# 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>Religion Cornerstones</td>
<td></td>
<td></td>
<td>Teachings and Doctrine of The Book of Mormon</td>
</tr>
<tr>
<td></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>
</tbody>
</table>

## The Individual and Society

<table>
<thead>
<tr>
<th>Subject</th>
<th>#Classes</th>
<th>Hours</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Heritage</td>
<td>1-2</td>
<td>3.0</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>
</tbody>
</table>

## Skills

<table>
<thead>
<tr>
<th>Subject</th>
<th>#Classes</th>
<th>Hours</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<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>CHEM 391*</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>
</tbody>
</table>

## Arts, Letters, and Sciences

<table>
<thead>
<tr>
<th>Subject</th>
<th>#Classes</th>
<th>Hours</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<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>
</tr>
<tr>
<td>Biological Science</td>
<td>1</td>
<td>4.0/3.0</td>
<td>BIO 130* or CELL 120*</td>
</tr>
<tr>
<td>Physical Science</td>
<td>2</td>
<td>7.0</td>
<td>CHEM 111* and PHSCS 121*</td>
</tr>
<tr>
<td>Social Science</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
</tbody>
</table>

## Core Enrichment: Electives

<table>
<thead>
<tr>
<th>Subject</th>
<th>#Classes</th>
<th>Hours</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Religion Electives</td>
<td>3-4</td>
<td>6.0</td>
<td>from approved list</td>
</tr>
<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 (21-22 hours overlap)

## Graduation Requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Hours</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum residence hours required</td>
<td>30.0</td>
<td></td>
</tr>
<tr>
<td>Minimum hours needed to graduate</td>
<td>120.0</td>
<td></td>
</tr>
</tbody>
</table>

## Suggested Sequence of Courses

### Freshman Year

**1st Semester**

- CHEM 111* (F) 4.0
- MATH 112 (WSpSu) 4.0
- First-year Writing or A HTG 100 (FW) 3.0
- Biological Science - BIO 130 or CELL 120** 3.0
- Religion Cornerstone course 2.0

**Total Hours**: 16.0-17.0

*With department approval, CHEM 105 may be substituted for CHEM 111. **There is no major-specific biology course required to fulfill the G.E. Biological Requirement. CELL 120 or BIO 130 are recommended options.

**2nd Semester**

- First-year Writing or A HTG 100 (FW) 3.0
- CHEM 112* (W) 3.0
- CHEM 113* (FW) 2.0
- CHEM 201 (FW) 0.5
- MATH 113 (FWSpSu) 4.0
- Religion Cornerstone course 2.0

**Total Hours**: 14.5

*With department approval, CHEM 106 may be substituted for CHEM 112; CHEM 107 for CHEM 113.

### Sophomore Year

**3rd Semester**

- CHEM 227 (Sp) 4.0
- STAT 201 (FW) or MATH 213 & 215 (FW) 3.0
- CHEM 351M* (F) 3.0
- Religion Cornerstone course 2.0

**Total Hours**: 15.0

*CHEM 351 may be substituted for CHEM 351M

**4th Semester**

- CHEM 352M* (W) 3.0
- CHEM 354* (FWSpSu) 1.0
- CHEM 381M* (W) 3.0
- CHEM 384 (W) 1.0
- PHSCS 123 (FWSpSu) 3.0
- CHEM 497R (FWSpSu) or open electives 1.0
- Religion Cornerstone course 2.0

**Total Hours**: 14.0

*CHEM 352 may be substituted for CHEM 352M; CHEM 353 may be substituted for CHEM 354 **With department approval, CHEM 481 may substitute for CHEM 381M. Pre-professional students may need 2 credits of CHEM 353, depending on specific professional school entrance requirements.

### Junior Year

**5th Semester**

- CHEM 351M* (F) 3.0
- Religion Cornerstone course 2.0

**6th Semester**

- CHEM 352M* (W) 3.0
- CHEM 354* (FWSpSu) 1.0
- CHEM 497R (FWSpSu) or open electives 1.0
- Religion Cornerstone course 2.0

**Total Hours**: 15.0

*CHEM 497R may substitute for CHEM 351M. Pre-professional students may need 2 credits of CHEM 353, depending on specific professional school entrance requirements.

### Senior Year

**7th Semester**

- CHEM 391 (FW) 3.0
- CHEM 586 (W) 3.0
- PWS 340 (FW) 3.0
- CHEM 497R (FWSpSu) or Requirement 5 3.0
- CHEM 498R (FW) or other Requirement 4 3.0
- Religion Elective 2.0

**Total Hours**: 15.0

*CHEM 497R, 498R (FWSpSu) or Requirement 5 3.0

### Sophomore Year

**8th Semester**

- CHEM 489 (F) 3.0
- CHEM 594R (FW) 0.5
- CHEM 498R (FWSpSu) or Requirement 5 3.0
- Civilization 2 or Social Science 3.0
- Global and Cultural Awareness 3.0
- Religion Elective 2.0

**Total Hours**: 14.5

*CHEM 498R (FWSpSu) or other Requirement 5 3.0

### Senior Year

**9th Semester**

- CHEM 586 (W) 3.0
- PWS 340 (FW) 3.0
- Religion Elective 2.0

**Total Hours**: 15.0

*CHEM 586 may substitute for CHEM 351M. Pre-professional students may need 2 credits of CHEM 353, depending on specific professional school entrance requirements.

## BS in Biochemistry (692826) MAP Sheet

Physical and Mathematical Sciences, Chemistry and Biochemistry

For students entering the degree program during the 2022-2023 curricular year.
REQUIREMENT 1 Complete 17 courses
NOTE: WITH DEPARTMENT APPROVAL CHEM 105 MAY SUBSTITUTE FOR CHEM 111; AND CHEM 106 FOR CHEM 112; AND CHEM 107 FOR CHEM 113.
NOTE: ONLY 1 CREDIT HOUR OF CHEM 354 IS REQUIRED; COMPLETION OF 2 CREDIT HOURS WILL SATISFY THE REQUIREMENT FOR CHEM 354 AND 1 CREDIT HOUR OF ELECTIVES UNDER REQUIREMENT 4.
CHEM 111 - Principles of Chemistry 1 4.0
CHEM 112 - Principles of Chemistry 2 3.0
CHEM 113 - Introductory General Chemistry Laboratory 2.0
CHEM 201 - Chemical Handling and Safe Laboratory Practices 0.5
CHEM 227 - Principles of Chemical Analysis 4.0
CHEM 351M - Organic Chemistry 1 - Majors 3.0
CHEM 352M - Organic Chemistry 2 - Majors 3.0
CHEM 381M - Fundamentals of Biochemistry 3.0
CHEM 384 - Biochemistry Methods 1.0
*CHEM 391 - Technical Writing Using Chemical Literature 3.0
CHEM 468 - Biophysical Chemistry 3.0
CHEM 482 - Mechanisms of Molecular Biology 3.0
CHEM 489 - Structural Biochemistry 3.0
CHEM 495 - Senior Seminar 1.0
CHEM 584 - Advanced Biochemistry Methods 1 3.0
CHEM 586 - Advanced Biochemistry Methods 2 3.0
CHEM 594R - General Seminar 0.5
REQUIREMENT 2 Complete 1 hour from the following course(s)
CHEM 354 - Organic Chemistry Laboratory--Majors 2.0v
REQUIREMENT 3 Complete 6 courses
MATH 122 - Calculus 1 4.0
MATH 123 - Calculus 2 4.0
PHSCS 121 - Introduction to Newtonian Mechanics 3.0
PHSCS 123 - Introduction to Waves, Optics, and Thermodynamics 3.0
PHSCS 220 - Introduction to Electricity and Magnetism 3.0
PWS 340 - Genetics 3.0
REQUIREMENT 4 Complete 1 option
OPTION 4.1 Complete 1 course
STAT 201 - Statistics for Engineers and Scientists 3.0
OPTION 4.2 Complete 2 courses
MATH 213 - Elementary Linear Algebra 2.0
MATH 215 - Computational Linear Algebra 1.0
REQUIREMENT 5 Complete 1 course
CELL 360 - Cell Biology 3.0
CELL 362 - Advanced Physiology 3.0
MMBIO 463 - Immunology 3.0
MMBIO 465 - Virology 3.0
MMBIO 468 - Developmental Biology Will Fill This Requirement.
MMBIO 466 - Microbiology and Molecular Biology, and Physiology and Developmental Biology Will Fill This Requirement.

REGISTRATION ADVISMENT
We want to assist students in their academic pursuit toward an undergraduate degree. 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 number of semesters to graduate.

New students should attend the chemistry and biochemistry session during New Student Orientation, where they can meet with a faculty advisor and review their planned registration. Transfer or mid-year incoming students should meet with an advisor prior to the add/drop deadline of their first semester, usually after the first week of class.

The department recommends a review of progress and planned registration with a faculty advisor in the semester when 30, 60, and 90 hours are completed. However, academic advisement is available to all majors at any point in their academic career. Contact the department advisement office to schedule an appointment with a faculty advisor: in person C104 BNSN; by phone 801-422-6269; by email suemort@chem.byu.edu or coffice@chem.byu.edu

MENTORED RESEARCH/EXPERIENTIAL LEARNING
We strongly encourage our majors to participate in mentored learning and receive credit toward completing their major requirements. Approximately 80% of our faculty conduct independent, externally funded research and invite undergraduates to participate in on-campus mentored learning opportunities. Students initiate contact with a faculty whose research interests them. Upon acceptance to participate in a research lab, students enroll in a series of mentored research courses (CHEM 297R, 497R) throughout their academic career, culminating in a capstone research experience (CHEM 498R). Contact the department advisement center for additional information: 801-422-6269; suemort@chem.byu.edu or coffice@chem.byu.edu

THE DISCIPLINE
The Biochemistry Bachelor of Science degree provides excellent
preparation for students preparing for health-related fields (medicine, dentistry, veterinary medicine) or for those who desire an advanced degree (MS or PhD) in biochemistry, molecular biology, or the health sciences. Chemists and biochemists study the fundamental processes that govern the natural world, including atomic structure and how atoms interact to form molecules and materials. They study the mechanisms of chemical processes, including those that underpin living systems such as the transfer of information from DNA to RNA to proteins. They work to develop simplifying models (theories) that permit the correlation and explanation of observations about the behavior of life to the structure of rocks and minerals.

Chemistry and biochemistry provide an essential foundation for the medical sciences, engineering (especially chemical engineering), electronics, energy, environmental sciences, materials science, pharmacy, and virtually all manufacturing processes.

Chemistry and biochemistry are active branches of science that are vital to human existence. Inasmuch as the field embraces all aspects of the material world, it is subdivided into five areas of interest. Examples of these diverse areas include the regulation of protein synthesis, cellular signal transduction at the molecular level and proteomics (biochemistry), design and synthesis of medicinal compounds, catalysts and polymers (organic chemistry), design and synthesis of new molecular structures and materials (inorganic chemistry), spectroscopic study of energy transfer and molecular structures (physical chemistry), and analysis of medicinal compounds, biological materials, and contaminants or trace elements found in the environment (analytical chemistry).

Chemistry and biochemistry involve far more than test tubes and beakers. They include sophisticated methodologies such as recombinant DNA technology, working with a variety of instruments such as mass spectrometers, calorimeters, chromatographs, ultracentrifuges, lasers, X-ray diffractometers, electron microscopes and nuclear magnetic resonance spectrometers, all of which are used by undergraduate chemistry and biochemistry students at BYU. Computers also play an important role in these disciplines, with applications ranging from simulation of molecules and their interactions to the collection and analysis of data. The chemistry and biochemistry curricula are both rigorous and intellectually rewarding.

**CAREER OPPORTUNITIES**

Graduates in chemistry and biochemistry obtain positions in education and many different industries, performing analysis, synthesis, characterization, observation, and modeling. Those who work hard, are creative, and have intellectual curiosity are in particular demand. The discipline also provides an excellent preprofessional course of study for those interested in medicine, dentistry, law, and business.

**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 Chemistry and Biochemistry Advisement
Brigham Young University
C-104 BNSN
Provo, UT 84602
Telephone: (801) 422-6269

**ADVISEMENT CENTER INFORMATION**

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

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2022-2023