

Forestry and Natural Resources

Bachelor of Science (BS)

Conserving and restoring the earth's natural resources requires broad knowledge and experience. The Forestry and Natural Resources (FNR) major offers 2 concentrations: Forestry & Natural Sciences or Human Dimensions of Natural Resources. Students in the program, regardless of concentration, have ample opportunity to acquire interdisciplinary skills in the ecology, stewardship, and management of ecosystems such as forests, woodlands, and grasslands.

Within the program, students can choose to emphasize topics such as wildlife biology, water policy, fire science, ecosystem restoration, environmental justice, remote sensing and GIS, and rural sociology.

FNR graduates are well-prepared for graduate school and careers in environmental consulting, public agencies, non-profit conservation organizations, and private companies. Students also have the option of preparing for professional careers in forestry, wildlife, and range management.

Admission to the Major

Freshman students may apply directly to the major, or they may select the College of Natural Resource's undeclared option and declare the major by the end of their fourth semester. For further information regarding how to declare the major after admission, including information on a change of major or change of college, please see the College of Natural Resources Undergraduate Student Handbook (http://www.cnr.berkeley.edu/site/forms/oisa/undergrad_handbook.pdf).

Honors Program

Students with a GPA of 3.6 or higher may enroll in the College of Natural Resources Honors Program (H196) once they have reached upper division standing. To fulfill the program requirements, students design, conduct, and report on an individual research project working with a faculty sponsor. For further information about registration for the Honors Symposium and the Honors requirements, please see the College of Natural Resources website (http://nature.berkeley.edu/site/honors_program.php).

Minor Program

A minor in Forestry is available for students who are interested in learning about forestry and renewable resource management as an adjunct to their chosen fields. Students in many diverse majors such as zoology, business administration, and civil engineering may find this minor complementary to their professional career goals. For information regarding how to declare the minor, please contact the Department.

Other Majors and Minors Offered by the Department of Environmental Science, Policy, and Management

Conservation and Resource Studies (<http://guide.berkeley.edu/archive/2014-15/undergraduate/degree-programs/conservation-resource-studies>) (Major and Minor)

Environmental Sciences (<http://guide.berkeley.edu/archive/2014-15/undergraduate/degree-programs/environmental-sciences>) (Major only)
Molecular Environmental Biology (<http://guide.berkeley.edu/archive/2014-15/undergraduate/degree-programs/molecular-environmental-biology>) (Major only)
Society and Environment (<http://guide.berkeley.edu/archive/2014-15/undergraduate/degree-programs/society-environment>) (Major only)

In addition to the University, campus, and college requirements, listed on the College Requirements tab, students must fulfill the below requirements specific to their major program.

General Guidelines

1. All courses taken to fulfill the major requirements below must be taken for graded credit, other than courses listed which are offered on a *Pass/No Pass* basis only. Other exceptions to this requirement are noted as applicable.
2. A minimum cumulative grade point average (GPA) of 2.0 is required.
3. A minimum GPA of 2.0 in upper-division major requirements is required.
4. At least 15 of the 36 required upper-division units must be taken in the College of Natural Resources (except for students majoring in Environmental Economics and Policy; please see the EEP major adviser for further information).
5. A maximum of 16 units of Independent Study (courses numbered 97, 98, 99, 197, 198, and 199) may count toward graduation, with a maximum of 4 units of Independent Study per semester.
6. No more than 1/3 of the total units attempted at UC Berkeley may be taken Pass/Not Pass. This includes units in the Education Abroad Program and UC Intercampus Visitor or Exchange Programs.
7. A maximum of 4 units of Physical Education courses will count toward graduation.

For information regarding residence requirements and unit requirements, please see the College Requirements tab.

Summary of Major Requirements

Lower-division ESPM Environmental Science Core: One course

Lower-division ESPM Social Science Core: One course

Lower-division Concentration Requirements: Five or six courses

Upper-division Requirements:

Five Core courses

Summer Forestry Field Camp or Fall semester course on
Polynesian Island of Moorea

Upper-division Electives: Six courses, restricted by concentration

Please see below for the specific details regarding these requirements.

Lower-division Requirements (All majors)

ESPM Environmental Sci Core

Select one of the following:

ESPM 2 The Biosphere

ESPM 6	Environmental Biology
ESPM C10	Environmental Issues
ESPM 15	Introduction to Environmental Sciences
ESPM Social Science Core	
Select one of the following:	
ESPM C11	Americans and the Global Forest
ESPM C12	Introduction to Environmental Studies
ESPM 50AC	Introduction to Culture and Natural Resource Management
ESPM 60	Environmental Policy, Administration, and Law

Lower-division Concentration Requirements

Students in this major choose a concentration in either Forestry and Natural Sciences (FNS) or Human Dimensions of Natural Resources (FDNR); see below for the lower-division Concentration Requirements for each concentration.

Forestry & Natural Sciences (FNS) Concentration

CHEM 1A & 1AL	General Chemistry and General Chemistry Laboratory	4
BIOLOGY 1B	General Biology Lecture and Laboratory	4
Select one of the following:		
MATH 16A & MATH 16B	Analytic Geometry and Calculus and Analytic Geometry and Calculus	
MATH 1A & MATH 1B	Calculus and Calculus	
STAT 2	Introduction to Statistics	4
or STAT 20	Introduction to Probability and Statistics	
Select one of the following:		
ENVECON C1	Introduction to Environmental Economics and Policy (rec)	
ECON 1	Introduction to Economics	
ECON 2	Introduction to Economics--Lecture Format	
Select one of the following:		
EPS 50	The Planet Earth	4
GEOG 1	Global Environmental Change	
GEOG 40	Introduction to Earth System Science	

Human Dimensions of Natural Resources (HDNR) Concentration

Select one course from Physical Sciences L & S Breadth course list		
BIOLOGY 1B	General Biology Lecture and Laboratory	4
or BIOLOGY 11	Course Not Available	
Select one of the following:		
MATH 16A	Analytic Geometry and Calculus	
MATH 1A	Calculus	
MATH 32	Precalculus	
Select one of the following:		
STAT 2	Introduction to Statistics	
STAT 20	Introduction to Probability and Statistics	
POL SCI 3	Introduction to Empirical Analysis and Quantitative Methods	
SOCIOL 5	Evaluation of Evidence	

Select one of the following:

ENVECON C1	Introduction to Environmental Economics and Policy
ECON 1	Introduction to Economics
or ECON 2	Introduction to Economics--Lecture Format
UGBA 10	Principles of Business

Upper-division Requirements (All majors)

Select one of the following options:

Option A: 8-week Forestry Field Program ("Summer Camp") in the northern Sierra Nevada (11 units) ¹

ESPM 105A	Sierra Nevada Ecology
ESPM 105B	Forest Measurements
ESPM 105C	Silviculture and Utilization
ESPM 105D	Forest Management and Assessment

Option B: Fall Semester Course on the Polynesian Island of Moorea (13 units): ²

ESPM C107	Biology and Geomorphology of Tropical Islands
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¹ Recommended before junior year. More information is available from the College of Natural Resources's website (<http://nature.berkeley.edu/espm/summercamp>).

² More information is available on the program's website (<http://ib.berkeley.edu/moorea/Information.html>).

Upper-division Core Courses (All Majors)

ESPM 102A	Terrestrial Resource Ecology	4
ESPM 102B & 102BL	Natural Resource Sampling and Laboratory in Natural Resource Sampling	4
ESPM 72	Introduction to Geographic Information Systems	3
ESPM 102C	Resource Management	4
ESPM 102D	Climate and Energy Policy	4

Upper-division Electives, Restricted Electives by Concentration (6 courses)

FNS Restricted Electives

The FNS Concentration has two specializations for the restricted elective requirement: Professional Forestry or Natural Sciences.

Professional Forestry Specialization

ESPM 108A	Trees: Taxonomy, Growth, and Structures (fall)	3
ESPM 134	Fire, Insects, and Diseases in Forest Ecosystems (spring)	3
ESPM 182	Forest Operations Management (fall)	3
ESPM 183	Forest Planning and Management (spring)	4
ESPM 185	Applied Forest Ecology (fall)	4

Plus one additional course from one of the following subject categories: PE or MM. 4

Natural Sciences Specialization

Two courses each from both the E and the PE subject categories, plus one additional course from each of the following: MM and MP. 8

HDNR Restricted Electives

Select six courses from the four subject categories below, one course from each category and two additional courses from any category

Ecology (E)

ESPM C103	Principles of Conservation Biology	4
ESPM 106	American Wildlife: Identification and Conservation	3
ESPM 108A	Trees: Taxonomy, Growth, and Structures	3
ESPM 108B	Environmental Change Genetics	3
ESPM 111	Ecosystem Ecology	4
ESPM 112	Microbial Ecology	3
ESPM 113	Insect Ecology	2
ESPM 114	Wildlife Ecology	3
ESPM 115B	Biology of Aquatic Insects	2
ESPM 115C	Fish Ecology	3
ESPM 116A	Course Not Available	4
ESPM 116B	Range Ecology, Improvements, and Management	3
ESPM 116C	Tropical Forest Ecology	3
ESPM 134	Fire, Insects, and Diseases in Forest Ecosystems	3
ESPM 135	Course Not Available	4
ESPM 187	Restoration Ecology	4
INTEGBI 102LF	Introduction to California Plant Life with Laboratory	4
IINTEGBI 153	Course Not Available	4
INTEGBI 154	Plant Ecology	3
INTEGBI 157LF	Ecosystems of California	4

Physical Environment

EPS 117	Geomorphology	4
ESPM 120	Soil Characteristics	3
ESPM 121	Development and Classification of Soils	3
ESPM C128	Chemistry of Soils	3
ESPM C129	Biometeorology	3
GEOG 140A	Physical Landscapes: Process and Form	4

Monitoring & Measurement (MM)

ANTHRO 169A	Data Analysis and Computational Methods	4
ANTHRO 169B	Research Theory and Methods in Socio-Cultural Anthropology	5
ARCH 110AC	The Social and Cultural Basis of Design	4
EPS C120	Course Not Available	
ESPM 172	Photogrammetry and Remote Sensing	3
ESPM 174	Design and Analysis of Ecological Research	4
GEOG 187	Geographic Information Analysis	5
LD ARCH 110	Ecological Analysis	3
LD ARCH C188	Geographic Information Systems	4

Management & Policy (MP)

CY PLAN 112A	Course Not Available	
ESPM 155	Sociology and Political Ecology of Agro-Food Systems	4
ESPM 165	International Rural Development Policy	4
ESPM 168	Political Ecology	4
ESPM 169	International Environmental Politics	4
ESPM 181A	Fire Ecology	3
ESPM 182	Forest Operations Management	3
ESPM 183	Forest Planning and Management	4

ESPM 184	Agroforestry Systems	3
ESPM 185	Applied Forest Ecology	4
ESPM 186	Management and Conservation of Rangeland Ecosystems	4
ESPM 188	Case Histories in Wildlife Management	2

Students who have a strong interest in an area of study outside their major often decide to complete a minor program. These programs have set requirements and are noted officially on the transcript in the memoranda section, but they are not noted on diplomas.

General Guidelines

1. All courses taken to fulfill the minor requirements below must be taken for graded credit.
2. A minimum grade point average (GPA) of 2.0 is required for courses used to fulfill the minor requirements.
3. No more than one upper-division course may be used to simultaneously fulfill requirements for a student's major and minor programs.

At least one of the five upper-division courses below must be taken during the academic year (i.e., not all courses may be Summer Session courses).

No substitutions to the courses listed below will be permitted.

Requirements

Lower Division

ESPM C11	Americans and the Global Forest	4
ESPM 50AC	Introduction to Culture and Natural Resource Management	4
ESPM 60	Environmental Policy, Administration, and Law	4
ESPM 72	Introduction to Geographic Information Systems	3

Upper Division

Select three from the following: 12

ESPM 102A	Terrestrial Resource Ecology	
ESPM 102B	Natural Resource Sampling	
ESPM 102C	Resource Management	
ESPM 102D	Climate and Energy Policy	
ESPM 108A	Trees: Taxonomy, Growth, and Structures	
ESPM 108B	Environmental Change Genetics	
ESPM 116A	Course Not Available	
ESPM 116C	Tropical Forest Ecology	
ESPM/EPS C129	Biometeorology	
ESPM 134	Fire, Insects, and Diseases in Forest Ecosystems	
ESPM 155	Sociology and Political Ecology of Agro-Food Systems	
ESPM 172	Photogrammetry and Remote Sensing	
ESPM 181A	Fire Ecology	
ESPM 182	Forest Operations Management	
ESPM 183	Forest Planning and Management	
ESPM 184	Agroforestry Systems	
ESPM 185	Applied Forest Ecology	

UC Forestry Summer Field Program at Baker Forest
(ESPM 105A-D) ¹

ESPM 105A	Sierra Nevada Ecology
ESPM 105B	Forest Measurements
ESPM 105C	Silviculture and Utilization
ESPM 105D	Forest Management and Assessment

¹ For more information and to download application materials, please see the College of Natural Resource's website (<http://nature.berkeley.edu/espm/summercamp>).

For College Requirements, please refer to the College of Natural Resources (<http://guide.berkeley.edu/archive/2014-15/undergraduate/colleges-schools/natural-resources/#collegerequirementstext>) .

Mission

The Forestry and Natural Resources (FNR) major at the University of California at Berkeley is designed to prepare students to manage forests and wildlands while sustaining ecological integrity and producing vital ecosystem services. The program combines a foundation in the relevant natural and social sciences with explicit hands-on learning opportunities. Students completing this major will be prepared to engage in the challenge of managing forest and natural resources in a rapidly-changing world.

The FNR major includes a professional option (Forestry and Natural Sciences, Professional Forestry specialization) that is accredited by the Society of American Foresters. The Forestry and Natural Resources major also includes a Natural Sciences specialization in the Forestry and Natural Sciences concentration and a Human Dimensions of Natural Resources concentration.

The Professional Forestry specialization provides four years of qualifying education or professional experience for licensing as a professional forester in California. The goals of the Professional Forestry specialization are very closely associated with the educational requirements of the forestry profession and prepare our students for careers in forestry or closely related natural resource fields. When students graduate with a FNR major from UC Berkeley, they will have the basic knowledge and skills to assess and manage forest resources. Graduates with the Professional Forestry specialization should have basic competencies as defined by the Society of American Foresters' requirements of accredited degree programs. Graduates with the Natural Sciences or Human Dimensions in Natural Resources concentrations will have similar competencies.

Learning Goals for the Major

Knowledge and skills for FNR majors are based on the four major subject areas required by the Society of American Foresters. These four subject areas and the basic competencies expected of students areas follows.

1. Ecology and Biology:

- a. Competencies must be documented as an:
 - Understanding of taxonomy and ability to identify forest species, their distribution, and associated habitat requirements
 - Understanding of soil properties and processes, hydrology, water quality, and watershed functions

- Understanding of ecological concepts and principles including the structure and function of ecosystems, plant and animal communities, competition, diversity, population dynamics, succession, disturbance, and nutrient cycling
- Ability to make ecosystem, forest, and stand assessments
- Understanding of plant and animal physiology and the effects of climate, fire, pollutants, moisture, nutrients, genetics, insects and diseases on ecosystem health and productivity

2. Measurement of Forest and Natural Resources:

- a. Competencies must be documented as an:
 - Ability to identify and measure land areas and conduct spatial analysis
 - Ability to design and implement comprehensive inventories that meet specific objectives using appropriate sampling methods and units of measurement
 - Ability to analyze inventory data and project ecosystem conditions

3. Management of Forest and Natural Resources:

- a. Competencies must be documented as an:
 - Ability to develop and apply silvicultural and restoration prescriptions appropriate to management objectives including methods of establishing and influencing the composition, growth, and quality of forests and wildlands and understand the impacts of those prescriptions
 - Ability to analyze the economic, environmental, and social consequences of resource management strategies and decisions
 - Ability to develop management plans with specific multiple objectives and constraints
 - Understanding of the valuation procedures, market forces, processing systems, transportation and harvesting activities that translate human demands for timber-based and other consumable natural resource products into the availability of those products
 - Understanding of the valuation procedures, market, and non-market forces that avail humans the opportunities to enjoy non-consumptive products and services of forests and wildlands
 - Understanding of the administration, ownership, and organization of forest and resource management enterprises

4. Resource Policy, Economics, and Administration:

- a. Competencies must be documented as an:
 - Understanding of resource policy and the processes by which it is developed.
 - Understanding of how federal, state, and local laws and regulations govern the practice of forestry and resource management
 - Understanding of professional ethics and recognition of the responsibility to adhere to ethical standards in decision making on behalf of clients and the public
 - Ability to understand the integration of technical, financial, human resources, and legal aspects of public and private enterprises