BS MARINE SCIENCES

Program Learning Objectives

Graduates of the BS Marine Sciences program will be able to:

1. Integrate and synthesize information from the various marine disciplines.
2. Recognize and value the diversity of marine life and ecosystems.
3. Apply the scientific method, by formulating hypotheses, making predictions, and assessing, analyzing, synthesizing, and interpreting data.
4. Communicate marine scientific principles and research findings effectively to diverse audiences verbally and in writing.
5. Demonstrate proficiency in lab and field techniques relevant to marine sciences.
6. Locate and utilize bibliographic resources and demonstrate the ability to evaluate 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) [1]	4
BIO 162	Introduction to Organismal Form and Function	4
BIO 263	Introductory Ecology and Evolution	4
BIO 461	Senior Project - Research Proposal [2]	2
or BIO 462	Senior Project - Research	
CHEM 302	Marine Chemistry	3
MSCI 100	Introduction to Marine Sciences	1
MSCI 301	Biological Oceanography	3
MSCI 303	Ocean Sampling Techniques	3
MSCI 328	Marine Ecology	4
PSC 201	Physical Oceanography	4

Marine Resources Conservation and Policy

Select from the following:		4
BIO 401	Principles of Conservation Biology	
MSCI 428	Marine Conservation and Policy	
MSCI 438	Aquaculture	
MSCI 439	Fisheries Science and Resource Management	

Marine Biodiversity

Select from the following:		4
BIO 322	Ichthyology	
BIO 336	Invertebrate Zoology	
MCRO 436	Microbial Ecology	
MSCI 324	Marine Mammals, Birds and Reptiles	
MSCI 437	Marine Botany	

Communicating Science

Select from the following:		1-4
COMS 390	Environmental Communication	
COMS 395	Science Communication	
ENGR 322/ SCM 302	The Learn By Doing Lab Teaching Practicum [3]	
MSCI 401	Marine Science Outreach	
MSCI 440	Communicating Ocean Sciences to Informal Audiences	

Electives

Select additional courses from Marine Resource Conservation and Policy, Marine Biodiversity, or Communicating Science (above) or select from the following: [3]		23-26
AG/EDES/ENGR/ GEOG/ISLA/ SCM/UNIV 350	The Global Environment (Area F) [4]	
BIO 200	Special Problems for Undergraduates	
BIO 327	Wildlife Ecology	
BIO 330	Extended Field Biology Activity [3]	
BIO 351	Principles of Genetics	
BIO 361	Principles of Animal Physiology	
BIO 400	Special Problems for Advanced Undergraduates [3]	
BIO 414	Evolution	
BIO 415	Biogeography	
BIO 419	Analytical Methods in Ecology	
BIO 434	Environmental Physiology	
BIO 442	Behavioral Ecology	
BIO 444	Population Ecology	
BIO 445	Community Ecology	
BIO 446	Ecosystem Ecology	
BIO 450	Undergraduate Laboratory Assistantship [3]	
BIO 452	Cell Biology	
BIO 461	Senior Project - Research Proposal [2, 3]	
BIO 462	Senior Project - Research [2, 3]	
BIO 463	Honors Research [3]	
BIO 470	Selected Advanced Topics [3]	
BIO 471	Selected Advanced Laboratory [3]	
BIO 472	Current Topics in Biological Research [3]	
BIO/CHEM 475	Molecular Biology Laboratory	
CHEM 217	Organic Chemistry II	
CHEM 218	Organic Chemistry III	
CHEM 220	Organic Chemistry Laboratory For Life Sciences II	

or CHEM 221	Organic Chemistry Laboratory II	
CHEM 223	Organic Chemistry Laboratory for Life Sciences III	
or CHEM 324	Organic Chemistry Laboratory III	
CHEM 313	Survey of Biochemistry and Biotechnology	
CHEM 331	Quantitative Analysis	
CHEM 341	Environmental Chemistry: Water Pollution	
CHEM 371	Biochemical Principles	
CHEM 372	Metabolism	
CHEM 400	Special Problems for Advanced Undergraduates	
CPE/CSC 101	Fundamentals of Computer Science	
CSC/CPE 202	Data Structures	
CSC/CPE 203	Project-Based Object-Oriented Programming and Design	
CRP/NR 404	Environmental Law	
EE 201	Electric Circuit Theory	
EE 321	Electronics	
ENGR 400	Special Problems for Advanced Undergraduates	
ENVE 434	Water Chemistry and Water Quality Measurements	
MATH 143	Calculus III	
MATH 244	Linear Analysis I	
MCRO 436	Microbial Ecology	
MSCI 307	World Aquaculture: Applications, Methodologies and Trends	
MSCI 330	Technologies for Ocean Discovery (Area F) [4]	
MSCI 410	Scientific Diving	
NR/LA 317	The World of Spatial Data and Geographic Information Technology (Area F) [4]	
NR 321	Water Systems Technology, Issues and Impacts (Area F) [4]	
PHYS 400	Special Problems for Advanced Undergraduates	
STAT 323	Design and Analysis of Experiments I	
STAT 324	Applied Regression Analysis	
or STAT 334	Applied Linear Models	
STAT 330	Statistical Computing with SAS	
STAT 331	Statistical Computing with R	
SUPPORT		
CHEM 127	General Chemistry for Agriculture and Life Science I (B3) [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	5
or CHEM 312	Survey of Organic Chemistry	
GEOL 102	Introduction to Geology	4
MATH 141	Calculus I (B1) [1,5]	4
or MATH 161	Calculus for the Life Sciences I	
MATH 142	Calculus II (B1) [1,5]	4
or MATH 162	Calculus for the Life Sciences II	
PHYS 121	College Physics I [6]	4
or PHYS 141	General Physics IA	
PHYS 122	College Physics II [6]	4
or PHYS 132	General Physics II	
PHYS 123	College Physics III [6]	4
or PHYS 133	General Physics III	
STAT 218	Applied Statistics for the Life Sciences	4
STAT 313	Applied Experimental Design and Regression Models	4
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		56
FREE ELECTIVES		
Free Electives [4]		4
Total units		180

1. Required in Major/Support; also satisfies GE.
2. If BIO 461 or BIO 462 meets the Senior Project requirement, it cannot also be counted for Approved Electives.
3. Maximum of 6 units may be applied toward Approved Electives from "by arrangement" courses: BIO 330, BIO 400, BIO 450, BIO 461, BIO 462, BIO 463, BIO 470, BIO 471, BIO 472, ENGR 322/ SCM 302.
4. If a course double counts for GE Area F as well as Approved Electives, four additional units of Free Electives will be needed to meet 180 total units required for degree.
5. Students emphasizing Chemistry, Physics or Engineering should take MATH 141 and MATH 142 instead of MATH 161 and MATH 162. GE B1 will be met with any of the following: MATH 161, MATH 162, MATH 141, MATH 142.
6. Students emphasizing Physics should take PHYS 141, PHYS 132 and PHYS 133 instead of PHYS 121, PHYS 122 and PHYS 123. GE B3 will be met with any of the following: PHYS 141, PHYS 132, PHYS 121 or PHYS 122.

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	4
Area B	**Science and Mathematics**	
B1	Mathematics/Statistics (8 units in Major or Support) [1]	0
B2	Life Science (4 units in Major or Support) [1]	0
B3	Physical Science (4 units in Major or 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)	4
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**	
F	Upper-division elective	4
Total units		56