

BS ENVIRONMENTAL MANAGEMENT AND PROTECTION

Program Learning Objectives

1. Demonstrate critical-thinking problem-solving skills.
2. Effectively communicate scientific and technical knowledge in a professional manner.
3. Demonstrate competency in scientific and technical knowledge related to environmental management in the following key areas:
 - a. Ecology and Biology – applied ecology to inform environmental impact analysis;
 - b. Measurement – identification of key ecosystem elements, indicators and range of variability; land and water quality indicators;
 - c. Management and Protection – developing alternatives and mitigation measures;
 - d. Social, Economic, and Political – conflict management, CEQA (California Environmental Quality Act) and NEPA (National Environmental Policy Act) interpretation and analysis, i.e., environmental impact reports (EIR), environmental impact statements (EIS), and other environmental documents.
4. Demonstrate proficiency in quantitative skills and information management specific to their discipline areas.
5. Exhibit an understanding of their professional and ethical responsibilities as sustainability managers, environmental managers, natural resources managers, forest managers, including respect for diversity.
6. Promote life-long learning habits by exposing students to the discovery process of applied research and demonstration projects conducted by the faculty.

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/generalrequirementsbachelorsdegree/#generaleducationtext>) section for 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

NR 140	Careers in Natural Resources Management and Environmental Sciences	1
or UNIV 100	University Studies	
NR 142	Environmental Management	3
NR 208	Dendrology ^{1,2}	3-4
or BIO 162	Introduction to Organismal Form and Function	

or BIO 222	Biodiversity of California	
or BIO 227	Wildlife Conservation Biology	
or GEOL 201	Physical Geology	
NR 215	Land and Resource Measurements	1
NR/LA 218	Introduction to Geographic Information Systems (GIS)	3
NR 306	Natural Resource Ecology and Habitat Management	4
or NR 304	Agroecology	
or NR 305	Forest Ecology and Silvics	
NR 314	Environmental Life-Cycle Analysis	4
or NR 445	Systems Thinking in Environmental Management	
NR 320	Watershed Processes and Management ²	4
or NR 402	Forest Health	
or ERSC 303	Soil Erosion and Water Conservation	
NR 323	Human Dimensions in Natural Resources Management (Upper-Division D) ³	4
or NR 324	Social Dimensions of Sustainable Food and Fiber Systems	
or NR 328	Environmental Leadership and Community Engagement	
NR 326	Natural Resources Economics and Valuation	4
NR 335	Conflict Management in Natural Resources	4
NR 363	Undergraduate Seminar	2
NR/CRP 404	Environmental Law	4
or NR/CRP 408	Water Resource Law and Policy	
NR 416	Environmental Impact Analysis and Management	4
Select from the following: ⁴		12
NR 425 & NR 435 & NR 465	Applied Resource Analysis and Assessment and Environmental Policy Analysis and Senior Project - Ecosystem Management	
NR 474 & NR 475	Forest Stewardship Practices and Senior Project - Forest Stewardship	
BIO 111	General Biology ¹	4
or BIO 150	Diversity and History of Life	
or BIO 161	Introduction to Cell and Molecular Biology	
BIO 114	Plant Diversity and Ecology (B2 & B3) ³	4
or BOT 121	General Botany	
BRAE 237	Introduction to Engineering Surveying	2-3
or BRAE 345	Aerial Photogrammetry and Remote Sensing	
BRAE 348	Energy for a Sustainable Society (Upper-Division B) ³	4
or ENVE 324	Introduction to Air Pollution	
or NR 310	Global Climate Change	
CHEM 127	General Chemistry for Agriculture and Life Science I (B1 & B3) ³	4

MATH 161	Calculus for the Life Sciences I (B4) 3,5	4
or MATH 221	Calculus for Business and Economics	
PHYS 121	College Physics I	4
SS 120	Introductory Soil Science	4
STAT 217	Introduction to Statistical Concepts and Methods (GE Electives) ³	4
or STAT 218	Applied Statistics for the Life Sciences	
Concentration (41 units) or Approved Electives (29 units) in combination with Free Electives ^{6,7,8}		29-41
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		48
FREE ELECTIVES		
Free Electives		0-12
Total units		180-182

- ¹ Students in the Wildlife Biology concentration need to take BIO 161 and BIO 162 to meet prerequisites for courses in the concentration.
- ² Students in the Watershed Management and Hydrology concentration need to take GEOL 201 and NR 320 to meet prerequisites for courses in the concentration.
- ³ Required in Major or Support; also satisfies General Education (GE) requirement.
- ⁴ Students must choose to take either NR 425, NR 435, and NR 465 or NR 474 and NR 475.
- ⁵ Students in the Watershed Management and Hydrology concentration need to take MATH 161 to meet prerequisites for courses in the concentration.
- ⁶ Unless a concentration is declared, the default will be a combination of Approved Electives and Free Electives.
- ⁷ Students who do not declare a concentration are encouraged to use Approved Electives and Free Electives to earn one or more minors. See the below Approved Electives Guide for recommended minors.
- ⁸ If a course is taken to meet a Major or Support requirement, it cannot be double-counted in a concentration or as an approved elective.

Concentrations

- Watershed Management and Hydrology (<https://catalog.calpoly.edu/collegesandprograms/collegeofagriculturefoodenvironmentalsciences/naturalresourcesmanagementenvironmentalsciences/bseenvironmentalmanagementandprotection/watershedmanagementandhydrologyconcentration/>)
- Wildlife Biology (<https://catalog.calpoly.edu/collegesandprograms/collegeofagriculturefoodenvironmentalsciences/naturalresourcesmanagementenvironmentalsciences/bseenvironmentalmanagementandprotection/wildlifebiologyconcentration/>)

Approved Electives Guide

Approved Electives are courses that support the below career areas. Refer to number(s) next to each course to identify which courses align with each of the career areas. Consultation with an advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

1. Climate Change Science
2. Environmental Mitigation Strategies
3. Environmental Policy and Management
4. Environmental Soil Science
5. Forest and Environmental Practices
6. Geology
7. Geospatial Technology
8. Sustainable Agriculture
9. Urban Forestry

Additionally, a student may earn one or more of the following minors through the appropriate selection of Approved Electives in combination with Free Electives (refer to advising materials for the minor):

- Agribusiness
- Anthropology and Geography
- Biology
- City and Regional Planning
- Entrepreneurship
- Environmental Soil Science
- Geographic Information Systems for Agriculture
- Geology
- Indigenous Studies in Natural Resources and the Environment
- Land Rehabilitation and Restoration Ecology
- Law and Society
- Political Science
- Spanish
- Sustainable Agriculture
- Sustainable Environments
- Water Science

Approved Electives

Select from the following:

At least 6 units must be upper-division (300-400 level). Additional units of upper-division coursework may be needed, depending on coursework taken in Major or Support.

If a course is taken to meet a Major or Support requirement, it cannot be double-counted as an Approved Elective.

AG/PLSC 315	Principles of Organic Crop Production ⁸
AG 339	Internship in Agriculture ⁸
AG/EDES/ENGR/ISLA/SCM/UNIV 350	The Global Environment ⁸
AG 360	Holistic Management ^{5, 8}
AGB 212	Agricultural Economics ⁸
AGB 312	Agricultural Policy ⁸
AGB 369	Agricultural Personnel Management ⁸
AGC 205	Agricultural Communications
ANT 201	Cultural Anthropology ¹
or ANT 202	World History Before Writing
or GEOG 150	Human Geography
ANT 250	Biological Anthropology ¹

ASCI 112	Principles of Animal Science ⁸	ENVE 405	Environmental Engineering Research
ASCI 221	Introduction to Beef Production ⁸	ERSC 223	Rocks and Minerals ^{3, 4, 5, 6, 7}
ASCI 223	Systems of Small Ruminant Management ⁸	ERSC/GEOG 250	Physical Geography ^{1, 7}
ASCI 239	Principles of Rangeland Management ^{1, 2, 3, 8}	ERSC 303	Soil Erosion and Water Conservation ^{4, 8}
ASCI 311	Advanced Beef Cattle System Management ⁸	ERSC/GEOG 325	Climate and Humanity ¹
ASCI 370	Rangeland Improvements ^{1, 2, 3, 8}	ERSC/GEOG 414	Global and Regional Climatology ¹
ASCI 465	Applied Practices for Monitoring California Rangelands ^{1, 2, 3, 8}	ERSC/GEOG 415	Applied Meteorology and Climatology ¹
BIO 150	Diversity and History of Life	ERSC 423	Geomorphology ^{4, 6}
BIO 222	Biodiversity of California	ERSC 442	Applied Environmental Groundwater Hydrology ⁴
BIO 227	Wildlife Conservation Biology	ERSC 443	Applied Environmental Contaminant Transport ⁴
BIO 263	Introductory Ecology and Evolution	GEOG 308	Global Geography ¹
BIO 329	Vertebrate Field Zoology ²	GEOG 328	Applications in Remote Sensing and GIS ^{1, 7}
BIO 400	Special Problems for Advanced Undergraduates	GEOG 435	Biodiversity and Biogeography Methods
BIO 427	Wildlife Management ²	GEOL 206	Geologic Excursions ⁶
BIO 435	Plant Physiology ⁵	GEOL 241	Physical Geology Laboratory ⁶
BIO 447	Spatial Ecology ^{2, 7}	GEOL 305	Seismology and Earth Structure ⁶
BOT 121	General Botany ⁵	GEOL 309	Igneous Petrology ⁶
BRAE 141	Agricultural Machinery Safety ⁸	GEOL 311	Metamorphic Petrology ⁶
BRAE 142	Agricultural Power and Machinery Management ⁸	GEOL 330	Principles of Stratigraphy ⁶
BRAE 150	Design Graphics and CAD for Agricultural Engineering ^{5, 7}	GEOL 415	Structural Geology ⁶
BRAE 239	Engineering Surveying ⁷	GEOL 420	Applied Geophysics ⁶
BRAE 333	Aquacultural Engineering ^{1, 2, 3, 8}	GEOL/ERSC 416	Field-Geology Methods ⁶
BRAE 340	Irrigation Water Management ^{5, 8}	GEOL/ERSC 417	Geologic Mapping ⁶
BRAE 345	Aerial Photogrammetry and Remote Sensing ⁷	JOUR 203	News Reporting and Writing ⁵
BRAE 348	Energy for a Sustainable Society ¹	MATH 142	Calculus II ⁶
BRAE 349	Water for a Sustainable Society ^{4, 8}	or MATH 162	Calculus for the Life Sciences II
BRAE 447	Advanced Surveying with GIS Applications ⁷	MCRO 221	Microbiology ⁵
CE 112	Design Principles in Civil Engineering ⁷	MCRO 436	Microbial Ecology ⁵
CE 113	Computer Aided Drafting in Civil Engineering ⁷	NR 200	Special Problems for Undergraduates ^{1, 2, 3, 4, 5, 6, 7, 8, 9}
CHEM 128	General Chemistry for Agriculture and Life Science II ⁴	NR/RPTA 203	Resource Law Enforcement ^{2, 3, 5}
CHEM 129	General Chemistry for Agriculture and Life Science III ⁴	NR 204	Wildland Fire Control ^{5, 9}
CHEM 312	Organic Chemistry: Fundamentals and Applications ⁴	NR/ES 308	Fire and Society ⁵
CRP 212	Introduction to Urban Planning ^{2, 5, 7, 9}	NR 312	Technology of Wildland Fire Management ⁵
CRP 336	Introduction to Environmental Planning ^{5, 7}	NR 324	Social Dimensions of Sustainable Food and Fiber Systems ⁸
CRP 420	Land Use Law ^{3, 5}	NR 328	Environmental Leadership and Community Engagement ^{1, 2, 3, 4, 5, 6, 7, 8, 9}
ECON 221	Microeconomics ³	NR 339	Internship in Forest and Natural Resources ^{1, 2, 3, 4, 5, 6, 7, 8, 9}
EDES 406	Sustainable Environments ⁸	NR 340	Wildland Fire Management ^{5, 8, 9}
ENGL 147	Writing Arguments about STEM ^{1, 2, 3}	NR 350	Urban Forestry ^{5, 9}
ENGL 316	Writing Sustainability ^{1, 2, 3}	NR 355	Drone Assisted Surveying ⁷
		NR/ES 360	Ethnicity and the Land ⁵
		NR 400	Special Problems for Advanced Undergraduates ^{5, 9}

NR/CRP 404	Environmental Law ^{2, 5, 8, 9}
NR/ES 406	Indigenous Peoples and International Law and Policy ⁹
NR/CRP 408	Water Resource Law and Policy ^{2, 3, 5, 8}
NR 413	Agricultural Law ^{1, 2, 3, 4, 8}
NR 418	Applied GIS ^{1, 5, 7, 9}
NR 420	Watershed Assessment and Protection ⁵
NR/BIO/SS 421	Wetlands ^{2, 4, 5}
NR 422	Stream Measurements and Water Quality Monitoring ^{5, 9}
NR 434	Wood Properties, Products and Sustainable Uses ^{5, 9}
NR 435	Environmental Policy Analysis ^{1, 3}
NR 445	Systems Thinking in Environmental Management ^{1, 2, 3, 4, 5, 6, 7, 8, 9}
NR 455	Wildland-Urban Fire Protection ^{5, 9}
PHIL 340	Environmental Ethics ³
PHYS 122 or PHYS 142	College Physics II ⁶ General Physics II
PLSC 123	Landscape Installation and Maintenance ^{5, 9}
PLSC 124	Plant Propagation ^{5, 9}
PLSC 203	Organic Enterprise Project ⁸
PLSC 230	Environmental Horticulture ^{8, 9}
PLSC 233	Plant Materials I ^{5, 9}
PLSC 234	Plant Materials II ^{5, 9}
PLSC 244	Precision Farming ^{7, 8}
PLSC 313	Agricultural Entomology ⁸
PLSC 321	Weed Biology and Management ^{5, 8}
PLSC 323	Plant Pathology ⁸
PLSC 327	Vertebrate Pest Management ⁵
PLSC 350	Abiotic Plant Problems ⁹
PLSC 381	Native Plants for California Landscapes ^{8, 9}
PLSC 420	Organic Crop Production Systems ⁸
PLSC 425	Arboriculture ^{5, 9}
PLSC 431	Insect Pest Management ⁸
PLSC 441	Biological Control for Pest Management ⁸
PLSC 445	Cropping Systems ⁸
PLSC 450	Current Issues in the Strawberry Industry ⁸
POLS 112	American and California Government ³
POLS 245	Judicial Process ³
POLS 332	World Food Systems
POLS 341	American Constitutional Law ³
POLS 343	Civil Rights in America ³
POLS 344	Civil Liberties ³
PSC 201	Physical Oceanography ¹
RPTA 112	Introduction to Parks and Outdoor Recreation ²

RPTA 210	Experience Design ²
RPTA 255	Leadership and Diverse Groups ²
RPTA 302	Environmental and Wilderness Education ²
RPTA 313	Sustainability in the Experience Industry
RPTA 314	Sustainable Travel and Tourism Planning
RPTA 321	Visitor Services in Experience Industry Management
RPTA 325	Leadership in Outdoor Experiences ²
RPTA 412	Advanced Experience Industry Management Applications
RPTA 413	Tourism and Protected Area Management
SS 221	Soil Health and Plant Nutrition ^{4, 5, 8}
SS 321	Soil Morphology ^{3, 4, 5, 7}
SS 322	Soil Plant Relationships ^{4, 8}
SS 422	Soil Ecology ⁴
SS 423	Environmental Soil and Water Chemistry ⁴
SS 431	Digital Soil Mapping ^{2, 4, 5, 7, 9}
SS 440	Forest and Range Soils ^{4, 5, 9}
SS 444	Soil Judging ⁴
UNIV 391	Appropriate Technology for the World's People: Development ⁸
WVIT 233	Basic Viticulture ⁸
WVIT 331	Advanced Viticulture - Fall ⁸
WVIT 332	Advanced Viticulture - Winter ⁸
WVIT 333	Advanced Viticulture - Spring ⁸
WVIT 428	Winegrape Vineyard Management ⁸
Any SCM course and any upper-division AG, ANT, BIO, BOT, BRAE, CHEM, CM, COMS, CRP, EDES, ERSC, ESCI, GEOG, GEOL, JOUR, LA, MCRO, MSCI, NR, PHIL, PHYS, PLSC, POLS, PSY, SS, STAT, or UNIV courses	

General Education (GE) Requirements

- 72 units required, 24 of which are specified in Major and/or Support.
- If any of the remaining 48 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/generalrequirementsbachelorsdegree/#generaleducationtext>).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking ¹	4
Area B	Scientific Inquiry and Quantitative Reasoning	

B1	Physical Science (4 units in Major) ²	0
B2	Life Science (4 units in Major) ²	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Major) ²	0
Upper-Division B (4 units in Major) ²		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C ³		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D (4 units in Major) ²		0
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Major plus 4 units in GE) ²		4
Total units		48

¹ Recommended course to satisfy GE Area A3: ENGL 147.

² Required in Major or Support; also satisfies General Education (GE) requirement.

³ Recommended courses to satisfy GE Area Upper-division C: NR 360 or ENGL 316.