

BACHELOR OF SCIENCE IN COMPUTER ENGINEERING

Computer engineering involves the design and application of computer hardware and computer software. Computer hardware consists of the physical components that implement a computer system: processor and memory chips, circuit boards, and peripheral devices. Computer software consists of computer programs that accomplish a specific task using sequences of simple, programmable steps. Computers have become an integral part of many large systems that require sophisticated control, including automobiles, medical instrumentation, telecommunication systems, and factory automation. Computers are a driving force behind many of today's exciting new technologies, including wireless communications, interactive multimedia, and high-speed computer networks. Computer engineers must have detailed knowledge of both hardware and software to design, build, and use complex information processing systems for a wide range of applications.

The objectives of the ECE undergraduate computer engineering program are to produce electrical engineering graduates who are prepared to:

- Enter their profession and make intellectual contributions to it
- Embark on a lifelong career of personal and professional growth
- Take advanced courses at the graduate level

Curriculum

Required Courses

| Code | Title | Credit Hours |
|---|---|--------------|
| Electrical Engineering Requirements | | (28) |
| ECE 100 | Introduction to the Profession I | 3 |
| ECE 211 | Circuit Analysis I | 3 |
| ECE 213 | Circuit Analysis II | 4 |
| ECE 218 | Digital Systems | 4 |
| ECE 242 | Digital Computers and Computing | 3 |
| ECE 311 | Engineering Electronics | 4 |
| ECE 441 | Smart and Connected Embedded System Design | 4 |
| ECE 485 | Computer Organization and Design | 3 |
| Computer Science Major Requirements | | (16) |
| CS 115 | Object-Oriented Programming I | 2 |
| CS 116 | Object-Oriented Programming II | 2 |
| CS 330 | Discrete Structures | 3 |
| CS 331 | Data Structures and Algorithms | 3 |
| CS 351 | Systems Programming | 3 |
| CS 450 | Operating Systems | 3 |
| Junior Computer Engineering Elective | | (3-4) |
| Select one of the following: | | 3-4 |
| ECE 307 | Electrodynamics | 4 |
| ECE 308 | Signals and Systems | 3 |
| ECE 319 | Fundamentals of Power Engineering | 4 |
| Professional ECE Electives | | (6-8) |
| Select six to eight credit hours | | 6-8 |
| Computer Systems/Software Elective | | (3-4) |
| Select one of the following: | | 3-4 |
| ECE 407 | Introduction to Computer Networks with Laboratory | 4 |
| ECE 408 | Introduction to Computer Networks | 3 |
| ECE 443 | Introduction to Computer Cyber Security | 3 |
| ECE 449 | Object-Oriented Programming and Machine Learning | 3 |
| CS 425 | Database Organization | 3 |
| CS 487 | Software Engineering I | 3 |
| Hardware-Design Elective | | (4) |
| ECE 429 | Introduction to VLSI Design | 4 |

| | | |
|---|--|------------------------|
| or ECE 446 | Advanced Logic Design | |
| Mathematics Requirements | | (24) |
| MATH 151 | Calculus I | 5 |
| MATH 152 | Calculus II | 5 |
| MATH 251 | Multivariate and Vector Calculus | 4 |
| MATH 252 | Introduction to Differential Equations | 4 |
| MATH 374 | Probability and Statistics for Electrical and Computer Engineers | 3 |
| MATH 333 | Matrix Algebra and Complex Variables | 3 |
| or MATH 350 | Introduction to Computational Mathematics | |
| Physics Requirements | | (8) |
| PHYS 123 | General Physics I: Mechanics | 4 |
| PHYS 221 | General Physics II: Electricity and Magnetism | 4 |
| Chemistry Requirement | | (3) |
| CHEM 122 | Principles of Chemistry I Without Laboratory | 3 |
| Career Elective | | (9)¹ |
| Career Elective I ² | | 3 |
| Career Elective II ³ | | 3 |
| Career Elective III ⁴ | | 3 |
| Interprofessional Projects (IPRO) | | (6) |
| See Illinois Tech Core Curriculum, section E | | 6 |
| Humanities and Social Sciences Requirements | | (21) |
| See Illinois Tech Core Curriculum, sections B and C | | 21 |
| Total Credit Hours | | 131-135 |

¹ Advisor-approved course from engineering, science, math, computer science, business, and law that is the same level or more advanced than the academic level of the student.

² Career Elective I is 100-level or above

³ Career Elective II is 200-level or above

⁴ Career Elective III is 300-level or above

Bachelor of Science in Computer Engineering Curriculum

| Semester 1 | | Credit Hours | Semester 2 | | Credit Hours |
|---|--|--------------|--|--|--------------|
| MATH 151 | | 5 | MATH 152 | | 5 |
| CHEM 122 | | 3 | PHYS 123 | | 4 |
| CS 115 | | 2 | Career Elective I ¹ | | 3 |
| ECE 100 | | 3 | CS 116 | | 2 |
| Humanities 200-level course | | 3 | Social Sciences Elective | | 3 |
| | | 16 | | | 17 |
| Semester 1 | | Credit Hours | Semester 2 | | Credit Hours |
| MATH 252 | | 4 | MATH 251 | | 4 |
| PHYS 221 | | 4 | Career Elective II ¹ | | 3 |
| ECE 211 | | 3 | ECE 213 | | 4 |
| ECE 218 | | 4 | ECE 242 | | 3 |
| CS 331 | | 3 | CS 330 | | 3 |
| | | 18 | | | 17 |
| Semester 1 | | Credit Hours | Semester 2 | | Credit Hours |
| I PRO Elective I | | 3 | Junior CPE Elective | | 3-4 |
| ECE 311 | | 4 | CS 450 | | 3 |
| CS 351 | | 3 | MATH 374 | | 3 |
| MATH 333 or 350 | | 3 | Social Sciences Elective (300+) | | 3 |
| Humanities Elective (300+) | | 3 | Career Elective III ¹ | | 3 |
| | | 16 | | | 15-16 |
| Semester 1 | | Credit Hours | Semester 2 | | Credit Hours |
| ECE 485 ³ | | 3 | ECE 441 ⁶ | | 4 |
| Computer Systems/Software Elective ⁴ | | 3-4 | Professional CPE Elective ⁵ | | 3-4 |
| ECE 429 or 446 | | 4 | I PRO Elective II | | 3 |
| Professional CPE Elective ⁵ | | 3-4 | Additional Hum. or Soc. Sci. Elective | | 3 |
| Humanities Elective (300+) | | 3 | Social Sciences Elective (300+) | | 3 |
| | | 16-18 | | | 16-17 |

Total Credit Hours: 131-135

- ¹ Career Electives: Advisor-approved course from engineering, science, math, computer science, business, and law that is the same level or more advanced than the academic level of the student. Career Elective I is 100-level or above, Career Elective II is 200-level or above, Career Elective III is 300-level or above.
- ² Junior CPE elective: Choose one of ECE 307, ECE 308, or ECE 319.
- ³ CS 470 may be substituted with advisor approval.
- ⁴ Computer systems/software elective: Choose one of ECE 407, ECE 408, ECE 443, ECE 449, CS 425, or CS 487.
- ⁵ Professional CPE Elective: ECE 4xx with (P) except ECE 448 or any CS 4xx except CS 485. A maximum of 3 credit hours of ECE 491, or ECE 497.
- ⁶ ECE 441 is a Major Design Experience (M) course.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).