

BACHELOR OF SCIENCE IN BIOCHEMISTRY - QUANTITATIVE REASONING CATEGORY III/IV AND ENG 114

120 Total Units Required

Minimum Number of Units in the Major: 72

Course	Title	Units
First Semester		
ENG 114	Writing the First Year: Finding Your Voice (A2) ¹	3
MATH 197	Prelude to Calculus I (Prerequisite for MATH 226) ^{2,3}	3
GE Area A ⁴		3
GE Area C		3
GE Area D		3
Units		15
Second Semester		
BIOL 230	Introductory Biology I (Major Lower- Division)	5
CHEM 115	General Chemistry I: Essential Concepts of Chemistry (Major Lower-Division)	5
MATH 198	Prelude to Calculus II (Prerequisite for MATH 226, B4) ^{2,3}	3
GE Area E		3
Units		16
Third Semester		
CHEM 215 & CHEM 216	General Chemistry II: Quantitative Applications of Chemistry Concepts and General Chemistry II Laboratory: Quantitative Applications of Chemistry Concepts (Major Lower- Division)	5
MATH 226	Calculus I (Major Lower-Division, B4) ^{2,3}	4
GE Area A		3
GE Area D		3
Units		15

Fourth Semester

CHEM 233 & CHEM 234	Organic Chemistry I and Organic Chemistry I Laboratory (Major Lower-Division)	5
MATH 227	Calculus II (Major Lower-Division)	4
Select One Set of Courses (Major Lower-Division): ⁵		4
PHYS 111 & PHYS 112	General Physics I and General Physics I Laboratory (B1, B3)	
PHYS 220 & PHYS 222	General Physics with Calculus I and General Physics with Calculus I Laboratory (B1, B3)	
GE Area C		3
Units		16

Fifth Semester

Select One Set of Courses (Major Lower-Division): ⁵		4
PHYS 121 & PHYS 122	General Physics II and General Physics II Laboratory	
PHYS 240 & PHYS 242	General Physics with Calculus III and General Physics with Calculus III Laboratory	
GE Area C		3
GE Area D		3
GE Area UD-B: Upper-Division Physical and/or Life Sciences (Consider SF State Studies Course)		3
Units		13

Sixth Semester

CHEM 321	Quantitative Chemical Analysis (Major Upper- Division)	3
CHEM 335	Organic Chemistry II (Major Upper- Division)	3
Major Electives (15 Units Total) - Take One ⁶		3
GE Area UD-C: Upper-Division Arts and/or Humanities (Consider SF State Studies Course)		3
GE Area UD-D: Upper-Division Social Sciences (Consider SF State Studies Course)		3
Units		15

Seventh Semester

CHEM 300	General Physical Chemistry I (Major Upper-Division)	3
CHEM 340	Biochemistry I (Major Upper-Division)	3
CHEM 343	Biochemistry I Laboratory (Major Upper-Division)	3

Major Electives (15 Units Total) - Take One ⁶	3
GWAR Elective ⁷	3
Units	15
Eighth Semester	
CHEM 301	3
	General Physical Chemistry II (Major Upper-Division)
CHEM 341	3
	Biochemistry II
Major Electives (15 Units Total) - Take Two ⁶	6
SF State Studies or University Elective	3
Units	15
Total Units	120

¹ ENG 114 can only be taken if you complete Directed Self-Placement (DSP) and select ENG 114; if you choose ENG 104/ENG 105 through DSP you will satisfy A2 upon successful completion of ENG 105 in the second semester; multilingual students may be advised into alternative English courses.

² Depending on courses completed through Early Start, students in Pathway/Category III or IV may be required to enroll in a support course to complement their Quantitative Reasoning/B4 requirement. There are multiple course options for this pathway. Before enrolling in a B4 course, students should verify their MATH Pathway/Category in their [Student Center](#). Information regarding the courses that correspond with your MATH Pathway/Category can be found on the [Developmental Studies Office Website](#).

³ QR Category III students with a grade of B or higher in high school pre-calculus in the past year may be able to enroll in MATH 226. Please see a department advisor.

⁴ To avoid taking additional units, it is recommended that you meet **SF State Studies** requirements (AERM, GP, ES, SJ) within your GE or major.

⁵ PHYS 111 and PHYS 112 are prerequisites for PHYS 121 and PHYS 122. PHYS 220 and PHYS 222 are prerequisites for PHYS 240 and PHYS 242.

⁶ Upper-Division Electives (15 units)

- Students must complete at least 15 units of upper-division Chemistry and Biology electives selected from the lists below. Courses from community colleges cannot be substituted for the courses on the list below.
- Electives must include at least:
 - a. one course with a CHEM prefix,
 - b. one GWAR (GW) course (See Footnote 7), and
 - c. three laboratory courses.
- Note that many Biology electives have a BIOL 240 prerequisite.
- Students wishing to enroll in BIOL 350, BIOL 355, and BIOL 612 without completing the BIOL 240 prerequisite should contact an advisor before registration.
- Students should consult an advisor regarding selection of elective courses and check course co- and pre-requisites before enrolling.
- Graduate level courses in chemistry or appropriate courses in biology, physics, geosciences, and computer science may be substituted upon prior approval of advisor.

Upper-Division Electives in Chemistry

- CHEM 322 Quantitative Chemical Analysis Laboratory (2 units)
- CHEM 325 Inorganic Chemistry (3 units)
- CHEM 327 Practical GC and HPLC (4 units)
- CHEM 336 Organic Chemistry II Laboratory (2 units)
- CHEM 370 Computer Applications in Chemistry and Biochemistry (3 units)
- CHEM 420 Environmental Analysis (3 units)
- CHEM 422 Instrumental Analysis (4 units)
- CHEM 426 Advanced Inorganic Chemistry Laboratory (2 units)
- CHEM 433 Advanced Organic Chemistry (3 units)
- CHEM 443 Biophysical Chemistry Laboratory (4 units)
- CHEM 451 Experimental Physical Chemistry Laboratory (2 units)
- CHEM 645 Research Trends in Chemistry and Biochemistry (3 units)
- CHEM 680 Chemical Oceanography (3 units)
- CHEM 699 Independent Study (1-6 units)

Upper-Division Electives in Biology

- BIOL 350 Cell Biology (3 units)
- BIOL 351GW Experiments in Cell and Molecular Biology - GWAR (4 units)
- BIOL 355 Genetics (3 units)
- BIOL 357 Molecular Genetics (3 units)
- BIOL 401 General Microbiology (3 units)
- BIOL 402GW General Microbiology Laboratory - GWAR (3 units)
- BIOL 420 General Virology (3 units)
- BIOL 435 Immunology (3 units)
- BIOL 436 Immunology Laboratory (2 units)
- BIOL 612 Human Physiology (3 units)
- BIOL 613GW Human Physiology Laboratory - GWAR (3 units)
- BIOL 638 Bioinformatics and Genome Annotation (4 units)
- BIOL 640 Cellular Neurosciences (3 units)

⁷ GWAR Elective (3-4 units)

- BIOL 351GW Experiments in Cell and Molecular Biology - GWAR (4 units)
- BIOL 402GW General Microbiology Laboratory - GWAR (3 units)
- BIOL 613GW Human Physiology Laboratory - GWAR (3 units)
- CHEM 390GW Contemporary Chemistry and Biochemistry Research - GWAR (3 units)