MICROBIOLOGY (BS)

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (https://catalog.calpoly.edu/academic-standards-policies/general-requirements-bachelors-degree/#generaleducationtext) section of this catalog, including:

- 40 units of upper-division courses
- 2.0 GPA
- Graduation Writing Requirement (GWR)
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support, or Concentration courses may be selected as credit/no credit. In addition, no more than 12 units of cooperative or internship courses can count towards your degree requirements.

Code	Title	Units
MAJOR COURSES		
BIO 1150	Life: History and Diversity (5B & 5C) [1]	4
BIO 1151	Life: Molecules and Cells	4
MCRO 1100	Introduction to Microbiology Research	2
MCRO 2224	General Microbiology I	4
MCRO 2227	General Microbiology II	4
MCRO 3351	Microbial Genetics	3
MCRO 3352	Microbial Genetics Laboratory	2
Select from the following:		2
BIO 4461	Senior Project - Research Proposal	
BIO 4462	Senior Project - Research Experience	
BIO 4463	Senior Project - Meta-analysis in Biology	
Restricted Electives		
Select from the following: [2]		15
BIO 4429	Parasitology	
BIO 4452	Cell Biology	
BIO 4456	Immunology	
BIO 4457	Molecular Biology Laboratory	
MCRO 4402	General Virology	
MCRO 4423	Medical Microbiology	
MCRO 4424	Microbial Physiology and Biochemistry	
MCRO 4433	Microbial Biotechnology	
MCRO 4436	Microbial Ecology	
Approved Electives		
Select from the following (a minimum of 8 units must be 3000-4000 level): [3,4,5]		15
ASCI 3303	Animal Parasitology	
ASCI 3321	Zoonoses and Veterinary Public Health Concerns	
ASCI 4403	Applied Biotechnology in Animal Science	
BIO 2200	Special Problems for Undergraduates [6]	
BIO 2252	Orientation to Biotechnology	
BIO 2253	Principles of Ecology and Evolution	
BIO 3300	Research Experience for Undergraduates [6]	
BIO 3352	Principles of Animal Physiology	
BIO 3352	Principles of Animal Physiology	
BIO 4400	Special Problems for Advanced Undergraduates [6]	
BIO 4413	Evolutionary Medicine	
BIO 4414	Evolution	

BIO 4429	Parasitology	
BIO 4436	Functional Histology	
BIO 4450	Undergraduate Laboratory Assistantship [6]	
BIO 4452	Cell Biology	
BIO 4456	Immunology	
BIO 4457	Molecular Biology Laboratory	
BIO 4458	Hematology	
BIO 4462	Senior Project - Research Experience [7]	
BIO 4463	Senior Project - Meta-analysis in Biology [7]	
BIO 4466	Honors Research [6]	
BIO 4485	Cooperative Education Experience [6]	
BIO 4495	Cooperative Education Experience [6]	
BRAE 4448	Bioconversion	
CHEM 3330	Foundations of Chemical Analysis	
CHEM 3354	Metabolism	
CHEM 3372	Environmental Chemistry	
CHEM 3374	Chemical and Biological Warfare	
CSC 1001 & 1001L	Fundamentals of Computer Science and Fundamentals of Computer Science Laboratory	
DATA 3301	Introduction to Data Science	
DSCI 4402	Quality Assurance and Control of Dairy Products	
FDSC 3350	Food Chemistry	
FDSC 3355	Food Analysis	
FSN 1111	Elements of Food Processing	
FSN 2245	Elements of Food Safety	
FSN 3316	Fermented Foods	
MATH 1151	Linear Algebra	
MCRO 3301	Wine Microbiology	
MCRO 3320	Emerging Infectious Diseases	
MCRO 3342	Public Health Microbiology	
MCRO 4402	General Virology	
MCRO 4421	Food Microbiology	
MCRO 4423	Medical Microbiology	
MCRO 4424	Microbial Physiology and Biochemistry	
MCRO 4433	Microbial Biotechnology	
MCRO 4436	Microbial Ecology	
MSCI 4401	Marine Science Outreach [6]	
STAT 3430 or STAT 3530	Applied Regression Analysis Applied Linear Models	
STAT 3520	Statistics II	
STAT 3540	Statistical Methods for Study Design and Analysis	
SUPPORT COURSES		
CHEM 1120	Fundamentals of Chemical Structure and Properties (5A) [1]	4
CHEM 1122	Fundamentals of Chemical Reactivity	4
CHEM 2240 or CHEM 2242	Organic Chemistry: Fundamentals and Applications Organic Chemistry I	4-5
CHEM 3350 or CHEM 3352	Biochemistry: Fundamentals and Applications (Upper-Division 2/5) [1,8] Biochemistry	4
DATA/MATH 1264	Calculus for Data Science I (2) [1]	4
PHYS 1121	College Physics I	4
STAT 1110	Applied Statistical Concepts and Methods	3
GENERAL EDUCATION (GE)		

(See GE program requirements below)	30
FREE ELECTIVES	
Free Electives [9]	8-7
Total Units	**120**

1. Required in Major or Support; also satisfies General Education (GE) requirement.
2. Excess units will be applied to Approved Electives.
3. May be substituted with an advisor approved course.
4. Consultation with advisor is recommended prior to selecting electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
5. Students planning to attend graduate or professional schools are strongly advised to meet with their advisors to ensure they meet the prerequisites for entry into these programs. Additional classes in math and chemistry may be necessary.
6. Maximum of 6 units may be applied toward Approved Electives: BIO 2200, BIO 3300, BIO 4400, BIO 4450, BIO 4466, BIO 4485, BIO 4495, or MSCI 4401.
7. If BIO 4462 or BIO 4463 is used to meet the senior project requirement, it cannot also be counted as an Approved Elective.
8. CHEM 3352 is suggested for students who plan to pursue graduate school or a health professions career.
9. If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

General Education (GE) Requirements

- 43 units required, 13 of which are specified in Major and/or Support.
- If any of the remaining 30 Units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (https://catalog.calpoly.edu/academic-standards-policies/general-requirements-bachelors-degree/#generaleducationtext).
- A grade of C- or better is required in one course in each of the following GE Areas: 1A (English Composition), 1B (Critical Thinking), 1C (Oral Communication), and 2 (Mathematics and Quantitative Reasoning).

Lower-Division General Education

Area 1	**English Communication and Critical Thinking**	
1A	Written Communication	3
1B	Critical Thinking	3
1C	Oral Communication	3
Area 2	**Mathematics and Quantitative Reasoning**	
2	Mathematics and Quantitative Reasoning (3 units in Support) [1]	0
Area 3	**Arts and Humanities**	
3A	Arts	3
3B	Humanities: Literature, Philosophy, Languages other than English	3
Area 4	**Social and Behavioral Sciences (Area 4 courses must come from at least two different course prefixes.)**	
4A	American Institutions (Title 5, Section 40404 Requirement)	3
4B	Social and Behavioral Sciences	3
Area 5	**Physical and Life Sciences**	
5A	Physical Sciences (3 units in Support) [1]	0
5B	Life Sciences (3 units in Major) [1]	0
5C	Laboratory (may be embedded in a 5A or 5B course) (1 units in Major) [1]	0
Area 6	**Ethnic Studies**	
6	Ethnic Studies	3
Upper-Division General Education		
Upper-Division 2/5	Mathematics and Quantitative Reasoning or Physical and Life Sciences (3 units in Support)	0
Upper-Division 3	Arts and Humanities	3

Upper-Division 4	Social and Behavioral Sciences (Area 4 courses must come from at least two different course prefixes.)	3
Total Units		**30**

[1] Required in Major or Support; also satisfies General Education (GE) requirement.