Computer Science, BS

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 grade-point average (GPA) of at least 2.00 in all courses for the major and in all UI courses for the major. A cumulative GPA 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 who major in computer science may not also major or minor in computer science and engineering, data science, or informatics.

Departmental Residency Requirement

Students who earn a BS 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 BS in computer science as listed below.

Program Requirements

The BS 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.

Mathematics Core

Calculus I

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

Calculus II

Course # 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.

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

Probability and Statistics

Course # 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

Course # 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.
Course # | Title | Hours
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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

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

Course # | Title | Hours
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**Biology**

- BIOL:2512 Fundamental Genetics | 4
- BIOL:3172 Evolution | 4

**Chemistry**

- 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

**Electrical and Computer Engineering**

- ECE:3600 Control Systems | 3
- ECE:5450 Machine Learning | 3
- ECE:5480 Digital Image Processing | 3
- ECE:5600 Control Theory | 3

**Geographical and Sustainability Sciences**

- GEOG:3520 GIS for Environmental Studies | 3
- GEOG:3540 Geographic Visualization | 3

**Earth and Environmental Sciences**

- 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

**Economics**

- ECON:4700 Topics in Analytical Economics | 3

**Mathematics**

- 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

**Philosophy**

- PHIL:4691 Mathematical Logic | 3
- PHIL:4692 Modal Logic | 3

**Physics**

- PHYS:2703 Physics III | 4
- PHYS:2704 Physics IV | 3-4

**Psychology**

- LING:3117 Psychology of Language | 3

**Statistics and Actuarial Science**

- 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/AP 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.

Course # | Title | Hours
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**Astronomy**

- ASTR:1771 Fundamental Astronomy I: The Solar System and Exoplanets | 4
- ASTR:1772 Fundamental Astronomy II: Evolution of Stars, Galaxies, and the Universe | 4

**Biology**

- BIOL:1411 Foundations of Biology | 4
- BIOL:1412 Diversity of Form and Function | 4

**Chemistry**

- 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
- EES:1050 Introduction to Geology | 3-4
- EES:1080 Introduction to Environmental Science | 3-4

**Geographical and Sustainability Sciences**

- GEOG:1020 The Global Environment | 3
- GEOG:2050 Foundations of GIS | 4

**Mathematics**

- 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

**Philosophy**

- PHIL:4691 Mathematical Logic | 3
- PHIL:4692 Modal Logic | 3

**Physics**

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