# 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>3</td>
<td>2.0</td>
<td>REL A 275</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 275</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>
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<tr>
<td>The Individual and Society</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>Skills</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>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>
<tr>
<td>Arts, Letters, and Sciences</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>
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<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>3.0</td>
<td>CHEM 481M*</td>
</tr>
<tr>
<td>Physical Science</td>
<td>1</td>
<td>3.0</td>
<td>CHEM 111* and PHSCS 121*, 123*, or 220*</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**

| Religion Electives | 3-4 | 6.0 | from approved list |
| Open Electives     | Variable | Variable | personal choice |

*THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (16 hours overlap)*

## 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

**1st Semester**
- Open Electives: 2.0
- CHEM 111 (F): 4.0
- First-Year Writing or A HTG 100: 3.0
- MATH 112 (FWSpSu): 4.0
- Religion Cornerstone course: 2.0

**Total Hours:** 15.0

**2nd Semester**
- First-Year Writing or American Heritage: 3.0
- CHEM 112 (W): 3.0
- CHEM 113 (FW): 2.0
- CHEM 201 (FWSpSu): 0.5
- MATH 113 (FWSpSu): 4.0
- Religion Cornerstone course: 2.0

**Total Hours:** 14.5

### SOPHOMORE YEAR

**3rd Semester**
- CHEM 227 (FWSpSu): 4.0
- CHEM 112 (FWSpSu): 4.0
- CHEM 227 (FWSpSu): 4.0
- PHSCS 121 (FWSpSu): 3.0
- CHEM 351M (F): 3.0
- Religion Cornerstone course: 2.0

**Total Hours:** 16.0

**4th Semester**
- 351 may be substituted for 351M: 3.0
- CHEM 352M (W): 3.0
- CHEM 354 (FWSp): 2.0
- PHSCS 123 (FWSp): 3.0
- Religion Cornerstone course: 2.0
- STAT 201 (FW): 3.0
- Open electives: 1.0

**Total Hours:** 14.0

**5th Semester**
- CHEM 391 (FW): 3.0
- CHEM 481M (F): 3.0
- PHSCS 220 (FWSpSu): 3.0
- Religion Cornerstone course: 2.0
- Religion Elective: 2.0
- Open Electives: 3.0

**Total Hours:** 15.0

**6th Semester**
- CHEM 391 (FW): 3.0
- CHEM 481M (F): 3.0
- PHSCS 220 (FWSpSu): 3.0
- Religion Cornerstone course: 2.0
- Religion Elective: 2.0
- Open Electives: 3.0

**Total Hours:** 15.0

### JUNIOR YEAR

**5th Semester**
- CHEM 391 (FW): 3.0
- CHEM 481M (F): 3.0
- PHSCS 220 (FWSpSu): 3.0
- Religion Cornerstone course: 2.0
- Religion Elective: 2.0
- Open Electives: 3.0

**Total Hours:** 15.0

**6th Semester**
- CHEM 391 (FW): 3.0
- CHEM 481M (F): 3.0
- PHSCS 220 (FWSpSu): 3.0
- Religion Cornerstone course: 2.0
- Religion Elective: 2.0
- Open Electives: 3.0

**Total Hours:** 15.0

### SENIOR YEAR

**7th Semester**
- CHEM 495 (FW): 1.0
- CHEM 586 (W): 3.0
- Advanced Chemistry electives: 3.0
- Religion Elective: 2.0
- Open Electives: 3.0

**Total Hours:** 14.5

**8th Semester**
- CHEM 495 (FW): 1.0
- CHEM 586 (W): 3.0
- Advanced Chemistry electives: 3.0
- Religion Elective: 2.0
- Open Electives: 3.0

**Total Hours:** 14.5

**Note:** The department recommends a review of progress and planned registration with a faculty advisor by the end of the first week of classes in the first semester or term at BYU and in the semester when 30, 60, and 90 hours are completed. Call 422-6269 or come to C104 BNSN to schedule an appointment. New incoming 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.

**Note:** 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.
No more than 3 hours of D credit is allowed in major courses.
The Chemistry and Biochemistry Department requires the final 10 hours of
required chemistry credit to be taken in residence at BYU for this degree
program.

REQUIREMENT 1 Complete 17 courses

CHEM 111 - Principles of Chemistry  4.0
CHEM 112 - Principles of Chemistry  2.0
CHEM 113 - Introductory General Chemistry Laboratory  0.5
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 354 - Organic Chemistry Laboratory—Majors  2.0
*CHEM 391 - Technical Writing Using Chemical Literature  3.0
CHEM 468 - Biophysical Chemistry  3.0
*CHEM 481M - Biochemistry—Majors  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

You may take this course up to 1 time.

REQUIREMENT 2 Complete 8 courses

BIO 130 - Biology  4.0
MATH 112 - Calculus 1  4.0
MATH 113 - Calculus 2  4.0
PHSCS 121 - Introduction to Waves, Optics, and Thermodynamics  3.0
PHSCS 220 - Introduction to Electricity and Magnetism  3.0
PWS 340 - Genetics  3.0
STAT 201 - Statistics for Engineers and Scientists  3.0

REQUIREMENT 3 Complete 1 course

MMBIO 463 - Immunology  3.0
MMBIO 465 - Virology  3.0
MMBIO 468 - (MMBio-Bio-PWS) Genomics  3.0
PDPIO 360 - Cell Biology  3.0

PDPIO 362 - Advanced Physiology  3.0

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

CHEM 455 - Synthesis and Qualitative Organic Analysis  3.0
CHEM 496R - Academic Internship: Chemistry and Biochemistry  6.0
CHEM 497R - Undergraduate Special Problems  6.0
CHEM 499R - Honors Thesis  6.0

You may take up to 4 credit hours.

CHEM 514 - Inorganic Chemistry  3.0
CHEM 518 - Advanced Inorganic Laboratory  2.0
CHEM 521 - Instrumental Analysis Lecture  2.0
CHEM 523 - Instrumental Analysis Laboratory  2.0
CHEM 552 - Advanced Organic Chemistry  3.0
CHEM 553 - Advanced Organic Chemistry  3.0
CHEM 554R - Advanced Organic Chemistry Laboratory  3.0
CHEM 563 - Reaction Kinetics  3.0
CHEM 565 - Introduction to Quantum Chemistry  3.0
CHEM 567 - Statistical Mechanics  3.0
CHEM 569 - Fundamentals of Spectroscopy  3.0
CHEM 581 - Advanced Biochemical Methodology 1  3.0
CHEM 583 - Advanced Biochemical Methodology 2  3.0
CHEM 596R - Special Topics in Chemistry  3.0

You may take up to 4 credit hours.

Recommended Courses: Chem 195; Math 302 or Math 313.

Note: Supporting courses suggested by most medical and dental schools are
found by visiting the Preprofessional Advisement Office. The more rigorous
chemistry, mathematics, and physics courses required for the chemistry
majors will satisfy the minimum requirements listed there. Elective courses
in biochemistry and in biological science are especially pertinent to these
preprofessional programs.

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.

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