

BACHELOR OF SCIENCE IN BIOLOGY: CONCENTRATION IN MICROBIOLOGY ROADMAP – QUANTITATIVE REASONING CATEGORY III/IV AND ENG 114

120 Total Units Required

Minimum Number of Units in the Major: 60

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 Semester		
BIOL 230	Introductory Biology I (Major Lower-Division Core)	5
BIOL 231	Advising for Success as a Biology Major (Major Lower-Division Core)	1
ENG 114	Writing the First Year: Finding Your Voice (A2) ¹	3
MATH 197	Prelude to Calculus I (Prerequisite for MATH 226) ^{2,3}	3
GE Area A ⁴		3
Units		15
Second Semester		
CHEM 115	General Chemistry I: Essential Concepts of Chemistry (Major Lower-Division Core)	5
MATH 198	Prelude to Calculus II (Prerequisite for MATH 226, B4) ^{2,3}	3
GE Area A		3
GE Area E		3
Units		14
Third Semester		
BIOL 240	Introductory Biology II (Major Lower-Division Core)	5
CHEM 215	General Chemistry II: Quantitative Applications of Chemistry Concepts (Major Lower-Division Core)	3

MATH 226	Calculus I (Major Lower-Division Core, B4) ^{2,3}	4
GE Area D		3
Units		15
Fourth Semester		
Select One (Major Lower-Division Core): ⁵		3
CHEM 130	General Organic Chemistry	
CHEM 233	Organic Chemistry I	
PHYS 111 & PHYS 112	General Physics I and General Physics I Laboratory (Major Lower-Division Core, B1, B3)	4
GE Area C - Take Two		6
GE Area D		3
Units		16
Fifth Semester		
BIOL 355	Genetics (Major Upper-Division Core)	3
BIOL 401 & BIOL 402GW	General Microbiology and General Microbiology Laboratory - GVAR (Major Upper-Division Core)	6
Select One (Major Lower-Division Core): ⁵		3
CHEM 335	Organic Chemistry II	
SF State Studies or University Elective (if CHEM 130 taken)		
PHYS 121 & PHYS 122	General Physics II and General Physics II Laboratory (Major Lower-Division Core)	4
Units		16
Sixth Semester		
BIOL 337	Evolution (Major Upper-Division Core)	3
Select One (Major Upper-Division Core):		
CHEM 340	Biochemistry I	
CHEM 349	General Biochemistry	
GE Area C		3
GE Area F		3
U.S. and California Government (http://bulletin.sfsu.edu/undergraduate-education/american-institutions/#usg)		3
SF State Studies or University Elective		3
Units		15
Seventh Semester		
Major Upper-Division Electives (11 Units Total) ⁶		6
GE Area UD-C: Upper-Division Arts and/or Humanities (Consider SF State Studies Course)		3
SF State Studies or University Elective - Take Two		6
Units		15
Eighth Semester		
Major Upper-Division Electives (11 Units Total) ⁶		5

GE Area UD-D: Upper-Division Social Sciences (Consider SF State Studies Course)	3
SF State Studies or University Elective - Take Two	6
Units	14
Total Units	120

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 GE Area A2 upon successful completion of ENG 105 in the second semester; multilingual students may be advised into alternative English courses.

² 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/>).

³ 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.

⁴ 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.

⁵ CHEM 233 is a prerequisite for CHEM 335. If students plan to take CHEM 335, they must take CHEM 233.

⁶ **Electives in Microbiology**

Select 11 units from the following courses, including at least two laboratory courses. Consult an advisor to select electives that best align with your interests and future career goals. Any course taken as an elective that does not appear on this list will not be counted towards the completion of the Microbiology degree requirements unless it is approved by an advisor prior to enrolling in the course. Students who intend to apply for admission to Clinical Laboratory Science programs after graduation are strongly advised to speak with a Microbiology advisor for help in choosing their elective classes.

- BIOL 420 General Virology (3 units)
 - BIOL 425 Emerging Diseases (3 units)
 - BIOL 430 Medical Microbiology (3 units)
 - BIOL 435 Immunology (3 units)
 - BIOL 442 Microbial Physiology (3 units)
 - BIOL 446 Microbial Genomics (4 units)
 - BIOL 453 General Parasitology (3 units)
 - BIOL 490 Ecology of Infectious Diseases (4 units)
 - BIOL 638 Bioinformatics and Genome Annotation (4 units)
 - BIOL 644 LEADerS Service Learning Course: Learners Engaged in Advocating for Diversity in Science (4 units)
 - or BIOL 652 Science Education Partners in Biology (4 units)
- Select two laboratory courses from the following:
- BIOL 431 Medical Microbiology Laboratory (2 units)
 - BIOL 436 Immunology Laboratory (2 units)
 - BIOL 443 Microbial Physiology Laboratory (2 units)
 - BIOL 454 Parasitology Laboratory (1 unit)
 - BIOL 625 Hematology (3 units)
 - BIOL 699 Independent Study in Biology (1-3 units)
 - CHEM 343 Biochemistry I Laboratory (3 units)
 - or CHEM 336 Organic Chemistry II Laboratory (2 units)