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*THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (21-22 hours overlap)*

**Graduation Requirements:**

- Minimum residence hours required: 30.0
- Minimum hours needed to graduate: 120.0

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**FRESHMAN YEAR**

- 1st Semester
  - Biological Science - BIO 130 or CELL 120: 3.0-4.0
  - CHEM 111* (F): 4.0
  - First-year Writing or A HTG 100: 3.0
  - MATH 112* (WSpSu): 4.0
  - Religion Cornerstone course: 2.0
  - **Total Hours:** 16.0-17.0

- 2nd Semester
  - First-year Writing or A HTG 100: 3.0
  - CHEM 112* (W): 3.0
  - CHEM 113* (FW): 2.0
  - CHEM 201 (F): 0.5
  - MATH 113 (FWSpSu): 4.0
  - Religion Cornerstone course: 2.0
  - **Total Hours:** 14.5

**SOPHOMORE YEAR**

- 3rd Semester
  - CHEM 227 (FSp): 4.0
  - STAT 201* or MATH 213 & 215 (FW): 3.0
  - PHSCS 122 (FWspSu): 3.0
  - CHEM 351M**: (F): 3.0
  - Religion Cornerstone course: 2.0
  - **Total Hours:** 15.0

- 4th Semester
  - MATH 213 & MATH 215 may be substituted for STAT 201 **CHEM 351 may be substituted for CHEM 351M
  - CHEM 352M* (W): 3.0
  - CHEM 354* (FWSp): 1.0
  - CHEM 381M**: (W): 3.0
  - CHEM 384 (W): 1.0
  - PHSCS 123 (FWsp): 3.0
  - CHEM 497R or open elective: 1.0
  - Religion Cornerstone course: 2.0
  - **Total Hours:** 14.0

**JUNIOR YEAR**

- 5th Semester
  - 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
  - CHEM 391* (FW): 3.0
  - CHEM 482 (F): 3.0
  - CHEM 584 (F): 3.0
  - PHSCS 220 (FWspSu): 3.0
  - CHEM 497R or open elective: 1.0
  - Civilization 1 or Social Science: 2.0
  - **Total Hours:** 16.0

- 6th Semester
  - CHEM 386 (W): 3.0
  - CHEM 468 (W): 3.0
  - PWS 340 (FW): 3.0
  - CHEM 497R or Requirement 5: 1.0
  - CELL 360 (FWspSu) or other Requirement 4: 3.0
  - Religion Elective: 2.0
  - **Total Hours:** 15.0

**SENIOR YEAR**

- 7th Semester
  - CHEM 489 (F): 3.0
  - CHEM 594R (FW): 0.5
  - Requirement 5 or open elective: 3.0
  - Civilization 1 or Social Science: 3.0
  - Global and Cultural Awareness: 3.0
  - Religion Elective: 2.0
  - **Total Hours:** 14.5

- 8th Semester
  - CHEM 495 (FWSu): 1.0
  - CHEM 498R or other Requirement 5: 3.0
  - Civilization 2 or Social Science: 3.0
  - Arts: 3.0
  - Letters: 3.0
  - Religion elective: 2.0
  - **Total Hours:** 15.0

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**Note:** CHEM 498R is a research capstone class. Typically, enrollment in CHEM 498R follows enrollment in CHEM 497R. Both courses give students an opportunity to be mentored in a faculty's research lab and receive class credit. Permission from faculty to enroll in either course is required. Contact department office for specific details.
**BS in Biochemistry (692826)**

**2021-2022 Program Requirements (77 Credit Hours)**

- **No more than 3 hours of 0 credit is allowed in major courses.**
- **REQUIREMENT 1** Complete 18 courses
  - 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 351H - Organic Chemistry 1 - Majors 3.0
  - CHEM 352H - Organic Chemistry 2 - Majors 3.0
  - CHEM 354 - Organic Chemistry Laboratory - Majors 2.0v
  - CHEM 358H - 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 594H - General Seminar 0.5
- **REQUIREMENT 2** Complete 6 courses
  - MATH 112 - Calculus 1 4.0
  - MATH 113 - Calculus 2 4.0
  - PHYS 112 - Introduction to Newtonian Mechanics 3.0
  - PHYS 113 - Introduction to Waves, Optics, and Thermodynamics 3.0
  - PHYS 220 - Introduction to Electricity and Magnetism 3.0
  - PHYS 340 - Genetics 3.0
- **OPTION 3.1** Complete 1 course
  - STAT 201 - Statistics for Engineers and Scientists 3.0
- **OPTION 3.2** Complete 2 courses
  - MATH 213 - Elementary Linear Algebra 2.0
  - MATH 215 - Computational Linear Algebra 1.0
- **REQUIREMENT 4** Complete 1 course
  - CELL 360 - Cell Biology 3.0
  - CELL 362 - Advanced Physiology 3.0
  - MMBIO 463 - Immunology 3.0

**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, usually after 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 or coffice@chem.byu.edu

**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, 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.