COMPUTER SCIENCE, B.S. (CAPITAL)

Begin Campus: Any Penn State Campus

End Campus: Harrisburg

Degree Requirements

For the Bachelor of Science degree in Computer Science, a minimum of 120 credits is required:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td>45</td>
</tr>
<tr>
<td>Requirements for the Major</td>
<td>88</td>
</tr>
</tbody>
</table>

13 of the 45 credits for General Education are included in Requirements for the Major. This includes: 3 credits of GWS courses, 6 credits of GQ courses, and 4 credits in GN courses.

FIRST-YEAR SEMINAR: Incoming first-year students are required to complete a course with the suffix S, T, or X, or the PSU abbreviation.

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 (http://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.)

- Quantification (GQ): 6 credits
- Writing and Speaking (GWS): 9 credits

Knowledge Domains

- Arts (GA): 6 credits
- Health and Wellness (GHW): 3 credits
- Humanities (GH): 6 credits
- Social and Behavioral Sciences (GS): 6 credits
- Natural Sciences (GN): 9 credits

Integrative Studies (may also complete a Knowledge Domain requirement)

- Inter-Domain or Approved Linked Courses: 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 (http://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.

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 (http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44).

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMPSC 221</td>
<td>Object Oriented Programming with Web-Based Applications</td>
<td>3</td>
</tr>
<tr>
<td>CMPSC 312</td>
<td>Computer Organization and Architecture</td>
<td>3</td>
</tr>
<tr>
<td>CMPSC 430</td>
<td>Database Design</td>
<td>3</td>
</tr>
<tr>
<td>CMPSC 460</td>
<td>Principles of Programming Languages</td>
<td>3</td>
</tr>
<tr>
<td>CMPSC 462</td>
<td>Data Structures</td>
<td>3</td>
</tr>
<tr>
<td>CMPSC 463</td>
<td>Design and Analysis of Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CMPSC 469</td>
<td>Formal Languages with Applications</td>
<td>3</td>
</tr>
<tr>
<td>CMPSC 470</td>
<td>Compiler Construction</td>
<td>3</td>
</tr>
<tr>
<td>CMPSC 472</td>
<td>Operating System Concepts</td>
<td>3</td>
</tr>
<tr>
<td>CMPSC 487W</td>
<td>Software Engineering and Design</td>
<td>3</td>
</tr>
<tr>
<td>CMPSC 488</td>
<td>Computer Science Project</td>
<td>3</td>
</tr>
</tbody>
</table>
### Prescribed Courses: Require a grade of C or better

- **CMPSC 121**: Introduction to Programming Techniques  
  - 3 credits
- **CMPSC 122**: Intermediate Programming  
  - 3 credits
- **CMPSC 360**: Discrete Mathematics for Computer Science  
  - 3 credits
- **MATH 140**: Calculus With Analytic Geometry I  
  - 4 credits
- **MATH 141**: Calculus with Analytic Geometry II  
  - 4 credits

### Additional Courses

Select one of the following:  

- **MATH 318**: Elementary Probability  
- **STAT 301**: Statistical Analysis I  
- **STAT 318**: Elementary Probability  

Select 15 credits of the following (9 of which must have a CMPSC prefix):  

- **CMPSC 313**: Assembly Language Programming  
- **CMPSC 412**: Data Structures Lab  
- **CMPSC 413**: Algorithms Lab  
- **CMPSC 426**: Object-oriented Design  
- **CMPSC 438**: Computer Network Architecture and Programming  
- **CMPSC 441**: Artificial Intelligence  
- **CMPSC 444**: Secure Programming  
- **CMPSC 455**: Introduction to Numerical Analysis I  
- **CMPSC 457**: Computer Graphics Algorithms  
- **CMPSC 475**: Applications Programming  
- **CMPSC 496**: Independent Studies  
- **CMPSC 497**: Special Topics  
- **MATH 401**: Introduction to Analysis I  
- **MATH 411**: Ordinary Differential Equations  
- **MATH 412**: Fourier Series and Partial Differential Equations  
- **MATH 425**: Introduction to Operations Research  
- **MATH 430**: Linear Algebra and Discrete Models I  
- **MATH 435**: Basic Abstract Algebra  
- **MATH 449**: Applied Ordinary Differential Equations  
- **MATH 450**: Mathematical Modeling  
- **MATH 455**: Introduction to Numerical Analysis I  
- **MATH 465**: Number Theory  
- **MATH 468**: Mathematical Coding Theory  
- **MATH 496**: Independent Studies  
- **MATH 497**: Special Topics

### Supporting Courses and Related Areas

Select 6 credits of 300-400 level courses in consultation with an academic adviser and in support of the student's interests  

Select 5 credits of 100-400 level courses  

1 Requires a grade point average of 2.5 or higher.