### University Core and Graduation Requirements

#### University Core Requirements:

<table>
<thead>
<tr>
<th>Requirements</th>
<th>#Classes</th>
<th>Hours</th>
<th>Classes</th>
</tr>
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<tbody>
<tr>
<td>Religion Cornerstones</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>
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<tr>
<td>Foundations of the Restoration</td>
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<td>REL C 225</td>
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<tr>
<td>The Eternal Family</td>
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<tr>
<td>The Individual and Society</td>
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</tr>
<tr>
<td>American Heritage</td>
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</tr>
<tr>
<td>Global and Cultural Awareness</td>
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<tr>
<td>Skills</td>
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<tr>
<td>First Year Writing</td>
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<tr>
<td>Advanced Written and Oral Communications</td>
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<td>3.0</td>
<td>WRTG 316*</td>
</tr>
<tr>
<td>Quantitative Reasoning</td>
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<td>4.0</td>
<td>MATH 112* or 113*</td>
</tr>
<tr>
<td>Languages of Learning (Math or Language)</td>
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<td>MATH 112* or 113*</td>
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<td>Arts, Letters, and Sciences</td>
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<tr>
<td>Civilization 1</td>
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<tr>
<td>Civilization 2</td>
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<tr>
<td>Arts</td>
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<tr>
<td>Letters</td>
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<tr>
<td>Biological Science</td>
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<tr>
<td>Physical Science</td>
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<td>CS 312*</td>
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<tr>
<td>Social Science</td>
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<td>Core Enrichment: Electives</td>
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<tr>
<td>Religion Electives</td>
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<td>6.0</td>
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<tr>
<td>Open Electives</td>
<td>Variable</td>
<td>Variable</td>
<td>personal choice</td>
</tr>
</tbody>
</table>

*THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (13 hours overlap)*

#### Graduation Requirements:

- Minimum residence hours required: 30.0
- Minimum hours needed to graduate: 120.0

### Suggested Sequence of Courses

#### FRESHMAN YEAR

- **1st Semester**
  - C S 142: 3.0
  - First-year Writing or American Heritage: 3.0
  - MATH 112: 4.0
  - General Education courses, university requirements, and/or general electives: 3.0
  - Religion Cornerstone course: 2.0
  - **Total Hours:** 15.0

- **2nd Semester**
  - PHSCS 121: 3.0
  - C S 236: 3.0
  - American Heritage or First-year Writing: 3.0
  - MATH 113: 4.0
  - Religion Cornerstone course: 2.0
  - **Total Hours:** 15.0

#### SOPHOMORE YEAR

- **3rd Semester**
  - C S 236: 3.0
  - C S 224: 3.0
  - STAT 121 or STAT 201 or MATH 431: 3.0
  - Civilization 1: 3.0
  - Religion Cornerstone course: 2.0
  - **Total Hours:** 14.0

- **4th Semester**
  - C S 240: 4.0
  - C S 252: 3.0
  - Biological Science: 3.0
  - MATH 213: 2.0
  - MATH 215: 1.0
  - Religion Cornerstone Course: 2.0
  - **Total Hours:** 15.0

#### JUNIOR YEAR

- **5th Semester**
  - C S 312: 3.0
  - C S 340: 3.0
  - C S 324: 3.0
  - WRTG 316: 3.0
  - Religion elective: 2.0
  - General electives: 2.0
  - **Total Hours:** 16.0

- **6th Semester**
  - Computer Science Elective: 3.0
  - Computer Science Elective: 3.0
  - Computer Science Elective: 3.0
  - Letters: 3.0
  - Religion Elective: 2.0
  - **Total Hours:** 16.0

#### SENIOR YEAR

- **7th Semester**
  - Computer Science Elective: 3.0
  - Computer Science Elective: 3.0
  - Computer Science Elective: 3.0
  - Arts: 3.0
  - Religion Elective: 2.0
  - **Total Hours:** 14.0

- **8th Semester**
  - Computer Science Elective: 3.0
  - CS/MATH/Science Elective: 3.0
  - Civilization 2: 3.0
  - Global and Cultural Awareness: 3.0
  - Social Science: 3.0
  - **Total Hours:** 15.0

Note: 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.
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 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. Personnel in the College of Physical and Mathematical Sciences Advisement Center will advise regarding core courses and suggested general education. Note: No double counting is allowed within the major.

### CORE COURSES:
- **C S 414** - 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

### REQUIREMENT 2 Complete 3 options

#### SUPPORTING COURSES:

**OPTION 2.1** Complete 4 courses
- **MATH 112** - Calculus 1 4.0
- **MATH 113** - Calculus 2 4.0
- **PHSCS 121** - Introduction to Newtonian Mechanics 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

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

#### COMPLETE A TOTAL OF 8 COURSES (24 HOURS) FROM THE FOLLOWING THREE GROUPS:

**OPTION 3.1** Complete up to 24.0 hours from the following course(s)

**COMPLETE 12-24 CREDIT HOURS FROM THE FOLLOWING COURSES. A MINIMUM OF 4 OF THE EIGHT ELECTIVE COURSES MUST BE FROM THIS GROUP:**

- **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 356** - Designing the User Experience 3.0
- **C S 393** - Advanced Algorithms and Problem Solving 3.0
- **C S 401R** - Topics in Computer Science 3.0

You may take up to 3 credit hours.

**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.**

- **C S 400R** - Introduction to Internet of Things 3.0
- **C S 423** - Database Systems 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 471** - Voice User Interfaces 3.0
- **C S 472** - Introduction to Machine Learning 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
- **C S 501R** - Advanced Topics in Computer Science 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.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>REQUIREMENT 1</strong></td>
<td>Complete 10 courses</td>
</tr>
<tr>
<td><strong>REQUIREMENT 2</strong></td>
<td>Complete 3 options</td>
</tr>
<tr>
<td><strong>REQUIREMENT 3</strong></td>
<td>Complete 24.0 hours from the following option(s)</td>
</tr>
<tr>
<td><strong>REQUIREMENT 4</strong></td>
<td>Complete Senior Exit Interview with the CS department during your last semester or term.</td>
</tr>
</tbody>
</table>

**Note:** If C S 401R or C S 501R is chosen, it must be taken for three hours.

**OPTION 2.3** Complete 1 course
- **MATH 431** - Probability Theory 3.0

**OPTION 3.1** Complete up to 24.0 hours from the following course(s)

**COMPLETE UP TO 9.0 CREDIT HOURS FROM THE FOLLOWING COURSES.**

- **C S 180** - Introduction to Data Science 3.0
- **C S 405** - Creating and Managing a Software Business 3.0
- **EC EN 424** - Computer Systems 4.0
- **EC EN 425** - Real-Time Operating Systems 4.0
- **IE 557** - Cybersecurity and Penetration Testing 3.0
- **MATH 411** - Numerical Methods 3.0
- **MATH 485** - Mathematical Cryptography 3.0

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

**COMPLETE UP TO 9.0 CREDIT HOURS FROM THE FOLLOWING COURSES.**

- **C S 480** - Software Engineering Capstone 1 3.0
- **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.

**OPTION 3.3** Complete up to 9.0 hours from the following course(s)

**COMPLETE UP TO 9.0 CREDIT HOURS FROM THE FOLLOWING COURSES.**

- **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 3.0v

You may take up to 3 credit hours.

**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

Computer Science Department  
Brigham Young University  
3361 Talmage Building  
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

BS in Computer Science (693220)  
2021-2022