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

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>NR 140</td>
<td>Careers in Natural Resources Management and Environmental Sciences</td>
<td>1</td>
</tr>
<tr>
<td>NR 142</td>
<td>Environmental Management</td>
<td>3</td>
</tr>
<tr>
<td>NR 208</td>
<td>Dendrology</td>
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<tr>
<td>or BIO 162</td>
<td>Introduction to Organismal Form and Function</td>
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<tr>
<td>NR 215</td>
<td>Land and Resource Measurements</td>
<td>1</td>
</tr>
<tr>
<td>NR/LA 218</td>
<td>Introduction to Geographic Information Systems (GIS)</td>
<td>3</td>
</tr>
<tr>
<td>NR 306</td>
<td>Natural Resource Ecology and Habitat Management</td>
<td>4</td>
</tr>
<tr>
<td>or NR 305</td>
<td>Forest Ecology and Silvics</td>
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<tr>
<td>NR 314</td>
<td>Environmental Life-Cycle Analysis</td>
<td>4</td>
</tr>
<tr>
<td>NR 320</td>
<td>Watershed Processes and Management</td>
<td>4</td>
</tr>
<tr>
<td>or NR 402</td>
<td>Forest Health</td>
<td></td>
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<tr>
<td>or ERSC 303</td>
<td>Soil Erosion and Water Conservation</td>
<td></td>
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<tr>
<td>NR 323</td>
<td>Human Dimensions in Natural Resources Management (D5)</td>
<td>4</td>
</tr>
<tr>
<td>or NR 324</td>
<td>Social Dimensions of Sustainable Food and Fiber Systems</td>
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<tr>
<td>or NR 328</td>
<td>Environmental Leadership and Community Engagement</td>
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<tr>
<td>NR 326</td>
<td>Natural Resources Economics and Valuation</td>
<td>4</td>
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<tr>
<td>NR 335</td>
<td>Conflict Management in Natural Resources</td>
<td>4</td>
</tr>
<tr>
<td>NR 363</td>
<td>Undergraduate Seminar</td>
<td>2</td>
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<tr>
<td>NR/CRP 404</td>
<td>Environmental Law</td>
<td>3</td>
</tr>
<tr>
<td>or NR/CRP 408</td>
<td>Water Resource Law and Policy</td>
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<tr>
<td>NR 416</td>
<td>Environmental Impact Analysis and Management</td>
<td>4</td>
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<tr>
<td>NR 425</td>
<td>Applied Resource Analysis and Assessment</td>
<td>4</td>
</tr>
<tr>
<td>NR 435</td>
<td>Environmental Policy Analysis</td>
<td>4</td>
</tr>
<tr>
<td>NR 465</td>
<td>Senior Project - Ecosystem Management</td>
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<tr>
<td>BIO 161</td>
<td>Introduction to Cell and Molecular Biology (B2 &amp; B4)</td>
<td>4</td>
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<tr>
<td>or BOT 121</td>
<td>General Botany</td>
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<tr>
<td>BRAE 237</td>
<td>Introduction to Engineering Surveying</td>
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<tr>
<td>or BRAE 239</td>
<td>Engineering Surveying</td>
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</tr>
<tr>
<td>or BRAE 345</td>
<td>Aerial Photogrammetry and Remote Sensing</td>
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<tr>
<td>BRAE 348</td>
<td>Energy for a Sustainable Society (B7)</td>
<td>3</td>
</tr>
<tr>
<td>or ENVE 324</td>
<td>Introduction to Air Pollution</td>
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</tr>
<tr>
<td>CHEM 127</td>
<td>General Chemistry for Agriculture and Life Science I (B3)</td>
<td>4</td>
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<tr>
<td>GEOL 201</td>
<td>Physical Geology</td>
<td>3</td>
</tr>
<tr>
<td>MATH 161</td>
<td>Calculus for the Life Sciences I (B1)</td>
<td>4</td>
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<tr>
<td>or MATH 221</td>
<td>Calculus for Business and Economics</td>
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<tr>
<td>PHYS 121</td>
<td>College Physics I</td>
<td>4</td>
</tr>
<tr>
<td>SS 120</td>
<td>Introductory Soil Science</td>
<td>4</td>
</tr>
<tr>
<td>STAT 217</td>
<td>Introduction to Statistical Concepts and Methods (B1)</td>
<td>3</td>
</tr>
<tr>
<td>or STAT 218</td>
<td>Applied Statistics for the Life Sciences</td>
<td></td>
</tr>
<tr>
<td>Concentration (41 units) or Approved Electives (29 units) in combination with Free Electives</td>
<td>29-41</td>
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</tbody>
</table>

GENERAL EDUCATION (GE)
(See GE program requirements below.)

FREE ELECTIVES

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
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<tbody>
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</table>
Free Electives  0-13

Total units  180-181

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/bsenvironmentalmanagementandprotection/watershedmanagementandhydrologyconcentration)
- Wildlife Biology (http://catalog.calpoly.edu/collegesandprograms/collegeofagriculturefoodenvironmentalsciences/naturalresourcesmanagementenvironmentalsciences/bsenvironmentalmanagementandprotection/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
- AEPS 124 Plant Propagation
- AEPS 203 Organic Enterprise Project
- AEPS 230 Environmental Horticulture
- AEPS 233 Plant Materials I
- AEPS 234 Plant Materials II
- AEPS 244 Precision Farming
- AEPS 313 Agricultural Entomology
- AEPS/AG 315 Principles of Organic Crop Production
- AEPS 321 Weed Biology and Management
- AEPS 323 Plant Pathology
- AEPS 327 Vertebrate Pest Management
- AEPS 350 Abiotic Plant Problems
- AEPS 381 Native Plants for California Landscapes
- AEPS 420 Organic Crop Production Systems
- AEPS 425 Arboriculture
- AEPS 431 Insect Pest Management
- AEPS 441 Biological Control for Pest Management
- AEPS 445 Cropping Systems
- AEPS 450 Current Issues in the Strawberry Industry
- AG 339 Internship in Agriculture
- AG/EDES/ENGR/ISLA/SCM/UNIV 350 The Global Environment
- AG 360 Holistic Management
- AGB 212 Agricultural Economics
- AGB 312 Agricultural Policy
- AGB 369 Agricultural Personnel Management
- ANT 201 Cultural Anthropology
- or ANT 202 World Prehistory
- or GEOG 150 Human Geography
- ANT 250 Biological Anthropology
- ASCI 112 Principles of Animal Science
- ASCI 221 Introduction to Beef Production
- ASCI 223 Systems of Small Ruminant Management
- ASCI 239 Principles of Rangeland Management
ASC 311  Advanced Beef Cattle System Management 8
ASC 370  Rangeland Improvements 1,2,3,8
ASC 465  Applied Practices for Monitoring California Rangelands 1,2,3,8
BIO 329  Vertebrate Field Zoology 2
BIO 400  Special Problems for Advanced Undergraduates
BIO 427  Wildlife Management 2
BIO 435  Plant Physiology 5
BOT 121  General Botany 5
BRAE 141  Agricultural Machinery Safety 8
BRAE 142  Agricultural Power and Machinery Management 8
BRAE 150  Design Graphics and CAD for Agricultural Engineering
BRAE 239  Engineering Surveying 7
BRAE 333  Aquacultural Engineering 1,2,3,8
BRAE 340  Irrigation Water Management 5,8
BRAE 345  Aerial Photogrammetry and Remote Sensing 7
BRAE 348  Energy for a Sustainable Society 1
BRAE 349  Water for a Sustainable Society 4,8
BRAE 447  Advanced Surveying with GIS Applications 7
CE 112  Design Principles in Civil Engineering 7
CE 113  Computer Aided Drafting in Civil Engineering 7
CHEM 128  General Chemistry for Agriculture and Life Science II 4
CHEM 129  General Chemistry for Agriculture and Life Science III 4
CHEM 312  Survey of Organic Chemistry 4
CRP 212  Introduction to Urban Planning 2,5,7,9
CRP 336  Introduction to Environmental Planning 5,7
CRP 420  Land Use Law 3,5
CSC 235  Fundamentals of Computer Science for Scientists and Engineers 1,7
ECON 221  Microeconomics 3
EDES 406  Sustainable Environments 8
ERSC 223  Rocks and Minerals 3,4,5,6,7
ERSC/GEOG 250  Physical Geography 1,7
ERSC 303  Soil Erosion and Water Conservation 4,8
ERSC 323  Geomorphology 4,6
ERSC/GEOG 325  Climate and Humanity 1
ERSC/GEOG 414  Global and Regional Climatology 1
ERSC/GEOG 415  Applied Meteorology and Climatology 1
ERSC 442  Applied Environmental Groundwater Hydrology 4
ERSC 443  Applied Environmental Contaminant Transport 4
ES 241  Survey of Indigenous Studies 9
GEOG 308  Global Geography 1
GEOG 328  Applications in Remote Sensing 1,7
GEOL 206  Geologic Excursions 6
GEOL 241  Physical Geology Laboratory 6
GEOL 305  Seismology and Earth Structure 6
GEOL 309  Igneous Petrology
GEOL 311  Metamorphic Petrology
GEOL 330  Principles of Stratigraphy 6
GEOL 415  Structural Geology 5
GEOL 420  Applied Geophysics 6
GEOL/ERSC 401  Field-Geology Methods 6
GEOL/ERSC 402  Geologic Mapping 6
JOUR 203  News Reporting and Writing 5
JOUR 205  Agricultural Communications 5
MATH 142  Calculus II 6
or MATH 162  Calculus for the Life Sciences II
MCRO 221  Microbiology 5
MCRO 436  Microbial Ecology 5
NR 200  Special Problems for Undergraduates 1,2,3,4,5,6,7,8,9
NR 204  Wildland Fire Control 5,9
NR/ES 308  Fire and Society 5
NR 312  Technology of Wildland Fire Management 5
NR 324  Social Dimensions of Sustainable Food and Fiber Systems 8
NR 328  Environmental Leadership and Community Engagement 1,2,3,4,5,6,7,8,9
NR 339  Internship in Forest and Natural Resources 1,2,3,4,5,6,7,8,9
NR 340  Wildland Fire Management 5,8,9
NR 350  Urban Forestry 5,9
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 5
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 7,4,5
NR 422  Stream Measurements and Water Quality Monitoring 5,9
NR 434  Wood Properties, Products and Sustainable Uses 6,9
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 College Physics II 6
PHYS 132 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.

<table>
<thead>
<tr>
<th>Area A</th>
<th>Communication</th>
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</thead>
<tbody>
<tr>
<td>A1</td>
<td>Expository Writing</td>
</tr>
<tr>
<td>A2</td>
<td>Oral Communication</td>
</tr>
<tr>
<td>A3</td>
<td>Reasoning, Argumentation and Writing</td>
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<table>
<thead>
<tr>
<th>Area B</th>
<th>Math, Science, and Quantitative Reasoning</th>
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<tbody>
<tr>
<td>B1</td>
<td>Mathematics/Statistics (8 units in Major)</td>
</tr>
<tr>
<td>B2</td>
<td>Life Science (4 units in Major)</td>
</tr>
<tr>
<td>B3</td>
<td>Physical Science (4 units in Major)</td>
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<tr>
<td>B4</td>
<td>One lab taken with either a B2 or B3 course</td>
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<tr>
<td>B7</td>
<td>Upper-division elective (4 units in Major)</td>
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<thead>
<tr>
<th>Area C</th>
<th>Arts and Humanities</th>
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<tbody>
<tr>
<td>C1</td>
<td>Literature</td>
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<tr>
<td>C2</td>
<td>Philosophy</td>
</tr>
<tr>
<td>C3</td>
<td>Fine/Performing Arts</td>
</tr>
<tr>
<td>C4</td>
<td>Upper-division elective</td>
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| Area C elective | (Choose one course from C1-C5) | 4 |

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<thead>
<tr>
<th>Area D</th>
<th>Society and the Individual</th>
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<tbody>
<tr>
<td>D1</td>
<td>The American Experience (Title 5, Section 40404 requirement)</td>
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<tr>
<td>D2</td>
<td>Political Economy</td>
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<td>D3</td>
<td>Comparative Social Institutions</td>
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<tr>
<td>D5</td>
<td>Upper-division elective (4 units in Major)</td>
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<table>
<thead>
<tr>
<th>Area E</th>
<th>Lifelong Learning and Self-Development</th>
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<tbody>
<tr>
<td>E</td>
<td>Lower-division elective</td>
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</table>

**Total units** 48

1 Required in Major; also satisfies GE.