COMPUTER ENGINEERING, B.S. (BEHREND)

Begin Campus: Any Penn State Campus

End Campus: Erie

Program Description

This major provides students with a strong foundation in computer engineering through a combination of classroom study, design projects, and laboratory experience. Analysis and design of computer hardware and software systems are stressed. Built upon a core of science and mathematics courses, this major has the objective of educating graduates to be problem solvers. Students acquire the ability to work as members of a team toward successful attainment of a common goal, preparing them for industry or further study in graduate school. In addition, written and oral communication skills are developed from an early stage, culminating in a senior design project that stresses communication as well as engineering content.

In addition to completing a broad-based science core in mathematics, chemistry and physics, students pursue their interest in computer engineering by studying principles in digital hardware design, computer architecture, computer software, microelectronics, and computer data communications. The student will be required to analyze and solve a significant computer engineering design problem during the senior year.

What is Computer Engineering?

Computer engineering is the study of the design, analysis, and implementation of computer systems including processors, memory, embedded devices, and data communication systems for a wide range of application domains. It includes the study of digital systems, computer architecture, and computer networks. It encompasses many design activities spanning from designing individual logic components to designing complete computer systems composed of hardware, software, and hardware-software co-design. Computer engineering drives the development of new computing systems that enable the latest technologies impacting our everyday lives.

You Might Like This Program If...

- You've ever opened a computer housing to explore what's inside.
- You enjoy working with both hardware and software.
- You're interested in both engineering and computing—and in the overlap of the two disciplines.
- You'd like to take coursework in computers, engineering, math, and physics.

Entrance to Major

In addition to the Carnegie unit and minimum GPA requirements described by University policies, all students applying for entrance to any of the engineering majors at Behrend College must have at least a 2.0 cumulative GPA by the end of the semester prior to applying for entrance to the major and have completed, with a minimum grade of C: CHEM 110, MATH 140, MATH 141, and PHYS 211. These courses must be completed by the end of the semester during which the admission to major process is carried out.

Degree Requirements

For the Bachelor of Science degree in Computer Engineering, a minimum of 130 credits is required:

Requirement	Credits
General Education	45
Electives	1
Requirements for the Major	105

21 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 9 credits of GN courses; 6 credits of GQ courses; 3 credits of GWS courses; 3 credits of GS courses.

Per Senate Policy 83.80.5, the college dean or campus chancellor and program faculty may require up to 24 credits of coursework in the major to be taken at the location or in the college or program where the degree is earned.

Requirements for the Major

Each student must earn at least a grade of C in each 300-and 400-level course in the major field.

To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44 (https://senate.psu.edu/students/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/).

Code	Title	Credits
Prescribed Courses		
CMPSC 121	Introduction to Programming Techniques	3
ENGL 202C	Effective Writing: Technical Writing	3
PHYS 212	General Physics: Electricity and Magnetism	4
PHYS 214	General Physics: Wave Motion and Quantum Physics	2
Prescribed Courses: Require a grade of C or better		
CHEM 110	Chemical Principles I	3
CHEM 111	Experimental Chemistry I	1
CMPEN 271	Introduction to Digital Systems	3
CMPEN 275	Digital Design Laboratory	1
CMPEN 351	Microprocessors	3
CMPEN 352W	Embedded Systems Design	3
CMPEN 371	Advanced Digital Design	3
CMPEN 411	VLSI Digital Circuits	3
CMPEN 431	Introduction to Computer Architecture	3
CMPEN 441	Operating Systems	3
CMPEN 461	Communication Networks	3
CMPEN 480	Computer Engineering Design	3
CMPEN 481	Computer Engineering Project	3
CMPSC 122	Intermediate Programming	3
CMPSC 360	Discrete Mathematics for Computer Science	3
CMPSC 465	Data Structures and Algorithms	3
EE 210	Circuits and Devices	4
EE 310	Electronic Circuit Design I	4
EE 352	Signals and Systems: Continuous and Discrete-Time	4
MATH 140	Calculus With Analytic Geometry I	4

MATH 141	Calculus with Analytic Geometry II	4
MATH 220	Matrices	3
MATH 230	Calculus and Vector Analysis	4
MATH 250	Ordinary Differential Equations	3
PHYS 211	General Physics: Mechanics	4
STAT 301		3
Additional Courses		
ECON 102	Introductory Microeconomic Analysis and Policy	3
or ECON 104	Introductory Macroeconomic Analysis and Policy	
Supporting Courses and Related Areas		
Select 9 credits of technical elective courses from school-approved list		9

General Education

Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (https://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program/) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

Foundations (grade of C or better is required and Inter-Domain courses do not meet this requirement.)
- **Quantification (GQ):** 6 credits
- **Writing and Speaking (GWS):** 9 credits

Breadth in the Knowledge Domains (Inter-Domain courses do not meet this requirement.)
- **Arts (GA):** 3 credits
- **Health and Wellness (GHW):** 3 credits
- **Humanities (GH):** 3 credits
- **Social and Behavioral Sciences (GS):** 3 credits
- **Natural Sciences (GN):** 3 credits

Integrative Studies
- **Inter-Domain Courses (Inter-Domain):** 6 credits

Exploration
- **GN,** may be completed with Inter-Domain courses: 3 credits
- **GA, GH, GN, GS, Inter-Domain courses.** This may include 3 credits of World Language course work beyond the 12th credit level or the requirements for the student's degree program, whichever is higher: 6 credits

University Degree Requirements
First Year Engagement
All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

Cultures Requirement
6 credits are required and may satisfy other requirements

- United States Cultures: 3 credits
- International Cultures: 3 credits

Writing Across the Curriculum
3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits
A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work
Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition
The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (https://senate.psu.edu/students/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/)). For more information, check the Suggested Academic Plan for your intended program.

Academic Advising

The objectives of the university's academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee's unit of enrollment will provide each advisee with a primary academic adviser, the information needed to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (https://senate.psu.edu/students/policies-and-rules-for-undergraduate-students/32-00-advising-policy/)

Erie

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Suggested Academic Plan

The suggested academic plan(s) listed on this page are the plan(s) that are in effect during the 2025-26 academic year. To access previous years' suggested academic plans, please visit the archive (https://bulletins.psu.edu/undergraduate/archive/) to view the appropriate Undergraduate Bulletin edition.

Computer Engineering, B.S. at Erie Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits	Spring	Credits
CMPSC 121†	3	CHEM 110*#†	3
ENGL 15 or 30H‡†	3	CHEM 111*†	1
MATH 140*‡#†	4	CMPSC 122*	3
PHYS 211*#†	4	MATH 141*‡#†	4
PSU 7	1	PHYS 212†	4
General Education Course (GHW)	1.5		
	16.5		**15**

Second Year

Fall	Credits	Spring	Credits
MATH 250*	3	CMPSC 360*1	3
CMPEN 270 or 271 *and* 275*1	4	EE 210*1	4
MATH 220*	2	ENGL 202C‡†	3
ECON 102 or 104†	3	MATH 230*	4
CAS 100‡†	3	PHYS 214†	2
General Education Course (GA/GH/GS)	3		
	18		**16**

Third Year

Fall	Credits	Spring	Credits
CMPEN 351*	3	CMPEN 352W*2	3
CMPEN 371*	3	CMPEN 411*	3
CMPSC 465*	3	CMPEN 431*	3
EE 310*	4	EE 352*	4
STAT 301 or STAT 318*	3	General Education Course (GA/GH/GS)	3
	16		**16**

Fourth Year

Fall	Credits	Spring	Credits
CMPEN 441*	3	CMPEN 481*	3
CMPEN 461*	3	Technical Elective (300, 400-level)*	3
CMPEN 480*	3	Technical Elective (300, 400-level)*	3
Technical Elective (300, 400-level)*	3	General Education Course (GA/GH/GS)	3
Technical Elective (300, 400-level)*	3	General Education Course (GA/GH/GS)	3
General Education Course (GA/GH/GS)	1.5		
	16.5		**15**

Total Credits 129

* Course requires a grade of C or better for the major
‡ Course requires a grade of C or better for General Education
# Course is an Entrance to Major requirement
† Course satisfies General Education and degree requirement

1 Must be completed prior to the third year to ensure that all fall semester third-year prerequisites are met.
2 Course will satisfy Writing Across the Curriculum requirement.

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

Program Notes:
- Only students who have gone through the entrance to major (ETM) process and have been accepted into this major may register for junior and senior-level EE, CMPEN, and SWENG courses.

School-Approved Electives for Computer Engineering:

Technical electives allow students to choose areas of interest to explore. Technical electives come in two categories: primary and secondary. Primary technical electives are those courses offered to the Computer Engineering major, which are not required for the Computer Engineering degree. Secondary technical electives are offered outside your home department and give you a broader latitude. **Students must complete at least two primary technical electives and, at most, one secondary technical elective.** Courses listed below as asynchronous are offered as needed when the appropriate faculty member is available.

*Exceptions to the above policy will be granted to students who **successfully** complete a minor in one of the areas listed in the Academic Minors portion of the School of Engineering Advising Handbook.*

Primary Technical Electives:

- Any 300-400 level SWENG course
- Any 300-400 level EE course not already required for the major
- Any 300-400 level CMPEN course not already required for the major

- Any 400 level CMPSC course not already required for the major, with the exception of CMPSC 455 and CMPSC 456
- Any 300-400 level technical gaming course

Secondary Technical Electives:

- CMPEN 395 - Internship
- CMPEN 495 - Internship
- CMPSC 461 - Programming Language Concept
- CMPSC 471 - Introduction to Compiler Construction
- MGMT 409 - Project Management for Engineers
- PSYCH 444 - Engineering Psychology
- ECON 481 - Business Forecasting Techniques
- ECON 485 - Econometric Techniques
- PHYS 458 - Intermediate Optics
- MATH 455 - Introduction to Numerical Analysis
- MATH 456 - Introduction to Numerical Analysis
- IE 302 - Engineering Economy

Career Paths

Breadth of experience with computing technologies makes it possible for computer engineering graduates to begin their careers in nearly every sector of the economy. Entry-level computer engineers typically work in computer design, systems analysis, hardware, software development, signal processing tool design, validation, firmware, and computer vision. Penn State Behrend has a comprehensive support system to help you identify and achieve your goals for college and beyond. Meet with your academic adviser often, and take advantage of the services offered by the Academic and Career Planning Center beginning with your first semester.

Careers

Employers of recent Penn State Behrend B.S. in Computer Engineering graduates include Bechtel Marine Propulsion, Duquesne Light, GE, Intel, Northrop Grumman, RoviSys, ASCO Power Technologies, Siemens, Zoll Medical Corp., Westinghouse, and Texas Instruments.

MORE INFORMATION ABOUT POTENTIAL CAREER OPTIONS FOR GRADUATES OF THE COMPUTER ENGINEERING PROGRAM (https://behrend.psu.edu/school-of-engineering/academic-programs/computer-engineering/)

Opportunities for Graduate Studies

Graduate programs in computer engineering often delve more deeply into areas of specialization such as control engineering, automation, embedded sensor systems, hardware and software architecture, biomedical technologies, nanotechnologies, and even economic and financial modeling. Or, you can earn a master's degree to learn management skills; Penn State Behrend offers a Master of Manufacturing Management (M.M.M) degree program for aspiring organizational leaders.

MORE INFORMATION ABOUT OPPORTUNITIES FOR GRADUATE STUDIES (https://behrend.psu.edu/school-of-engineering/academic-programs/master-of-manufacturing-management/)

Professional Resources

- ABET (https://www.abet.org/)
- Institution of Electrical and Electronics Engineers (IEEE) Computer Society (https://www.computer.org/)

- Association for Computing Machinery (https://www.acm.org/)
- Society of Women Engineers (https://swe.org)
- National Society of Black Engineers (https://nsbe.org)

Accreditation

The Bachelor of Science in Computer Engineering at Penn State Behrend is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the commission's General Criteria and Program Criteria for Electrical, Computer, Communications, Telecommunication(s), and Similarly Named Engineering Programs.

Professional Licensure/Certification

Many U.S. states and territories require professional licensure/certification to be employed. If you plan to pursue employment in a licensed profession after completing this program, please visit the Professional Licensure/Certification Disclosures by State (https://opair.psu.edu/plc/dashboard/) interactive map.

Contact

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