BS in Chemistry (692821) 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

University Core Requirements:

Requirements	#Classes	Hours	Classes
Religion Cornerstones			
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
The Individual and Society			
American Heritage	1-2	3-6.0	from approved list
Global and Cultural Awareness	1	3.0	from approved list
Skills			
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*
Arts, Letters, and Sciences			
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	3.0/4.0	CELL 120 or BIO 130
Physical Science	2	7.0	CHEM 111* and PHSCS 121*
Social Science	1	3.0	from approved list
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 (18 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

A HTG 100 (FWSpSu) or First-year Writing	3.0
CHEM 111* (F)	4.0
CELL 120, BIO 130 or other Biology G.E.**	3.0-4.0
MATH 112 (FWSPSu)	4.0
Religion Cornerstone course	2.0
Total Hours	**16-17**

*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.

2nd Semester

A HTG 100 (FWSpSu) or First-year Writing	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
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 213 (FWSpSu)	2.0
MATH 215 (FWSpSu)	1.0
PHSCS 121 (FWSp)	3.0
Religion Cornerstone course	2.0
Total Hours	**15**

*CHEM 351 may be substituted for CHEM 351M.

4th Semester

CHEM 352M* (W)	3.0
CHEM 354* (FWSp)	2.0
CHEM 381M** (W)	3.0
PHSCS 123 (FWSp)	3.0
CHEM 497R*** (FWSpSu) or other elective	1.0
Religion Cornerstone course	2.0
Open elective	1.0
Total Hours	**15**

*CHEM 352 may substitute for CHEM 352M; CHEM 353 for CHEM 354.
**With department approval, CHEM 481 may substitute for CHEM 381M
*** CHEM 497R requires acceptance by faculty for a mentored experience in their research lab

JUNIOR YEAR

5th Semester

Civilization 1	3.0
CHEM 514 (F)	3.0
CHEM 460 (F)	1.0
CHEM 462 (F)	3.0
PHSCS 220 (FWSp)	3.0
CHEM 518 (F)	2.0
Total Hours	**15**

6th Semester

CHEM 391 (FW)	3.0
CHEM 463 (W)	3.0
CHEM 464 (W)	1.0
CHEM 465 (W)	1.0
CHEM 497R or other Requirement 4	1.0
Global and Cultural Awareness	3.0
Religion Elective	2.0
Open Elective	1.0
Total Hours	**15**

SENIOR YEAR

7th Semester

CHEM 521(F) or 455 (F)*	2.0
CHEM 594R (FW)	0.5
Social Science	3.0
Arts or Letters	3.0
CHEM 497R (FWSpSu) or other Requirement 4	1.0
Religion Elective	2.0
Elective or Requirement 4	3.0
Total Hours	**14.5**

*Either CHEM 455 or CHEM 521 and 523 is required (see Requirement #3, options 3.1, 3.2). Taking both options can also fulfill Req. #4 .

8th Semester

CHEM 495 (FW)	1.0
CHEM 523* (W) or other Requirement 4	2.0
CHEM 498R** or other Requirement 4	3.0
Arts or Letters	3.0
Civilization 2	2.0
Religion elective	2.0
Total Hours	**14.0**

*Complete Requirement #3, option 3.2, by taking CHEM 523 **CHEM 498R is a research capstone experience. Enrollment in CHEM 498R follows successive semesters of enrollment in CHEM 497R. Faculty permission required. Contact department office for specific details.

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2022-2023 Program Requirements (76 Credit Hours)

REQUIREMENT 1 Complete 19 courses

NOTE: WITH DEPARTMENT APPROVAL, CHEM 105 MAY SUBSTITUTE FOR CHEM 111; AND CHEM 106 FOR CHEM 112; AND CHEM 107 FOR CHEM 113. MATH 314 MAY SUBSTITUTE FOR CHEM 460. NOTE: 2 CREDIT HOURS OF CHEM 354 ARE REQUIRED.

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 391 - Technical Writing Using Chemical Literature	3.0
CHEM 460 - Mathematics for Physical Chemistry	1.0
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 495 - Senior Seminar	1.0
CHEM 514 - Inorganic Chemistry	3.0
CHEM 518 - Advanced Inorganic Laboratory	2.0
CHEM 594R - General Seminar	0.5
You may take this course up to 1 time.	

REQUIREMENT 2 Complete 7 courses

MATH 112 - Calculus 1	4.0
MATH 113 - Calculus 2	4.0
MATH 213 - Elementary Linear Algebra	2.0
MATH 215 - Computational Linear Algebra	1.0
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 1 option

COMPLETE ONE OF THE FOLLOWING ADVANCED OPTIONS:

OPTION 3.1 Complete 1 course

CHEM 455 - Synthesis and Qualitative Organic Analysis	4.0

OPTION 3.2 Complete 2 courses

CHEM 521 - Instrumental Analysis Lecture	2.0
CHEM 523 - Instrumental Analysis Laboratory	2.0

REQUIREMENT 4 Complete 9.0 hours from the following course(s)

AFTER CONSULTING WITH AN ADVISOR, COMPLETE 9 HOURS FROM THE FOLLOWING. NOTE: ONLY ONE OF BIO 130 OR CELL 120 CAN BE APPLIED TO THIS REQUIREMENT. NOTE: WITH APPROVAL, CERTAIN OTHER 300-LEVEL AND ABOVE COURSES IN THE ALLIED FIELDS OF PHYSICS, STATISTICS, ENGINEERING, AND BIOLOGY MAY BE TAKEN TO SATISFY THIS REQUIREMENT. NOTE: ANY COURSE NOT TAKEN TO SATISFY REQUIREMENT 3 CAN BE TAKEN TO SATISFY REQUIREMENT 4.

BIO 130 - Biology	4.0
CELL 120 - Science of Biology	3.0
CHEM 384 - Biochemistry Methods	1.0
CHEM 397R - Mentored Outreach and Service Learning	3.0v
You may take up to 3 credit hours.	
CHEM 455 - Synthesis and Qualitative Organic Analysis	4.0
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 498R - Capstone Experience in Chemistry/Biochemistry	4.0v
You may take up to 3 credit hours.	
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 555 - Organic Spectroscopic Identification	2.0
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 - Adv Biochemical Methodology 1	
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
You may take up to 3 credit hours.	

Recommended Courses: Phscs 225; 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.

REGISTRATION ADVISEMENT

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.

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, which usually follows the first week of class.

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

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 or coffice@chem.byu.edu.

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).

BS in Chemistry (692821)

2022-2023

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

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ADVISEMENT CENTER INFORMATION

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