## 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

This roadmap is a suggested plan of study and does not replace meeting with an advisor. Please note that students may need to adjust the actual sequence of courses based on course availability. Please consult an advisor in your major program for further guidance.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Semester</strong></td>
<td></td>
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<tr>
<td>EN14</td>
<td>Writing the First Year: Finding Your Voice (A2)</td>
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<tr>
<td>MATH 197</td>
<td>Prelude to Calculus I (Prerequisite for MATH 226)</td>
<td>3</td>
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<tr>
<td>GE Area A</td>
<td></td>
<td>3</td>
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<tr>
<td>GE Area C</td>
<td></td>
<td>3</td>
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<tr>
<td>GE Area D</td>
<td></td>
<td>3</td>
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<tr>
<td><strong>Second Semester</strong></td>
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<td>Units</td>
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<tr>
<td>BIOL 230</td>
<td>Introductory Biology I (Major Lower-Division)</td>
<td>5</td>
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<tr>
<td>CHEM 215</td>
<td>General Chemistry I: Essential Concepts of Chemistry (Major Lower-Division)</td>
<td>5</td>
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<tr>
<td>MATH 198</td>
<td>Prelude to Calculus II (Prerequisite for MATH 226, B4)</td>
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<tr>
<td>GE Area E</td>
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<tr>
<td><strong>Third Semester</strong></td>
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<td>Units</td>
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<tr>
<td>CHEM 215</td>
<td>General Chemistry II: Quantitative Applications of Chemistry Concepts and General Chemistry II Laboratory: Quantitative Applications of Chemistry Concepts (Major Lower-Division)</td>
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<tr>
<td>MATH 226</td>
<td>Calculus I (Major Lower-Division, B4)</td>
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<tr>
<td>GE Area A</td>
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<td>3</td>
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### Fourth Semester

- **CHEM 233**: Organic Chemistry I and Organic Chemistry I Laboratory (Major Lower-Division)  
- **MATH 227**: Calculus II (Major Lower-Division)  
- **Select One Set of Courses (Major Lower-Division)**:  
  - **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)  

### Fifth Semester

- **Select One Set of Courses (Major Lower-Division)**:  
  - **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  

### Sixth Semester

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

### Seventh Semester

- **CHEM 300**: General Physical Chemistry I (Major Upper-Division)  
- **CHEM 340**: Biochemistry I (Major Upper-Division)
Bachelor of Science in Biochemistry - Quantitative Reasoning Category III/IV and ENG 114

**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 (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)