# Electrical and Computer Engineering, BSEE (Oakland)

This Bachelor of Science in Electrical Engineering program requires coursework in both electrical and computer engineering along with technical electives distributed among the areas of computer engineering; fields, waves, and optics; signals and systems; power engineering; and electronic circuits and devices. Additional NUpath requirements must be fulfilled using general electives.

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

## Program Requirements

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 |
| **Electrical Engineering Fundamentals** | | |
| EECE 2412<br>and EECE 2413 | Fundamentals of Electronics<br>and Lab for EECE 2412 | 5 |
| EECE 2520 | Fundamentals of Linear Systems | 4 |
| EECE 2530<br>and EECE 2531 | Fundamentals of Electromagnetics<br>and Lab for EECE 2530 | 5 |
| **Computer Engineering Fundamentals** | | |
| EECE 2322<br>and EECE 2323 | Fundamentals of Digital Design and Computer Organization<br>and Lab for EECE 2322 | 5 |
| EECE 2540 | Fundamentals of Networks | 4 |
| EECE 2560 | Fundamentals of Engineering Algorithms | 4 |
| **Electrical and Computer Engineering Capstone Courses** | | |
| If taking EECE 4791 in First-Half Summer, EECE 4792 should be taken in Spring. If taking EECE 4791 in Second-Half Summer EECE 4792 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. | | |
| Complete four of the following: | | 16 |
| EECE 2750 | Enabling Engineering | |
| EECE 3324 to EECE 3410 | | |
| EECE 4512 to EECE 4698 | | |
| EECE 4991 | Research | |
| EECE 4992 | Directed Study | |
| EECE 5115 to EECE 5699 | | |
| EECE 5670 | Sustainable Energy: Materials, Conversion, Storage, and Usage | |
| Two CS/CY/IS courses from the following approved list may be taken toward the EECE technical elective requirement: | | |
| CS 3200 | Introduction to Databases | |
| CS 3540 to CS 3800 | | |
| CS 4100 to CS 4770 | | |

| | | |
|---|---|---|
| CS 4850 | Building Game Engines | |
| CY 2550 | Foundations of Cybersecurity | |
| **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 | |

## Supporting Courses: Mathematics/Science

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

| Code | Title | Hours |
|---|---|---|
| **Required Mathematics/Science** | | |
| CHEM 1151<br>and CHEM 1153 | General Chemistry for Engineers<br>and Recitation for CHEM 1151 | 4 |
| CS 1800<br>and CS 1802 | Discrete Structures<br>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 |
| PHYS 1151<br>and PHYS 1152<br>and PHYS 1153 | Physics for Engineering 1<br>and Lab for PHYS 1151<br>and Interactive Learning Seminar for PHYS 1151 | 5 |
| PHYS 1155<br>and PHYS 1156<br>and PHYS 1157 | Physics for Engineering 2<br>and Lab for PHYS 1155<br>and Interactive Learning Seminar for PHYS 1155 | 5 |
| **Supplemental Credit** | | |
| 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 | |
| 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 16 semester hours of academic, nonremedial, nonrepetitive courses. | | 16 |

## Major GPA Requirement

A 2.000 minimum GPA is required in EECE coursework.

## Program Requirement

135 total semester hours required

[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).

## Plan of Study

## Sample Plans of Study

### FOUR YEARS, ONE CO-OP IN SPRING/SUMMER SESSION A

**Year 1**

| Fall | Hours | Spring | Hours | Summer Session A | Hours | Summer Session B | Hours |
|---|---|---|---|---|---|---|---|
| MATH 1341 | 4 | MATH 1342 | 4 | MATH 2341 | 4 | Vacation | |
| CHEM 1151 | 4 | PHYS 1151 | 3 | | | | |
| CHEM 1153 | 0 | PHYS 1152 | 1 | | | | |
| GE 1000 | 1 | PHYS 1153 | 1 | | | | |
| GE 1501 | 4 | GE 1502 | 4 | | | | |
| ENGW 1111 | 4 | General Elective | 4 | | | | |
| | **17** | | **17** | | **4** | | **0** |

**Year 2**

| Fall | Hours | Spring | Hours | Summer Session A | Hours | Summer Session B | Hours |
|---|---|---|---|---|---|---|---|
| MATH 2321 | 4 | CS 1800 | 4 | Vacation | | Vacation | |
| PHYS 1155 | 3 | CS 1802 | 1 | | | | |
| PHYS 1156 | 1 | EECE 2150 or 2160 | 5 | | | | |
| PHYS 1157 | 1 | EE/CE Fundamental | 5 | | | | |
| ENCP 2000 | 1 | General Elective | 4 | | | | |
| EECE 2150 or 2160 | 4 | | | | | | |
| EECE 2140 | 4 | | | | | | |
| | **18** | | **19** | | **0** | | **0** |

**Year 3**

| Fall | Hours | Spring | Hours | Summer Session A | Hours | Summer Session B | Hours |
|---|---|---|---|---|---|---|---|
| EE/CE Fundamental | 4 | Co-op | 0 | Co-op | 0 | EECE 4791 | 1 |
| EE/CE Fundamental | 4 | | | | | Technical Elective | 4 |
| EE/CE Fundamental | 4 | | | | | ENGW 3302 or 3315 | 4 |
| General Elective | 4 | | | | | | |
| | **16** | | **0** | | **0** | | **9** |

**Year 4**

| Fall | Hours | Spring | Hours |
|---|---|---|---|
| EECE 4792 | 4 | EECE 3468 | 4 |
| EE/CE Fundamental | 5 | Technical Elective | 4 |
| EE/CE Fundamental | 5 | Technical Elective | 4 |
| Technical Elective | 4 | General Elective | 4 |
| ENCP 3000 | 1 | | |
| | **19** | | **16** |

**Total Hours: 135**

## FOUR YEARS, ONE CO-OP IN SUMMER SESSION B/FALL

**Year 1**

| Fall | Hours | Spring | Hours | Summer Session A | Hours | Summer Session B | Hours |
|---|---|---|---|---|---|---|---|
| CHEM 1151 (ND) | 4 | GE 1502 (ER) | 4 | MATH 2341 | 4 | 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** | | **4** | | **0** |

**Year 2**

| Fall | Hours | Spring | Hours | Summer Session A | Hours | Summer Session B | Hours |
|---|---|---|---|---|---|---|---|
| EECE 2140[2] | 4 | CS 1800 (FQ) | 4 | Vacation | | Co-op | 0 |
| EECE 2150 or 2160 (AD) | 5 | CS 1802 | 1 | | | | |
| MATH 2321 (FQ) | 4 | EECE 2160 or 2150 | 4 | | | | |
| PHYS 1155 (ND) | 3 | ENCP 2000 | 1 | | | | |
| PHYS 1156 (AD) | 1 | EE or CE fundamentals | 4 | | | | |
| PHYS 1157 | 1 | General elective | 4 | | | | |
| | **18** | | **18** | | **0** | | **0** |

**Year 3**

| Fall | Hours | Spring | Hours | Summer Session A | Hours | Summer Session B | Hours |
|---|---|---|---|---|---|---|---|
| Co-op | 0 | ENCP 3000 | 1 | EECE 4791 (EI, WI, CE)[3] | 1 | Vacation | |
| | | EE or CE fundamentals | 5 | ENGW 3302 or 3315 (WD) | 4 | | |
| | | EE or CE fundamentals | 5 | EECE technical elective | 4 | | |
| | | EE or CE fundamentals | 5 | | | | |
| | | General elective | 4 | | | | |
| | **0** | | **20** | | **9** | | **0** |

**Year 4**

| Fall | Hours | Spring | Hours |
|---|---|---|---|
| EECE 3468 | 4 | EECE 4792 (EI, WI, CE)[3] | 4 |
| EE or CE fundamentals | 4 | EECE technical elective | 4 |
| EE or CE fundamentals | 4 | EECE technical elective | 4 |
| EECE technical elective | 4 | General elective | 4 |
| | **16** | | **16** |

**Total Hours: 135**

2 Computing Fundamentals for Engineers (EECE 2140) can be taken in year 1 spring instead of a general elective by students who are interested in the course in preparation for co-ops involving programming and computing hardware.

3 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.