### University Core and Graduation Requirements

#### University Core Requirements:

<table>
<thead>
<tr>
<th>Requirements</th>
<th>#Classes</th>
<th>Hours</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Religion Cornerstones</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teachings and Doctrine of The Book of Mormon</td>
<td>1</td>
<td>2.0</td>
<td>REL A 275</td>
</tr>
<tr>
<td>Jesus Christ and the Everlasting Gospel</td>
<td>1</td>
<td>2.0</td>
<td>REL A 250</td>
</tr>
<tr>
<td>Foundations of the Restoration</td>
<td>1</td>
<td>2.0</td>
<td>REL C 225</td>
</tr>
<tr>
<td>The Eternal Family</td>
<td>1</td>
<td>2.0</td>
<td>REL C 200</td>
</tr>
<tr>
<td><strong>The Individual and Society</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Heritage</td>
<td>1-2</td>
<td>3-6.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Global and Cultural Awareness</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td><strong>Skills</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Year Writing</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Advanced Written and Oral Communications</td>
<td>1</td>
<td>3.0</td>
<td>ENGL 316*</td>
</tr>
<tr>
<td>Quantitative Reasoning</td>
<td>1</td>
<td>4.0</td>
<td>MATH 112* or 113*</td>
</tr>
<tr>
<td>Languages of Learning (Math or Language)</td>
<td>1</td>
<td>4.0</td>
<td>MATH 112* or 113*</td>
</tr>
<tr>
<td><strong>Arts, Letters, and Sciences</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civilization 1</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Civilization 2</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Arts</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Letters</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
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<tr>
<td>Biological Science</td>
<td>1</td>
<td>3-4.0</td>
<td>from approved list</td>
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<tr>
<td>Physical Science</td>
<td>1</td>
<td>3.0</td>
<td>CS 312*</td>
</tr>
<tr>
<td>Social Science</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
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<tr>
<td><strong>Core Enrichment: Electives</strong></td>
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</tr>
<tr>
<td>Religion Electives</td>
<td>3-4</td>
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<td>from approved list</td>
</tr>
<tr>
<td>Open Electives</td>
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<td>Variable</td>
<td>Variable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>personal choice</td>
<td></td>
</tr>
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* THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (13 hours overlap)

#### Graduation Requirements:

<table>
<thead>
<tr>
<th>Requirements</th>
<th></th>
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<tbody>
<tr>
<td>Minimum residence hours required</td>
<td>30.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum hours needed to graduate</td>
<td>120.0</td>
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### Suggested Sequence of Courses

#### FRESHMAN YEAR

<table>
<thead>
<tr>
<th>Semester</th>
<th>Total Hours</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Semester</td>
<td>15.0</td>
<td></td>
</tr>
<tr>
<td>C S 142</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>First-year Writing or American Heritage</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>MATH 112</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>General Education courses, university requirements, and/or general electives</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Religion Cornerstone course</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td><strong>Total Hours</strong></td>
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<table>
<thead>
<tr>
<th>2nd Semester</th>
<th>Total Hours</th>
<th>Classes</th>
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<tbody>
<tr>
<td>C S 224</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>C S 235</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>A HTG or First-Year Writing</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>MATH 113</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>Religion Cornerstone course</td>
<td>2.0</td>
<td></td>
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<tr>
<td><strong>Total Hours</strong></td>
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#### SOPHOMORE YEAR

<table>
<thead>
<tr>
<th>Semester</th>
<th>Total Hours</th>
<th>Classes</th>
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<tbody>
<tr>
<td>3rd Semester</td>
<td>14.0</td>
<td></td>
</tr>
<tr>
<td>C S 236</td>
<td>3.0</td>
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</tr>
<tr>
<td>PHSCS 121</td>
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<td></td>
</tr>
<tr>
<td>STAT 121 or STAT 201 or MATH 431</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Civilization 1</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Religion Cornerstone course</td>
<td>2.0</td>
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<tr>
<td><strong>Total Hours</strong></td>
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<table>
<thead>
<tr>
<th>4th Semester</th>
<th>Total Hours</th>
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<tr>
<td>C S 240</td>
<td>4.0</td>
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<tr>
<td>C S 252</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Biological Science</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>MATH 313</td>
<td>3.0</td>
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<td>Religion Cornerstone course</td>
<td>2.0</td>
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<tr>
<td><strong>Total Hours</strong></td>
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### JUNIOR YEAR

<table>
<thead>
<tr>
<th>Semester</th>
<th>Total Hours</th>
<th>Classes</th>
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<tbody>
<tr>
<td>5th Semester</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>C S 312</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Computer Science Elective</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Computer Science Elective</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Computer Science Elective</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Letters</td>
<td>3.0</td>
<td></td>
</tr>
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<td><strong>Total Hours</strong></td>
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<table>
<thead>
<tr>
<th>6th Semester</th>
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<th>Classes</th>
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<tbody>
<tr>
<td>C S 324</td>
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<td></td>
</tr>
<tr>
<td>C S 404</td>
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<td></td>
</tr>
<tr>
<td>Religion Elective</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td><strong>Total Hours</strong></td>
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### SENIOR YEAR

<table>
<thead>
<tr>
<th>Semester</th>
<th>Total Hours</th>
<th>Classes</th>
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<tbody>
<tr>
<td>7th Semester</td>
<td>3.0</td>
<td></td>
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<tr>
<td>C S 312</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Computer Science Elective</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Computer Science Elective</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Computer Science Elective</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Arts</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td><strong>Total Hours</strong></td>
<td><strong>15.0</strong></td>
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</table>

<table>
<thead>
<tr>
<th>8th Semester</th>
<th>Total Hours</th>
<th>Classes</th>
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<tbody>
<tr>
<td>C S 312</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>C S 312</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>CS/MATH/Science Elective</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Computer Science Elective</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Civilization 2</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Religion Elective</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Social Science</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td><strong>Total Hours</strong></td>
<td><strong>15.0</strong></td>
<td></td>
</tr>
</tbody>
</table>

Note: The sequence of courses suggested may not fit the circumstances of every student. Students should consult 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.
Computer science majors, especially those planning graduate work, are advised to acquire a strong background in mathematics, possibly a minor. Personnel in the College of Physical and Mathematical Sciences Advise 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 department. Students may choose to graduate under later requirements by updating their date of entry into the major at the college advising department.

Note: No double counting is allowed within the major.

**REQUIREMENT 1** Complete 10 courses

<table>
<thead>
<tr>
<th>CORE COURSES:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>C S 142 - Introduction to Computer Programming</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 224 - Introduction to Computer Systems</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 235 - Data Structures and Algorithms</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 236 - Discrete Structures</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 240 - Advanced Programming Concepts</td>
<td>4.0</td>
</tr>
<tr>
<td>C S 252 - Introduction to Computational Theory</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 312 - Algorithm Design and Analysis</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 324 - Systems Programming</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 340 - Software Design and Testing</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 404 - Ethics and Computers in Society</td>
<td>2.0</td>
</tr>
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**REQUIREMENT 2** Complete 2 options

<table>
<thead>
<tr>
<th>SUPPORTING COURSES:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>OPTION 2.1: Complete 5 courses</td>
<td></td>
</tr>
<tr>
<td>&quot;ENGL 316 - Technical Communication&quot;</td>
<td>3.0</td>
</tr>
<tr>
<td>MATH 112 - Calculus 1</td>
<td>4.0</td>
</tr>
<tr>
<td>MATH 113 - Calculus 2</td>
<td>4.0</td>
</tr>
<tr>
<td>MATH 313 - Elementary Linear Algebra</td>
<td>3.0</td>
</tr>
<tr>
<td>PHSCS 121 - Intro to Newtonian Mechanics</td>
<td>3.0</td>
</tr>
</tbody>
</table>

| OPTION 2.2: Complete 1 course |  |
| MATH 431 - Probability Theory | 3.0 |
| STAT 121 - Principles of Statistics | 3.0 |
| STAT 201 - Statistics for Engineers and Scientists | 3.0 |

**REQUIREMENT 3** Complete 24.0 hours from the following option(s)

<table>
<thead>
<tr>
<th>COMPLETE A TOTAL OF 8 COURSES (24 HOURS) FROM THE FOLLOWING THREE GROUPS:</th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>OPTION 3.1</strong> Complete up to 24.0 hours from the following course(s)</td>
<td></td>
</tr>
<tr>
<td>COMPLETE 12-24 CREDIT HOURS FROM THE FOLLOWING COURSES. A MINIMUM OF 4 OF THE EIGHT ELECTIVE COURSES MUST BE FROM THIS GROUP.</td>
<td></td>
</tr>
<tr>
<td>C S 330 - Concepts of Programming Languages</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 345 - Operating Systems Design</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 355 - Interactive Graphics and Image Processing</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 401R - Topics in Computer Science</td>
<td>3.0</td>
</tr>
<tr>
<td>You may take up to 3 credit hours.</td>
<td></td>
</tr>
<tr>
<td>C S 412 - Linear Programming and Convex Optimization</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 418 - Bioinformatics</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 428 - Software Engineering</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 431 - Algorithmic Languages and Compilers</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 450 - Introduction to Digital Signal and Image Processing</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 452 - Database Modeling Concepts</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 453 - Fundamentals of Information Retrieval</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 455 - Computer Graphics</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 456 - Introduction to User Interface Software</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 460 - Computer Communications and Networking</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 462 - Large-Scale Distributed System Design</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 465 - Computer Security</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 470 - Introduction to Artificial Intelligence</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 478 - Tools for Machine Learning</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 479 - Natural Language Processing</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 484 - Parallel Processing</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 486 - Verification and Validation</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 501R - Advanced Topics in Computer Science</td>
<td>3.0</td>
</tr>
<tr>
<td>You may take up to 3 credit hours.</td>
<td></td>
</tr>
<tr>
<td>C S 513 - Robust Control</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 557 - Computer-Aided Geometric Design</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**OPTION 3.2** Complete up to 9.0 credit hours from the following course(s)

**COMPLETE UP TO 9.0 CREDIT HOURS FROM THE FOLLOWING COURSES. UP TO 3 OF THE EIGHT ELECTIVE COURSES COULD BE FROM THIS GROUP.**

<table>
<thead>
<tr>
<th>COMPLETE 10-24 CREDIT HOURS FROM THE FOLLOWING COURSES.</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>C S 450 - Operating Systems Design</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 452 - Database Modeling Concepts</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 453 - Fundamentals of Information Retrieval</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 455 - Computer Graphics</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 456 - Introduction to User Interface Software</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 460 - Computer Communications and Networking</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 462 - Large-Scale Distributed System Design</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 465 - Computer Security</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 470 - Introduction to Artificial Intelligence</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 478 - Tools for Machine Learning</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 479 - Natural Language Processing</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 484 - Parallel Processing</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 486 - Verification and Validation</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 501R - Advanced Topics in Computer Science</td>
<td>3.0</td>
</tr>
<tr>
<td>You may take up to 3 credit hours.</td>
<td></td>
</tr>
<tr>
<td>C S 513 - Robust Control</td>
<td>3.0</td>
</tr>
<tr>
<td>C S 557 - Computer-Aided Geometric Design</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Note: If C S 493R, C S 497R, C S 498R, or C S 501R is chosen, it must be taken for three credit hours.

**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
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Provo, UT 84602
Telephone: (801) 422-3027

ADVISEMENT CENTER INFORMATION
Physical and Mathematical Sciences College Advisement Center
Brigham Young University
N-181 ESC
Provo, UT 84602
Telephone: (801) 422-2674