

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: Essential Concepts of Chemistry (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 | 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 - GVAR (Major Upper-Division) | 3 |
| CHEM 426 | Advanced Inorganic Chemistry Laboratory (Major Upper-Division) ⁶ | 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 (Consider SF State Studies Course) | | 3 |
| GE Area UD-D: Upper-Division Social Sciences (Consider SF State Studies Course) | | 3 |
| Units | | 6 |

Fall Semester

| | | |
|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-----------|
| CHEM 340 | Biochemistry I (Major Upper-Division) | 3 |
| CHEM 451 | Experimental Physical Chemistry Laboratory (Major Upper-Division) ⁶ | 2 |
| Upper-Division Major Elective (9 Units) - Take One ⁷ | | 3 |
| GE Area UD-B: Upper-Division Physical and/or Life Sciences (Consider SF State Studies Course) | | 3 |
| Graduate Related Study - Take One ⁸ | | 3 |
| Units | | 14 |

Spring Semester

| | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-----------|
| CHEM 879 | Research Methods I (Graduate Core) | 3 |
| Upper-Division Major Elective (9 Units) – Take Two ⁷ | | 6 |
| Graduate Related Study - Take One ⁸ | | 3 |
| U.S. and California Government (http://bulletin.sfsu.edu/undergraduate-education/american-institutions/#usg) | | 3 |
| Units | | 15 |

Fifth Year**Fall Semester**

| | | |
|------------------------------------------------|-------------------------------------|-----------|
| CHEM 880 | Research Methods II (Graduate Core) | 3 |
| CHEM 897 | Research (Graduate Research) | 3 |
| Graduate Related Study - Take Two ⁸ | | 6 |
| Units | | 12 |

Spring Semester

| | | |
|--------------------------------------|------------------------------|------------|
| CHEM 897 | Research (Graduate Research) | 6 |
| Select One (Culminating Experience): | | 3 |
| CHEM 895 | Research Project | |
| CHEM 898 | Master's Thesis | |
| Units | | 9 |
| 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 CHEM 338 may be substituted for CHEM 336.

⁶ 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.

Major Electives

⁷ 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.

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)

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)

⁸ 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 NMR Applications and Techniques (3 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 Statistical Mechanics: Molecular Relaxation (3 units)

CHEM 870 Computational Methods in Chemistry (3 units)

Chemical Education

CHEM 885 Teaching College Chemistry (3 units)

± Given catalog rights, fall 2022 transfer students do not need to complete an Area F course.