B.S. AND M.S. IN CHEMISTRY SF SCHOLARS ROADMAP

The San Francisco State Scholars program provides undergraduate students with an accelerated pathway to a graduate degree. Students in this program pursue a bachelor's and master's degree simultaneously. This program allows students to earn graduate credit while in their junior and/or senior year, reducing the number of semesters required for completion of a master's degree.

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
First Year		
Fall Semester		
CHEM 115	General Chemistry I (Major Lower-Division)	5
ENG 114	Writing the First Year: Finding Your Voice (A2) [1]	3
MATH 226	Calculus I (Major Lower-Division, B4)) [2]	4
GE Area A [3]		3
	Units	**15**
Spring 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 227	Calculus II (Major Lower-Division)	4
GE Area A		3
GE Area E		3
	Units	**15**
Second Year		
Fall Semester		
CHEM 233 & CHEM 234	Organic Chemistry I and Organic Chemistry I Laboratory (Major Lower-Division) [4]	5
CHEM 321 & CHEM 322	Quantitative Chemical Analysis and Quantitative Chemical Analysis Laboratory (Major Upper-Division)	5
Select One (Major Lower-Division, B1, B3):		4
PHYS 111 & PHYS 112	General Physics I and General Physics I Laboratory	
PHYS 220 & PHYS 222	General Physics with Calculus I and General Physics with Calculus I Laboratory	
	Units	**14**
Spring Semester		
CHEM 335 & CHEM 336	Organic Chemistry II and Organic Chemistry II Laboratory (Major Upper-Division)	5
Select One (Major Lower-Division):		4
PHYS 121 & PHYS 122	General Physics II and General Physics II Laboratory	
PHYS 230 & PHYS 232	General Physics with Calculus II and General Physics with Calculus II Laboratory	
GE Area B: Life Science (B2)		3
GE Area C		3
	Units	**15**
Third Year		
Summer Semester		
GE Area D		3
SF State Studies or University Elective		3
	Units	**6**
Fall Semester		
CHEM 251	Mathematics and Physics for Chemistry (Major Lower-Division)	3
CHEM 325	Inorganic Chemistry (Major Upper-Division)	3
CHEM 351	Physical Chemistry I: Thermodynamics and Kinetics (Major Upper-Division)	3
GE Area C		3
GE Area D		3
	Units	**15**

Spring Semester		
CHEM 353	Physical Chemistry II: Quantum Chemistry and Spectroscopy (Major Upper-Division)	3
CHEM 390GW	Contemporary Chemistry and Biochemistry Research - GWAR (Major Upper-Division)	3
CHEM 426	Advanced Inorganic Chemistry Laboratory (Major Upper-Division) [5]	2
GE Area C		3
GE Area F [±]		3
	Units	**14**
Fourth Year		
Summer Semester		
GE Area UD-C: Upper-Division Arts and/or Humanities		3
GE Area UD-D: Upper-Division Social Sciences		3
	Units	**6**
Fall Semester		
CHEM 340	Biochemistry I (Major Upper-Division)	3
CHEM 451	Experimental Physical Chemistry Laboratory (Major Upper-Division) [5]	2
Upper-Division Major Elective (9 Units) - Take One [6]		3
Graduate Related Study - Take One [7]		3
GE Area UD-B: Upper-Division Physical and/or Life Sciences		3
	Units	**14**
Spring Semester		
CHEM 879	Research Methods I (Graduate Core)	3
Upper-Division Major Elective (9 Units) – Take Two [6]		6
Graduate Related Study - Take One [7]		3
U.S. and California Government (http://bulletin.sfsu.edu/undergraduate-education/american-institutions/#usg)		3
	Units	**15**
Fifth Year		
Fall Semester		
CHEM 897	Research (Graduate Research)	3
Graduate Related Study - Take Two [7]		6
	Units	**9**
Spring Semester		
CHEM 880	Research Methods II (Graduate Core)	3
CHEM 897	Research (Graduate Research)	6
Select One (Culminating Experience):		3
CHEM 895	Research Project	
CHEM 898	Master's Thesis	
	Units	**12**
	Total Units	**150**

1 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.

2 To determine the best B4 course option, students should complete the online advising activity at mathadvising.sfsu.edu (https://mathadvising.sfsu.edu/). Questions? Contact Gator Smart Start. (https://gatorsmartstart.sfsu.edu/)

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

4 Area B1 (Physical Science) is satisfied upon completion of CHEM 233. Area B3 (Laboratory Science) is satisfied upon completion of CHEM 234.

5 Students may substitute CHEM 343 for CHEM 426 or CHEM 451 upon prior approval of advisor. If CHEM 343 is used as a substitute, it can not also be used as an elective.

6 **Major Electives**

A minimum of 9 units of electives must be selected from the following list of courses. Courses from community colleges cannot be substituted for the courses on the list below. Graduate-level courses in chemistry or appropriate courses in biology, physics, geosciences, and computer science may be substituted upon prior approval of an advisor. Students should keep in mind that non-Chemistry courses may require additional prerequisites that are not met in the Chemistry degree or permission of the instructor.

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 - GWAR (3 units)
CHEM 667/BIOL 667 Optical Engineering for the Biological Sciences (3 units)
CHEM 680 Chemical Oceanography (3 units)
CHEM 699 Independent Study* (3 units)
Select a maximum of one:
CSC 306 An Interdisciplinary Approach to Computer Programming (3 units)
CSC 508 Machine Learning and Data Science for Personalized Medicine (3 units)
CSC 509 Data Science and Machine Learning for Medical Image Analysis (3 units)

7 **Related Study**

Graduate courses in biochemistry, chemistry, physics, mathematics, or biology on advisement of graduate major advisor. Upper-division courses may be used with permission of a graduate major advisor.
Analytical/Environmental/Methods (AEM)
CHEM 741 Electron Microscopy (4 units)
CHEM 800 Special Topics in Chemistry (3 units)
CHEM 820 (units)

CHEM 821 Mass Spectrometry - Principles and Practice (3 units)
Biochemistry (BIO)
CHEM 800 Special Topics in Chemistry (3 units)
CHEM 841 Enzymology (3 units)
CHEM 851 Biochemical Spectroscopy (3 units)
Organic/Medicinal (OM)
CHEM 800 Special Topics in Chemistry (3 units)
CHEM 832 Organic Synthesis (3 units)
CHEM 834 Organic Spectroscopic Methods (3 units)
CHEM 842 Bioorganic and Medicinal Chemistry (3 units)
Physical/Inorganic/Computational (PIC)
CHEM 800 Special Topics in Chemistry (3 units)
CHEM 851 Biochemical Spectroscopy (3 units)
CHEM 852 (units)
CHEM 870 Computational Methods in Chemistry (3 units)
Chemical Education
CHEM 885 (units)

* By petition only. To be used as an upper division elective in Chemistry, a minimum of 3-units must be taken in a single semester.

± Given catalog rights, fall 2023 transfer students do not need to complete an Area F course.