### University Core and Graduation Requirements:

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<table>
<thead>
<tr>
<th>Requirements</th>
<th>#Classes</th>
<th>Hours</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Religion Cornerstones</td>
<td>1-2</td>
<td>3-6.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>American Heritage</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
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<tr>
<td>Global and Cultural Awareness</td>
<td>1</td>
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<td>1</td>
<td>3.0</td>
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<tr>
<td>Arts, Letters, and Sciences</td>
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<td>3.0</td>
<td>from approved list</td>
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<tr>
<td>Biological Science</td>
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<tr>
<td>Physical Science</td>
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<td>7.0</td>
<td>CHEM 111* and PHSCS 121</td>
</tr>
<tr>
<td>Social Science</td>
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<td>3.0</td>
<td>from approved list</td>
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<td>Core Enrichment: Electives</td>
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<tr>
<td>Religion Electives</td>
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<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 (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**
- First-year Writing: 3.0
- CHEM 111* (F): 4.0
- PDBIO 120 (FWSp): 3.0
- MATH 112* (FWSPSu): 4.0
- Religion Cornerstone course: 2.0
- Total Hours: 16.0

*With department approval, CHEM 105 may be substituted for CHEM 111.

**2nd Semester**
- American Heritage: 3.0
- CHEM 112* (W): 3.0
- CHEM 113* (FW): 2.0
- CHEM 201 (FWSp): 0.5
- 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 (FSp): 4.0
- CHEM 351M* (F): 3.0
- MATH 302 (FW): 4.0
- PHSCS 121 (FWSp): 3.0
- Religion Cornerstone course: 2.0
- Total Hours: 16.0

*351 may be substituted for 351M.

**4th Semester**
- CHEM 352M* (W): 3.0
- CHEM 354* (FWSp): 2.0
- PHSCS 123 (FWSp): 3.0
- Religion Cornerstone course: 2.0
- Social Science: 3.0
- CHEM 497R or open elective: 2.0
- Total Hours: 15.0

*352 may substitute for 352M; 353 for 354.

Note: Enrolling in CHEM 497R gives students an opportunity to be mentored in a faculty’s research lab and receive class credit. Enrollment in this course can be repeated for several successive semesters. Permission is required from the faculty member. Contact the department office for specific details and to receive a permission-to-add code.

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.
BS in Chemistry (692821)
2018-2019 Program Requirements (75.0 Credit Hours)

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. These hours may also go toward BYU’s 30-hour residency requirement for graduation.

REQUIREMENT 1: Complete 21 courses
NOTE: WITH DEPARTMENT APPROVAL, CHEM 105 MAY SUBSTITUTE FOR CHEM 111; AND CHEM 106 FOR CHEM 112.

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 354 - Organic Chemistry Laboratory—Majors 2.0
*CHEM 391 - Technical Writing Using Chemical Literature 3.0
CHEM 455 - Synthesis and Qualitative Organic Analysis 3.0
CHEM 462 - Physical Chemistry 1 3.0
CHEM 463 - Physical Chemistry 2 3.0
CHEM 464 - Physical Chemistry Laboratory 1 1.0
CHEM 465 - Physical Chemistry Laboratory 2 1.0
*CHEM 481M - Biochemistry—Majors 3.0
CHEM 495 - Senior Seminar 1.0
CHEM 514 - Inorganic Chemistry 3.0
CHEM 518 - Advanced Inorganic Laboratory 3.0
CHEM 521 - Instrumental Analysis Lecture 2.0
CHEM 523 - Instrumental Analysis Laboratory 2.0
CHEM 594R - General Seminar 0.5

You may take this course up to 1 time.

REQUIREMENT 2: Complete 7 courses
NOTE: MATH 313 AND MATH 314 MAY SUBSTITUTE FOR MATH 302.

MATH 112 - Calculus 1 4.0
MATH 113 - Calculus 2 4.0
MATH 302 - Mathematics for Engineering 1 4.0
PDIBIO 120 - Science of Biology 3.0
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

REQUIREMENT 3: Complete 3.0 hours from the following course(s)

CHEM 392R - Mentored Outreach and Service Learning 3.0v
CHEM 482 - Mechanisms of Molecular Biology 3.0
CHEM 496R - Academic Internship: Chemistry and Biochemistry 6.0v

You may take up to 3 credit hours.

CHEM 497R - Undergraduate Special Problems 6.0v

You may take up to 3 credit hours.

CHEM 552 - Advanced Organic Chemistry 3.0
CHEM 553 - Advanced Organic Chemistry 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 584 - Advanced Biochemistry Methods 1 3.0
CHEM 586 - Advanced Biochemistry Methods 2 3.0
CHEM 596R - Special Topics in Chemistry 3.0v

You may take up to 3 credit hours.

HONRS 499R - Honors Thesis 6.0v

Recommended Courses: Chem 195; Math 303; Phscs 140, 145; Stat 201.

Note: Elective courses, beyond the requirements above, should be selected in consultation with an advisor. The following should be given consideration: advanced chemistry, foreign languages (especially French, German, Japanese, and Russian), biological sciences, computer science, engineering, mathematics, physics, statistics.

PLANNING REGISTRATION

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 801-422-6269 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.

THE DISCIPLINE

The Chemistry Bachelor of Science degree is the preferred degree for chemistry majors (approved by the American Chemical Society), especially those who desire an advanced degree (MS or PhD) in chemistry. It also provides excellent preparation for individuals in preprofessional programs (e.g., medicine, dentistry, business administration, or law).

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).
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
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