Major in Computer Science

Computer Science is the study of algorithms and software systems: their theory, analysis, design, efficiency, implementation, maintenance, and application. Computer scientists seek to advance the fundamental understanding of how information is processed, as well as the practical design of software to perform specific functions. Computer science courses include, but are not limited to, the study of algorithm design, networks, security, programming languages, software engineering, graphics, databases, and artificial intelligence.

Computer Science majors are required to complete basic courses in calculus, core courses in programming and mathematical foundations, computer organization, data structures, software engineering, algorithmic theory, computer security, and systems software. An understanding of statistics is also required. Majors select senior-level courses from offerings such as graphics, artificial intelligence, networks, compilers, bioinformatics, architecture, parallel programming, cloud computing, and database systems. A minor in Computer Science is also available.

Department of Computer Science laboratories are open to students 24/7. All major systems are networked and accessible by direct network connection from student residences.

Learning Outcomes

Students will:

- Demonstrate proficiency in the areas of software design and development, computing systems, and algorithmic analysis. Students will, upon completing this program, have a thorough grounding in the key principles and practices of computing, and in the mathematical and scientific principles of computation
- Be able to work effectively in groups to develop computational solutions to complex problems
- Be able to communicate ideas effectively, both generally and specifically, with regard to technology and computing
- Upon completing this program, either attend graduate school in computer science or find professional computer-related employment

Potential Occupations

Most Computer Science students are able to find related employment at graduation. The proven performance of CSU graduates has resulted in annual recruiting visits by a wide variety of commercial firms, government agencies, and research laboratories. Graduates have found employment as software developers and with research and development teams in government and industry. Internships are readily available that enhance skills and marketability.

Some career opportunities include, but are not limited to: systems programmer, software designer, computer researcher, software engineer, software tester, systems administrator, security systems designer, database programmer, consultant, technical product support personnel, and educator.

Requirements

Effective Fall 2015

View Major Completion Map (http://wsnet.colostate.edu/CWIS608/Home/MajorCompletionMap)

A minimum grade of C is required in CO 150 and in all mathematics, statistics, computer science, and departmental Group II courses which are required for graduation.

<table>
<thead>
<tr>
<th>Freshman</th>
<th>AUCC</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CO 150</td>
<td>A</td>
<td>3</td>
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<tr>
<td>CS 160</td>
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<td>CS 161</td>
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<tr>
<td>CS 192</td>
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<td>2</td>
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<tr>
<td>MATH 160</td>
<td>B</td>
<td>4</td>
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<tr>
<td>MATH 161</td>
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Select at least two courses from two departments totaling a minimum of 7 credits from the following (one course must be or include the sequenced laboratory):

- BZ 110 & BZ 111 Principles of Animal Biology (GT-SC2) 3A
- BZ 120 Principles of Plant Biology (GT-SC2) 3A
- CHEM 107 Fundamentals of Chemistry (GT-SC2) 3A
- CHEM 111 & CHEM 112 General Chemistry I (GT-SC2) 3A
- GEOL 120 & GEOL 121 Exploring Earth: Physical Geology (GT-SC2) 3A
- LIFE 102 Attributes of Living Systems (GT-SC1) 3A
- PH 141 Physics for Scientists and Engineers I (GT-SC1) 3A

Electives 3

Total Credits 31

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<thead>
<tr>
<th>Sophomore</th>
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<tbody>
<tr>
<td>CS 200 Algorithms and Data Structures 4</td>
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<tr>
<td>CS 253 Software Development with C++ 4</td>
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<tr>
<td>CS 270 Computer Organization 4</td>
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<tr>
<td>MATH 229 or 369 Matrices and Linear Equations 2-3</td>
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<tr>
<td>MATH 230 or 371 Introduction to Statistical Methods 3</td>
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<tr>
<td>Arts and Humanities 3B 3</td>
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<tr>
<td>Historical Perspectives 3D 3</td>
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<tr>
<td>Social and Behavioral Sciences 3C 3</td>
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<tr>
<td>Electives 2-3</td>
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</tbody>
</table>

Total Credits 29
Freshman

Junior

CS 314  Software Engineering
CS 320  Algorithms--Theory and Practice
CS 356  Systems Security
CS 370  Operating Systems

Select a minimum of 5 credits additional science from the list of 3A courses in the freshman year and/or from the following for a total of at least 12 credits:

AA 301  Astrophysics I
ATS 350  Introduction to Weather and Climate
ATS 351  Introduction to Weather and Climate Laboratory
BZ 220  Introduction to Evolution

CH 113 & CHEM 114  General Chemistry II

CIVE 260  Engineering Mechanics-Statics
GEOL 154  Historical and Analytical Geology

LIFE 201A  Introductory Genetics: Applied/Population/Conservation/Ecological (GT-SC2)
LIFE 201B  Introductory Genetics: Molecular/Immunological/Developmental (GT-SC2)

PH 142  Physics for Scientists and Engineers II (GT-SC1)

PSY 352  Learning and Memory
SOCR 330  Principles of Genetics
SOCR 331  Genetics Laboratory

Advanced Writing  2  3
Arts and Humanities  3B  3
Global and Cultural Awareness  3E  3
Electives  3

Total Credits  29

Senior

Group 1-A:

Select one course from the following:

CS 410  Introduction to Computer Graphics
CS 414  Object-Oriented Design
CS 440  Introduction to Artificial Intelligence
CS 454  Principles of Programming Languages
CS 455  Introduction to Distributed Systems
CS 464  Principles of Human-Computer Interaction
CS 475  Parallel Programming

Group 1-B:

Select three courses (not previously taken) from Group 1-A above and/or from the following for a minimum of 12 credits:

CS 420  Introduction to Analysis of Algorithms
CS 425  Introduction to Bioinformatics Algorithms
CS 430  Database Systems
CS 453  Introduction to Compiler Construction
CS 457  Computer Networks and the Internet
CS 470  Computer Architecture

Electives\(^1\)  6-9

Total Credits  31

Program Total Credits:  120

1. Select three courses from the CS Department Group II list for a total of 6-9 credits (6 credits if MATH 369 is taken to meet the linear algebra requirement in the Sophomore year).

2. Select enough elective credits to bring the program total to a minimum of 120 credits, of which at least 42 must be upper-division (300- to 400-level).