

# COMPUTER SCIENCE, B.S. (ENGINEERING)

**Begin Campus:** Any Penn State Campus

**End Campus:** Beaver, Brandywine, Hazleton, University Park

## Degree Requirements

For the Bachelor of Science degree in Computer Science, a minimum of 127 credits is required:

Requirement	Credits
General Education	45
Requirements for the Major	106-108

24 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; 9 credits of GWS courses.

### Requirements for the Major

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/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44>).

Code	Title	Credits
<b>Prescribed Courses</b>		
CMPSC 464	Introduction to the Theory of Computation	3
MATH 220	Matrices	2-3
MATH 230	Calculus and Vector Analysis	4
<i>Prescribed Courses: Require a grade of C or better</i>		
CMPEN 331	Computer Organization And Design	3
CMPSC 221	Object Oriented Programming with Web-Based Applications	3
CMPSC 311	Introduction to Systems Programming	3
CMPSC 360	Discrete Mathematics for Computer Science	3
CMPSC 461	Programming Language Concepts	3
CMPSC 465	Data Structures and Algorithms	3
CMPSC 473	Operating Systems Design & Construction	3
ENGL 202C	Effective Writing: Technical Writing	3
MATH 140	Calculus With Analytic Geometry I	4
MATH 141	Calculus with Analytic Geometry II	4
PHYS 211	General Physics: Mechanics	4
PHYS 212	General Physics: Electricity and Magnetism	4
<b>Additional Courses</b>		
Select 1 credit of First-Year Seminar		1
Select one of the following:		3
STAT/MATH 318	Elementary Probability	
STAT/MATH 414	Introduction to Probability Theory	
STAT/MATH 418	Introduction to Probability and Stochastic Processes for Engineering	
Select 6 credits from the following:		6

CMPEN 362	Communication Networks	
CMPEN 431	Introduction to Computer Architecture	
CMPEN 454	Fundamentals of Computer Vision	
CMPSC 442	Artificial Intelligence	
CMPSC 443	Introduction to Computer and Network Security	
CMPSC 444	Secure Programming	
CMPSC 450	Concurrent Scientific Programming	
CMPSC 451	Numerical Computations	
CMPSC 455	Introduction to Numerical Analysis I	
CMPSC 456	Introduction to Numerical Analysis II	
CMPSC 458	Fundamentals of Computer Graphics	
CMPSC 467	Factorization and Primality Testing	
CMPSC 471	Introduction to Compiler Construction	
CMPSC 475	Applications Programming	
EE 456	Introduction to Neural Networks	
Select 3 credits from any CMPEN or CMPSC course numbered 400-489		3
CMPSC 431W	Database Management Systems	3
or CMPSC 483W	Software Design Methods	
STAT/MATH 319	Elementary Mathematical Statistics	3
or STAT/MATH 415	Introduction to Mathematical Statistics	
<i>Additional Courses: Require a grade of C or better:</i>		
CMPSC 121	Introduction to Programming Techniques	3
or CMPSC 131	Programming and Computation I: Fundamentals	
CMPSC 122	Intermediate Programming	3
or CMPSC 132	Programming and Computation II: Data Structures	
CMPEN 270	Digital Design: Theory and Practice	4
or CMPEN 271	Introduction to Digital Systems	
& CMPEN 275	and Digital Design Laboratory	
ENGL 15	Rhetoric and Composition	3
or ENGL 137H	Rhetoric and Civic Life I	
ENGL 138T	Rhetoric and Civic Life II	3
or CAS 100A	Effective Speech	
or CAS 100B	Effective Speech	

### Supporting Courses and Related Areas

Select 2-3 credits from the following:		2-3
PHYS 213	General Physics: Fluids and Thermal Physics	
PHYS 214	General Physics: Wave Motion and Quantum Physics	
3 credits from the approved list of natural sciences courses		
Select 0-4 credits in a foreign language (second-semester proficiency)		0-4
Select 10-14 credits from department list. Students may apply up to 10-14 3 credits of ROTC as department list credits and 3 credits of ROTC as GHW credits.		
Select 6 credits in non-CMPEN or CMPSC courses numbered 400-489 in consultation with adviser		6

### 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/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#83-80>)). For more information, check the Suggested Academic Plan for your intended program.