	4	ENGW 1111 (WF)	4	MATH 2341	4	Vacation	
CHEM 1153	0	GE 1502 (ER)	4				
GE 1000	1	MATH 1342 (FQ)	4				
GE 1501	4	PHYS 1165 or 1155 (ND)	4				
MATH 1341 (FQ)	4	PHYS 1166 or 1156 (AD)	1				
PHYS 1161 or 1151 (ND)	4	PHYS 1167 or 1157	0				
PHYS 1162 or 1152 (AD)	1						
PHYS 1163 or 1153	0						
	18		17		4		0

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
EECE 2140	4	CS 1800 (FQ)	4	Vacation		Vacation	
EECE 2160	4	CS 1802	1				
ENCP 2000	1	EECE 2150 (AD)	5				
MATH 2321 (FQ)	4	PHYS 4305 (ND)	4				
PHYS 2303 (ND)	4	CE fundamentals	4				
	17		18		0		0

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
PHYS 3602 (ND)	4	Co-op		Co-op		EECE 4791 (EI, WI, CE)	1
CE fundamentals	5					ENGW 3302 or 3315 (WD)	4
CE fundamentals	4					PHYS 3600 (ND, AD, WI)	4
General elective	4						
	17		0		0		9

Year 4

Fall	Hours	Spring	Hours
EECE 4792 (EI, WI, CE)	4	EE fundamentals	4
ENCP 3000	1	EECE technical elective	4
MATH 3081 (AD)	4	General elective	4
PHYS 4115 (ND, FQ)	4	PHYS advanced elective	4
EECE technical elective	4		
	17		16

Total Hours: 133

Five Years, Three Co-ops in Summer 2/Fall

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 (ND)	4	ENGW 1111 (WF)	4	Vacation	0	Vacation	0
CHEM 1153	0	GE 1502 (ER)	4				
GE 1000	1	MATH 1342 (FQ)	4				
GE 1501	4	PHYS 1165 or 1155 (ND)	4				
MATH 1341 (FQ)	4	PHYS 1166 or 1156 (AD)	1				
PHYS 1161 or 1151 (ND)	4	PHYS 1167 or 1157	0				
PHYS 1162 or 1152 (AD)	1						
PHYS 1163 or 1153	0						
	18		17		0		0

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
EECE 2140	4	CS 1800 (FQ)	4	Vacation	0	Co-op	0
MATH 2321 (FQ)	4	CS 1802	1				
MATH 2341	4	EECE 2150 (AD)	5				
PHYS 2303 (ND)	4	EECE 2160	4				
		ENCP 2000	1				
		PHYS 3602 (ND)	4				
	16		19		0		0

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op	0	PHYS 4115 (ND, FQ)	4	PHYS 3600 (ND, AD, WI)	4	Co-op	0
		CE fundamentals	5				
		CE fundamentals	4				

		CE fundamentals	4				
	0		17		4		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	Co-op	0
		MATH 3081 (AD)	4	ENGW 3302 or 3315 (WD)	4		
		PHYS 4305 (ND)	4	EECE technical elective	4		
		EE fundamentals	4				
		General elective	4				
	0		17		9		0

Year 5

Fall	Hours	Spring	Hours
Co-op	0	EECE 4792 (EI, WI, CE)	4
		EECE technical elective	4
		General elective	4
		PHYS advanced elective	4
	0		16

Total Hours: 133

Notes:

The capstone design courses are taken as follows:

- Electrical and Computer Engineering Capstone 1 (EECE 4791) in Summer 1 and Electrical and Computer Engineering Capstone 2 (EECE 4792) in Spring, or...
- ... Electrical and Computer Engineering Capstone 1 (EECE 4791) in Summer 2 and Electrical and Computer Engineering Capstone 2 (EECE 4792) in Fall.

Physics courses are offered on the following schedule:

- PHYS 2303 offered every fall, spring, and summer 2
- PHYS 2371/2372 offered every fall
- PHYS 3600 offered every summer 1 and summer 2
- PHYS 3601 offered spring and fall (even years)
- PHYS 3602 offered every fall and spring
- PHYS 3603 offered fall (even years) and summer 1 (odd years)
- PHYS 4115 offered every fall and spring
- PHYS 4305 offered every spring and summer 2 (even years)
- PHYS 4621 offered spring (odd years) and fall (even years)
- PHYS 4623 offered summer 1 and fall (even years)
- PHYS 4651 offered spring and fall (odd years)
- PHYS 4652 offered every spring
- PHYS 5318 offered every spring