Bachelor of Science in Biochemistry - Quantitative Reasoning Category I/II and Stretch English

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

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>First Semester</td>
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</tr>
<tr>
<td>CHEM 115</td>
<td>General Chemistry I: Essential Concepts of Chemistry (Major Lower-Division)</td>
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<tr>
<td>ENG 104</td>
<td>Writing the First Year: Finding Your Voice Stretch I</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>Second Semester</td>
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<tr>
<td>ENG 105</td>
<td>Writing the First Year: Finding Your Voice Stretch II (A2)</td>
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<tr>
<td>MATH 227</td>
<td>Calculus II (Major Lower-Division)</td>
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<tr>
<td>Select One Set of Courses (Major Lower-Division):</td>
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<tr>
<td>PHYS 111 &amp; PHYS 112</td>
<td>General Physics I and General Physics I Laboratory (B1, B3)</td>
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<td>PHYS 220 &amp; PHYS 222</td>
<td>General Physics with Calculus I and General Physics with Calculus I Laboratory (B1, B3)</td>
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<td>GE Area C</td>
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<td>GE Area D</td>
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<td>Third Semester</td>
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<tr>
<td>CHEM 215 &amp; CHEM 216</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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<td>Fourth Semester</td>
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<td>BIOL 230</td>
<td>Introductory Biology I (Major Lower-Division)</td>
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<td>GE Area C - Take Two</td>
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<tr>
<td>GE Area D</td>
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<td>Fifth Semester</td>
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<td>CHEM 321</td>
<td>Quantitative Chemical Analysis (Major Upper-Division)</td>
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<td>CHEM 335</td>
<td>Organic Chemistry II (Major Upper-Division)</td>
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<td>GWAR Elective</td>
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<tr>
<td>GE Area D</td>
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<tr>
<td>SF State Studies or University Elective</td>
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<tr>
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<td>Sixth Semester</td>
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<td>CHEM 340</td>
<td>Biochemistry I (Major Upper-Division)</td>
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<td>CHEM 343</td>
<td>Biochemistry I Laboratory (Major Upper-Division)</td>
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<td>Major Electives (15 Units Total) - Take One</td>
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<td>GE Area UD-D: Upper-Division Social Sciences (Consider SF State Studies Course)</td>
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<td>GE Area UD-C: Upper-Division Arts and/or Humanities (Consider SF State Studies Course)</td>
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<td>Seventh Semester</td>
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<td>CHEM 300</td>
<td>General Physical Chemistry I (Major Upper-Division)</td>
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<tr>
<td>CHEM 341</td>
<td>Biochemistry II (Major Upper-Division)</td>
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<tr>
<td>GE Area UD-B: Upper-Division Physical and/or Life Sciences (Consider SF State Studies Course)</td>
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Eighth Semester

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<tr>
<td>CHEM 301</td>
<td>General Physical Chemistry II (Major Upper-Division)</td>
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<tr>
<td>SF State Studies or University Elective - Take Two</td>
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<td>Total Units</td>
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Upper-Division Electives (15 units)

- Students must complete at least 1.5 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 5), 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)