

# BS FOREST AND FIRE SCIENCES

## 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 forestry, fire and fuels management, and environmental management in the following key areas:
  - a. Forest Ecology and Biology – watershed, vegetation, and stand classification; analysis and prediction of stand dynamics; disturbance ecology;
  - b. Measurement of Forest Resources – forest sampling and inventory, biometrics, GPS, GIS, remote sensing;
  - c. Management of Forest Resources – develop vegetation, fuel, stand, landscape prescriptions and management plans; environmental impact analysis, profitability and valuation analysis;
  - d. Forest Resource Policy and Administration – present and defend management plans, work in interdisciplinary (i.e., ID) teams, apply forest policies and regulations to management decisions.
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, student must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (<https://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

NR 140	Careers in Natural Resources Management and Environmental Sciences	1
or UNIV 100	University Studies	
NR 141	Introduction to Forest Ecosystem Management	3
NR 204	Wildland Fire Control	3
NR 208	Dendrology	4
NR 215	Land and Resource Measurements	1

NR/LA 218	Introduction to Geographic Information Systems (GIS)	3
NR 260	Forest Operations	4
NR 305	Forest Ecology and Silvics	4
NR 307	Fire Ecology	3
NR 308	Fire and Society (Upper-Division D) <sup>1</sup>	4
NR 310	Global Climate Change (Upper-Division B) <sup>1</sup>	4
NR 315	Forest Mensuration	4
NR 320	Watershed Processes and Management	4
NR 326	Natural Resources Economics and Valuation	4
NR 335	Conflict Management in Natural Resources	4
NR 350	Urban Forestry	3
NR 365	Silviculture and Fuels Management	4
NR 402	Forest Health	4
NR 414	Sustainable Forest Management	4
Select from the following: <sup>2</sup>		12
NR 416 & NR 435 & NR 465	Environmental Impact Analysis and Management and Environmental Policy Analysis and Senior Project - Ecosystem Management	
NR 474 & NR 475	Forest Stewardship Practices and Senior Project - Forest Stewardship	
Concentration (26-28 units) or Approved Electives (14 units) in combination with Free Electives <sup>3,4</sup>		14-28

### SUPPORT COURSES

ASCI 239	Principles of Rangeland Management <sup>5</sup>	4
or BIO 227	Wildlife Conservation Biology	
or BIO 363	Principles of Conservation Biology	
or BIO 427	Wildlife Management	
or PHYS 121	College Physics I	
BOT 121	General Botany (B2 & B3) <sup>1</sup>	4
BRAE 237	Introduction to Engineering Surveying	2-4
or BRAE 239	Engineering Surveying	
BRAE 345	Aerial Photogrammetry and Remote Sensing	3
CHEM 127	General Chemistry for Agriculture and Life Science I (B1 & B3) <sup>1</sup>	4
MATH 161	Calculus for the Life Sciences I (B4) <sup>1,6</sup>	4
or MATH 221	Calculus for Business and Economics	
SS 120	Introductory Soil Science	4
STAT 217	Introduction to Statistical Concepts and Methods (GE Electives) <sup>1</sup>	4
or STAT 218	Applied Statistics for the Life Sciences	

### GENERAL EDUCATION (GE)

(See GE program requirements below.) 48

### FREE ELECTIVES

Free Electives	0-12
<b>Total units</b>	<b>180-184</b>

- <sup>1</sup> Required in Major or Support; also satisfies General Education (GE) requirement.
- <sup>2</sup> Students must choose to take either NR 416, NR 435, and NR 465 or NR 474 and NR 475.
- <sup>3</sup> Unless a concentration is declared, the default will be a combination of Approved Electives and Free Electives.
- <sup>4</sup> Students who do not declare a concentration are encouraged to use Approved Electives and Free Electives to earn a minor. See the below Approved Electives Guide for recommended minors.
- <sup>5</sup> Students in the Watershed Management and Hydrology concentration need to take PHYS 121 and students in the Wildlife Biology concentration need to take BIO 427 to meet prerequisites for courses in the concentration.
- <sup>6</sup> Students in the Watershed Management and Hydrology concentration need to take MATH 161 to meet prerequisites for courses in the concentration.

## Concentrations

- Watershed Management and Hydrology (<https://catalog.calpoly.edu/collegesandprograms/collegeofagriculturefoodenvironmentalsciences/naturalresourcesmanagementenvironmentalsciences/bsforest-and-fire-sciences/watershed-management-and-hydrology-concentration/>)
- Wildlife Biology (<https://catalog.calpoly.edu/collegesandprograms/collegeofagriculturefoodenvironmentalsciences/naturalresourcesmanagementenvironmentalsciences/bsforest-and-fire-sciences/wildlife-biology-concentration/>)
- Wildland Fire and Fuels Management (<https://catalog.calpoly.edu/collegesandprograms/collegeofagriculturefoodenvironmentalsciences/naturalresourcesmanagementenvironmentalsciences/bsforest-and-fire-sciences/wildland-fire-and-fuels-management-concentration/>)

## 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 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:

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 <sup>8</sup>
AG 339	Internship in Agriculture <sup>8</sup>
AG/EDES/ENGR/ISLA/SCM/UNIV 350	The Global Environment <sup>8</sup>
AG 360	Holistic Management <sup>5,8</sup>
AGB 212	Agricultural Economics <sup>8</sup>
AGB 312	Agricultural Policy <sup>8</sup>
AGB 369	Agricultural Personnel Management <sup>8</sup>
AGC 205	Agricultural Communications <sup>5</sup>
ANT 201	Cultural Anthropology <sup>1</sup>
or ANT 202	World History Before Writing
or GEOG 150	Human Geography
ANT 250	Biological Anthropology <sup>1</sup>
ASCI 112	Principles of Animal Science <sup>8</sup>
ASCI 221	Introduction to Beef Production <sup>8</sup>
ASCI 223	Systems of Small Ruminant Management <sup>8</sup>
ASCI 311	Advanced Beef Cattle System Management <sup>8</sup>
ASCI 372	California Rangeland & Ranch Resource Management <sup>1,2,3,8</sup>
ASCI 465	Applied Practices for Monitoring California Rangelands <sup>1,2,3,8</sup>
BIO 329	Vertebrate Field Zoology <sup>2</sup>
BIO 400	Special Problems for Advanced Undergraduates <sup>2</sup>
BIO 427	Wildlife Management <sup>2</sup>
BIO 435	Plant Physiology <sup>5</sup>
BIO 447	Spatial Ecology <sup>2,7</sup>
BOT/PLSC 323	Plant Pathology <sup>8</sup>
BRAE 141	Agricultural Machinery Safety <sup>8</sup>
BRAE 142	Agricultural Power and Machinery Management <sup>8</sup>
BRAE 150	Design Graphics and CAD for Agricultural Engineering
BRAE 239	Engineering Surveying <sup>7</sup>
BRAE 333	Aquacultural Engineering <sup>1,2,3,8</sup>
BRAE 340	Irrigation Water Management <sup>5,8</sup>
BRAE 345	Aerial Photogrammetry and Remote Sensing <sup>7</sup>

BRAE 348	Energy for a Sustainable Society <sup>1</sup>	MATH 142	Calculus II <sup>6</sup>
BRAE 349	Water for a Sustainable Society <sup>1,2,3,8</sup>	or MATH 162	Calculus for the Life Sciences II
BRAE 447	Advanced Surveying with GIS Applications <sup>7</sup>	MCRO 221	Microbiology <sup>5</sup>
CE 112	Design Principles in Civil Engineering <sup>7</sup>	MCRO 436	Microbial Ecology <sup>5</sup>
CE 113	Computer Aided Drafting in Civil Engineering <sup>7</sup>	NR 142	Environmental Management <sup>8</sup>
CHEM 128	General Chemistry for Agriculture and Life Science II <sup>4</sup>	NR 200	Special Problems for Undergraduates <sup>1,2,3,4,5,6,7,8,9</sup>
CHEM 129	General Chemistry for Agriculture and Life Science III <sup>4</sup>	NR 203	Resource Law Enforcement <sup>5,9</sup>
CHEM 312	Organic Chemistry: Fundamentals and Applications <sup>4</sup>	NR 204	Wildland Fire Control <sup>5,9</sup>
CRP 212	Introduction to Urban Planning <sup>3,5,7,9</sup>	NR/ES 308	Fire and Society <sup>5</sup>
CRP 336	Introduction to Environmental Planning <sup>5,7</sup>	NR 312	Technology of Wildland Fire Management <sup>5</sup>
CRP 420	Land Use Law <sup>3,5</sup>	NR 324	Social Dimensions of Sustainable Food and Fiber Systems <sup>8</sup>
ECON 221	Microeconomics <sup>3</sup>	NR 339	Internship in Forest and Natural Resources <sup>1,2,3,4,5,6,7,8,9</sup>
ECON 431	Environmental Economics <sup>3</sup>	NR 340	Wildland Fire Management <sup>5,8,9</sup>
EDES 406	Sustainable Environments <sup>8</sup>	NR 350	Urban Forestry <sup>5,9</sup>
ENGL 147	Writing Arguments about STEM <sup>1,2,3</sup>	NR 355	Drone Assisted Surveying <sup>4</sup>
ENGL 316	Writing Sustainability <sup>1,2,3</sup>	NR/ES 360	Ethnicity and the Land <sup>5</sup>
ENVE 405	Environmental Engineering Research	NR 363	Undergraduate Seminar <sup>1,2,3,4,5,6,7,8,9</sup>
ERSC 223	Rocks and Minerals <sup>3,4,5,6,7</sup>	NR 400	Special Problems for Advanced Undergraduates <sup>1,2,3,4,5,6,7,8,9</sup>
ERSC/GEOG 250	Physical Geography <sup>1</sup>	NR/CRP 404	Environmental Law <sup>2,3,5,8,9</sup>
ERSC 303	Soil Erosion and Water Conservation <sup>4,8</sup>	NR/ES 406	Indigenous Peoples and International Law and Policy <sup>9</sup>
ERSC/GEOG 325	Climate and Humanity <sup>1</sup>	NR/CRP 408	Water Resource Law and Policy <sup>2,3,5,8</sup>
ERSC/GEOG 414	Global and Regional Climatology <sup>1</sup>	NR 413	Agricultural Law <sup>1,2,3,4,8</sup>
ERSC/GEOG 415	Applied Meteorology and Climatology <sup>1</sup>	NR 418	Applied GIS <sup>1,5,7,9</sup>
ERSC/GEOL 416	Field-Geology Methods <sup>6</sup>	NR 420	Watershed Assessment and Protection <sup>5</sup>
ERSC/GEOL 417	Geologic Mapping <sup>6</sup>	NR/BIO/SS 421	Wetlands <sup>2,4,5</sup>
ERSC 423	Geomorphology <sup>4,6</sup>	NR 422	Stream Measurements and Water Quality Monitoring <sup>5,9</sup>
ERSC 442	Applied Environmental Groundwater Hydrology <sup>4</sup>	NR 434	Wood Properties, Products and Sustainable Uses <sup>5,9</sup>
ERSC 443	Applied Environmental Contaminant Transport <sup>4</sup>	NR 445	Systems Thinking in Environmental Management <sup>1,2,3,4,5,6,7,8,9</sup>
GEOG 308	Global Geography <sup>1</sup>	NR 455	Wildland-Urban Fire Protection <sup>5,9</sup>
GEOG 328	Applications in Remote Sensing and GIS <sup>1,7</sup>	NR 472	Leadership Practice <sup>3,5</sup>
GEOG 435	Biodiversity and Biogeography Methods	PHIL 340	Environmental Ethics <sup>3</sup>
GEOL 201	Physical Geology <sup>6</sup>	PHYS 122	College Physics II <sup>6</sup>
GEOL 206	Geologic Excursions <sup>6</sup>	or PHYS 142	General Physics II
GEOL 241	Physical Geology Laboratory <sup>6</sup>	PLSC 123	Landscape Installation and Maintenance <sup>5,9</sup>
GEOL 305	Seismology and Earth Structure <sup>6</sup>	PLSC 124	Plant Propagation <sup>5,9</sup>
GEOL 309	Igneous Petrology	PLSC 203	Organic Enterprise Project <sup>8</sup>
GEOL 311	Metamorphic Petrology	PLSC 230	Environmental Horticulture <sup>8,9</sup>
GEOL 330	Principles of Stratigraphy <sup>6</sup>	PLSC 233	Plant Materials I <sup>5,9</sup>
GEOL 415	Structural Geology <sup>6</sup>	PLSC 234	Plant Materials II <sup>5,9</sup>
GEOL 420	Applied Geophysics <sup>6</sup>	PLSC 244	Precision Farming <sup>7,8</sup>
JOUR 203	News Reporting and Writing <sup>5</sup>	PLSC 313	Agricultural Entomology <sup>8</sup>

PLSC 321	Weed Biology and Management <sup>5,8</sup>
PLSC 327	Vertebrate Pest Management <sup>5</sup>
PLSC 350	Abiotic Plant Problems <sup>9</sup>
PLSC 381	Native Plants for California Landscapes <sup>8,9</sup>
PLSC 420	Organic Crop Production Systems <sup>8</sup>
PLSC 425	Arboriculture <sup>5,9</sup>
PLSC 431	Insect Pest Management <sup>8</sup>
PLSC 441	Biological Control for Pest Management <sup>8</sup>
PLSC 450	Current Issues in the Strawberry Industry <sup>8</sup>
POLS 112	American and California Government <sup>3</sup>
POLS 245	Judicial Process <sup>3</sup>
POLS 332	World Food Systems
POLS 341	American Constitutional Law <sup>3</sup>
POLS 343	Civil Rights in America <sup>3</sup>
POLS 344	Civil Liberties <sup>3</sup>
PSC 201	Physical Oceanography <sup>1</sup>
RPTA 112	Introduction to Parks and Outdoor Recreation <sup>3</sup>
RPTA 210	Experience Design <sup>3</sup>
RPTA 255	Leadership and Diverse Groups <sup>2</sup>
RPTA 302	Environmental and Wilderness Education <sup>3</sup>
RPTA 325	Leadership in Outdoor Experiences <sup>3</sup>
SS 221	Soil Health and Plant Nutrition <sup>4,5,8</sup>
SS 321	Soil Morphology <sup>3,4,5,7</sup>
SS 322	Soil Plant Relationships <sup>4,8</sup>
SS 422	Soil Ecology <sup>4</sup>
SS 423	Environmental Soil and Water Chemistry <sup>4</sup>
SS 431	Digital Soil Mapping <sup>3,4,5,7,9</sup>
SS 440	Forest and Range Soils <sup>4,5,7,9</sup>
SS 444	Soil Judging <sup>4</sup>
UNIV 391	Appropriate Technology for the World's People: Development <sup>8</sup>
WVIT 233	Basic Viticulture <sup>8</sup>
WVIT 331	Advanced Viticulture - Fall <sup>8</sup>
WVIT 332	Advanced Viticulture - Winter <sup>8</sup>
WVIT 333	Advanced Viticulture - Spring <sup>8</sup>
WVIT 428	Winegrape Vineyard Management <sup>8</sup>
Any SCM course and any upper-division AG, ANT, BIO, BOT, BRAE, CHEM, COMS, CRP, EDES, ERSC, GEOG, GEOL, JOUR, LA, MCRO, NR, PLSC, RPTA, SS 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).

<b>Area A</b>	<b>English Language Communication and Critical Thinking</b>	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking <sup>1</sup>	4
<b>Area B</b>	<b>Scientific Inquiry and Quantitative Reasoning</b>	
B1	Physical Science (4 units in Support) <sup>2</sup>	0
B2	Life Science (4 units in Support) <sup>2</sup>	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) <sup>2</sup>	0
Upper-Division B (4 units in Major) <sup>2</sup>		0
<b>Area C</b>	<b>Arts and Humanities</b>	
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 <sup>3</sup>		4
<b>Area D</b>	<b>Social Sciences - Select courses in Area D from at least two different prefixes</b>	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D (4 units in Major) <sup>2</sup>		0
<b>Area E</b>	<b>Lifelong Learning and Self-Development</b>	
Lower-Division E		4
<b>Area F</b>	<b>Ethnic Studies</b>	
F	Ethnic Studies	4
<b>GE Electives in Areas B, C, and D</b>		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Support plus 4 units in GE) <sup>2</sup>		4
<b>Total units</b>		<b>48</b>

<sup>1</sup> Recommended course to satisfy GE Area A3: ENGL 147.

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

<sup>3</sup> Recommended course to satisfy GE Area Upper-division C: NR 360 or ENGL 316.