# B.S. in Computer Engineering

(120 credit minimum)

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|---|---|---|
| **First Year** | | |
| **1st Semester** | | **Credits** |
| CHEM 125 | General Chemistry I | 3 |
| FED 101 | Fundamentals of Engineering Design | 2 |
| ENGL 101 | English Composition: Introduction to Academic Writing | 3 |
| MATH 111 | Calculus I | 4 |
| PHYS 111 | Physics I | 3 |
| PHYS 111A | Physics I Lab | 1 |
| FYS SEM | First-Year Student Seminar | 0 |
| | **Term Credits** | **16** |
| **2nd Semester** | | |
| CS 115 | Introduction to Computer Science I in C++ | 3 |
| MATH 112 | Calculus II | 4 |
| PHYS 122 | Electricity & Magntsm ECE Appl | 3 |
| PHYS 121A | Physics II Lab | 1 |
| ECE 101 | Introduction to Electrical and Computer Engineering | 0 |
| ENGL 102 | English Composition: Introduction to Writing for Research | 3 |
| | **Term Credits** | **14** |
| **Second Year** | | |
| **1st Semester** | | |
| CS 116 | Introduction to Computer Science II in C++. | 3 |
| ECE 231 | Circuits and Systems I | 3 |
| ECE 251 | Digital Design | 3 |
| MATH 222 | Differential Equations | 4 |
| History and Humanities GER 200 level (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-200-level/) | | 3 |
| | **Term Credits** | **16** |
| **2nd Semester** | | |
| ECE 232 | Circuits and Systems II | 3 |
| ECE 252 | Microprocessors | 3 |
| MATH 213 | Calculus III B | 4 |
| ECE 294 | Analog and Digital Circuits Laboratory | 2 |
| ECE 271 | Electronic Circuits I | 3 |
| | **Term Credits** | **15** |
| **Third Year** | | |
| **1st Semester** | | |
| CS 280 | Programming Language Concepts | 3 |
| ECE 368 | Signal Transmission | 3 |
| ECE 395 | Microprocessor Laboratory | 2 |
| MATH 326 | Discrete Analysis for Computer Engineers | 3 |
| ECE 321 | Random Signals and Noise | 3 |
| | **Term Credits** | **14** |
| **2nd Semester** | | |
| CS 332 | Principles of Operating Systems | 3 |
| MATH 340<br>or MATH 337 | Applied Numerical Methods<br>or Linear Algebra | 3 |
| ECE 353 | Computer Organization and Architecture | 3 |
| PHIL 334 | Engineering Ethics and Technological Practice: Philosophical Perspectives on Engineering | 3 |

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| Select one of the following: | | 3 |
| MGMT 390 | Principles of Business | |
| IE 492 | Engineering Management | |
| ECON 201 | Economics | |
| ECON 265 | Microeconomics | |
| ECON 266 | Macroeconomics | |
| | **Term Credits** | **15** |
| **Fourth Year** | | |
| **1st Semester** | | |
| ECE 414 | Electrical and Computer Engineering Project I | 1 |
| ECE 495 | Computer Engineering Design Lab | 3 |
| COE Track Elective I | | 3 |
| COE Track Elective II | | 3 |
| Technical Elective | | 3 |
| History and Humanities GER 300+ level (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-300-level/) | | 3 |
| | **Term Credits** | **16** |
| **2nd Semester** | | |
| ECE 416<br>or ECE 417 | Electrical and Computer Engineering Project II<br>or Electrical & Computer Engineering Project II | 3 |
| COE Track Laboratory Elective | | 2 |
| COE Track Elective III | | 3 |
| Technical Elective | | 3 |
| Humanities and Social Science Senior Seminar GER (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/hss-capstone/) | | 3 |
| | **Term Credits** | **14** |
| | **Total Credits** | **120** |

**Computer Engineering Tracks**

The computer Engineering technical tracks are designed to provide in-depth study in a specialty area. Students at the fourth year of the curriculum must choose one of the available tracks. Courses are listed below. Students may take alternative courses but must see their academic advisor for approval.

| Code | Title | Credits |
|---|---|---|
| Computer Engineering Tracks - Select one of the following: | | |
| 1. Advanced Computer Systems Track | | |
| ECE 451 | Advanced Computer Architecture | |
| ECE 452 | High Performance Computer Architecture | |
| ECE 453 | Introduction to Discrete Event Systems | |
| or IS 461 | Systems Simulation | |
| ECE 459 | Advanced Computer Systems Design Lab | |
| 2. Computer Communications Track | | |
| ECE 421 | Digital Data Communication | |
| ECE 422 | Computer Communications Networks | |
| ECE 425 | Wireless Communication Systems | |
| ECE 429 | Computer Communications Lab | |

## Computer Engineering Technical Electives - 3 courses

The ECE Elective must be a 300 or 400 level ECE course or an advisor approved upper level engineering, science or mathematics course. Elective courses cannot cover the same material as other courses taken by the student. For example, a CS course covering the same material as an ECE course taken by the student cannot count as a technical elective. .Courses from the Engineering Technology Department are generally not approved as ECE electives.

**Co-op**

Co-op courses bearing degree credit replace a technical elective or another course approved by the faculty advisor in the student's major department. In Computer Engineering, ECE 310 Co-op Work Experience I is taken for zero credits, and ECE 410 Co-op Work Experience II is taken for 3 degree credits, upon acceptance by the faculty co-op advisor of an approved proposal.

**CoOp Option A Track**

(145 credits minimum)

| | | |
|---|---|---|
| **First Year** | | |
| **1st Semester** | | **Credits** |
| CHEM 125 | General Chemistry I | 3 |
| FED 101 | Fundamentals of Engineering Design | 2 |
| ENGL 101 | English Composition: Introduction to Academic Writing | 3 |
| MATH 111 | Calculus I | 4 |
| PHYS 111 | Physics I | 3 |
| PHYS 111A | Physics I Lab | 1 |
| FYS SEM | First-Year Student Seminar | 0 |
| | **Term Credits** | **16** |
| **2nd Semester** | | |
| CS 115 | Introduction to Computer Science I in C++ | 3 |
| MATH 112 | Calculus II | 4 |
| PHYS 122 | Electricity & Magntsm ECE Appl | 3 |
| PHYS 121A | Physics II Lab | 1 |
| ECE 101 | Introduction to Electrical and Computer Engineering | 0 |
| ENGL 102 | English Composition: Introduction to Writing for Research | 3 |
| | **Term Credits** | **14** |
| **Second Year** | | |
| **1st Semester** | | |
| CS 116 | Introduction to Computer Science II in C++. | 3 |
| ECE 231 | Circuits and Systems I | 3 |
| ECE 251 | Digital Design | 3 |
| MATH 222 | Differential Equations | 4 |
| History and Humanities GER 200 level (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-200-level/) | | 3 |
| | **Term Credits** | **16** |
| **2nd Semester** | | |
| ECE 232 | Circuits and Systems II | 3 |
| ECE 252 | Microprocessors | 3 |
| ECE 271 | Electronic Circuits I | 3 |
| MATH 213 | Calculus III B | 4 |
| ECE 294 | Analog and Digital Circuits Laboratory | 2 |
| ENGR 211 | Professional Skills for Engineers I | 1 |
| | **Term Credits** | **16** |
| **Summer** | | |
| CO-OP I | | |
| | **Term Credits** | **0** |
| **Third Year** | | |
| **1st Semester** | | |
| ENGR 310 | Co-op Work Experience I | 12 |
| | **Term Credits** | **12** |
| **2nd Semester** | | |
| CS 280 | Programming Language Concepts | 3 |
| ECE 368 | Signal Transmission | 3 |
| ECE 395 | Microprocessor Laboratory | 2 |

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|---|---|---|
| MATH 326 | Discrete Analysis for Computer Engineers | 3 |
| ECE 321 | Random Signals and Noise | 3 |
| | **Term Credits** | **14** |
| **Summer** | | |
| CO-OP II | | |
| | **Term Credits** | **0** |
| **Fourth Year** | | |
| **1st Semester** | | |
| ENGR 410 | Co-op Work Experience II | 12 |
| | **Term Credits** | **12** |
| **2nd Semester** | | |
| CS 332 | Principles of Operating Systems | 3 |
| MATH 340<br>or MATH 337 | Applied Numerical Methods<br>or Linear Algebra | 3 |
| ECE 353 | Computer Organization and Architecture | 3 |
| PHIL 334 | Engineering Ethics and Technological Practice: Philosophical Perspectives on Engineering | 3 |
| Select one of the following: | | 3 |
| MGMT 390 | Principles of Business | |
| IE 492 | Engineering Management | |
| ECON 201 | Economics | |
| ECON 265 | Microeconomics | |
| ECON 266 | Macroeconomics | |
| | **Term Credits** | **15** |
| **Fifth Year** | | |
| **1st Semester** | | |
| ECE 414 | Electrical and Computer Engineering Project I | 1 |
| ECE 495 | Computer Engineering Design Lab | 3 |
| COE Track Elective I | | 3 |
| COE Track Elective II | | 3 |
| Technical Elective | | 3 |
| History and Humanities GER 300+ level (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-300-level/) | | 3 |
| | **Term Credits** | **16** |
| **2nd Semester** | | |
| ECE 416<br>or ECE 417 | Electrical and Computer Engineering Project II<br>or Electrical & Computer Engineering Project II | 3 |
| COE Track Laboratory Elective | | 2 |
| COE Track Elective III | | 3 |
| Technical Elective | | 3 |
| Humanities and Social Science Senior Seminar GER (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/hss-capstone/) | | 3 |
| | **Term Credits** | **14** |
| | **Total Credits** | **145** |

**Computer Engineering Tracks**

The computer Engineering technical tracks are designed to provide in-depth study in a specialty area. Students at the fourth year of the curriculum must choose one of the available tracks. Courses are listed below. Students may take alternative courses but must see their academic advisor for approval.

| Code | Title | Credits |
|---|---|---|
| Computer Engineering Tracks - Select one of the following: | | |
| 1. Advanced Computer Systems Track | | |
| ECE 451 | Advanced Computer Architecture | |
| ECE 452 | High Performance Computer Architecture | |

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|---|---|
| ECE 453 | Introduction to Discrete Event Systems |
| or IS 461 | Systems Simulation |
| ECE 459 | Advanced Computer Systems Design Lab |
| 2. Computer Communications Track | |
| ECE 421 | Digital Data Communication |
| ECE 422 | Computer Communications Networks |
| ECE 425 | Wireless Communication Systems |
| ECE 429 | Computer Communications Lab |

## Computer Engineering Technical Electives - 3 courses

The ECE Elective must be a 300 or 400 level ECE course or an advisor approved upper level engineering, science or mathematics course. Elective courses cannot cover the same material as other courses taken by the student. For example, a CS course covering the same material as an ECE course taken by the student cannot count as a technical elective. .Courses from the Engineering Technology Department are generally not approved as ECE electives.

**CoOp Option B Track**

(145 credits minimum)

| | | |
|---|---|---|
| **First Year** | | |
| **1st Semester** | | **Credits** |
| CHEM 125 | General Chemistry I | 3 |
| FED 101 | Fundamentals of Engineering Design | 2 |
| ENGL 101 | English Composition: Introduction to Academic Writing | 3 |
| MATH 111 | Calculus I | 4 |
| PHYS 111 | Physics I | 3 |
| PHYS 111A | Physics I Lab | 1 |
| FYS SEM | First-Year Student Seminar | 0 |
| | **Term Credits** | **16** |
| **2nd Semester** | | |
| CS 115 | Introduction to Computer Science I in C++ | 3 |
| MATH 112 | Calculus II | 4 |
| PHYS 122 | Electricity & Magntsm ECE Appl | 3 |
| PHYS 121A | Physics II Lab | 1 |
| ECE 101 | Introduction to Electrical and Computer Engineering | 0 |
| ENGL 102 | English Composition: Introduction to Writing for Research | 3 |
| | **Term Credits** | **14** |
| **Second Year** | | |
| **1st Semester** | | |
| CS 116 | Introduction to Computer Science II in C++. | 3 |
| ECE 231 | Circuits and Systems I | 3 |
| ECE 251 | Digital Design | 3 |
| MATH 222 | Differential Equations | 4 |
| History and Humanities GER 200 level (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-200-level/) | | 3 |
| | **Term Credits** | **16** |
| **2nd Semester** | | |
| ECE 232 | Circuits and Systems II | 3 |
| ECE 252 | Microprocessors | 3 |
| ECE 271 | Electronic Circuits I | 3 |
| MATH 213 | Calculus III B | 4 |
| ECE 294 | Analog and Digital Circuits Laboratory | 2 |
| | **Term Credits** | **15** |

| | | |
|---|---|---|
| **Third Year** | | |
| **1st Semester** | | |
| CS 280 | Programming Language Concepts | 3 |
| ECE 368 | Signal Transmission | 3 |
| ECE 395 | Microprocessor Laboratory | 2 |
| MATH 326 | Discrete Analysis for Computer Engineers | 3 |
| ECE 321 | Random Signals and Noise | 3 |
| ENGR 211 | Professional Skills for Engineers I | 1 |
| | **Term Credits** | **15** |
| **2nd Semester** | | |
| ENGR 310 | Co-op Work Experience I | 12 |
| | **Term Credits** | **12** |
| **Summer** | | |
| CO-OP I | | |
| | **Term Credits** | **0** |
| **Fourth Year** | | |
| **1st Semester** | | |
| CS 332 | Principles of Operating Systems | 3 |
| MATH 340 | Applied Numerical Methods | 3 |
| ECE 353 | Computer Organization and Architecture | 3 |
| PHIL 334 | Engineering Ethics and Technological Practice: Philosophical Perspectives on Engineering | 3 |
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| MGMT 390 | Principles of Business | |
| IE 492 | Engineering Management | |
| ECON 201 | Economics | |
| ECON 265 | Microeconomics | |
| ECON 266 | Macroeconomics | |
| | **Term Credits** | **15** |
| **2nd Semester** | | |
| ENGR 410 | Co-op Work Experience II | 12 |
| | **Term Credits** | **12** |
| **Summer** | | |
| CO-OP II | | |
| | **Term Credits** | **0** |
| **Fifth Year** | | |
| **1st Semester** | | |
| ECE 414 | Electrical and Computer Engineering Project I | 1 |
| ECE 495 | Computer Engineering Design Lab | 3 |
| COE Track Elective I | | 3 |
| COE Track Elective II | | 3 |
| Technical Elective | | 3 |
| History and Humanities GER 300+ level (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-300-level/) | | 3 |
| | **Term Credits** | **16** |
| **2nd Semester** | | |
| ECE 416<br>or ECE 417 | Electrical and Computer Engineering Project II<br>or Electrical & Computer Engineering Project II | 3 |
| COE Track Laboratory Elective | | 2 |
| COE Track Elective III | | 3 |
| Technical Elective | | 3 |

| | | |
|---|---|---|
| Humanities and Social Science Senior Seminar GER (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/hss-capstone/) | | 3 |
| | **Term Credits** | **14** |
| | **Total Credits** | **145** |

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| ECE 452 | High Performance Computer Architecture | |
| ECE 453 | Introduction to Discrete Event Systems | |
| or IS 461 | Systems Simulation | |
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| ECE 422 | Computer Communications Networks | |
| ECE 425 | Wireless Communication Systems | |
| ECE 429 | Computer Communications Lab | |

Computer Engineering Technical Electives - 3 courses

The ECE Elective must be a 300 or 400 level ECE course or an advisor approved upper level engineering, science or mathematics course. Elective courses cannot cover the same material as other courses taken by the student. For example, a CS course covering the same material as an ECE course taken by the student cannot count as a technical elective. .Courses from the Engineering Technology Department are generally not approved as ECE electives.

Refer to the General Education Requirements (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/) section of this catalog for further information on electives.

*This curriculum represents the maximum number of credits per semester for which a student is advised to register. A full-time credit load is 12 credits. First-year students are placed in a curriculum that positions them for success which may result in additional time needed to complete curriculum requirements. Continuing students should consult with their academic advisor to determine the appropriate credit load.*