## Bachelor of Science in Biochemistry - Quantitative Reasoning Category III/IV and Stretch English

120 Total Units Required  
Minimum Number of Units in the Major: 72

### Course Title Units

#### First Semester
- **ENG 104**  
  Writing the First Year: Finding Your Voice Stretch I  
  3
- **MATH 197**  
  Prelude to Calculus I (Prerequisite for MATH 226)  
  3
- **GE Area A**  
  3
- **GE Area C**  
  3
- **GE Area D**  
  3

#### Second Semester
- **BIOL 230**  
  Introductory Biology I (Major Lower-Division)  
  5
- **CHEM 115**  
  General Chemistry I: Essential Concepts of Chemistry (Major Lower-Division)  
  5
- **ENG 105**  
  Writing the First Year: Finding Your Voice Stretch II (A2)  
  3
- **MATH 198**  
  Prelude to Calculus II (Prerequisite for MATH 226, B4)  
  3

#### 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)  
  4
- **GE Area A**  
  3

#### 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
- **PHYS 111 & PHYS 112**  
  General Physics I and General Physics I Laboratory (B1, B3)  
  4
- **PHYS 220 & PHYS 222**  
  General Physics with Calculus I and General Physics with Calculus I Laboratory (B1, B3)  
  4

#### Fifth Semester
- **Select One Set of Courses (Major Lower-Division):**  
  5
- **PHYS 121 & PHYS 122**  
  General Physics II and General Physics II Laboratory  
  4
- **PHYS 240 & PHYS 242**  
  General Physics with Calculus III and General Physics with Calculus III Laboratory  
  4
- **GE Area C**  
  3
- **GE Area D - Take Two**  
  6

#### 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
- **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

#### Seventh Semester
- **CHEM 300**  
  General Physical Chemistry I (Major Upper-Division)  
  3
- **CHEM 340**  
  Biochemistry I (Major Upper-Division)  
  3
Bachelor of Science in Biochemistry - Quantitative Reasoning Category III/IV and Stretch English

**Eighth Semester**

- **CHEM 301**
  - General Physical Chemistry II (Major Upper-Division)
  - 3 units

- **CHEM 341**
  - Biochemistry II
  - 3 units

- **Major Electives (15 Units Total) - Take One**
  - 6 units

- **GE Area UD-B: Upper-Division Physical and/or Life Sciences (Consider SF State Studies Course)**
  - 3 units

**Units Total**: 15

---

**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 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 (2 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)

**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)