Purdue University **2023-2024 University Catalog**

Computer Engineering, BSCMPE

About the Program

The Computer Engineering program is accredited by the Engineering Accreditation Commission of ABET.

Electrical and Computer engineering encompasses all areas of research, development, design, and operation of electrical and electronic systems and their components, including software. Emphasis in such varied areas as bioengineering, circuit theory, communication sciences, computers and automata, control systems, electromagnetic fields, energy sources and systems, and materials and electronic devices is available. Two degree programs are offered by the School: Bachelor of Science in Electrical Engineering (BSEE) and Bachelor of Science in Computer Engineering (BSCmpE).

Engineers in both fields must have a strong background in mathematics and physics, a broad base in the humanities, and a command of the English language in order to provide the scope of knowledge essential for optimum professional growth. The curriculum offered by the School of Electrical and Computer Engineering meets these objectives.

Graduates from the School of Electrical and Computer Engineering are sought after by all major industries. Electrical engineers hold many unusual and challenging positions in the aerospace, chemical, nuclear, automotive, medical, metallurgical, textile, railway, petroleum, and other basically non-electrical industries, as well as in computers, electronics, communications, power, and other electrical industries. Their professional roles span industrial activity, research, development, design, production, marketing, operation, field testing, and maintenance of many types of equipment for government, industry, farm, and home.

Two degree programs are offered by the school:

Electrical Engineering encompasses the development, design, research, and operation of electrical and electronic systems and components. Disciplines include VLSI and circuit design, communication and signal processing, computer engineering, automatic control, fields and optics, energy sources and systems, and microelectronics and nanotechnology.

Computer Engineering is a specialization within electrical and computer engineering offering an in-depth education in both hardware and software aspects of modern computer systems.

Electrical and Computer Engineering provides students with a versatile education that will prove valuable looking toward a professional future. Along with problem-solving and design skills, students develop a strong foundation in math, science, and core electrical/computer engineering fundamentals. This skillset prepares them for research and development positions in industry, management, sales, teaching, medical school, and law school.

At Birck Nanotechnology Center, engineers and scientists conduct research in emerging fields where new materials and tiny structures are built atom by atom or molecule by molecule.

Electrical and Computer Engineering website

Electrical and Computer Engineering Major Change (CODO) Requirements

Degree Requirements

125 Credits Required

Computer Engineering Required Major Courses (53 credits)

An overall 2.00 cumulative GPA or better for Required Major courses. (Some courses have minimum grade requirements for prerequisites.)

Required Core Courses (30 credits)

- ECE 20001 - Electrical Engineering Fundamentals I (minimum grade of C)
- ECE 20007 - Electrical Engineering Fundamentals I Lab
- ECE 20002 - Electrical Engineering Fundamentals II (minimum grade of C)
- ECE 26400 - Advanced C Programming (minimum grade of C)
- ECE 20875 - Python For Data Science
- ECE 27000 - Introduction To Digital System Design (minimum grade of C)
- ECE 30100 - Signals And Systems
- ECE 30200 - Probabilistic Methods In Electrical And Computer Engineering
- ECE 36200 - Microprocessor Systems And Interfacing
- ECE 36800 - Data Structures

Required Seminars (3 credits)

- ECE 29401 - Electrical And Computer Engineering Sophomore Seminar
- ECE 39401 - Professional Communications And Diversity
- ECE 49401 - Professional Communication Capstone

Senior Design Requirement - Choose One Option (4 credits)

The CmpE Core Requirements listed above must be completed before taking Senior Design.

Option 1:

- ECE 47700 - Digital Systems Senior Project

Option 2:

- ECE 49022 - Electrical Engineering Senior Design Projects

Option 3:

Must be taken in each of 2 consecutive semesters.

- EPCS 41200 - Senior Design Participation In EPICS

Option 4:

Must be taken in 2 consecutive semesters.

- VIP 47921 - Senior Design Participation In Vertically Integrated Projects (VIP) I
- VIP 47922 - Senior Design Participation In Vertically Integrated Projects (VIP) II

Computer Engineering Selectives (16 credits)

Select from the following list so that total credits for Required Major Courses is at least 53.

- ECE 30834 - Fundamentals Of Computer Graphics

- ECE 33700 - ASIC Design Laboratory
- ECE 40400 - Introduction To Computer Security
- ECE 43700 - Computer Design And Prototyping
- ECE 46100 - Software Engineering
- ECE 46900 - Operating Systems Engineering

- ECE 46300 - Introduction To Computer Communication Networks or
- ECE 50863 - Computer Network Systems

- ECE 46800 - Introduction To Compilers And Translation Engineering or
- ECE 57300 - Compilers And Translator Writing Systems

- ECE 40862 - Software For Embedded Systems or
- ECE 56800 - Embedded Systems

- ECE 47300 - Introduction To Artificial Intelligence or
- ECE 57000 - Artificial Intelligence

- Computer Engineering "Special Content" courses - Maximum of 6 credits (See Computer Engineering "Special Content" Courses in Additional Requirements)

Optional Concentrations

- Artificial Intelligence and Machine Learning Concentration for Computer Engineering
- Computer Systems Concentration in Computer Engineering
- Microelectronics and Semiconductor Concentration for Computer Engineering
- Software Engineering Concentration for Computer Engineering

Other Department/Program Course Requirements (72 credits)

If pursuing Bachelor of Science in Computer Engineering, CS 15900 - Prog Appl for Engineers is required to graduate, but not required to complete the First Year Engineering program.

First-Year Engineering Requirements (29-39 credits)

Click here for First-Year Engineering requirements.

- Requirement #1 - Intro to Engineering I (2-4 credits)
- Requirement #2 - Intro to Engineering II (2-4 credits)
- Requirement #3 - Calculus I (4-5 credits) *(satisfies Quantitative Reasoning for core)*
- Requirement #4 - Calculus II (4-5 credits) *(satisfies Quantitative Reasoning for core)*
- Requirement #5 - Chemistry I (4-6 credits) *(satisfies Science #1 for core)*
- Requirement #6 - Physics (4 credits) *(satisfies Science #2 for core)*
- Requirement #7 - First-Year Engineering Selective (3-4 credits)
- Requirement #8 - Written and Oral Communication (6-7 credits) *(could satisfy Written Communication, Information Literacy or Oral Communication for core)*

General Engineering Requirement (3-6 credits)

C Programming (0-3 credits)

Required only if CS 15900 not taken as the FYE Science Selective.

- CS 15900 - C Programming (minimum grade of C-)

Engineering Breadth Selective - Choose One (3 credits)

- AAE 20300 - Aeromechanics I
- ABE 20100 - Thermodynamics In Biological Systems I
- BME 20100 - Biomolecules: Structure, Function, And Engineering Applications
- CE 29700 - Basic Mechanics I (Statics)
- CE 35000 - Introduction To Environmental And Ecological Engineering
- CE 35500 - Engineering Environmental Sustainability
- CHE 20500 - Chemical Engineering Calculations
- EEE 35000 - Introduction To Environmental And Ecological Engineering
- EEE 35500 - Engineering Environmental Sustainability
- IE 33500 - Operations Research - Optimization
- IE 33600 - Operations Research - Stochastic Models
- ME 20000 - Thermodynamics I
- ME 27000 - Basic Mechanics I
- ME 41300 - Noise Control
- MSE 23000 - Structure And Properties Of Materials
- NUCL 20000 - Introduction to Nuclear Engineering

Mathematics Requirement - Choose One Option (13-14 credits)

Calculus I and II must be completed as part of the First Year Engineering Requirements.

Option 1 (13 credits)

- MA 26100 - Multivariate Calculus (minimum grade of C-)
- MA 26600 - Ordinary Differential Equations
- MA 26500 - Linear Algebra
- ECE 36900 - Discrete Mathematics For Computer Engineering

Option 2 (14 credits)

- MA 26100 - Multivariate Calculus (minimum grade of C-)
- MA 26200 - Linear Algebra And Differential Equations
- ECE 36900 - Discrete Mathematics For Computer Engineering

Advanced Math Selective - Choose One (3 credits)

- MA 30300 - Differential Equations And Partial Differential Equations For Engineering And The Sciences
- MA 35100 - Elementary Linear Algebra

- MA 38500 - Introduction To Logic
- MA 42500 - Elements Of Complex Analysis
- MA 51000 - Vector Calculus
- CS 31400 - Numerical Methods

Science Requirement (4-8 credits)

Physics I and General Chemistry are part of the First Year Engineering Requirements. If an FYE Science Selective other than CS 15900 is selected, it will satisfy the ECE Science Selective requirement below.

- PHYS 27200 - Electric And Magnetic Interactions ♦

ECE Science Selective - Choose One

- BIOL 11000 - Fundamentals Of Biology I
- BIOL 11100 - Fundamentals Of Biology II

- BIOL 12100 - Biology I: Diversity, Ecology, And Behavior and
- BIOL 13500 - First Year Biology Laboratory

- BIOL 13100 - Biology II: Development, Structure, And Function Of Organisms
- CHM 11600 - General Chemistry
- PHYS 31000 - Intermediate Mechanics
- PHYS 32200 - Intermediate Optics
- PHYS 34200 - Modern Physics
- PHYS 34400 - Introduction To Quantum Science

ECE General Education Requirement (17-18 credits)

- General Education I (Human Cultures: Humanities) - Credit Hours: 3.00 (satisfies Human Cultures: Humanities for core)
- General Education II (satisfies Human Cultures: Behavioral/Social Science for core) - Credit Hours: 3.00
- General Education III (satisfies Science, Technology & Society for core) - Credit Hours: 3.00
- General Education IV - Credit Hours: 3.00
- General Education V - Credit Hours: 3.00
- General Education VI - Credit Hours: 3.00

C- or better required in all General Education Requirement Courses

- 6 of 24 credits must be Upper level courses (*Non-Introductory: At least 6 credits must be 30000-level or above (or from courses with a required pre-requisite in the same department.*)
- 12 of 24 must be taken from College of Liberal Arts, the Krannert School of Management, and/or the Honors College-provided such courses are not focused primarily on engineering, technology, the natural sciences, or mathematics.

24 credits total of General Education Courses Required

6-7 credits are taken in First-Year Engineering

- General Education - FYE Requirement #8 (Written Communication) - Credit Hours: 3.00-4 credits (satisfies Written Communication for core)

- General Education - FYE Requirement #8 (Oral Communication) Credit Hours: 3.00 (satisfies Oral Communication for core)

Electives (0-2 credits)

- Elective - Credit Hours: 0.00-2.00

- Choose additional coursework to bring total credits to the minimum 125 required for the BSCMPE degree. Students should carefully select these courses to complement their personal interests and their academic record.
- All courses, except those specifically identified on the Electrical and Computer Engineering No Count List.

Supplemental Lists

- Electrical and Computer Engineering General Education
- Computer Engineering "Special Content" Courses
- Electrical and Computer Engineering No Count List

GPA Requirements

- An overall GPA of 2.0 or higher in the Required Major Courses is required.

Pass/No Pass Policy

- The pass/no pass (P/NP) grade option, if available, may be used for courses taken to satisfy the ECE General Education and Complementary Elective Requirements. The P/NP grade option cannot be used for courses applied towards the Required Major Courses, General Engineering Requirement, Mathematics Requirement, and the Science Requirement (unless P/NP is the only allowed grade option for that course).

Transfer Credit Policy

- All 30000-level and above courses applied towards the Required Major Courses must be completed at the Purdue West Lafayette campus.

University Requirements

University Core Requirements

For a complete listing of University Core Course Selectives, visit the Provost's Website.

- Human Cultures: Behavioral/Social Science (BSS)
- Human Cultures: Humanities (HUM)
- Information Literacy (IL)
- Oral Communication (OC)
- Quantitative Reasoning (QR)
- Science #1 (SCI)
- Science #2 (SCI)
- Science, Technology, and Society (STS)
- Written Communication (WC)

Civics Literacy Proficiency Requirement

The Civics Literacy Proficiency activities are designed to develop civic knowledge of Purdue students in an effort to graduate a more informed citizenry. For more information visit the Civics Literacy Proficiency website.

Students will complete the Proficiency by passing a test of civic knowledge, and completing one of three paths:

- Attending six approved civics-related events and completing an assessment for each; or
- Completing 12 podcasts created by the Purdue Center for C-SPAN Scholarship and Engagement that use C-SPAN material and completing an assessment for each; or
- Earning a passing grade for one of **these approved courses** (or transferring in approved AP or departmental credit in lieu of taking a course).

Upper Level Requirement

- Resident study at Purdue University for at least two semesters and the enrollment in and completion of at least 32 semester hours of coursework required and approved for the completion of the degree. These courses are expected to be at least junior-level (30000+) courses.
- Students should be able to fulfill *most*, *if not all*, of these credits within their major requirements; there should be a clear pathway for students to complete any credits not completed within their major.

Sample First Year Engineering Plan of Study

Fall 1st Year

- CHM 11500 - General Chemistry *(FYE Requirement #8)* - Credit Hours: 4.00 or (CHM 11100 and CHM 11200)

- ENGR 13100 - Transforming Ideas To Innovation I ♦ *(FYE Requirement #1)* - Credit Hours: 2.00

- MA 16100 - Plane Analytic Geometry And Calculus I ♦ *(FYE Requirement #3)* - Credit Hours: 5.00 or
- MA 16500 - Analytic Geometry And Calculus I ♦ *(FYE Requirement #3)* - Credit Hours: 4.00

- Written Communication Selective *(FYE Requirement #8)* - Credit Hours: 3.00-4.00 (satisfies Written Communication for core) or
- Oral Communication Selective *(FYE Requirement #8)* - Credit Hours: 3.00 (satisfies Oral Communication for core)

13-14 Credits

Spring 1st Year

- ENGR 13200 - Transforming Ideas To Innovation II ♦ *(FYE Requirement #2)* - Credit Hours: 2.00

- PHYS 17200 - Modern Mechanics *(FYE Requirement #6)* - Credit Hours: 4.00

- MA 16200 - Plane Analytic Geometry And Calculus II ♦ *(FYE Requirement #4)* - Credit Hours: 5.00 or
- MA 16600 - Analytic Geometry And Calculus II ♦ *(FYE Requirement #4)* - Credit Hours: 4.00

- Written Communication Selective *(FYE Requirement #8)* - Credit Hours: 3.00-4.00 (satisfies Written Communication for core) or
- Oral Communication Selective *(FYE Requirement #8)* - Credit Hours: 3.00 (satisfies Oral Communication for core)

First-Year Engineering Selective (*FYE Requirement # 7*) - Credit Hours: 3.00-4.00
- CHM 11600 - General Chemistry or
- CS 15900 - C Programming or
- BIOL 11000 - Fundamentals Of Biology I or
- BIOL 11100 - Fundamentals Of Biology II

16 Credits

Sample Computer Engineering Plan of Study

Combined with two semesters for FYE above, the following is an example of a 4-year plan that satisfies the BSCMPE degree requirements.

Fall 2nd Year

- ECE 29401 - Electrical And Computer Engineering Sophomore Seminar
- ECE 20001 - Electrical Engineering Fundamentals I
- ECE 20007 - Electrical Engineering Fundamentals I Lab
- ECE 26400 - Advanced C Programming
- ECE 36900 - Discrete Mathematics For Computer Engineering
- MA 26100 - Multivariate Calculus

C Programming (if not taken in FYE)
- CS 15900 - C Programming

16-19 Credits

Spring 2nd Year

- ECE 20002 - Electrical Engineering Fundamentals II
- ECE 20875 - Python For Data Science
- ECE 27000 - Introduction To Digital System Design

Mathematics Requirement
- MA 26600 - Ordinary Differential Equations or
- MA 26200 - Linear Algebra And Differential Equations

- Foundational General Education I (Human Cultures: Humanities) - Credit Hours: 3.00

16-17 Credits

Fall 3rd Year

- ECE 30100 - Signals And Systems
- ECE 36200 - Microprocessor Systems And Interfacing
- ECE 36800 - Data Structures

- ECE 39401 - Professional Communications And Diversity
- ECE Science Selective - Credit Hours: 0.00-4.00
- Foundational General Education II (Human Cultures: Behavioral/Social Science) - Credit Hours: 3.00

14-18 Credits

Spring 3rd Year

- ECE 30200 - Probabilistic Methods In Electrical And Computer Engineering
- PHYS 27200 - Electric And Magnetic Interactions
- Computer Engineering Selectives - Credit Hours: 7.00
- Foundational General Education III (Science, Technology, and Society) - Credit Hours: 3.00

16 Credits

Fall 4th Year

Senior Design Requirement Option I

- ECE 47700 - Digital Systems Senior Project

- MA 26500 - Linear Algebra or
- Advanced Math Selective - Credit Hours: 3.00

- Computer Engineering Selectives - Credit Hours: 3.00
- General Education IV - Credit Hours: 3.00
- Elective - Credit Hour: 0.00-3.00

13-16 Credits

Spring 4th Year

- ECE 49401 - Professional Communication Capstone
- Computer Engineering Selectives - Credit Hours: 6.00
- Engineering Breadth Selective - Credit Hours: 3.00
- General Education V - Credit Hours: 3.00
- General Education VI - Credit Hours: 3.00
- Elective - Credit Hours: 0.00-2.00

16-18 Credits

Pre-Requisite Information

For pre-requisite information, click here.

Critical Course

The ♦ course is considered critical.

In alignment with the Degree Map Guidance for Indiana's Public Colleges and Universities, published by the Commission for Higher Education (pursuant to HEA 1348-2013), a Critical Course is identified as "one that a student must be able to pass to persist and succeed in a particular major. Students who want to be nurses, for example, should know that they are expected to be proficient in courses like biology in order to be successful. These would be identified by the institutions for each degree program".

Disclaimer

The student is ultimately responsible for knowing and completing all degree requirements.

Consultation with an advisor may result in an altered plan customized for an individual student.

The myPurduePlan powered by DegreeWorks is the knowledge source for specific requirements and completion.