

# Computer Science, B.S.

## Requirements

The Bachelor of Science with a major in computer science requires a minimum of 120 s.h., including at least 63 s.h. of work for the major. Students must maintain a g.p.a. of at least 2.00 in all courses for the major and in all UI courses for the major. A cumulative g.p.a. of at least 2.00 is required for graduation. Students also must complete the College of Liberal Arts and Sciences GE CLAS Core.

The Bachelor of Science program is more rigorous than that of the Bachelor of Arts program; it is designed to provide in-depth training for students who would like to acquire strength in math and science in order to enhance their skills and job prospects. It also is appropriate for those who plan to pursue graduate work in computer science, although it is not required for graduate study at most universities.

Coursework for the major includes computer science courses as well as courses in mathematics, statistics, and other supporting disciplines. Work for the major may not be taken pass/nonpass.

Bachelor of Science students with a computer science major should choose their GE CLAS Core Natural Sciences courses carefully since they may be able to use the same courses to satisfy the computer science major natural science sequences requirement; see "Natural Science Sequences" below.

Students majoring in computer science may not earn a second major or minor in business analytics and information systems, computer science and engineering, data science, or informatics.

## Departmental Residency Requirement

Students who earn a B.S. in computer science must complete at least seven courses (minimum of 21 s.h.) at the University of Iowa from the following: CS:2630 Computer Organization or ECE:3350 Computer Architecture and Organization, CS:2820 Introduction to Software Development, CS:3330 Algorithms, and at least four computer science courses numbered CS:3620-CS:5899, but excluding CS:3910 Informatics Project, CS:3980 Topics in Computer Science I, and CS:4310 Design and Implementation of Algorithms; these courses are requirements for the B.S. in computer science as listed below.

## Program Requirements

The B.S. with a major in computer science requires the following coursework. Many courses for the major require a minimum grade of C-minus in the prerequisite courses.

Code	Title	Hours
	Computer Science Core Courses	27-28
	Mathematics Core Courses	15-16
	Computation Theory Course	3
	Advanced Technical Electives	12
	Natural Sciences Sequences Courses	6-8
<b>Total Hours</b>		<b>63-67</b>

## Computer Science Core

Code	Title	Hours
All of these:		
CS:1210	Computer Science I: Fundamentals	4
CS:2210	Discrete Structures	3
CS:2230	Computer Science II: Data Structures	4
CS:2820	Introduction to Software Development	4
CS:3330	Algorithms	3
CS:3820	Programming Language Concepts	3
One of these:		
CS:2630	Computer Organization	4
ECE:3350	Computer Architecture and Organization	3
One of these:		
CS:3620	Operating Systems	3
CS:3640	Introduction to Networks and Their Applications	3

## Mathematics Core

### Calculus I

Code	Title	Hours
One of these:		
MATH:1550	Engineering Mathematics I: Single Variable Calculus	4
MATH:1850	Calculus I	4

### Calculus II

Code	Title	Hours
One of these:		
MATH:1560	Engineering Mathematics II: Multivariable Calculus	4
MATH:1860	Calculus II	4

### Linear Algebra

Students who take MATH:2550 Engineering Mathematics III: Matrix Algebra and MATH:2560 Engineering Mathematics IV: Differential Equations can use these courses together to satisfy the linear algebra requirement.

Code	Title	Hours
This course:		
MATH:2700	Introduction to Linear Algebra	4

### Probability and Statistics

Code	Title	Hours
One of these:		
STAT:2020	Probability and Statistics for the Engineering and Physical Sciences	3
STAT:3120	Probability and Statistics	4
Other probability and statistics courses (prefix STAT) with a calculus prerequisite approved by the department		

## Computation Theory

Code	Title	Hours
One of these:		
CS:4330	Theory of Computation	3
CS:4350	Logic in Computer Science	3

## Advanced Technical Electives

Students must earn at least 12 s.h. (four courses) in advanced technical electives, as follows.

Code	Title	Hours
At least 6 s.h. from these:		
A computer science course (prefix CS) numbered 3620-5899, except CS:3910, CS:3980, and CS:4310; a maximum of 3 s.h. in CS:3990 will count toward the requirement		
A computer science course (prefix CS) numbered 5900 or above, with department approval		
And:		

Remaining courses may be chosen from advanced technical elective courses in computer science (prefix CS) or in other disciplines with department approval; preapproved technical electives are these:

<b>Biology</b>		
BIOL:2512	Fundamental Genetics	4
BIOL:3172	Evolution	4

<b>Chemistry</b>		
CHEM:2210	Organic Chemistry I	3
CHEM:2220	Organic Chemistry II	3
CHEM:2230	Organic Chemistry I for Majors	3
CHEM:2240	Organic Chemistry II for Majors	3
CHEM:2410	Organic Chemistry Laboratory	3

<b>Electrical and Computer Engineering</b>		
ECE:3600	Control Systems	3
ECE:5450	Machine Learning	3
ECE:5480	Digital Image Processing	3
ECE:5600	Control Theory	3

<b>Geographical and Sustainability Sciences</b>		
GEOG:3520	GIS for Environmental Studies	3
GEOG:3540	Geographic Visualization	3

<b>Earth and Environmental Sciences</b>		
EES:2410	Mineralogy	4
EES:3020	Earth Surface Processes	3
EES:3210	Principles of Paleontology	3
EES:3300	Sedimentary Geology	4
EES:3360	Soil Genesis and Geomorphology	3
EES:3380	Fluvial Geomorphology	3
EES:3390	Integrated Watershed Analysis	3
EES:3500	Igneous and Metamorphic Petrology	4
EES:3840	Structural Geology	4
EES:4800	Global Geophysics	3

<b>Economics</b>		
ECON:4700	Topics in Analytical Economics	3

<b>Mathematics</b>		
MATH:2560	Engineering Mathematics IV: Differential Equations	3
MATH:2850	Calculus III	4
MATH:3550	Engineering Mathematics V: Vector Calculus	3
MATH:3600	Introduction to Ordinary Differential Equations	2-3
MATH:3720	Introduction to Abstract Algebra I	4
MATH:3770	Fundamental Properties of Spaces and Functions I	4
MATH:4040	Matrix Theory	3
MATH:4050	Introduction to Discrete Mathematics	3
MATH:4060	Discrete Mathematical Models	3

<b>Philosophy</b>		
PHIL:4691	Mathematical Logic	3
PHIL:4692	Modal Logic	3

<b>Physics</b>		
PHYS:2703	Physics III	4
PHYS:2704	Physics IV	3-4

<b>Psychology</b>		
LING:3117	Psychology of Language	3

<b>Statistics and Actuarial Science</b>		
ACTS:3080	Mathematics of Finance I	3
STAT:4100	Mathematical Statistics I	3
STAT:4101	Mathematical Statistics II	3

## Natural Science Sequences

Students take two or more courses in a sequence (totaling at least 6 s.h.) in a cognate area of natural science. The natural science sequence is intended to enhance a student's perspective by providing a deeper understanding of the scientific method. Typically, it consists of a sequence of courses taken in the same science department. Students often choose courses that also fulfill the GE CLAS Core Natural Sciences requirement. Some possible choices are listed below; the director of undergraduate studies may approve others.

CLEP/APP credit may be used to satisfy part or all of the natural science requirement only if the appropriate science department at the University of Iowa accepts the credit as equivalent to one or more of the specific courses listed below.

Code	Title	Hours
<b>Astronomy</b>		
ASTR:1771	Introductory Astronomy I: Basic Astrophysics and Planetary Astronomy	4
ASTR:1772	Introductory Astronomy II: Stellar, Galactic, and Extragalactic Astronomy	4
<b>Biology</b>		
BIOL:1411	Foundations of Biology	4
BIOL:1412	Diversity of Form and Function	4
<b>Chemistry</b>		

CHEM:1110	Principles of Chemistry I	4
CHEM:1120	Principles of Chemistry II	4

### **Earth and Environmental Sciences**

EES:1030	Introduction to Earth Science	3-4
or EES:1050	Introduction to Geology	
EES:1080	Introduction to Environmental Science	3-4

### **Geographical and Sustainability Sciences**

GEOG:1020	The Global Environment	3
GEOG:1050	Foundations of GIS	4

### **Physics**

One of these sequences:

PHYS:1611-	Introductory Physics I-II	8
PHYS:1612		
PHYS:1701-	Physics I-II	8
PHYS:1702		

## **Early Admission to the Graduate College**

Undergraduate computer science students who have 6 s.h. or less to earn toward graduation may apply for early admission to the Graduate College. Early admission allows students in their final undergraduate semester to take courses for graduate credit in addition to the courses they need to complete their bachelor's degrees.