### 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>
<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>
<td>1</td>
<td>2.0</td>
<td>REL C 225</td>
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<tr>
<td>The Eternal Family</td>
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<td>2.0</td>
<td>REL C 200</td>
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<tr>
<td><strong>The Individual and Society</strong></td>
<td></td>
<td></td>
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</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><strong>Skills</strong></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><strong>Arts, Letters, and Sciences</strong></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>
<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>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

### 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 (FWsp): 4.0
- BIO 130 (FW): 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
- 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
- PD BIO 360 (FWSpSu): 3.0
- Religion Elective: 2.0
- Letters: 3.0

**Total Hours:** 15.0

#### JUNIOR YEAR

**5th Semester**
- CHEM 391M* (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:** 16.0

**6th Semester**
- CHEM 482 (W): 3.0
- CHEM 468 (W): 3.0
- PWS 340 (FW): 3.0
- Religion Elective: 2.0
- Civilization 2: 3.0
- PD BIO 360 (FWSpSu): 3.0

**Total Hours:** 16.0

#### SENIOR YEAR

**7th Semester**
- CHEM 584 (FW): 3.0
- CHEM 594R (FW): 0.5
- Global and Cultural Awareness: 3.0
- Religion Elective: 2.0
- Open Electives: 3.0

**Total Hours:** 14.5

**8th Semester**
- CHEM 586 (W): 3.0
- Advanced Chemistry electives: 3.0
- Arts: 3.0
- Religion Elective: 2.0
- Social Science: 3.0

**Total Hours:** 15.0

**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.
### REQUIREMENT 2
The Chemistry and Biochemistry Department requires the final 10 hours of required chemistry credit to be taken in residence at BYU for this degree.

**REQUIREMENT 1 Complete 17 courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 111</td>
<td>Principles of Chemistry 1</td>
<td>4.0</td>
</tr>
<tr>
<td>CHEM 112</td>
<td>Principles of Chemistry 2</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 105</td>
<td>Principles of Chemistry Laboratory</td>
<td>2.0</td>
</tr>
<tr>
<td>CHEM 107</td>
<td>Chemical Handling and Safe Laboratory Practices</td>
<td>0.5</td>
</tr>
<tr>
<td>CHEM 227</td>
<td>Principles of Chemical Analysis</td>
<td>4.0</td>
</tr>
<tr>
<td>CHEM 351M</td>
<td>Organic Chemistry 1 - Majors</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 352M</td>
<td>Organic Chemistry 2 - Majors</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 354</td>
<td>Organic Chemistry Laboratory–Majors</td>
<td>2.0</td>
</tr>
<tr>
<td>*CHEM 391</td>
<td>Technical Writing Using Chemical Literature</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 468</td>
<td>Biophysical Chemistry</td>
<td>3.0</td>
</tr>
<tr>
<td>*CHEM 481M</td>
<td>Biochemistry–Majors</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 482</td>
<td>Mechanisms of Molecular Biology</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 489</td>
<td>Structural Biochemistry</td>
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<tr>
<td>CHEM 495</td>
<td>Senior Seminar</td>
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<tr>
<td>CHEM 584</td>
<td>Advanced Biochemistry Methods 1</td>
<td>3.0</td>
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<tr>
<td>CHEM 586</td>
<td>Advanced Biochemistry Methods 2</td>
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<tr>
<td>CHEM 594R</td>
<td>General Seminar</td>
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**REQUIREMENT 3 Complete 1 course**

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>MMBIO 463</td>
<td>Immunology</td>
<td>3.0</td>
</tr>
<tr>
<td>MMBIO 465</td>
<td>Virology</td>
<td>3.0</td>
</tr>
<tr>
<td>MMBIO 468</td>
<td>(MMBio-Bio-PWS) Genomics</td>
<td>3.0</td>
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<tr>
<td>PDIBIO 360</td>
<td>Cell Biology</td>
<td>3.0</td>
</tr>
</tbody>
</table>

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

**CHEM 455 - Synthesis and Qualitative Organic Analysis**

**CHEM 468R - Academic Internship: Chemistry and Biochemistry**

**CHEM 481M - Biochemistry--Majors**

**CHEM 482**

**CHEM 495**

**CHEM 496R - Academic Internship: Chemistry and Biochemistry**

**CHEM 497R - Undergraduate Special Problems**

**CHEM 499R - Honors Thesis**

**CHEM 514 - Inorganic Chemistry**

**CHEM 518 - Advanced Inorganic Laboratory**

**CHEM 521 - Instrumental Analysis Lecture**

**CHEM 523 - Instrumental Analysis Laboratory**

**CHEM 552 - Advanced Organic Chemistry**

**CHEM 553 - Advanced Organic Chemistry**

**CHEM 563 - Reaction Kinetics**

**CHEM 565 - Introduction to Quantum Chemistry**

**CHEM 567 - Statistical Mechanics**

**CHEM 569 - Fundamentals of Spectroscopy**

**CHEM 581 - Advanced Biochemical Methodology 1**

**CHEM 583 - Advanced Biochemical Methodology 2**

**CHEM 596R - Special Topics in Chemistry**

- **BIO 130 - Biology**
- **MATH 112 - Calculus 1**
- **MATH 113 - Calculus 2**
- **PHSCS 121 - Introduction to Newtonian Mechanics**
- **PHSCS 123 - Introduction to Waves, Optics, and Thermodynamics**
- **PHSCS 220 - Introduction to Electricity and Magnetism**
- **PWS 340 - Genetics**
- **STAT 201 - Statistics for Engineers and Scientists**

**PDIBIO 362 - Advanced Physiology**

**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.
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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