# Bachelor of Arts in Chemistry Roadmap

120 Total Units Required  
Minimum Number of Units in the Major: 56

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Semester</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 115</td>
<td>General Chemistry I: Essential Concepts of Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>PHYS 111 &amp; PHYS 112</td>
<td>General Physics I: or General Physics with Calculus I and General Physics with Calculus I Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>or PHYS 220 &amp; PHYS 222</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GE Area A: Oral Communication (A1) or Critical Thinking (A3) ¹</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GE Area A: Written English Communication (A2) ²</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Second Semester</strong></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>CHEM 215 &amp; CHEM 216</td>
<td>General Chemistry II: Quantitative Applications of Chemistry Concepts and General Chemistry II Laboratory</td>
<td>5</td>
</tr>
<tr>
<td>PHYS 121 &amp; PHYS 122</td>
<td>General Physics II: or General Physics with Calculus II and General Physics with Calculus II Laboratory or General Physics with Calculus III and General Physics with Calculus III Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>or PHYS 230 &amp; PHYS 232</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or PHYS 240 &amp; PHYS 242</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GE Area A: Oral Communication (A1) or Critical Thinking (A3) ¹</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GE Area A: Written English Communication II (A4) if not already satisfied</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GE Area A: Written English Communication II (A4) if not already satisfied</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GE Area C: Arts (C1) or Humanities (C2)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GE Area D: U.S. History (D2) or U.S. and California Government (D3)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Third Semester</strong></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>CHEM 233 &amp; CHEM 234</td>
<td>Organic Chemistry I and Organic Chemistry I Laboratory</td>
<td>5</td>
</tr>
<tr>
<td>MATH 226</td>
<td>Calculus I ³</td>
<td>4</td>
</tr>
<tr>
<td>GE Area C: Humanities: Literature (C3)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GE Area D: Social Sciences (D1)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Fourth Semester</strong></td>
<td>15</td>
</tr>
<tr>
<td>CHEM 335 &amp; CHEM 336</td>
<td>Organic Chemistry II and Organic Chemistry II Laboratory</td>
<td>5</td>
</tr>
<tr>
<td>MATH 227</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>GE Area A: Written English Communication II (A4) if not already satisfied</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>or Complementary Studies or SF State Studies or University Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GE Area B: Life Science (B2)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Fifth Semester</strong></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>CHEM 321 &amp; CHEM 322</td>
<td>Quantitative Chemical Analysis and Quantitative Chemical Analysis Laboratory</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 390GW or SCI 560GW</td>
<td>Contemporary Chemistry and Biochemistry Research - GWAR or Science Writing - GWAR</td>
<td>3</td>
</tr>
<tr>
<td>GE Area C: Arts (C1) or Humanities (C2)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GE Area D: U.S. History (D2) or U.S. and California Government (D3)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Sixth Semester</strong></td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>CHEM 300</td>
<td>General Physical Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 349 &amp; CHEM 340</td>
<td>General Biochemistry or Biochemistry I</td>
<td>3</td>
</tr>
<tr>
<td>GE Area C: Arts (C1)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GE Area UD–C: Upper Division Arts and/or Humanities (Consider SF State Studies Course)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Complementary Studies or SF State Studies or University Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Seventh Semester</strong></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>CHEM 325</td>
<td>Inorganic Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>GE Area UD–B: Upper Division Physical and/or Life Sciences (Consider SF State Studies Course)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Complementary Studies or SF State Studies or University Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Eighth Semester</strong></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Advanced Laboratory Electives ⁸</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GE Area UD–D: Upper Division Social Sciences (Consider SF State Studies Course)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

¹ Only one of these two courses is required.  
² GE Area A: Written English Communication (A4) is required of students who have not already satisfied this area through another course.  
³ Calculus I ³ and Calculus II ³ are required of students who have not already satisfied this area through another course.  
⁴ Students must complete at least one science laboratory course in a major in addition to the chemistry laboratory courses.  
⁵ GE Area C: Arts (C1) and/or Humanities (C2) is required of students who have not already satisfied this area through another course.  
⁶ GE Area D: Social Sciences (D1) is required of students who have not already satisfied this area through another course.  
⁷ This course must be taken at San Francisco State University.  
⁸ Advanced Laboratory Electives are courses that are designed to provide advanced laboratory experience in areas of chemistry. These courses are typically offered in the advanced chemistry sequence and are intended to provide students with a deeper understanding of chemical principles and techniques.  
⁹ This course must be taken at San Francisco State University.
Complementary Studies or SF State Studies or University Elective | 10 Units
--- | ---
Total Units | 120

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

2. 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.

3. Depending on courses completed through Early Start and in high school, students in Pathway/Category 3 or 4 may be required to enroll in additional courses before they can take MATH 199 or MATH 226. Most students in Pathway/Category 3 or 4 will need to take a stretch format for MATH 199 (MATH 197 in Fall 2018 and MATH 198 in Spring 2019). Before enrolling in a B4 course, students should verify their MATH Pathway/Category in their Student Center (http://cms.sfsu.edu/content/student-center). Information regarding the courses that correspond with your MATH Pathway/Category can be found on the Developmental Studies Office Website (http://developmentalstudies.sfsu.edu).

4. CHEM 338 may be substituted for CHEM 336.

5. **Complementary Studies**

   Students in the BA chemistry program will satisfy the Complementary Studies Requirement with the completion of courses in physics and mathematics that are required in the major.

   Students who have earned AA-T or AS-T degrees and are pursuing a similar B.A. degree at SF State are required to fulfill the Complementary Studies requirement as defined by the major department. Students should consult with a major advisor about how transfer units and/or SF State units can best be applied to this requirement in order to ensure degree completion within 60 units.

6. CHEM 351 may be substituted for CHEM 300 if prerequisites for CHEM 351 are met.

7. CHEM 699 and CHEM 470 may not both be used to fulfill the elective requirements. Enrollment by petition only.

8. **Advanced Laboratory Electives**

   - CHEM 327 Practical GC and HPLC (4 units)
   - CHEM 343 Biochemistry I Laboratory (3 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 451 Experimental Physical Chemistry Laboratory (2 units)
   - CHEM 699 Independent Study (1-6 units)