ENVIRONMENTAL EARTH AND SOIL SCIENCES (BS)

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/academic-standards-policies/general-requirements-bachelors-degree/) section of this catalog, including:

- 40 units of upper-division courses
- 2.0 GPA
- Graduation Writing Requirement (GWR)
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit. In addition, no more than 12 units of cooperative or internship courses can count towards your degree requirements.

Code	Title	Units
MAJOR COURSES		
SS 1120	Introductory Soil Science (5A & 5C) [1]	4
ERSC 1144	Introduction to Earth Science	3
GEOL 2240	Physical Geology	3
GEOL 2241	Physical Geology Laboratory	1
NR/LA 2218	Introduction to Geographic Information Systems (GIS)	3
NR 3310	Global Climate Change (Upper-Division 2/5) [1]	3
NR 3363	Career Preparation and Practices in Natural Resources Fields	2
SS 3321	Soil Morphology	4
SS 4422	Soil Ecology [2, 3]	3-4
or ERSC 4450	Geomorphology	
SS 4423	Environmental Soil and Water Chemistry	4
ERSC/NR 4478	Senior Project - Current Topics in Environmental Science	2
or ERSC/NR 4479	Senior Project - Independent Study	
Select from the following: [2]		2-4
BRAE 3345	Photogrammetry and Remote Sensing with GIS Applications	
GEOG 4441	Advanced Applications in Geospatial Technologies	
NR 4418	Applied Geographic Information System	
SS/NR 4431	Spatial Data Analysis and Environmental Mapping	
Select from the following: [2, 3]		3-4
GEOL 3330	Principles of Stratigraphy	
SS 2221	Soil Health and Plant Nutrition	
SS 3444	Climate Smart Agriculture	
Select from the following: [2]		3-4
ERSC 3303	Soil Erosion and Water Conservation	
NR 3323	Human Dimensions in Natural Resources Management	
NR 3328	Environmental Leadership and Community Engagement	
NR 3335	Conflict Management in Natural Resources	
NR 4404	Environmental Law	
NR 4408	Water Resource Law and Policy	
NR 4413	Agricultural Law	
NR 4416	Environmental Impact Analysis and Management	
NR/SS 4421	Wetlands	
NR 4442	Environmental Life-Cycle Analysis	
NR 4445	Systems Thinking in Environmental Management	
SS 4440	Forest and Range Soils	
Select from the following: [2]		4
SS 4424	Environmental Soil Physics	

ERSC 4442	Applied Groundwater Hydrology	
ERSC 4443	Applied Environmental Contaminant Transport	
Concentration or Approved Electives		
(See Concentration or Approved Electives listed below) [2, 3, 4]		20-22
SUPPORT COURSES		
BOT 1121	General Botany (5B) [1]	4
CHEM 1120	Fundamentals of Chemical Structure and Properties	4
CHEM 2240	Organic Chemistry: Fundamentals and Applications	4
Select from the following: (2) [1, 3]		3-4
MATH 1261	Calculus I	
MATH 1264	Calculus for Data Science I	
PHYS 1121	College Physics I [3]	4
or PHYS 1141	General Physics I	
STAT 1110	Applied Statistical Concepts and Methods	3
GENERAL EDUCATION (GE)		
(See GE program requirements below)		30
FREE ELECTIVES		
Free Electives [5]		0-4
Total Units		**120**

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

2 Courses taken to meet a Major or Support requirement cannot be double-counted in the concentration or the Approved Electives.

3 ERSC 4450, GEOL 3330, MATH 1261, and PHYS 1141 are prerequisite courses for those pursuing the Geology concentration.

4 Courses may need to be at the 3000-4000 level to ensure completion of the requirement minimum of 40 units of upper-division.

5 If a General Education (GE) course 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.

Approved Electives

Code	Title	Units
Approved Electives		
Select from the following emphasis areas: [1, 2]		20-22
Environmental Science Emphasis Area		
Ecology Courses		
Select two courses from the following:		
BIO 1111	General Biology	
BIO 1114	Plant Diversity and Ecology	
BIO 1150	Life: History and Diversity	
BIO 1151	Life: Molecules and Cells	
BIO 4447	Spatial Ecology	
BOT 3326	Plant Ecology	
ERSC/NR 4477	Senior Project - Research Experience in Environmental Science	
NR 3304	Agroecology	
NR 3305	Forest and Fire Ecology	
NR 3306	Natural Resource Ecology and Habitat Management	
NR 4421	Wetlands	
NR 4445	Systems Thinking in Environmental Management	
NR 4464	Senior Project - Environmental Policy Analysis	
SS 4422	Soil Ecology	
Plant Courses		
Select one course from the following:		
BOT 3313	Plant Taxonomy	
BOT 4433	Field Botany: California Plant Diversity	

NR 2208	Dendrology
PLSC 3323	Plant Pathology
SS 2221	Soil Health and Plant Nutrition
Policy, Law, Human Dimensions Courses	
Select one course from the following:	
AG 4452	Leadership Seminar on Issues Affecting California Agriculture, Food Systems, and Natural Resources
NR 3323	Human Dimensions in Natural Resources Management
NR 3328	Environmental Leadership and Community Engagement
NR 4404	Environmental Law
NR 4408	Water Resource Law and Policy
NR 4413	Agricultural Law
NR 4416	Environmental Impact Analysis and Management
Water Science Courses	
Select one to two courses from the following:	
BRAE/NR 3349	Water for a Sustainable Society
ERSC 4442	Applied Groundwater Hydrology
ERSC 4443	Applied Environmental Contaminant Transport
NR 3319	Watershed Processes and Management
NR 3320	Watershed Processes and Management Laboratory
NR 4422	Stream Measurements and Water Quality Monitoring
PSC 2201	Physical Oceanography
Atmospheric Science Courses	
Select one course from the following:	
ENVE 3324	Introduction to Air Pollution
GEOG 3325	Climate and Humanity
GEOG 4414	Global and Regional Climatology
GEOG 4415	Applied Meteorology and Climatology
Water Science Emphasis Area	
Select seven courses from the following:	
BRAE 3340	Irrigation Water Management
BRAE 3345	Photogrammetry and Remote Sensing with GIS Applications
BRAE 5533	Irrigation Project Design
ERSC 4442	Applied Groundwater Hydrology
ERSC 4443	Applied Environmental Contaminant Transport
ERSC 4450	Geomorphology
ERSC/NR 4477	Senior Project - Research Experience in Environmental Science
MATH 1262	Calculus II
or MATH 1265	Calculus for Data Science II
NR 3319	Watershed Processes and Management
NR 3320	Watershed Processes and Management Laboratory
NR 4408	Water Resource Law and Policy
NR 4422	Stream Measurements and Water Quality Monitoring
PHYS 1123	College Physics II
or PHYS 1143	General Physics II
SS 4421	Wetlands
SS 4431	Spatial Data Analysis and Environmental Mapping
SS 4440	Forest and Range Soils
Soil Resource Management Emphasis Area	
Soil Science Courses	
Select two courses from the following:	
ERSC/NR 4477	Senior Project - Research Experience in Environmental Science

SS 2221	Soil Health and Plant Nutrition
SS 4421	Wetlands
SS 4431	Spatial Data Analysis and Environmental Mapping
SS 4440	Forest and Range Soils
SS 4444	Soil Judging
SS 4445	Advanced Soil Judging
Earth Science Courses	
Select one to two courses from the following:	
ERSC 4450	Geomorphology
GEOL 3310	Igneous and Metamorphic Petrology
GEOL 3330	Principles of Stratigraphy
GEOL 4415	Structural Geology
GEOL 4420	Field Geophysics
Applied Plant Science and Resource Management Courses	
Select one course from the following:	
ASCI 1101	Principles of Animal Physiology
ASCI 1102	Animal Management Systems
ASCI 1103	Animal Science Laboratory
ASCI 2232	Small Ruminant and Rangeland Management
ASCI 2239	Principles of Rangeland Management
ASCI 3370	Rangeland Improvements
NR 2208	Dendrology
NR 2350	Urban Forestry
NR 4402	Forest Health and Disturbance Ecology
NR 4464	Senior Project - Environmental Policy Analysis
PLSC 1120	Principles of Plant Sciences
PLSC 1132	Introduction to Fruit Crop Production
PLSC 2232/WVIT 2233	Basic Viticulture
Plant Science Courses	
Select one course from the following:	
BOT 3313	Plant Taxonomy
BOT 4433	Field Botany: California Plant Diversity
PLSC 3323	Plant Pathology
Water Science Courses	
Select one to two courses from the following:	
BRAE/NR 3349	Water for a Sustainable Society
ERSC 4442	Applied Groundwater Hydrology
ERSC 4443	Applied Environmental Contaminant Transport
NR 3319	Watershed Processes and Management
NR 3320	Watershed Processes and Management Laboratory
NR 4422	Stream Measurements and Water Quality Monitoring
GIS and Environmental Data Science Emphasis Area	
Select seven courses from the following:	
BRAE 1239	Engineering Surveying
BRAE 3345	Photogrammetry and Remote Sensing with GIS Applications
BRAE 4447	Advanced Surveying with GIS Applications
ERSC/NR 4477	Senior Project - Research Experience in Environmental Science
GEOG 3328	Applications in Remote Sensing and GIS
GEOG 4441	Advanced Applications in Geospatial Technologies [3]
NR 3318	Introduction to Environmental Data Science
NR 4418	Applied Geographic Information System

NR 4445	Systems Thinking in Environmental Management
SS 4431	Spatial Data Analysis and Environmental Mapping

1 A minimum of 6 units must be taken at the 3000-4000 level.
2 Courses taken to meet a Major or Support requirement cannot be double-counted in the concentration or the Approved Electives.
3 A maximum of 6 units from may count towards Approved Electives.

Concentrations

Geology

Code	Title	Units
REQUIRED COURSES		
NR 3318	Introduction to Environmental Data Science	3
GEOL 3310	Igneous and Metamorphic Petrology	4
GEOL 4415	Structural Geology	3
GEOL 4417	Field Geology Methods and Mapping	5
GEOL 4420	Field Geophysics	3
Select from the following: [1]		4
ERSC 4442	Applied Groundwater Hydrology	
ERSC 4443	Applied Environmental Contaminant Transport	
SS 4424	Environmental Soil Physics	
Total Units		**22**

1 If a course is taken to meet a Major or Support requirement, it cannot be double-counted in the concentration.

General Education (GE) Requirements

- 43 units required, 13 of which are specified in Major and/or Support.
- If any of the remaining 30 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/academic-standards-policies/general-requirements-bachelors-degree/#generaleducationtext).
- A grade of C- or better is required in one course in each of the following GE Areas: 1A (English Composition), 1B (Critical Thinking), 1C (Oral Communication), and 2 (Mathematics and Quantitative Reasoning).

Lower-Division General Education

Area 1	**English Communication and Critical Thinking**	
1A	Written Communication	3
1B	Critical Thinking	3
1C	Oral Communication	3
Area 2	**Mathematics and Quantitative Reasoning**	
2	Mathematics and Quantitative Reasoning (3 units in Support) [1]	0
Area 3	**Arts and Humanities**	
3A	Arts	3
3B	Humanities: Literature, Philosophy, Languages other than English	3
Area 4	**Social and Behavioral Sciences (Area 4 courses must come from at least two different course prefixes.)**	
4A	American Institutions (Title 5, Section 40404 Requirement)	3
4B	Social and Behavioral Sciences	3
Area 5	**Physical and Life Sciences**	
5A	Physical Sciences (3 units in Major) [1]	0
5B	Life Sciences (3 units in Support) [1]	0
5C	Laboratory (may be embedded in a 5A or 5B course) (1 units in Major) [1]	0
Area 6	**Ethnic Studies**	
6	Ethnic Studies	3

Upper-Division General Education		
Upper-Division 2/5	Mathematics and Quantitative Reasoning or Physical and Life Sciences (3 units in Major) [1]	0
Upper-Division 3	Arts and Humanities	3
Upper-Division 4	Social and Behavioral Sciences (Area 4 courses must come from at least two different course prefixes.)	3
Total Units		**30**

[1] Required in Major or Support; also satisfies General Education (GE) requirement.