B.S. IN COMPUTER SCIENCE

Overview

The major in Computer Science for BS students consists of a core of 23 credits of Computer Science courses, 17 credits of Mathematics courses (which may apply towards a mathematics minor), 17 credits from a chosen track, and 12-14 credits of required science and ethics courses.

Curriculum Requirements for B.S. in Computer Science and for Additional Major in Computer Science with Tracks

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 120</td>
<td>Computer Programming I</td>
<td>4</td>
</tr>
<tr>
<td>CSC 220</td>
<td>Computer Programming II</td>
<td>4</td>
</tr>
<tr>
<td>CSC 314</td>
<td>Computer Organization and Architecture</td>
<td>3</td>
</tr>
<tr>
<td>CSC 317</td>
<td>Data Structures and Algorithm Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CSC 322</td>
<td>System Programming</td>
<td>3</td>
</tr>
<tr>
<td>CSC 427</td>
<td>Theory of Computing</td>
<td>3</td>
</tr>
<tr>
<td>CSC 431</td>
<td>Introduction to Software Engineering</td>
<td>3</td>
</tr>
<tr>
<td>MTH 161</td>
<td>Calculus I (or equivalent - MTH 140 and MTH 141, MTH 151, or MTH 171)</td>
<td>4</td>
</tr>
<tr>
<td>MTH 162</td>
<td>Calculus II (or equivalent - MTH 172)</td>
<td>4</td>
</tr>
<tr>
<td>MTH 210</td>
<td>Introduction to Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MTH 224</td>
<td>Introduction to Probability and Statistics</td>
<td>3</td>
</tr>
<tr>
<td>MTH 309</td>
<td>Discrete Mathematics I</td>
<td>3</td>
</tr>
</tbody>
</table>

Tracks

Select one of the following Tracks:

Comprehensive Track: 2,3

- CSC 419 Programming Languages
- or CSC 546 Introduction to Machine Learning with Applications
- CSC 421 Principles of Computer Operating Systems
- CSC 423 Database Systems
- CSC 424 Computer Networks

Select a minimum of 5 credit hours of approved electives

Flexible Track: 2

Select a minimum of 17 credit hours of approved electives

Computational Science Track: 4

- CSC 210 Computing for Scientists
- CSC 528 Introduction to Parallel Computing
- CSC 547 Computational Geometry
- CSC 548 Bioinformatics Algorithms
- CSC 410 Computer Science Project Planning
- or CSC 411 Computer Science Project Implementation
- MTH 320 Introduction to Numerical Analysis
- or MTH 520 Numerical Linear Algebra
- BIL 150 General Biology 5
- BIL 151 General Biology Laboratory 5

Cryptography and Security Track: 4

- CSC 421 Principles of Computer Operating Systems
- CSC 424 Computer Networks
- CSC 507 Data Security and Cryptography
- CSC 410 Computer Science Project Planning
- or CSC 411 Computer Science Project Implementation
- MTH 461 Survey of Modern Algebra
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>or MTH 505</td>
<td>Theory of Numbers</td>
</tr>
<tr>
<td>or MTH 561</td>
<td>Abstract Algebra I</td>
</tr>
</tbody>
</table>

Select a minimum of 2 credit hours of approved electives

**Graphics and Games Track:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>CSC 329</td>
<td>Introduction to Game Programming</td>
</tr>
<tr>
<td>CSC 529</td>
<td>Introduction to Computer Graphics</td>
</tr>
<tr>
<td>CSC 545</td>
<td>Introduction to Artificial Intelligence</td>
</tr>
<tr>
<td>CSC 410</td>
<td>Computer Science Project Planning</td>
</tr>
<tr>
<td>or CSC 411</td>
<td>Computer Science Project Implementation</td>
</tr>
</tbody>
</table>

Select a minimum of 5 credit hours of approved electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHY 201</td>
<td>University Physics I for the Sciences</td>
</tr>
<tr>
<td>or PHY 221</td>
<td>University Physics I</td>
</tr>
</tbody>
</table>

**Data Science Track:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 315</td>
<td>Introduction to Python for Scientists</td>
</tr>
<tr>
<td>MTH 542</td>
<td>Statistical Analysis</td>
</tr>
<tr>
<td>CSC 546</td>
<td>Introduction to Machine Learning with Applications</td>
</tr>
<tr>
<td>CSC 410</td>
<td>Computer Science Project Planning</td>
</tr>
<tr>
<td>CSC 411</td>
<td>Computer Science Project Implementation</td>
</tr>
</tbody>
</table>

Select a minimum of 6 credit hours of approved electives

**Science & Ethics Requirement**

An approved two semester sequence of courses with laboratory in Biology, Chemistry, Physics, or Geological Sciences

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>PHI 115</td>
<td>Social and Ethical Issues in Computing</td>
</tr>
</tbody>
</table>

**Approved Electives**

Any CSC 2XX, CSC 3XX, CSC 4XX, CSC 5XX

<table>
<thead>
<tr>
<th>Course</th>
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</thead>
<tbody>
<tr>
<td>BTE 535</td>
<td>Information Security</td>
</tr>
<tr>
<td>BTE 565</td>
<td>Mobile to Cloud: Developing Distributed Applications</td>
</tr>
<tr>
<td>ECE 414</td>
<td>Computer Organization and Design</td>
</tr>
<tr>
<td>ECE 514</td>
<td>Computer Architecture</td>
</tr>
<tr>
<td>ECE 548</td>
<td>Machine Learning</td>
</tr>
<tr>
<td>ECE 553</td>
<td>Neural Networks</td>
</tr>
<tr>
<td>ECE 570</td>
<td>Network Client-Server Programming</td>
</tr>
<tr>
<td>ECE 572</td>
<td>Object-Oriented and Distributed Database Management Systems</td>
</tr>
<tr>
<td>ECE 574</td>
<td>Agent Technology</td>
</tr>
<tr>
<td>ECE 576</td>
<td>Internet and Intranet Security</td>
</tr>
<tr>
<td>ECE 577</td>
<td>Data Mining</td>
</tr>
<tr>
<td>ECE 481</td>
<td>Senior Project I</td>
</tr>
<tr>
<td>ECE 482</td>
<td>Senior Project II</td>
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<tr>
<td>MTH 320</td>
<td>Introduction to Numerical Analysis</td>
</tr>
<tr>
<td>MTH 505</td>
<td>Theory of Numbers</td>
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<tr>
<td>MTH 520</td>
<td>Numerical Linear Algebra</td>
</tr>
<tr>
<td>MTH 521</td>
<td>Numerical Methods in Differential Equations</td>
</tr>
<tr>
<td>MTH 524</td>
<td>Introduction to Probability</td>
</tr>
<tr>
<td>MTH 525</td>
<td>Introduction to Mathematical Statistics</td>
</tr>
<tr>
<td>MTH 542</td>
<td>Statistical Analysis</td>
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</table>

**Additional Requirements for the B.S.**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>ENG 105</td>
<td>English Composition I</td>
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<tr>
<td>ENG 106</td>
<td>English Composition II</td>
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</table>

Language Requirement

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>3-9</td>
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</table>

Arts and Humanities Cognate

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<th>Title</th>
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<tr>
<td>9</td>
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</table>

People and Society Cognate

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tr>
<td>9</td>
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</table>
B.S. in Computer Science

Electives 25-16
Total Credit Hours 120

1. These mathematics courses can also fulfill the requirements for a Minor in Mathematics (see here [link for details]).
2. Available to all students.
3. The Comprehensive Track provides coverage of the topics in Computer Science prescribed by the Association of Computing Machinery curriculum and the ABET Computing Accreditation Commission.
4. Requires permission of the Director of Undergraduate Studies.
5. In addition to the generally approved electives, CIM 423, CIM 433, MMI 504, and MMI 505 are approved for the Graphics and Games track.
6. This course may also be applied towards the Science requirement.
7. In addition to the generally approved electives, JMM 429 is approved for the Data Science track.
8. CSC 40X - Computer Science Practicum must be taken at the same time as host course.
9. Maximally 6 credit hours from CSC 481 - Computer Science Teaching Assistant.
10. ECE 481 and ECE 482 may be used to replace any requirement for CSC 410 and CSC411.
11. For the Additional Major in Computer Science, with Tracks, students not in the College of Arts and Sciences should use their school or college’s degree in place of the additional requirements listed here.

Suggested Plan of Study

### Year One

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CSC 120 - Computer Programming I</td>
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<tr>
<td>MTH 161 - Calculus I</td>
<td>4</td>
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<tr>
<td>ENG 105 - English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>Language Course</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td><strong>17</strong></td>
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</table>

<table>
<thead>
<tr>
<th>Spring</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 220 - Computer Programming II</td>
<td>4</td>
</tr>
<tr>
<td>MTH 162 - Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>ENG 106 - English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>Language Course</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
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<td><strong>Total Credit Hours</strong></td>
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### Year Two

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<tr>
<td>CSC 314 - Computer Organization and Architecture</td>
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<tr>
<td>MTH 309 - Discrete Mathematics I</td>
<td>3</td>
</tr>
<tr>
<td>BIL or CHM or PHY Course I</td>
<td>4</td>
</tr>
<tr>
<td>BIL or CHM or PHY Associated Lab I</td>
<td>1</td>
</tr>
<tr>
<td>Language Course</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td><strong>14</strong></td>
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</tbody>
</table>

<table>
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<th>Spring</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CSC 322 - System Programming</td>
<td>3</td>
</tr>
<tr>
<td>MTH 210 - Introduction to Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>BIL or CHM or PHY Course II</td>
<td>4</td>
</tr>
<tr>
<td>BIL or CHM or PHY Associated Lab Course II</td>
<td>1</td>
</tr>
<tr>
<td>PHI 115 - Social and Ethical Issues in Computing</td>
<td>3</td>
</tr>
<tr>
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### Year Three

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CSC 317 - Data Structures and Algorithm Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CSC 401 - Computer Science Practicum I</td>
<td>1</td>
</tr>
</tbody>
</table>
Mission
The Department’s mission is to educate and perform scholarly activities in the discipline of Computer Science, in order to meet national and international demand for trained computer scientists who are capable of building the robust computation structures upon which society is becoming increasingly dependent.

Goals
Students will acquire understanding and capability for the structure and developmental processes of software systems, from the translation of domain problems to forms amenable to software solution, through the production of efficient and robust computer programs, to the supporting systems and hardware components.

Students will acquire these abilities through a combination of classroom instruction, laboratory work, independent project work, and group project work.

Graduates will be prepared to work in industries that are directly involved in the development of fundamental computing resources (e.g., Microsoft, Apple, IBM, Intel, etc.), and in industries that rely on computation in support of their core businesses (e.g., banking, transport, manufacturing, medical, etc.).

Faculty and students will engage in activities that support and achieve the development of new techniques and software that can contribute to the science, and where appropriate contribute to the teaching objectives. Examples of such activities include academic research, development of novel techniques and software products, consulting and internship activities in local industries, and maintaining awareness of cutting edge approaches to Computer Science.

Student Learning Outcomes
- Students must be able to translate domain problems to forms amenable to software solution.
- Students must be able to produce efficient and robust computer programs.
• Students must be able to build and deploy a completed, integrated, and documented (Advanced Writing and Communication Skills) software solution to a domain problem.

• Students must have understanding and competence in the mathematical foundations of Computer Science.