BS Microbiology

Program Learning Objectives

1. Students will demonstrate a writing style appropriate for communicating scientific results to a diverse audience.
2. Students will integrate math, physical sciences and technology to answer biological questions using the scientific method.
3. Students will demonstrate proficiency of lab and field techniques in their area of specialization.
4. Students will master and retain fundamental concepts in biology (atom to ecosystem).
5. Students will demonstrate the skill to assess and analyze data with objectivity.
6. Students will demonstrate proficiency in searching, reading and evaluating the scientific literature.

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 (http://catalog.calpoly.edu/generalrequirementsbachelorsdegree/#generaleducationtext) section of this catalog, including:

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

Note: No major, support, or concentration courses may be selected as credit/no credit.

MAJOR COURSES

BIO 160 Diversity and History of Life 4
BIO 161 Introduction to Cell and Molecular Biology (B2&B4) 4
BIO 263 Introductory Ecology and Evolution 4
BIO 351 Principles of Genetics 5
BIO 426 Immunology 4
BIO 452 Cell Biology 4
MCRO 224 General Microbiology I 5
MCRO 225 General Microbiology II 5
MCRO 402 General Virology 4
MCRO 423 Medical Microbiology 5
MCRO 424 Microbial Physiology 5
BIO 461 Senior Project - Research Proposal 2
or BIO 462 Senior Project - Research 2

Approved Electives

Select from the following: 2,3,4,6 19

Biotechnology

MCRO 433 Microbial Biotechnology
ASCI 403 Applied Biotechnology in Animal Science
BIO 202 Orientation to Biotechnology
BIO/CHEM 441 Bioinformatics Applications
BIO/CHEM 476 Molecular Biology Laboratory

Food Microbiology

MCRO/WVIT 301 Wine Microbiology
MCRO 421 Food Microbiology
DSCI 402 Quality Assurance and Control of Dairy Products
DSCI 434 Cheese and Fermented Dairy Foods
DSCI 444 Dairy Microbiology
FSN 230 Elements of Food Processing
FSN 275 Elements of Food Safety
FSN 335 Food Quality Assurance
FSN 341 Fermented Foods
FSN 364 Food Chemistry
FSN 368 Food Analysis
FSN 374 Food Laws and Regulations
FSN 474 Advanced Food Processing

Medical and Public Health Microbiology

MCRO 320 Emerging Infectious Diseases
MCRO 342 Public Health Microbiology
ASCI 203 Animal Parasitology
ASCI 312 Production Medicine
ASCI 321 Zoonoses and Veterinary Public Health Concerns
ASCI 438 Systemic Animal Physiology
ASCI 440 Immunology and Diseases of Animals
BIO 162 Introduction to Organismal Form and Function
BIO 406 Neuroscience
BIO 407 Endocrinology
BIO 408 Cardiorespiratory Physiology
BIO 409 Muscle and Locomotion
BIO 410 Functional Histology
CHEM 331 Quantitative Analysis
CHEM 349 Chemical and Biological Warfare
CHEM 377 Chemistry of Drugs and Poisons
CHEM 477 Biochemical Pharmacology
KINE 301 Applied Functional Muscle Anatomy
ZOO 425 Parasitology
ZOO 428 Hematology

Microbial Ecology and Evolution

MCRO 436 Environmental Microbiology
BIO 414 Evolution
CHEM 341 Environmental Chemistry: Water Pollution
ENVE 434 Water Chemistry and Water Quality Measurements
SS 422 Soil Ecology

Other electives for Microbiology Majors
AEPS 313  Agricultural Entomology
AEPS/BOT 323  Plant Pathology
AEPS 441  Biological Control for Pest Management
BIO 361  Principles of Physiology
BIO 400  Special Problems for Advanced Undergraduates
BIO 434  Environmental Physiology
BIO 450  Undergraduate Laboratory Assistantship 2
BIO 462  Senior Project - Research
BIO 463  Honors Research
CHEM 218 & CHEM 223  Organic Chemistry III and Organic Chemistry Laboratory for Life Sciences III
CHEM 419  Bioorganic Chemistry
MATH 162  Calculus for the Life Sciences II
SCM 451  Ethics in the Sciences
STAT 313  Applied Experimental Design and Regression Models
STAT 419  Applied Multivariate Statistics
STAT 421  Survey Sampling and Methodology
ZOO 335  General Entomology
ZOO 336  Invertebrate Zoology

**SUPPORT COURSES**
CHEM 127  General Chemistry for Agriculture and Life Science I (B3&B4) 1 4
CHEM 128  General Chemistry for Agriculture and Life Science II 4
CHEM 129  General Chemistry for Agriculture and Life Science III 4
CHEM 216  Organic Chemistry I 4 5
CHEM 217 & CHEM 220  Organic Chemistry II and Organic Chemistry Laboratory for Life Sciences II 4
CHEM 313 or CHEM 371  Survey of Biochemistry and Biotechnology 5 4
MATH 161  Calculus for the Life Sciences I (B1) 1,4 4
PHYS 121  College Physics I 4
PHYS 122  College Physics II 4
PHYS 123  College Physics III 4
STAT 218  Applied Statistics for the Life Sciences (B1) 4

**GENERAL EDUCATION (GE)**

<table>
<thead>
<tr>
<th>Area</th>
<th>Course Type</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>A1</td>
<td>Communication</td>
<td>Expository Writing</td>
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<tr>
<td>A2</td>
<td></td>
<td>Oral Communication</td>
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<tr>
<td>A3</td>
<td></td>
<td>Reasoning, Argumentation and Writing</td>
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<tr>
<td>B1</td>
<td>Science and Mathematics</td>
<td>Mathematics/Statistics (8 units in Support) 1</td>
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<tr>
<td>B2</td>
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<td>Life Science (4 units in Major) 1</td>
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<td>B3</td>
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<td>Physical Science (4 units in Support) 1</td>
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<td>B4</td>
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<td>One lab taken with either a B2 or B3 course</td>
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<tr>
<td>C1</td>
<td>Arts and Humanities</td>
<td>Literature</td>
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<td>C2</td>
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<td>Philosophy</td>
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<td>C3</td>
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<td>Fine/Performing Arts</td>
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<tr>
<td>C4</td>
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<td>Upper-division elective</td>
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<tr>
<td>C5</td>
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<td>(Choose one course from C1-C5)</td>
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<tr>
<td>D1</td>
<td>Society and the Individual</td>
<td>The American Experience (Title 5, Section 40404 requirement)</td>
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<tr>
<td>D2</td>
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<td>Political Economy</td>
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<td>D3</td>
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<td>Comparative Social Institutions</td>
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<td>D4</td>
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<td>Self Development (CSU Area E)</td>
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<td>D5</td>
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<td>Upper-division elective</td>
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<tr>
<td>F</td>
<td>Technology</td>
<td>Upper-division elective</td>
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**Total units** 180

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1 Required in Major/Support; also satisfies GE.
2 Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
3 Limited to a total of 4 units from BIO 400, BIO 450, BIO 462, and BIO 463. At least 14 units must be upper division (300-400 level).
4 Students planning to attend graduate or professional schools are strongly advised to meet with their advisors to ensure that they meet necessary prerequisites for entry into these programs. Additional courses in math and chemistry may be necessary.
5 CHEM 371 suggested for students who plan to pursue graduate school or a health professions career.
6 Care must be taken to ensure compliance with the “60 units of upper-division” requirement.

**General Education (GE) Requirements**

- 72 units required, 16 of which are specified in Major and/or Support.
- See the complete GE course listing (http://catalog.calpoly.edu/generalrequirementsbachelorsdegree/#generaleducationtext).
- Minimum of 12 units required at the 300 level.

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