

# 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.



University Core and Graduation Requirements				Suggested Sequence of Courses				
<b>University Core Requirements:</b>				<b>FRESHMAN YEAR</b>				
<b>Requirements</b>	<b>#Classes</b>	<b>Hours</b>	<b>Classes</b>	<b>1st Semester</b>			<b>JUNIOR YEAR</b>	
<b>Religion Cornerstones</b>				<b>5th Semester</b>				
Teachings and Doctrine of The Book of Mormon	1	2.0	REL A 275	CHEM 111* (F)	4.0		CHEM 391 (FW)	3.0
Jesus Christ and the Everlasting Gospel	1	2.0	REL A 250	MATH 112 (WSpSu)	4.0		CHEM 482 (F)	3.0
Foundations of the Restoration	1	2.0	REL C 225	First-year Writing or A HTG 100 (FW)	3.0		CHEM 584 (F)	3.0
The Eternal Family	1	2.0	REL C 200	Biological Science - BIO 130 or CELL 120**	3.0-4.0		PHSCS 220 (FWSu)	3.0
<b>The Individual and Society</b>				<b>Religion Cornerstone course</b>				
American Heritage	1-2	3-6.0	from approved list		2.0		CHEM 497R (FWSPSu) or open elective	1.0
Global and Cultural Awareness	1	3.0	from approved list				Civilization 1 or Social Science	3.0
<b>Skills</b>				<b>Total Hours</b>				
First Year Writing	1	3.0	from approved list					<b>16.0-17.0</b>
Advanced Written and Oral Communications	1	3.0	CHEM 391*	*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.				
Quantitative Reasoning	1	4.0	MATH 112* or 113*	<b>2nd Semester</b>				
Languages of Learning (Math or Language)	1	4.0	MATH 112* or 113*	First-year Writing or A HTG 100 (FW)	3.0		CHEM 586 (W)	3.0
<b>Arts, Letters, and Sciences</b>				<b>3rd Semester</b>				
Civilization 1	1	3.0	from approved list	CHEM 112* (W)	3.0		CHEM 468 (W)	3.0
Civilization 2	1	3.0	from approved list	CHEM 113* (FW)	2.0		PWS 340 (FW)	3.0
Arts	1	3.0	from approved list	CHEM 201 (FW)	0.5		CHEM 497R (FWSpSu) or Requirement 5	1.0
Letters	1	3.0	from approved list	MATH 113 (FWSpSu)	4.0		CELL 360 (FWSp) or other Requirement 4	3.0
Biological Science	1	4.0/3.0	BIO 130* or CELL 120*	Religion Cornerstone course	2.0		Religion Elective	2.0
Physical Science	2	7.0	CHEM 111* and PHSCS 121*				<b>Total Hours</b>	<b>15.0</b>
Social Science	1	3.0	from approved list	<b>4th Semester</b>				
<b>Core Enrichment: Electives</b>				<b>SOPHOMORE YEAR</b>				
Religion Electives	3-4	6.0	from approved list	<b>3rd Semester</b>				
Open Electives	Variable	Variable	personal choice	CHEM 227 (FSp)	4.0		CHEM 594R (FW)	0.5
*THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (21-22 hours overlap)				* With department approval, CHEM 106 may be substituted for CHEM 112; CHEM 107 for CHEM 113.				
<b>Graduation Requirements:</b>				<b>4th Semester</b>				
Minimum residence hours required		30.0		CHEM 352M* (W)	3.0		CHEM 497R, 498R (FWSpSu) or Requirement 5	3.0
Minimum hours needed to graduate		120.0		CHEM 354* (FWSp)	1.0		Civilization1, 2 or Social Science	3.0
				Global and Cultural Awareness				
				Religion Elective				
				<b>Total Hours</b>				
				<b>14.5</b>				
				*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.				
				<b>8th Semester</b>				
				CHEM 495 (FW)				1.0
				CHEM 498R (FWSpSu) or other Requirement 5				3.0
				Civilization 2 or Social Science				3.0
				Arts				3.0
				Letters				3.0
				Religion elective				2.0
				<b>Total Hours</b>				<b>15.0</b>

**BS in Biochemistry (692826)**  
**2022-2023 Program Requirements (77 Credit Hours)**

<p><b>REQUIREMENT 1</b> Complete 18 courses  <b>NOTE: WITH DEPARTMENT APPROVAL CHEM 105 MAY SUBSTITUTE FOR CHEM 111; AND CHEM 106 FOR CHEM 112; AND CHEM 107 FOR CHEM 113.</b>  <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 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 2.0v            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</p> <p><b>REQUIREMENT 2</b> Complete 6 courses            MATH 112 - Calculus 1 4.0            MATH 113 - 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</p> <p><b>REQUIREMENT 3</b> Complete 1 option  <b>OPTION 3.1</b> Complete 1 course            STAT 201 - Statistics for Engineers and Scientists 3.0  <b>OPTION 3.2</b> Complete 2 courses            MATH 213 - Elementary Linear Algebra 2.0            MATH 215 - Computational Linear Algebra 1.0</p> <p><b>REQUIREMENT 4</b> 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</p>	<p>MMBIO 468 - (MMBio-Bio-PWS) Genomics 3.0</p> <p><b>REQUIREMENT 5</b> Complete 7.0 hours from the following course(s)  <b>AFTER CONSULTING WITH AN ADVISOR, COMPLETE 7 HOURS FROM THE FOLLOWING. NOTE: ONLY ONE OF BIO 130 OR CELL 120 CAN BE APPLIED TO THIS REQUIREMENT. NOTE: CHEM 355 CANNOT BE TAKEN IF CHEM 354 WAS TAKEN FOR 2 CREDIT HOURS. NOTE: WITH PRIOR APPROVAL, MANY 300-LEVEL AND ABOVE COURSES IN BIOLOGY, INTEGRATIVE BIOLOGY, MICROBIOLOGY AND MOLECULAR BIOLOGY, AND PHYSIOLOGY AND DEVELOPMENTAL BIOLOGY WILL FILL THIS REQUIREMENT.</b></p> <p>BIO 130 - Biology 4.0            CELL 120 - Science of Biology 3.0            CHEM 355 - Organic Chemistry Laboratory 2 - Nonmajors 1.0            CHEM 397R - Mentored Outreach and Service Learning 3.0v            CHEM 455 - Synthesis and Qualitative Organic Analysis 4.0            CHEM 460 - Mathematics for Physical Chemistry 1.0            CHEM 496R - Academic Internship: Chemistry and Biochemistry 6.0v  <i>You may take up to 3 credit hours.</i>            CHEM 498R - Capstone Experience in Chemistry/Biochemistry 4.0v  <i>You may take up to 3 credit hours.</i>            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 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 3.0v  <i>You may take up to 3 credit hours.</i>            HONRS 499R - Honors Thesis 6.0v  <i>You may take up to 3 credit hours.</i></p> <p><b>Recommended Courses: Chem 460.</b>  <b>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.</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> <p>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 <b>any</b> 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 <a href="mailto:suemort@chem.byu.edu">suemort@chem.byu.edu</a> or <a href="mailto:coffice@chem.byu.edu">coffice@chem.byu.edu</a></p> <p><b>MENTORED RESEARCH/EXPERIENTIAL LEARNING</b></p> <p>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; <a href="mailto:suemort@chem.byu.edu">suemort@chem.byu.edu</a> or <a href="mailto:coffice@chem.byu.edu">coffice@chem.byu.edu</a>.</p> <p><b>THE DISCIPLINE</b></p> <p>The Biochemistry Bachelor of Science degree provides excellent</p>
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## BS in Biochemistry (692826)

2022-2023

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