

# BA in Chemistry (692827) MAP Sheet

Physical and Mathematical Sciences, Chemistry and Biochemistry

For students entering the degree program during the 2022-2023 curricular year.



University Core and Graduation Requirements				Suggested Sequence of Courses	
<b>University Core Requirements:</b>					
<b>Requirements</b>	<b>#Classes</b>	<b>Hours</b>	<b>Classes</b>		
<b>Religion Cornerstones</b>					
Teachings and Doctrine of The Book of Mormon	1	2.0	REL A 275		
Jesus Christ and the Everlasting Gospel	1	2.0	REL A 250		
Foundations of the Restoration	1	2.0	REL C 225		
The Eternal Family	1	2.0	REL C 200		
<b>The Individual and Society</b>					
American Heritage	1-2	3-6.0	from approved list		
Global and Cultural Awareness	1	3.0	from approved list		
<b>Skills</b>					
First Year Writing	1	3.0	from approved list		
Advanced Written and Oral Communications	1	3.0	CHEM 391*		
Quantitative Reasoning	1	4.0	MATH 112* or 113*		
Languages of Learning (Math or Language)	1	4.0	MATH 112* or 113*		
<b>Arts, Letters, and Sciences</b>					
Civilization 1	1	3.0	from approved list		
Civilization 2	1	3.0	from approved list		
Arts	1	3.0	from approved list		
Letters	1	3.0	from approved list		
Biological Science	1	3-4.0	PD BIO 120*, BIOL 130*, MM BIO 121*		
Physical Science	2	7.0	CHEM 111* and PHSCS 121*		
Social Science	1	3.0	from approved list		
<b>Core Enrichment: Electives</b>					
Religion Electives	3-4	6.0	from approved list		
Open Electives	Variable	Variable	personal choice		
*THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (21-22 hours overlap)					
<b>Graduation Requirements:</b>					
Minimum residence hours required		30.0			
Minimum hours needed to graduate		120.0			
<b>FRESHMAN YEAR</b>					
<b>1st Semester</b>					
First-year Writing or A HTG 100 (FWSpSu)				3.0	
Biological Science*				3-4.0	
CHEM 111** (F)				4.0	
MATH 112 (FWSpSu)				4.0	
Religion Cornerstone course				2.0	
<b>Total Hours</b>				<b>16-17.0</b>	
*There is no major-specific biology course required for the major; just the G.E. biological science requirement. CELL 120, BIO 130, and MM BIO 121 are recommended options. **With department approval, CHEM 105 may be substituted for CHEM 111					
<b>2nd Semester</b>					
First-year Writing or A HTG 100				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	
<b>Total Hours</b>				<b>14.5</b>	
*With department approval, CHEM 106 may be substituted for CHEM 112; CHEM 107 for CHEM 113.					
<b>SOPHOMORE YEAR</b>					
<b>3rd Semester</b>					
CHEM 227 (FSp)				4.0	
CHEM 351M* (F)				3.0	
STAT 201 (FW) or MATH 213 & 215 (FW)				3.0	
PHSCS 121 (FWSp)				3.0	
Religion Cornerstone course				2.0	
<b>Total Hours</b>				<b>15.0</b>	
*CHEM 351 may substitute for CHEM 351M.					
<b>4th Semester</b>					
CHEM 352M* (W)				3.0	
CHEM 354* (FWSp) and/or CHEM 384 (W)				2.0	
PHSCS 123 (FWSp)				3.0	
CHEM 381M** (W)				3.0	
CHEM 497R (FWSpSu) or open electives				1.0	
Religion Cornerstone course				2.0	
<b>Total Hours</b>				<b>14.0</b>	
*CHEM 352 may substitute for CHEM 352M; CHEM 353 may substitute for CHEM 354.					
**With department approval, CHEM 481 may substitute for CHEM 381M.					
<b>JUNIOR YEAR</b>					
<b>5th Semester</b>					
CHEM 462 (F) or elective					3.0
CHEM 460 (F) or CHEM 497R (FWSpSu) or elective					1.0
PHSCS 220 (FWSu)					3.0
Civilization 1					3.0
Social Science					3.0
Global and Cultural Awareness					3.0
<b>Total Hours</b>					<b>16.0</b>
<b>6th Semester</b>					
CHEM 391 (FW)					3.0
CHEM 463 (W) or CHEM 468 (W)					3.0
CHEM 464 & 465 (W) or CHEM 497R and/or elective					2.0
Arts or Letters					3.0
Civilization 2					3.0
Religion Elective					2.0
<b>Total Hours</b>					<b>16.0</b>
<b>SENIOR YEAR</b>					
<b>7th Semester</b>					
CHEM 584 (F) or open elective					3.0
CHEM 497R (FWSpSu) and other Requirement 4					6.0
Religion elective					2.0
Global and Cultural Awareness					3.0
<b>Total Hours</b>					<b>14.0</b>
<b>8th Semester</b>					
CHEM 495 (FW)					1.0
Requirement 4 or open elective					2.0
Arts or Letters					3.0
Religion elective					2.0
CHEM 498R (FWSpSu) and open elective					6.0
<b>Total Hours</b>					<b>14.0</b>

## BA in Chemistry (692827)

### 2022-2023 Program Requirements (57.5 Credit Hours)

<p><b>REQUIREMENT 1</b> Complete 9 courses</p> <p>CHEM 111 - Principles of Chemistry 1 4.0</p> <p>CHEM 112 - Principles of Chemistry 2 3.0</p> <p>CHEM 113 - Introductory General Chemistry Laboratory 2.0</p> <p>CHEM 201 - Chemical Handling and Safe Laboratory Practices 0.5</p> <p>CHEM 227 - Principles of Chemical Analysis 4.0</p> <p>CHEM 351M - Organic Chemistry 1 - Majors 3.0</p> <p>CHEM 352M - Organic Chemistry 2 - Majors 3.0</p> <p>*CHEM 391 - Technical Writing Using Chemical Literature 3.0</p> <p>CHEM 495 - Senior Seminar 1.0</p> <p><b>Note: With departmental approval, Chem 105 may substitute for Chem 111, and Chem 106 for Chem 112; and Chem 107 for Chem 113.</b></p> <p><b>REQUIREMENT 2</b> Complete 1 option</p> <p><b>OPTION 2.1</b> Complete 6 courses</p> <p><b>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.</b></p> <p>CHEM 354 - Organic Chemistry Laboratory--Majors 2.0v</p> <p>CHEM 381M - Fundamentals of Biochemistry 3.0</p> <p>CHEM 384 - Biochemistry Methods 1.0</p> <p>CHEM 468 - Biophysical Chemistry 3.0</p> <p>CHEM 584 - Advanced Biochemistry Methods 1 3.0</p> <p>STAT 201 - Statistics for Engineers and Scientists 3.0</p> <p><b>OPTION 2.2</b> Complete 7 courses</p> <p><b>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.</b></p> <p>CHEM 354 - Organic Chemistry Laboratory--Majors 2.0v</p> <p>CHEM 381M - Fundamentals of Biochemistry 3.0</p> <p>CHEM 384 - Biochemistry Methods 1.0</p> <p>CHEM 468 - Biophysical Chemistry 3.0</p> <p>CHEM 584 - Advanced Biochemistry Methods 1 3.0</p> <p>MATH 213 - Elementary Linear Algebra 2.0</p> <p>MATH 215 - Computational Linear Algebra 1.0</p> <p><b>OPTION 2.3</b> Complete 8 courses</p> <p><b>NOTE: 2 CREDIT HOURS OF CHEM 354 ARE REQUIRED. NOTE: MATH 314 MAY SUBSTITUTE FOR CHEM 460.</b></p> <p>CHEM 354 - Organic Chemistry Laboratory--Majors 2.0v</p> <p>CHEM 460 - Mathematics for Physical Chemistry 1.0</p>	<p>CHEM 462 - Physical Chemistry 1 3.0</p> <p>CHEM 463 - Physical Chemistry 2 3.0</p> <p>CHEM 464 - Physical Chemistry Laboratory 1 1.0</p> <p>CHEM 465 - Physical Chemistry Laboratory 2 1.0</p> <p>MATH 213 - Elementary Linear Algebra 2.0</p> <p>MATH 215 - Computational Linear Algebra 1.0</p> <p><b>REQUIREMENT 3</b> Complete 5 courses</p> <p>MATH 112 - Calculus 1 4.0</p> <p>MATH 113 - Calculus 2 4.0</p> <p>PHSCS 121 - Introduction to Newtonian Mechanics 3.0</p> <p>PHSCS 123 - Introduction to Waves, Optics, and Thermodynamics 3.0</p> <p>PHSCS 220 - Introduction to Electricity and Magnetism 3.0</p> <p><b>REQUIREMENT 4</b> Complete 3.0 hours from the following course(s)</p> <p><b>AFTER CONSULTING WITH AN ADVISOR, COMPLETE 3 HOURS FROM THE FOLLOWING. NOTE: COURSES USED FOR REQUIREMENT 2 CANNOT ALSO BE APPLIED TO REQUIREMENT 4. CHEM 355 CANNOT BE TAKEN IF CHEM 354 WAS TAKEN FOR 2 CREDIT HOURS.</b></p> <p>CELL 360 - Cell Biology 3.0</p> <p>CHEM 355 - Organic Chemistry Laboratory 2 - Nonmajors 1.0</p> <p>CHEM 381M - Fundamentals of Biochemistry 3.0</p> <p>CHEM 384 - Biochemistry Methods 1.0</p> <p>CHEM 397R - Mentored Outreach and Service Learning 3.0v</p> <p>CHEM 455 - Synthesis and Qualitative Organic Analysis 4.0</p> <p>CHEM 460 - Mathematics for Physical Chemistry 1.0</p> <p>CHEM 462 - Physical Chemistry 1 3.0</p> <p>CHEM 463 - Physical Chemistry 2 3.0</p> <p>CHEM 464 - Physical Chemistry Laboratory 1 1.0</p> <p>CHEM 465 - Physical Chemistry Laboratory 2 1.0</p> <p>CHEM 468 - Biophysical Chemistry 3.0</p> <p>CHEM 482 - Mechanisms of Molecular Biology 3.0</p> <p>CHEM 489 - Structural Biochemistry 3.0</p> <p>CHEM 496R - Academic Internship: Chemistry and Biochemistry 6.0v</p> <p><i>You may take up to 3 credit hours.</i></p> <p>CHEM 498R - Capstone Experience in Chemistry/Biochemistry 4.0v</p> <p><i>You may take up to 3 credit hours.</i></p> <p>CHEM 514 - Inorganic Chemistry 3.0</p> <p>CHEM 518 - Advanced Inorganic Laboratory 2.0</p> <p>CHEM 521 - Instrumental Analysis Lecture 2.0</p> <p>CHEM 523 - Instrumental Analysis Laboratory 2.0</p> <p>CHEM 552 - Advanced Organic Chemistry 3.0</p>	<p>CHEM 553 - Advanced Organic Chemistry 3.0</p> <p>CHEM 563 - Reaction Kinetics 3.0</p> <p>CHEM 565 - Introduction to Quantum Chemistry 3.0</p> <p>CHEM 567 - Statistical Mechanics 3.0</p> <p>CHEM 569 - Fundamentals of Spectroscopy 3.0</p> <p>CHEM 581 - Advanced Biochemical Methodology 1 3.0</p> <p>CHEM 583 - Advanced Biochemical Methodology 2 3.0</p> <p>CHEM 584 - Advanced Biochemistry Methods 1 3.0</p> <p>CHEM 586 - Advanced Biochemistry Methods 2 3.0</p> <p>CHEM 594R - General Seminar 0.5</p> <p>CHEM 596R - Special Topics in Chemistry 3.0v</p> <p><i>You may take up to 3 credit hours.</i></p> <p>HONRS 499R - Honors Thesis 6.0v</p> <p><i>You may take up to 3 credit hours.</i></p> <p><b>Note 1: Elective courses must be different from required courses.</b></p> <p><b>Note 2: With prior approval, certain 300-level and above courses in biology, engineering, physics, and statistics may be taken to satisfy Requirement 4.</b></p> <p><b>Recommended Courses: Math 213 and 215; Chem 460; Phscs 225.</b></p> <p><b>Note: Supporting courses suggested by most medical and dental schools are found by visiting the Preprofessional Advisement Center (ppa.byu.edu). The more rigorous chemistry, mathematics, and physics courses required for the chemistry majors will satisfy the minimum requirements listed there.</b></p> <p><b>Elective courses in biochemistry and in biological science are especially pertinent to these preprofessional programs.</b></p> <p><b>REGISTRATION ADVISEMENT</b></p> <p>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.</p> <p>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.</p>
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## BA in Chemistry (692827)

2022-2023

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](mailto:suemort@chem.byu.edu) or [coffice@chem.byu.edu](mailto: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; C104 BNSN; [suemort@chem.byu.edu](mailto:suemort@chem.byu.edu) or [coffice@chem.byu.edu](mailto:coffice@chem.byu.edu).

### THE DISCIPLINE

The Chemistry Bachelor of Arts degree provides preparation for individuals in preprofessional programs (e.g., medicine, dentistry, business administration, or law). It also provides background for careers in chemistry-related professions (e.g., information specialist, safety engineer, forensics). 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

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