### 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>
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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>
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<td>REL A 250</td>
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<tr>
<td>Foundations of the Restoration</td>
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<td><strong>Global Heritage</strong></td>
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<tr>
<td>American Heritage</td>
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<tr>
<td>Global and Cultural Awareness</td>
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<tr>
<td><strong>Skills</strong></td>
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<td>First Year Writing</td>
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<tr>
<td>Advanced Written and Oral Communications</td>
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<td>WRTG 316*</td>
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<td>Quantitative Reasoning</td>
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<td>Languages of Learning (Math or Language)</td>
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<td>MATH 112* or 113*</td>
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<tr>
<td><strong>Arts, Letters, and Sciences</strong></td>
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<tr>
<td>Civilization 1</td>
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<tr>
<td>Civilization 2</td>
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<td>ARTHC 202* or from approved list</td>
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<tr>
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<tr>
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<td><strong>Core Enrichment: Electives</strong></td>
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<tr>
<td>Open Electives</td>
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<td>personal choice</td>
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</tbody>
</table>

*These classes fill both University Core and Program Requirements (13-23 hours overlap)

**Graduation Requirements:**

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

### University Core and Graduation Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Description</th>
<th>#Classes</th>
<th>Hours</th>
<th>Classes</th>
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<tr>
<td>Freshman Year 1st Semester</td>
<td>C S 142</td>
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<tr>
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<td>STAT 121 or 201</td>
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<td>MATH 112</td>
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<td>First-Year Writing or American Heritage</td>
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<td>Junior Year 5th Semester</td>
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<td>Global and Cultural Awareness</td>
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<td>Senior Year 7th Semester</td>
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<td>CSANM 450R or CSANM 459R</td>
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<td></td>
<td>Letters</td>
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<td>8th Semester</td>
<td>C S 404</td>
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<td>Computer Science Elective</td>
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<td>Biological Science</td>
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<td>Open Elective</td>
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<tr>
<td></td>
<td>Total Hours</td>
<td>15.0</td>
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</tr>
</tbody>
</table>

Note 1: The sequence of courses 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.
**BS in Computer Science: Animation (693223)**

**2020-2021 Program Requirements (77 - 80.5 Credit Hours)**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Courses</th>
<th>Credits</th>
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<tbody>
<tr>
<td><strong>Requirement 1</strong></td>
<td>Complete 3 courses</td>
<td></td>
</tr>
</tbody>
</table>
C S 142 - Introduction to Computer Programming | 3.0  
C S 235 - Data Structures and Algorithms | 3.0  
CSANM 150 - Introduction to Three-Dimensional Computer Graphics | 1.5 |
| **Requirement 2** | Complete 20 courses |  
Complete the following after being admitted to the program: |  
C S 224 - Introduction to Computer Systems | 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 355 - Interactive Graphics and Image Processing | 3.0  
C S 404 - Ethics and Computers in Society | 2.0  
C S 455 - Computer Graphics | 3.0 |
| **Requirement 3** | Complete 5 courses |  
Supporting Courses: |  
CSANM 354 - Shader Programming | 3.0  
MATH 112 - Calculus 1 | 4.0  
MATH 113 - Calculus 2 | 4.0  
PHSCS 121 - Introduction to Newtonian Mechanics | 3.0  
*WRTG 116 - Technical Communication | 3.0 |
| **Requirement 4** | Complete 1 option |  
Option A.1 Complete 1 course |  
MATH 333 - (Not currently offered) |  
Option A.2 Complete 2 courses |  
MATH 213 - Elementary Linear Algebra | 2.0  
MATH 215 - Computational Linear Algebra | 1.0 |
| **Requirement 5** | Complete 1 course |  
You may take this course up to 2 times |  
CSANM 459R - Video Game Production 1 | 3.0  
You may take this course up to 2 times. |
| **Requirement 6** | Complete 1 course |  
STAT 121 - Principles of Statistics | 3.0  
STAT 201 - Statistics for Engineers and Scientists | 3.0 |
| **Requirement 7** | Complete 1 course |  
**Note:** If C S 401R is chosen, it must be taken for three hours. |  
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 356 - Designing the User Experience | 3.0  
C S 401R - Topics in Computer Science | 3.0v  
C S 412 - Linear Programming and Convex Optimization | 3.0  
C S 418 - (Not currently offered) |  
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 456 - Introduction to User Interface Software | 3.0  
C S 460 - Computer Communications and Networking | 3.0  
C S 465 - Computer Security | 3.0  
C S 470 - Introduction to Artificial Intelligence | 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) |  
C S 486 - Verification and Validation | 3.0v  
C S 498R - Undergraduate Special Projects | 3.0v  
| **Requirement 8** | Complete 3 courses |  
Courses used to fulfill Requirement 6 cannot be double counted here. |  
**Note:** If C S 401R, C S 498R, or C S 501R is chosen, it must be taken for three hours. |  
C S 401R - Topics in Computer Science | 3.0v  
C S 412 - Linear Programming and Convex Optimization | 3.0  
C S 418 - (Not currently offered) |  
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 |
| **Requirement 9** | Complete 1 course |  
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 472 - Introduction to Machine Learning | 3.0  
C S 474 - Introduction to Deep Learning | 3.0  
C S 479 - (Not currently offered) |  
C S 486 - Verification and Validation | 3.0v  
C S 498R - Undergraduate Special Projects | 3.0v  
| **Requirement 10** | 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. |  

**Grades below C- are not allowed in major courses.**

**Supporting courses:**

- Complete the following after being admitted to the program:
  - CS 224 - Introduction to Computer Systems
  - C S 236 - Discrete Structures
  - C S 240 - Advanced Programming Concepts
  - C S 252 - Introduction to Computational Theory
  - C S 312 - Algorithm Design and Analysis
  - C S 324 - Systems Programming
  - C S 340 - Software Design
  - C S 355 - Interactive Graphics and Image Processing
  - C S 404 - Ethics and Computers in Society
  - C S 455 - Computer Graphics

**Required courses:**

- Complete 20 courses
  - C S 142 - Introduction to Computer Programming
  - C S 235 - Data Structures and Algorithms
  - CSANM 150 - Introduction to Three-Dimensional Computer Graphics

**Additional courses:**

- Complete 5 courses
  - Supporting Courses:
    - CSANM 354 - Shader Programming
    - MATH 112 - Calculus 1
    - MATH 113 - Calculus 2
    - PHSCS 121 - Introduction to Newtonian Mechanics
    - *WRTG 116 - Technical Communication

**Option:**

- Complete 1 course
  - Option A.1
    - MATH 333 - (Not currently offered)
  - Option A.2
    - MATH 213 - Elementary Linear Algebra
    - MATH 215 - Computational Linear Algebra

**Requirement 5:**

- Complete 1 course
  - You may take this course up to 2 times
  - CSANM 459R - Video Game Production 1
  - You may take this course up to 2 times.

**Requirement 6:**

- Complete 1 course
  - STAT 121 - Principles of Statistics
  - STAT 201 - Statistics for Engineers and Scientists
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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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