BS in Computer Science: Bioinformatics (693222) MAP Sheet

Physical and Mathematical Sciences, Computer Science
For students entering the degree program during the 2020-2021 curricular year.

<table>
<thead>
<tr>
<th>University Core and Graduation Requirements</th>
<th>Suggested Sequence of Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>University Core Requirements:</strong></td>
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<tr>
<td>Requirements</td>
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<tr>
<td><strong>#Classes</strong></td>
<td><strong>Hours</strong></td>
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<tr>
<td><strong>Religion Cornerstones</strong></td>
<td></td>
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<tr>
<td>Teachings and Doctrine of The Book of Mormon</td>
<td>1</td>
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<tr>
<td>Jesus Christ and the Everlasting Gospel</td>
<td>1</td>
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<tr>
<td>Foundations of the Restoration</td>
<td>1</td>
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<tr>
<td>The Eternal Family</td>
<td>1</td>
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<tr>
<td><strong>The Individual and Society</strong></td>
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<tr>
<td>American Heritage</td>
<td>1-2</td>
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<tr>
<td>Global and Cultural Awareness</td>
<td>1</td>
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<tr>
<td><strong>Skills</strong></td>
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<tr>
<td>First Year Writing</td>
<td>1</td>
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<td>Advanced Written and Oral Communications</td>
<td>1</td>
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<tr>
<td>Quantitative Reasoning</td>
<td>1</td>
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<tr>
<td>Languages of Learning (Math or Language)</td>
<td>1</td>
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<tr>
<td><strong>Arts, Letters, and Sciences</strong></td>
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<tr>
<td>Civilization 1</td>
<td>1</td>
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<tr>
<td>Civilization 2</td>
<td>1</td>
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<tr>
<td>Arts</td>
<td>1</td>
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<tr>
<td>Letters</td>
<td>1</td>
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<tr>
<td>Biological Science</td>
<td>1</td>
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<tr>
<td>Physical Science</td>
<td>2</td>
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<tr>
<td>Social Science</td>
<td>1</td>
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<tr>
<td><strong>Core Enrichment: Electives</strong></td>
<td></td>
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<tr>
<td>Religion Electives</td>
<td>3-4</td>
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<tr>
<td>Open Electives</td>
<td>Variable</td>
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<tr>
<td><strong>Total Hours</strong></td>
<td><strong>16.0</strong></td>
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<tr>
<td><strong>Graduation Requirements:</strong></td>
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<tr>
<td>Minimum residence hours required</td>
<td>30.0</td>
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<tr>
<td>Minimum hours needed to graduate</td>
<td>120.0</td>
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</tbody>
</table>

**FRESHMAN YEAR**

1st Semester
- C S 142
- First-year Writing or American Heritage
- BIO 130
- MATH 112
- Religion Cornerstone course
- Total Hours: 16.0

2nd Semester
- C S 235
- STAT 211 or 201
- MATH 113
- Religion Cornerstone course
- Total Hours: 15.0

**SOPHOMORE YEAR**

3rd Semester
- C S 236
- Civilization 1
- C S 224
- CHEM 105
- Religion Cornerstone course
- Total Hours: 15.0

4th Semester
- C S 240
- MATH 213
- MATH 215
- Religion Cornerstone course
- Arts
- Total Hours: 15.0

**JUNIOR YEAR**

5th Semester
- C S 312
- C S 324
- MATH 112
- Religion Cornerstone course
- Total Hours: 15.0

6th Semester
- MMBIO 240
- Religion Elective
- Total Hours: 15.0

**SENIOR YEAR**

7th Semester
- C S 340
- C S 472
- C S 404
- PWS 340
- Civilization 2 (letters)
- Religion Elective
- Total Hours: 15.0

8th Semester
- Computer Science Elective
- Computer Science Elective
- Computer Science Elective
- Computer Science Elective
- Global and Cultural Awareness
- Religion Elective
- Total Hours: 15.0

Note 1: The sequence of courses suggested may not fit the circumstances of every student. Students should contact their college advisement center for help in outlining an efficient schedule.

Note 2: Students are encouraged to complete an average of 15 credit hours each semester or 30 credit hours each year, which could include spring and/or summer terms. Taking fewer credits substantially increases the cost and the number of semesters to graduate.

FOR UNIVERSITY CORE OR PROGRAM QUESTIONS, CONTACT THE ADVISEMENT CENTER.
Personnel in the College of Physical and Mathematical Sciences Advisement Center will advise regarding core courses and suggested general education. Questions regarding curriculum and career decisions should be directed to the undergraduate advisor in the Computer Science Department.

Note: All hours of credit applied toward a major in computer science must be of C- or better and must be taken within eight years of declaring the computer science major. Any exceptions must be approved by the department. Students may choose to graduate under later requirements by updating their date of entry into the major at the college advisement center.

REQUIREMENT 1 Complete 11 courses

**CORE COURSES:**
- C S 142 - Introduction to Computer Programming 3.0
- C S 224 - Introduction to Computer Systems 3.0
- C S 235 - Data Structures and Algorithms 3.0
- C S 236 - Discrete Structures 3.0
- C S 240 - Advanced Programming Concepts 4.0
- C S 252 - Introduction to Computational Theory 3.0
- C S 312 - Algorithm Design and Analysis 3.0
- C S 324 - Systems Programming 3.0
- C S 340 - Software Design 3.0
- C S 404 - Ethics and Computers in Society 2.0
- C S 472 - Introduction to Machine Learning 3.0

**REQUIREMENT 2 Complete 3 options**

**SUPPORTING COURSES:**

**OPTION 2.1 Complete 10 courses**
- *BIO 130 - Biology 4.0
- BIO 365 - Quantitative Biology 3.0
- BIO 465 - Capstone in Bioinformatics 3.0
- CHEM 105 - General College Chemistry 1 with Lab (Integrated) 4.0
- MATH 112 - Calculus 1 4.0
- MATH 113 - Calculus 2 4.0
- MMBio 240 - Molecular Biology 3.0
- PHSCS 121 - Introduction to Newtonian Mechanics 3.0
- PWS 340 - Genetics 3.0
- *WRTG 316 - Technical Communication 3.0

**OPTION 2.2 Complete 1 group**

**GROUP 2.2.1 Complete 1 course**
- MATH 313 - (Not currently offered)

**GROUP 2.2.2 Complete 2 courses**
- MATH 213 - Elementary Linear Algebra 2.0
- MATH 215 - Computational Linear Algebra 1.0

**OPTION 2.3 Complete 1 course**
- STAT 121 - Principles of Statistics 3.0
- STAT 201 - Statistics for Engineers and Scientists 3.0

**REQUIREMENT 3 Complete 15.0 hours from the following option(s)**

**COMPLETE A TOTAL OF 5 ELECTIVE COURSES (15.0 CREDIT HOURS) FROM THE FOLLOWING LIST:**

- BIO 463 - Genetics of Human Disease 3.0
- C S 260 - Web Programming 3.0
- C S 329 - Testing, Analysis, and Verification 3.0
- C S 330 - Concepts of Programming Languages 3.0
- C S 345 - Operating Systems Design 3.0
- C S 355 - Interactive Graphics and Image Processing 3.0
- C S 401R - Topics in Computer Science 3.0
  You may take up to 3 credit hours.
- C S 412 - Linear Programming and Convex Optimization 3.0
- C S 428 - Software Engineering 3.0
- C S 431 - Algorithmic Languages and Compilers 3.0
- C S 450 - Computer Vision 3.0
- C S 452 - Database Modeling Concepts 3.0
- C S 453 - Fundamentals of Information Retrieval 3.0
- C S 455 - Computer Graphics 3.0
- C S 456 - Introduction to User Interface Software 3.0
- C S 460 - Computer Communications and Networking 3.0
- C S 462 - Large-Scale Distributed System Design 3.0
- C S 465 - Computer Security 3.0
- C S 470 - Introduction to Artificial Intelligence 3.0
- C S 474 - Introduction to Deep Learning 3.0
- C S 479 - (Not currently offered) 3.0
- C S 486 - Verification and Validation 3.0

**OPTION 3.2 Complete up to 6.0 hours from the following course(s)**

**COMPLETE 0-2 ELECTIVE COURSES (0-6.0 CREDIT HOURS) FROM THE FOLLOWING LIST:**
- C S 480 - Software Engineering Capstone 1 3.0
  You may take up to 3 credit hours.
- C S 481 - Software Engineering Capstone 2 3.0
- C S 482 - Data Science Capstone 1 3.0
- C S 483 - Data Science Capstone 2 3.0
- C S 493R - Computing Competitions 3.0
  You may take up to 3 credit hours.
- C S 494 - Capstone 1 3.0
- C S 495 - Capstone 2 3.0
- C S 497R - Undergraduate Research 3.0
  You may take up to 6 credit hours.
- C S 498R - Undergraduate Special Projects 3.0
  You may take up to 3 credit hours.

**REQUIREMENT 4 Complete Senior Exit Interview with the CS department during your last semester or term.**

**THE DISCIPLINE**

Computer science touches virtually every area of human endeavor. Software is responsible for everything from the control of kitchen appliances to sophisticated climate models used in predicting future environmental change. Students in computer science learn to approach complex problems in business, science, and entertainment using their strong background in mathematics, algorithms, and data structures.

The degree programs in the Computer Science Department prepare students to be confident software developers and technical problem solvers. The curriculum also trains students for research into new avenues where computers will have a significant impact.

The BS curriculum is accredited by the Computing Accreditation Commission of ABET.

**CAREER OPPORTUNITIES**

Graduates pursue exciting opportunities in graphics, artificial intelligence, software engineering, database design, scientific programming, systems administration, and research at universities and national laboratories.
Students completing the animation emphasis will be prepared for technical positions at animation and game programming studios. Students will learn both the technical and artistic side of creating and implementing digital animations and games.

The bioinformatics emphasis is designed for students who are interested in building software to assist in analyzing biological systems. Students will graduate with a significant background in biology coupled with the software development and analysis skills necessary to implement large bioinformatics applications.

MAP DISCLAIMER
While every reasonable effort is made to ensure accuracy, there are some student populations that could have exceptions to listed requirements. Please refer to the university catalog and your college advisement center/department for complete guidelines.

DEPARTMENT INFORMATION

Computer Science Department
Brigham Young University
3361 Talmage Building
Provo, UT 84602
Telephone: (801) 422-3027

ADVISEMENT CENTER INFORMATION

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N-181 ESC
Provo, UT 84602
Telephone: (801) 422-2674