# University Core and Graduation Requirements

## University Core Requirements:

### Religion Cornerstones
- Teachings and Doctrine of The Book of Mormon
  - REL A 275
  - 2.0 Classes
- Jesus Christ and the Everlasting Gospel
  - REL A 250
  - 2.0 Classes
- Foundations of the Restoration
  - REL C 225
  - 2.0 Classes
- The Eternal Family
  - REL C 200
  - 2.0 Classes
- #Classes | Hours | Classes
- --- | --- | ---
- 1 | 2.0 | REL A 275
- 1 | 2.0 | REL A 250
- 1 | 2.0 | REL C 225
- 1 | 2.0 | REL C 200

### The Individual and Society

#### American Heritage
- 1-2 Classes
- 3-6.0 Hours
- from approved list

#### Global and Cultural Awareness
- 1 Class
- 3.0 Hours
- from approved list

### Skills

#### First Year Writing
- 1 Class
- 3.0 Hours
- from approved list

#### Advanced Written and Oral Communications
- 1 Class
- 3.0 Hours
- ENGL 316 recommended

#### Quantitative Reasoning
- 0-1 Classes
- 0-3.0 Hours
- from approved list

#### Languages of Learning (Math or Language)
- 1-4 Classes
- 3–20.0 Hours
- MATH 112 or STAT 121 recommended

### Arts, Letters, and Sciences

#### Civilization 1
- 1 Class
- 3.0 Hours
- from approved list

#### Civilization 2
- 1 Class
- 3.0 Hours
- from approved list

#### Arts
- 1 Class
- 3.0 Hours
- from approved list

#### Letters
- 1 Class
- 3.0 Hours
- from approved list

#### Biological Science
- 1 Class
- 3.0 Hours
- from approved list

#### Physical Science
- 2 Classes
- 7.0 Hours
- CHEM 105*, PHSCS 105*

#### Social Science
- 1 Class
- 3.0 Hours
- from approved list

### Core Enrichment: Electives

#### Religion Electives
- 3-4 Classes
- 6.0 Hours
- from approved list

#### Open Electives
- Variable Classes
- Variable Hours
- personal choice

FOR GE QUESTIONS CONTACT THE ADVISEMENT CENTER.
*ASTERISKED CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS

## Graduation Requirements:

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

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### Suggested Sequence of Courses

#### FRESHMAN YEAR

<table>
<thead>
<tr>
<th>1st Semester</th>
<th>2nd Semester</th>
<th>Total Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CELL 120 (Biological Science)</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 105</td>
<td>4.0</td>
<td>4.0</td>
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<tr>
<td>First-Year Writing or American Heritage</td>
<td>3.0</td>
<td>3.0</td>
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<tr>
<td>Religion Cornerstone Course</td>
<td>2.0</td>
<td>2.0</td>
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<tr>
<td>Quantitative Reasoning (if needed)</td>
<td>0-3.0</td>
<td>0-3.0</td>
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<tr>
<td>Global &amp; Cultural Awareness Elective</td>
<td>3.0</td>
<td>3.0</td>
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<tr>
<td>Total Hours</td>
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<td>Total Hours</td>
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#### SOPHOMORE YEAR

<table>
<thead>
<tr>
<th>3rd Semester</th>
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<tbody>
<tr>
<td>BIO 250</td>
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<tr>
<td>CHEM 106</td>
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<td>CHEM 107</td>
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<tr>
<td>PHSCS 105</td>
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<td>3.0</td>
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<tr>
<td>First-Year Writing or American Heritage</td>
<td>3.0</td>
<td>3.0</td>
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<tr>
<td>Religion Cornerstone Course</td>
<td>2.0</td>
<td>2.0</td>
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<tr>
<td>Total Hours</td>
<td>14.0</td>
<td>Total Hours</td>
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#### JUNIOR YEAR

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<th>5th Semester</th>
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<tbody>
<tr>
<td>CELL 220</td>
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</tr>
<tr>
<td>MBBIO 240</td>
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<tr>
<td>MBBIO 241</td>
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<tr>
<td>CHEM 351</td>
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<tr>
<td>Languages of Learning Elective</td>
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<tr>
<td>Religion Cornerstone Course</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Total Hours</td>
<td>16-17.0</td>
<td>Total Hours</td>
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#### SENIOR YEAR

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<tr>
<th>7th Semester</th>
<th>8th Semester</th>
<th>Total Hours</th>
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</thead>
<tbody>
<tr>
<td>CELL 325</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>CELL Experiential Learning (see major requirement #4)</td>
<td>1-2.0</td>
<td>1-2.0</td>
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<tr>
<td>CHEM 352</td>
<td>3.0</td>
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<tr>
<td>PHSCS 106</td>
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<td>3.0</td>
</tr>
<tr>
<td>Arts or Letter Elective</td>
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<td>3.0</td>
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<tr>
<td>Religion Cornerstone Course</td>
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<td>2.0</td>
</tr>
<tr>
<td>Total Hours</td>
<td>15-16.0</td>
<td>Total Hours</td>
</tr>
</tbody>
</table>

**Note:** The Senior Survey, Exit Interview, and ETS Biology Field Exam must be completed during the last semester. You will be contacted during the graduation clearance process.

**Note:** This degree program requires a minimum of 120.0 hours for graduation. 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.
REQUIREMENT 1 Complete 8 courses

MAJOR CORE COURSES: (NOTE: CELL 210 CAN BE SUBSTITUTED FOR CELL 220 UPON REQUEST.)

- CELL 120 - Science of Biology 3.0
- CELL 220 - Human Anatomy (with lab) 4.0
- CELL 325 - Tissue Biology (with lab) 3.0
- CELL 360 - Cell Biology 3.0
- CELL 362 - Advanced Physiology 3.0
- CELL 363 - Advanced Physiology Laboratory 1.0
- CELL 382 - Developmental Biology 3.0
- CELL 455R - Cell Biology and Physiology Seminar 0.5

REQUIREMENT 2 Complete 4 courses

ADDITIONAL BIOLOGY COURSES:

- BIO 250 - Evolutionary Medicine 2.0
- MMBIO 240 - Molecular Biology 3.0
- MMBIO 241 - Molecular and Cellular Biology Laboratory 1.0
- PWSC 340 - Genetics 3.0

REQUIREMENT 3 Complete 8 courses

CHEMISTRY AND PHYSICS COURSES:

- *CHEM 105 - General College Chemistry 1 with Lab (Integrated) 4.0
- CHEM 106 - General College Chemistry 2 3.0
- CHEM 107 - General College Chemistry Laboratory 1.0
- CHEM 351 - Organic Chemistry 1 3.0
- CHEM 352 - Organic Chemistry 2 3.0
- CHEM 481 - Biochemistry 3.0
- *PHSCS 105 - General Physics 1 3.0
- PHSCS 106 - General Physics 2 3.0

REQUIREMENT 4 Complete 3.0 hours from the following course(s)

EXPERIMENTAL LEARNING OPTIONS - MUST BE AT LEAST TWO DIFFERENT COURSES. EXPERIENCES SHOULD BE SOUGHT EARLY IN YOUR BYU EDUCATION.

- CELL 359R - Introductory Undergraduate Research in Cell Biology and Phys 2.0v
- CELL 349R - Cell Biology and Physiology Teaching Experience 3.0v
- CELL 395R - Advanced Undergraduate Research in Cell Biology and Phy 4.0v

You may take up to 2 credit hours.

- LFSCI 190R - Nonresearch Academic Internship 3.0v
- You may take up to 1 credit hour.
- STDEV 132 - Introduction to Tutoring 1.0
- STDEV 133 - Advanced Tutoring 1.0

REQUIREMENT 5 Complete 1 course

CAPSTONE COURSES:

- CELL 498 - Advanced Senior Research Project 3.0
- CELL 561 - Physiology of Drug Mechanisms 3.0
- CELL 562 - Reproductive Physiology 3.0
- CELL 565 - Endocrinology 3.0
- CELL 569 - Cellular Electrophysiology and Biophysics 3.0
- CELL 582 - Developmental Genetics 3.0
- NEURO 480 - Cellular Neuroscience 3.0

REQUIREMENT 6 Complete 9.0 hours from the following course(s)

ELECTIVE COURSES (AT LEAST 3 HOURS MUST BE CELL). COURSES TAKEN TO FULFILL THE REQUIREMENTS ABOVE CANNOT DOUBLE COUNT IN THIS REQUIREMENT.

- BIO 165 - Introduction to Bioinformatics 3.0
- BIO 463 - Genetics of Human Disease 3.0
- BIO 468 - (Bio-MMBio-PWS) Genomics 3.0
- BIO 475 - Plant Developmental Biology 3.0
- CELL 320 - Dissection Techniques in Human Anatomy 1.0
- CELL 363 - Pathophysiology 4.0
- CELL 455R - Cell Biology and Physiology Seminar 0.5
- CELL 498 - Advanced Senior Research Project 3.0
- CELL 520R - Advanced Topics in Clinical Human Anatomy 2.0v
- CELL 549 - Advanced Human Embryology 3.0
- CELL 550R - Advanced Topics in Cell Biology and Physiology 4.0v
- CELL 561 - Physiology of Drug Mechanisms 3.0
- CELL 562 - Reproductive Physiology 3.0
- CELL 565 - Endocrinology 3.0
- CELL 569 - Cellular Electrophysiology and Biophysics 3.0
- CELL 582 - Developmental Genetics 3.0
- CHEM 482 - Mechanisms of Molecular Biology 3.0
- EXSC 463 - Exercise Physiology 3.0
- EXSC 464 - Exercise Physiology Lab 0.5
- MMBIO 221 - General Microbiology 3.0
- MMBIO 222 - General Microbiology Laboratory 1.0
- MMBIO 261 - Infection and Immunity 3.0
- MMBIO 441 - Advanced Molecular Biology 3.0
- MMBIO 442 - Advanced Molecular Biology Laboratory 2.0
- MMBIO 463 - Immunology 3.0
- NEURO 480 - Cellular Neuroscience 3.0

Professional schools and graduate programs may require additional courses not required for this major, such as physics labs, chemistry, calculus, or statistics. Contact the programs to which you may apply to determine the specific courses required. Students should work closely with the Life Science Advisement Center and BYU’s Pre-Professional Advisement Center.

THE DISCIPLINE:

Cell Biology is the study of the structure and function of the cell, the basic unit of life. Physiology is the study of the function and mechanisms of cells, tissues, organs, and organ systems that make up living organisms. Combined, these branches of biology aim to understand such remarkable processes as how the heart develops and works to pump blood, how neurons communicate with one another, how insulin regulates blood sugar, and how specific gene products determine the morphology and functional capacity of the nervous system. Building on a foundation of chemistry, physics, and biology, this major’s emphasis on integrating molecular, cellular, systems, and whole-body function is what distinguishes the study of cell biology and physiology from other life sciences.

CAREER OPPORTUNITIES:

A major in Cell Biology and Physiology prepares students to pursue advanced degrees in the biological sciences and non-biological fields or to directly enter into employment. This major provides outstanding preparation for students seeking admittance into professional programs in medicine, dentistry, optometry, podiatry, chiropractics, and pharmacy. For students who have aspirations of doing health-related research, this major will provide a challenging, thorough preparation for entrance into graduate programs and beyond. Graduates of this program will also have the academic and laboratory skills necessary for employment in medical, biotechnological, and pharmaceutical industries. This degree provides students pursuing advanced degrees in business, public management, or law the knowledge and training necessary to be admitted into professional schools and work in
governmental agencies, health care and biotechnical industries, and patent or health care law.

**STUDENT INVOLVEMENT IN RESEARCH:**
Students majoring in Cell Biology and Physiology have the opportunity to become involved in mentored laboratory research with the faculty (CELL 295R and 495R). Students that become highly engaged in research and generate sufficient data to participate with faculty in writing a peer-reviewed primary research article reporting their results can fulfill their capstone requirement (CELL 498 in requirement 5 of the MAP). Explore faculty research interests under the RESEARCH tab at cell.byu.edu.

**EXPERIENTIAL LEARNING:**
Completion of the Cell Biology and Physiology major requires experiential learning over multiple semesters. Experiential learning can occur by working closely with the faculty 1) as a teaching assistant (CELL 349R, STDEV 132/133), 2) as a mentored laboratory researcher (CELL 295R/495R), 3) in a research internship (CELL 399R), 4) in exploring current research by directed literature readings (CELL 450R), 5) in a nonacademic internship (LFSCI 199R), or 6) in the BIO-Innovation and Entrepreneurship (BIO-I&E) Program (CELL 444 and 445).

**FINANCING:**
Various private, federal, and university sources of scholarships, fellowships, and grants are available. Please see the Life Sciences Advisement Center (2060 LSB) for information regarding college-level and department-level scholarships. Advanced undergraduates may be hired to teach labs or help sections for CELL courses.

**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**
Department of Cell Biology and Physiology
Brigham Young University
4005 Life Sciences Building