

## Computer Science Major and Minor

<http://cs.pitt.edu/undergrads>

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The Department of Computer Science of the University of Pittsburgh was established in 1966, which makes it one of the oldest such departments in the country. The Bachelor of Science degree program started in 1974 with the following objectives: 1) to provide an opportunity for students to focus their educational efforts on computer science as a discipline; 2) to prepare students for employment and positions of responsibility in an increasingly computer-oriented world; and 3) to prepare students for graduate study in computer science.

The curriculum for the BS degree program requires the completion of 40 credits and is dependent on a carefully constructed set of required core courses followed by advanced courses that assume knowledge in the core areas. Five core courses (16 credits) provide an introduction to the fundamental areas and to the basic concepts of computer science. These courses include the study of modern languages such as Java, as well as a careful investigation of fundamental problem-solving techniques used to solve an important variety of computational problems. Additionally, the computer science major is required to complete eight upper-level courses (24 credits). Three of those courses must be CS 1501, 1502 and 1550. Students may select the remaining courses from areas such as theory, programming languages, systems programming, artificial intelligence, and software engineering. In addition to regular course work, the computer science major must complete an approved capstone experience prior to graduation. Finally, three courses (11-12 credits) in mathematics are required. These courses provide a level of mathematical maturity essential to the study of computer science.

### **Required courses for the Computer Science major**

Students must complete all required courses with a grade of C or better. Students should have some programming experience (usually acquired in high school) before taking CS 0401. Any high school course that includes the writing of several Pascal, C++, or Java programs would be sufficient. It is also possible to take the department's service course, CS 0007 Introduction to Computer Programming, as preparation.

### **Core courses**

CS 0401 Intermediate Programming with Java  
CS 0441 Discrete Structures for Computer Science  
CS 0445 Data Structures  
CS 0447 Computer Organization and Assembly Language  
CS 0449 Introduction to Systems Software

### **Upper-level required courses**

CS 1501 Algorithm Implementation  
CS 1502 Formal Methods in Computer Science  
CS 1550 Introduction to Operating Systems

### **Upper-level elective courses**

At least five 1000-level courses from a set of approved elective courses must be completed with a grade of C or better.

### **Mathematics courses**

These courses must be completed with a grade of C or better.

### **Both**

MATH 0220 Analytic Geometry and Calculus 1  
MATH 0230 Analytic Geometry and Calculus 2

### **One of the following**

STAT 1000 Applied Statistical Methods  
STAT 1100 Statistics and Probability for Business Management  
STAT 1151 Introduction to Probability

**Capstone experience:** Prior to graduation, all CS majors must satisfy the Capstone Experience requirements through one of the following:

- Completion of a CS capstone-designated course
- Completion of a CS directed research (CS 1950)
- Completion of a CS internship (CS 1900)
- Completion of at least two co-op rotations

### **Restrictions**

- CS majors who have completed CS 0401 cannot enroll in CS 0004, CS 0007, or CS 0008. Majors may enroll in the intermediate-level service courses such as CS 0131, CS 0134, and CS 0155.
- While internships, directed research, and co-op courses are strongly encouraged, they cannot be used to satisfy CS elective course requirements. They may however be used to satisfy the capstone graduation requirement.
- Students must complete four core CS courses, typically CS 0401, CS 0441, CS 0445, and CS 0447, each completed with a grade of C or better, prior to declaring the major.

**Grade requirements:** A grade of C or better is required in each CS and statistics/mathematics course that is to count toward the major. A minimum GPA of 2.0 in departmental courses is required for graduation.

**Satisfactory/No Credit option:** No CS course that counts toward the major can be taken on an S/NC basis. Required MATH/STAT courses may be taken on an S/NC basis.

**Writing (W) requirement:** Students must complete at least one W-course in the major.

**Related area:** A student majoring in CS can complete a related area in mathematics by taking a minimum of 12 credits in MATH/STAT, or a minimum of 12 credits in any one Arts and Sciences department. Algebra, trigonometry, and pre-calculus courses do not count toward the related area in mathematics. The completion of an official Arts and Sciences minor or an Arts and Sciences or UCIS certificate also satisfies the related area requirement.

**Honors major requirements:** Honors in CS is granted if, in addition to fulfilling all requirements for the CS major, the student:

1. completes one additional upper-level course; and,
2. maintains a GPA of 3.5 or above in CS courses; and,
3. maintains an overall GPA of 3.25 or above.

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**BS/MS degree option:** The five year BS/MS degree is an attractive option for students who have had some previous programming experience and are willing to work hard to complete their BS degree requirements in an expeditious fashion. This program is quite challenging, so it is best to discuss your potential for completing it with Dr. Ramirez; some of the undergraduate requirements differ slightly for students planning to pursue this option.

**Computer Science Co-Op Program:** Through the assistance of the Swanson School of Engineering's Cooperative Education Office, formal arrangements have been established with industry that permit students to rotate four-month terms between the workplace and the classroom. At the University of Pittsburgh, this rotation begins after the completion of the sophomore year, and extends into the senior year, with the co-op student completing at least three four-month work rotations. These periods of employment are typically with the same employer, which allow job duties to expand as the student's knowledge and skills increase. During co-op sessions, students earn competitive salaries, thus making this program financially rewarding. The co-op credits do not count toward the 40 CS credits required for the completion of the CS major. They do, however, count as Arts and Sciences elective credits. Completion of at least two rotations can satisfy the Capstone Experience requirement. Students interested in this option should speak with Dr. Ramirez as early in their CS education as possible.

**CS Core Course Three-Term Structures**

Term 1	Term 2	Term 3
CS 0401	CS 0445 *	CS 0449
CS 0441	CS 0447	

\* CS 0445 pre- or co-requisites for CS 0447

Term 1	Term 2	Term 3
CS 0401	CS 0441	CS 0447 *
	CS 0445	CS 0449

\* CS 0447 pre- or co-requisites for CS 0449

**Checklist for the Computer Science major**

**Prerequisite course**

\_\_\_\_\_ CS 0007 <sup>1</sup>

**Core courses**

\_\_\_\_\_ CS 0401  
 \_\_\_\_\_ CS 0441  
 \_\_\_\_\_ CS 0445  
 \_\_\_\_\_ CS 0447  
 \_\_\_\_\_ CS 0449

**Upper-level required courses**

\_\_\_\_\_ CS 1501  
 \_\_\_\_\_ CS 1502  
 \_\_\_\_\_ CS 1550

**Upper-level courses**

**Choose five**

\_\_\_\_\_ CS \_\_\_\_\_  
 \_\_\_\_\_ CS \_\_\_\_\_  
 \_\_\_\_\_ CS \_\_\_\_\_  
 \_\_\_\_\_ CS \_\_\_\_\_  
 \_\_\_\_\_ CS \_\_\_\_\_

**Mathematics courses**

\_\_\_\_\_ MATH 0220  
 \_\_\_\_\_ MATH 0230  
 \_\_\_\_\_ STAT 1000 or 1100 or 1151 <sup>2</sup>

1. While CS 0007 does not count toward the CS major, taking this course is strongly recommended for those with insufficient programming experience using a language such as C++, Java, or Pascal.
2. Taking STAT 1151 in addition to MATH 0220 and MATH 0230 will fulfill the CS mathematics requirement. Because STAT 1151 is a three credit course, an additional mathematics course is necessary for those who want to use mathematics to fulfill their Arts and Sciences related area requirement.

**Checklist for the Computer Science minor**

**Prerequisite course**

\_\_\_\_\_ CS 0007 <sup>1</sup>

1. A student with no programming background is advised to take this course in preparation for CS 0401.

**Required courses**

\_\_\_\_\_ CS 0401  
 \_\_\_\_\_ CS 0445  
 \_\_\_\_\_ CS 1501

**Elective courses; select two**

\_\_\_\_\_ CS 0441  
 \_\_\_\_\_ CS 0447  
 \_\_\_\_\_ CS 0449

**Note:** Students must apply for any official minor they will complete or have completed at the time they apply for graduation.