Computer Science

Computer science is now a critical tool for pursuing an ever-broadening range of topics, from outer space to the workings of the human mind. In most areas of science and in many liberal arts fields, cutting-edge work depends increasingly on computational approaches. The undergraduate program at Brown is designed to combine breadth in practical and theoretical computer science with depth in specialized areas. These areas range from traditional topics, such as analysis of algorithms, artificial intelligence, databases, distributed systems, graphics, mobile computing, networks, operating systems, programming languages, robotics and security, to novel areas including games and scientific visualization.

Our requirements are built on a core set of foundation courses, each representing an essential area within computer science. Concentrators choose the upper-level courses that align with their interests. Students may not use more than two CSCI 1970 courses to complete the requirements for the Sc.B. and one CSCI 1970 course for the A.B. requirements.

For up-to-date information on our concentration requirements please see https://cs.brown.edu/degrees/undergrad/concentrating-in-cs/concentration-requirements-2024. Please see https://cs.brown.edu/degrees/undergrad/concentrating-in-cs/concentration-handbook/ for additional information regarding our concentration requirements (including allowed substitutions and policies).

Requirements for the Standard Track of the Sc.B. degree

Prerequisites (0-3 courses)		
Calculus prerequisite: students must complete or place out of second semester calculus.		
MATH 0100	Single Variable Calculus, Part II	
or MATH 0170	Single Variable Calculus, Part II (Accelerated)	
or MATH 0190	Single Variable Calculus, Part II (Physics/ Engineering)	
Concentration Requirements		
Core-Computer Science:		
Select one of the following introductory course Series:		2
Series A		
CSCI 0150 & CSCI 0200	Introduction to Object-Oriented Programming and Computer Science and Program Design with Data Structures and Algorithms	
Series B		
CSCI 0170 & CSCI 0200	Computer Science: An Integrated Introduction and Program Design with Data Structures and Algorithms	
Series C		
CSCI 0190	Accelerated Introduction to Computer Science	
AND		
an additional CS course not otherwise used to satisfy a concentration requirement; this course may be CSCI 0200, a Foundations course, or a 1000-level course.		
Series D [1]		
CSCI 0111 & CSCI 0112 & CSCI 0200	Computing Foundations: Data and Computing Foundations: Program Organization and Program Design with Data Structures and Algorithms	
Introductory Math Foundations		**1**
CSCI 0220	Introduction to Discrete Structures and Probability	
or APMA 1650	Statistical Inference I	
or CSCI 1450	Advanced Introduction to Probability for Computing and Data Science	
or MATH 1530	Abstract Algebra	
Foundations Courses		
ScB students must take one course from each foundation area.		
Foundations Areas		
a. Algorithms/Theory Foundations (Choose one)		1
CSCI 0500	Data Structures, Algorithms, and Intractability: An Introduction	
CSCI 1010	Theory of Computation	
CSCI 1550	Probabilistic Methods in Computer Science	
CSCI 1570	Design and Analysis of Algorithms	
b. AI/Machine Learning/Data Science Foundations		1
CSCI 1410	Artificial Intelligence	
or CSCI 1420	Machine Learning	
or CSCI 1430	Computer Vision	
or CSCI 1460	Computational Linguistics	
or CSCI 1470	Deep Learning	
or CSCI 1951A	Data Science	
c. Systems Foundations		1
CSCI 0300	Fundamentals of Computer Systems	
or CSCI 0330	Introduction to Computer Systems	
CSCI Electives		**5**
Five CSCI courses at the 1000 level [2]		
Four Additional Electives. These can include:		**4**
CSCI 0320	Introduction to Software Engineering	
1000-level and 2000-level CSCI courses (no more than three arts/policy/humanities courses)		
Linear algebra (MATH 0520, MATH 0540, or APMA 0260)		
Approved 1000-level courses outside of CS (see the concentration handbook for the current list)		
Capstone		
A capstone taken in the senior year (from the list of approved capstone courses in the concentration handbook). The capstone may also be used to satisfy another requirement.		
Total Credits		**15**

1 Students wishing to go directly from CSCI 0111 to CSCI 0200 (without CSCI 0112) will need to successfully complete additional exercises to receive an instructor override code for CSCI 0200.

2 None of these can be arts/humanities/policy courses [https://cs.brown.edu/degrees/undergrad/concentrating-in-cs/concentration-handbook/]

Requirements for the Standard Track of the A.B. degree

Concentration Requirements (10 courses)		
Core Computer Science:		
Select one of the following series:		2
Series A		
CSCI 0150 & CSCI 0200	Introduction to Object-Oriented Programming and Computer Science and Program Design with Data Structures and Algorithms	
Series B		
CSCI 0170 & CSCI 0200	Computer Science: An Integrated Introduction and Program Design with Data Structures and Algorithms	

Series C		
CSCI 0190	Accelerated Introduction to Computer Science	
AND		
An additional CS course not otherwise used to satisfy a concentration requirement; this course may be CSCI 0200, a Foundations course, or a 1000-level course.		
Series D [1]		
CSCI 0111 & CSCI 0112 & CSCI 0200	Computing Foundations: Data and Computing Foundations: Program Organization and Program Design with Data Structures and Algorithms	
Introductory Math Foundations		**1**
CSCI 0220	Introduction to Discrete Structures and Probability	
or APMA 1650	Statistical Inference I	
or CSCI 1450	Advanced Introduction to Probability for Computing and Data Science	
Foundations Courses		
AB students must take one course from each foundation area		
Foundation Areas		
a. Algorithms/Theory Foundations (choose one)		1
CSCI 0500	Data Structures, Algorithms, and Intractability: An Introduction	
CSCI 1010	Theory of Computation	
CSCI 1550	Probabilistic Methods in Computer Science	
CSCI 1570	Design and Analysis of Algorithms	
b. AI/Machine Learning/Data Science Foundations		1
CSCI 1410	Artificial Intelligence	
or CSCI 1420	Machine Learning	
or CSCI 1430	Computer Vision	
or CSCI 1460	Computational Linguistics	
or CSCI 1470	Deep Learning	
or CSCI 1951A	Data Science	
c. Systems Foundations		1
CSCI 0300	Fundamentals of Computer Systems	
or CSCI 0320	Introduction to Software Engineering	
or CSCI 0330	Introduction to Computer Systems	
CSCI Electives		**2**
Two CSCI courses at the 1000 level. [2]		
Two additional electives. These can include:		**2**
CSCI 0320	Introduction to Software Engineering (if not used towards System Foundations)	
1000-level and 2000-level CSCI courses (at most one can be an arts/policy/humanities course)		
Linear algebra (MATH 0520, MATH 0540, or APMA 0260)		
One approved 1000-level course outside of CS (see the concentration handbook for the current list)		
Capstone		
A capstone taken in the senior year (from the list of approved capstone courses in the concentration handbook). The capstone may also be used to satisfy another requirement.		
Total Credits		**10**

[1] Students wishing to go directly from CSCI 0111 to CSCI 0200 (without CSCI 0112) will need to successfully complete additional exercises to receive an instructor override code for CSCI 0200.

[2] Neither of these can be arts/humanities/policy courses [https://cs.brown.edu/degrees/undergrad/concentrating-in-cs/concentration-handbook/]

Requirements for the Professional Track of the both the Sc. B. and A.B. degrees.

The requirements for the professional track include all those of the standard track, as well as the following:

Students must complete full-time professional experiences doing work that is related to their concentration programs, totaling 2-6 months, whereby each internship must be at least one month in duration in cases where students choose to do more than one internship experience. Such work is normally done at a company, but may also be at a university under the supervision of a faculty member. Internships that take place between the end of the fall and the start of the spring semesters cannot be used to fulfill this requirement.

On completion of each professional experience, the student must write and upload to ASK a reflective essay about the experience addressing the following prompts, to be approved by the student's concentration advisor:

- Which courses were put to use in your summer's work? Which topics, in particular, were important?
- In retrospect, which courses should you have taken before embarking on your summer experience? What are the topics from these courses that would have helped you over the summer if you had been more familiar with them?
- Are there topics you should have been familiar with in preparation for your summer experience, but are not taught at Brown? What are these topics?
- What did you learn from the experience that probably could not have been picked up from course work?
- Is the sort of work you did over the summer something you would like to continue doing once you graduate? Explain.
- Would you recommend your summer experience to other Brown students? Explain.

Honors

Honors candidates must have earned A's or S-with-distinction in 2/3 (rounding up) of the courses used towards the concentration, excluding introductory-sequence courses (CS courses numbered 0200 or below) and the calculus prerequisite.