

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 forest managers, natural resources managers, environmental 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 (<http://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
NR 142	Environmental Management	3
NR 208	Dendrology ¹	4
or BIO 162	Introduction to Organismal Form and Function	
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
NR 314	Environmental Life-Cycle Analysis	4
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 (D5) 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	3
or NR/CRP 408	Water Resource Law and Policy	
NR 416	Environmental Impact Analysis and Management	4
NR 425	Applied Resource Analysis and Assessment	4
NR 435	Environmental Policy Analysis	4
NR 465	Senior Project - Ecosystem Management	4
BIO 161	Introduction to Cell and Molecular Biology (B2 & B4) ^{1,3}	4
or BOT 121	General Botany	
BRAE 237	Introduction to Engineering Surveying	2-4
or BRAE 239	Engineering Surveying	
or BRAE 345	Aerial Photogrammetry and Remote Sensing	
BRAE 348	Energy for a Sustainable Society (B7) ³	4
or ENVE 324	Introduction to Air Pollution	
CHEM 127	General Chemistry for Agriculture and Life Science I (B3) ³	4
GEOL 201	Physical Geology	3
MATH 161	Calculus for the Life Sciences I (B1) ^{3,4}	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 (B1) ³	4
or STAT 218	Applied Statistics for the Life Sciences	
Concentration (41 units) or Approved Electives (29 units) in combination with Free Electives ^{5,6,7}		29-41
GENERAL EDUCATION (GE) (See GE program requirements below.)		48
FREE ELECTIVES		

Free Electives	0-13
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 NR 320 to meet prerequisites for courses in the concentration.
- ³ Required in Major; also satisfies GE.
- ⁴ Students in the Watershed Management and Hydrology concentration need to take MATH 161 to meet prerequisites for courses in the concentration.
- ⁵ Unless a concentration is declared, the default will be a combination of Approved Electives and Free Electives.
- ⁶ 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.
- ⁷ If a course is taken to meet a major requirement, it cannot double-count in the concentration or as an approved elective.

Concentrations

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

- Anthropology and Geography
- Biology
- Geographic Information Systems for Agriculture

- Geology
- Indigenous Studies in Natural Resources and the Environment
- 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 the major.

Courses used to meet a degree requirement cannot double count as an elective.

AEPS 123	Landscape Installation and Maintenance ^{5,9}
AEPS 124	Plant Propagation ^{5,9}
AEPS 203	Organic Enterprise Project ⁸
AEPS 230	Environmental Horticulture ^{8,9}
AEPS 233	Plant Materials I ^{5,9}
AEPS 234	Plant Materials II ^{5,9}
AEPS 244	Precision Farming ^{7,8}
AEPS 313	Agricultural Entomology ⁸
AEPS/AG 315	Principles of Organic Crop Production ⁸
AEPS 321	Weed Biology and Management ^{5,8}
AEPS 323	Plant Pathology ⁸
AEPS 327	Vertebrate Pest Management ⁵
AEPS 350	Abiotic Plant Problems ⁹
AEPS 381	Native Plants for California Landscapes ^{8,9}
AEPS 420	Organic Crop Production Systems ⁸
AEPS 425	Arboriculture ^{5,9}
AEPS 431	Insect Pest Management ⁸
AEPS 441	Biological Control for Pest Management ⁸
AEPS 445	Cropping Systems ⁸
AEPS 450	Current Issues in the Strawberry Industry 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
ANT 201	Cultural Anthropology ¹
or ANT 202	World Prehistory
or GEOG 150	Human Geography
ANT 250	Biological Anthropology ¹
ASCI 112	Principles of Animal Science ⁸
ASCI 221	Introduction to Beef Production ⁸
ASCI 223	Systems of Small Ruminant Management ⁸
ASCI 239	Principles of Rangeland Management ^{1,2,3,8}

ASCI 311	Advanced Beef Cattle System Management ⁸	ES 241	Survey of Indigenous Studies ⁹
ASCI 370	Rangeland Improvements ^{1,2,3,8}	GEOG 308	Global Geography ¹
ASCI 465	Applied Practices for Monitoring California Rangelands ^{1,2,3,8}	GEOG 328	Applications in Remote Sensing ^{1,7}
BIO 329	Vertebrate Field Zoology ²	GEOL 206	Geologic Excursions ⁶
BIO 400	Special Problems for Advanced Undergraduates	GEOL 241	Physical Geology Laboratory ⁶
BIO 427	Wildlife Management ²	GEOL 305	Seismology and Earth Structure ⁶
BIO 435	Plant Physiology ⁵	GEOL 309	Igneous Petrology
BOT 121	General Botany ⁵	GEOL 311	Metamorphic Petrology
BRAE 141	Agricultural Machinery Safety ⁸	GEOL 330	Principles of Stratigraphy ⁶
BRAE 142	Agricultural Power and Machinery Management ⁸	GEOL 415	Structural Geology ⁶
BRAE 150	Design Graphics and CAD for Agricultural Engineering	GEOL 420	Applied Geophysics ⁶
BRAE 239	Engineering Surveying ⁷	GEOL/ERSC 401	Field-Geology Methods ⁶
BRAE 333	Aquacultural Engineering ^{1,2,3,8}	GEOL/ERSC 402	Geologic Mapping ⁶
BRAE 340	Irrigation Water Management ^{5,8}	JOUR 203	News Reporting and Writing ⁵
BRAE 345	Aerial Photogrammetry and Remote Sensing ⁷	JOUR 205	Agricultural Communications 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 204	Wildland Fire Control ^{5,9}
CHEM 129	General Chemistry for Agriculture and Life Science III ⁴	NR/ES 308	Fire and Society ⁵
CHEM 312	Survey of Organic Chemistry ⁴	NR 312	Technology of Wildland Fire Management ⁵
CRP 212	Introduction to Urban Planning ^{2,5,7,9}	NR 324	Social Dimensions of Sustainable Food and Fiber Systems ⁸
CRP 336	Introduction to Environmental Planning ^{5,7}	NR 328	Environmental Leadership and Community Engagement ^{1,2,3,4,5,6,7,8,9}
CRP 420	Land Use Law ^{3,5}	NR 339	Internship in Forest and Natural Resources ^{1,2,3,4,5,6,7,8,9}
CSC 235	Fundamentals of Computer Science for Scientists and Engineers I ⁷	NR 340	Wildland Fire Management ^{5,8,9}
ECON 221	Microeconomics ³	NR 350	Urban Forestry ^{5,9}
EDES 406	Sustainable Environments ⁸	NR 355	Drone Assisted Surveying ⁷
ERSC 223	Rocks and Minerals ^{3,4,5,6,7}	NR/ES 360	Ethnicity and the Land ⁵
ERSC/GEOG 250	Physical Geography ^{1,7}	NR 400	Special Problems for Advanced Undergraduates ^{5,9}
ERSC 303	Soil Erosion and Water Conservation ^{4,8}	NR/CRP 404	Environmental Law ^{2,5,8,9}
ERSC 323	Geomorphology ^{4,6}	NR/ES 406	Indigenous Peoples and International Law and Policy ⁹
ERSC/GEOG 325	Climate and Humanity ¹	NR/CRP 408	Water Resource Law and Policy ^{2,3,5,8}
ERSC/GEOG 414	Global and Regional Climatology ¹	NR 413	Agricultural Law ^{1,2,3,4,8}
ERSC/GEOG 415	Applied Meteorology and Climatology ¹	NR 418	Applied GIS ^{1,5,7,9}
ERSC 442	Applied Environmental Groundwater Hydrology ⁴	NR 420	Watershed Assessment and Protection ⁵
ERSC 443	Applied Environmental Contaminant Transport ⁴	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 132	College Physics II ⁶ General Physics II
POLS 112	American and California Government ³
POLS 245	Judicial Process ³
POLS 341	American Constitutional Law ³
POLS 343	Civil Rights in America ³
POLS 344	Civil Liberties ³
RPTA 112	Introduction to Parks and Outdoor Recreation ²
RPTA 210	Experience Design ²
RPTA 302	Environmental and Wilderness Education ²
RPTA 255	Leadership and Diverse Groups ²
RPTA 302	Environmental and Wilderness Education
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/POLS 333	World Food Systems ⁸
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 upper division AEPS, AG, ANT, BIO, BOT, BRAE, CHEM, CM, COMS, CRP, EDES, ERSC, GEOG, JOUR, LA, MCRO, MSCI, NR, PHIL, PHYS, PSY, SS, STAT, or UNIV courses	

General Education (GE) Requirements

- 72 units required, 24 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	Math, Science, and Quantitative Reasoning	
B1	Mathematics/Statistics (8 units in Major) ¹	0
B2	Life Science (4 units in Major) ¹	0
B3	Physical Science (4 units in Major) ¹	0
B4	One lab taken with either a B2 or B3 course	
B7	Upper-division elective (4 units in Major) ¹	0
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	Society and the Individual	
D1	The American Experience (Title 5, Section 40404 requirement)	4
D2	Political Economy	4
D3	Comparative Social Institutions	4
D5	Upper-division elective (4 units in Major) ¹	0
Area E	Lifelong Learning and Self-Development	
E	Lower-division elective	4
Total units		48

¹ Required in Major; also satisfies GE.