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

Electives
Select from the following: 1,2,3,5 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 475 Molecular Biology Laboratory
BIO/CHEM 476 Gene Expression Laboratory
BRAE 448 Bioconversion
CHEM 331 Quantitative Analysis
CHEM 372 Metabolism
CHEM 373 Molecular Biology
CHEM 474 Protein Techniques Laboratory

Food Microbiology
MCRO/WTIT 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 Advanced Anatomy and Physiology: Neuroscience
BIO 407 Advanced Anatomy and Physiology: Endocrinology
BIO 408 Advanced Anatomy and Physiology: Cardiorespiratory and Renal
BIO 409 Advanced Anatomy and Physiology: Muscle and Locomotion
BIO 410 Functional Histology
BIO 428 Hematology
BIO 429 Parasitology
CHEM 331 Quantitative Analysis
CHEM 349 Chemical and Biological Warfare
CHEM 377 Chemistry of Drugs and Poisons
CHEM 477 Biochemical Pharmacology
KINE 301 Functional Anatomy

Microbial Ecology and Evolution
MCRO 436 Microbial Ecology
BIO 414 Evolution
BS Microbiology

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 335 General Entomology
BIO 336 Invertebrate Zoology
BIO 361 Principles of Animal Physiology
BIO 400 Special Problems for Advanced Undergraduates
BIO 434 Environmental Physiology
BIO 450 Undergraduate Laboratory Assistantship
BIO 462 Senior Project - Research
BIO 463 Honors Research
CHEM 218 Organic Chemistry III and Organic Chemistry Laboratory for Life Sciences III
CHEM 418 Neurochemistry
CHEM 419 Bioorganic Chemistry
MATH 162 Calculus for the Life Sciences II
MCRO 100 Introduction to Microbiology Research
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

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

FREE ELECTIVES
Free Electives 8

Total units 180

1 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.
2 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).
3 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.
4 CHEM 371 suggested for students who plan to pursue graduate school or a health professions career.
5 Care must be taken to ensure compliance with the “60 units of upper-division” requirement.
6 If BIO 462 is used to meet the Senior Project Requirement, it cannot also be counted as an Approved Elective.

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.

Area A Communication
A1 Expository Writing 4
A2 Oral Communication 4
A3 Reasoning, Argumentation and Writing

Area B Science and Mathematics
B1 Mathematics/Statistics (8 units in Support) 1 0
B2 Life Science (4 units in Major) 1 0
B3 Physical Science (4 units in Support) 1 0
B4 One lab taken with either a B2 or B3 course

Area C Arts and Humanities
C1 Literature 4
C2 Philosophy 4
C3 Fine/Performing Arts 4
C4 Upper-division elective 4
Area C elective (Choose one course from C1-C5)

Area D/E Society and the Individual
D1 The American Experience (Title 5, Section 40404 requirement) 4
D2 Political Economy 4
D3 Comparative Social Institutions 4
D4 Self Development (CSU Area E) 4
D5 Upper-division elective 4

Area F Technology
<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>F Upper-division elective</td>
<td>4</td>
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<tr>
<td>Total units</td>
<td>56</td>
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1 Required in Major/Support; also satisfies GE.