

# BACHELOR OF SCIENCE IN CHEMISTRY ROADMAP - QUANTITATIVE REASONING CATEGORY III/IV AND STRETCH ENGLISH

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.

Course	Title	Units
<b>First Semester</b>		
ENG 104	Writing the First Year: Finding Your Voice Stretch I <sup>1</sup>	3
MATH 197	Prelude to Calculus I (Prerequisite for MATH 226) <sup>2,3</sup>	3
GE Area A <sup>4</sup>		3
GE Area C		3
GE Area D		3
Units		15
<b>Second Semester</b>		
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) <sup>1</sup>	3
MATH 198	Prelude to Calculus II (Prerequisite for MATH 226, B4) <sup>2,3</sup>	3
GE Area C		3
GE Area D		3
Units		17
<b>Third Semester</b>		
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) <sup>2,3</sup>	4
GE Area A		3
GE Area E		3
Units		15
<b>Fourth Semester</b>		
CHEM 233 & CHEM 234	Organic Chemistry I and Organic Chemistry I Laboratory (Major Lower-Division)	5
MATH 227	Calculus II (Major Lower-Division)	4
PHYS 220 & PHYS 222	General Physics with Calculus I and General Physics with Calculus I Laboratory (Major Lower-Division, B1, B3)	4
GE Area B: Life Science (B2)		3
Units		16
<b>Fifth Semester</b>		
CHEM 321 & CHEM 322	Quantitative Chemical Analysis and Quantitative Chemical Analysis Laboratory (Major Upper-Division)	5
CHEM 335 & CHEM 336	Organic Chemistry II and Organic Chemistry II Laboratory (Major Upper-Division) <sup>5</sup>	5
PHYS 230 & PHYS 232	General Physics with Calculus II and General Physics with Calculus II Laboratory (Major Lower-Division)	4
GE Area C		3
Units		17
<b>Sixth Semester</b>		
CHEM 251	Mathematics and Physics for Chemistry (Major Lower-Division) <sup>6</sup>	3
CHEM 325	Inorganic Chemistry (Major Upper-Division)	3
CHEM 351	Physical Chemistry I: Thermodynamics and Kinetics (Major Upper-Division)	3

CHEM 390GW	Contemporary Chemistry and Biochemistry Research - GVAR (Major Upper-Division)	3	
GE Area D		3	
		Units	15
<b>Seventh Semester</b>			
CHEM 340	Biochemistry I (Major Upper-Division)	3	
CHEM 353	Physical Chemistry II: Quantum Chemistry and Spectroscopy (Major Upper-Division)	3	
CHEM 426	Advanced Inorganic Chemistry Laboratory (Major Upper-Division) <sup>7</sup>	2	
Upper-Division Major Elective (9 Units Total) - Take One <sup>8</sup>		3-4	
GE Area UD-D: Upper-Division Social Sciences (Consider SF State Studies Course)		3	
		Units	14-15
<b>Eighth Semester</b>			
CHEM 451	Experimental Physical Chemistry Laboratory (Major Upper-Division) <sup>7</sup>	2	
Upper-Division Major Elective (9 Units Total) – Take Two <sup>8</sup>		6-8	
GE Area UD-B: Upper-Division Physical and/or Life Sciences (Consider SF State Studies Course)		3	
GE Area UD-C: Upper-Division Arts and/or Humanities (Consider SF State Studies Course)		3	
		Units	15
		Total Units	124-125

<sup>7</sup> CHEM 343 may be substituted for either CHEM 426 or CHEM 451 with prior approval of an advisor; CHEM 699 (three units of research in one or more of these three disciplinary areas) may also be substituted with advisor approval.

<sup>8</sup> **Major Electives**

CHEM 341 Biochemistry II (3 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 433 Advanced Organic Chemistry (3 units)  
 CHEM 443 Biophysical Chemistry Laboratory (4 units)  
 CHEM 645GW Research Trends in Chemistry and Biochemistry - GVAR (3 units)  
 CHEM 680 Chemical Oceanography (3 units)  
 CHEM 699 Independent Study (3 units)<sup>7</sup>

\* General Education Requirements Met in the Chemistry Major  
 The requirements below are deemed “met in the major” upon completion of the courses listed (even though the courses and their prerequisites are not approved for GE). This is true whether or not the student completes the major.

Area B1 (Physical Science) is satisfied upon completion of CHEM 233.

Area B3 (Laboratory Science) is satisfied upon completion of CHEM 234.

<sup>1</sup> 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.

<sup>2</sup> 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 (<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/>).

<sup>3</sup> 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.

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

<sup>5</sup> CHEM 338 may be substituted for CHEM 336.

<sup>6</sup> PHYS 240 and MATH 228 may be substituted for CHEM 251.