### Environmental Sciences

**Bachelor of Science (BS)**

The Environmental Sciences (ES) major is designed for students interested in studying environmental problems from a scientific perspective. The ES major prepares students to deal with issues arising from the impact of human interaction on natural systems. To address these problems, all ES students acquire strong backgrounds in math, biological sciences, and physical sciences. Students may choose to specialize further in a biological or physical science field such as ecology, conservation biology, toxicology, geology, hydrology, meteorology, engineering, or a social science field such as planning, policy analysis, economics, environmental justice, or education. Each ES student completes a year-long senior research project with the support of a mentor in a biological, physical, or interdisciplinary research area.

Graduates are well-prepared for careers in fields such as environmental consulting, education, health, or law as well as community, urban, or regional planning and other related areas of environmentalism in public agencies, non-profit conservation organizations, and private companies. Graduates are well-qualified for a variety of graduate programs, including environmental policy and management, law school, medical school (and other pre-health programs), and environmental engineering.

For more information, visit the Environmental Sciences webpage (https://nature.berkeley.edu/advising/majors/environmental-sciences/).

### Admission to the Major

Advice on admission for freshmen and transfer students can be found on the Raasser College of Natural Resources Admissions (http://guide.berkeley.edu/undergraduate/colleges-schools/natural-resources/admissionstext) page or the Prospective Students (https://nature.berkeley.edu/prospective-students) page. Freshman students may apply directly to the major, or they may select the college's undeclared option and declare the major by the end of their fourth semester. Transfer students (https://nature.berkeley.edu/advising/transfer-applicants) may apply directly to the major through the UC application and must meet the the minimum requirements outlined in the Transfer Admission Guidelines (https://nature.berkeley.edu/sites/default/files/ES%20Transfer%20Admission%20Guidelines.pdf).

Information for current Berkeley students who would like to declare the major after admission, including information on a change of major or change of college, please see chapter 6 of the Raasser College Undergraduate Student Handbook (https://nature.berkeley.edu/handbook), (https://nature.berkeley.edu/handbook/)

### Honors Program

Students with a GPA of 3.6 or higher may enroll in the Honors Program (https://nature.berkeley.edu/advising/honors-program) 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. Qualified ES students enroll in ESPM H175A and ESPM H175L fall of their senior year, and ESPM H175B and ESPM H175L spring of their senior year. In this course series, students design, conduct, and report on an individual research project working with a faculty sponsor.

### Minor Program

There is no minor program in environmental sciences.

### Other Majors Offered by the Department of Environmental Science, Policy, and Management (ESPM)

Conservation and Resource Studies (http://guide.berkeley.edu/undergraduate/degree-programs/conservation-resource-studies) (Major and Minor)
Ecosystem Management and Forestry (http://guide.berkeley.edu/undergraduate/degree-programs/ecosystem-management-forestry) (Major, Forestry Minor)
Molecular Environmental Biology (http://guide.berkeley.edu/undergraduate/degree-programs/molecular-environmental-biology) (Major only)
Society and Environment (http://guide.berkeley.edu/undergraduate/degree-programs/society-environment) (Major only)

Students in this major choose a concentration in biological, physical, or social sciences based on their intended research area, or general area of interest. The specific requirements for each concentration are outlined below.

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. Please see the ES Major Snapshot (https://docs.google.com/document/d/15nsiH5SenQCdyiyku_pHPEcay7bwgg2HT12mV5Au-oA/edit) for an overview.

### 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. All courses taken to fulfill major requirements must be passed with a C- or better letter grade.
3. A minimum cumulative grade point average (GPA) of 2.0 is required.
4. A minimum GPA of 2.0 in upper division major requirements is required.
5. A minimum of 30 upper division units is required in the Environmental Sciences major. 15 of the required upper division units must be taken in the College of Natural Resources.
6. 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.
7. No more than 1/3 of the total units attempted at UC Berkeley may be taken Pass/No Pass. This includes units in the Education Abroad Program and UC Intercampus Visitor or Exchange Programs.
8. 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.
Lower Division Requirements for all ES Majors

ESPM Environmental Science Core (select one):

- ESPM 2 The Biosphere [3]
- ESPM 6 Environmental Biology [3]
- ESPM C10 Environmental Issues [4]
- ESPM 15 Introduction to Environmental Sciences [3]
- ESPM C46 Climate Change and the Future of California [4]

ESPM Social Science Core (select one):

- ESPM 5 FROM FARM TO TABLE: FOOD SYSTEMS IN A CHANGING WORLD [4]
- ESPM C11 Americans and the Global Forest [4]
- ESPM C22AC Fire: Past, Present and Future Interactions with the People and Ecosystems of California [4]
- ESPM 50AC Introduction to Culture and Natural Resource Management [4]
- ESPM 60 Environmental Policy, Administration, and Law [4]

Environmental Economics:

- ENVECON Introduction to Environmental Economics and ECON C3 Policy [4]

Breadth Requirements (two courses):

Select courses from the Seven Course Breadth listing on the College of Letters & Science website.

1 course from the Arts & Literature, Historical Studies, or Philosophy & Values category (3-4 units)

1 course from the Social & Behavioral Science or International Studies category (3-4 units)

Area of Concentration: Choose a concentration in Biological, Physical, or Social Sciences (see below for requirements for each concentration)

Lower Division Requirements by Concentration

Biological Science Concentration

Math (select one calculus sequence):

- MATH 16A Analytic Geometry and Calculus
- & MATH 16B Analytic Geometry and Calculus
- MATH 1A Calculus
- & MATH 1B Calculus

Chemistry (two courses):

- CHEM 1A General Chemistry
- & 1AL General Chemistry Laboratory
- CHEM 3A Chemical Structure and Reactivity
- & 3AL Organic Chemistry Laboratory

Biology (two courses):

- BIOLOGY 1A General Biology Lecture
- & 1AL General Biology Laboratory
- BIOLOGY 1B General Biology Lecture and Laboratory [4]

Physics (one course):

- PHYSICS 8A Introductory Physics [4]

Physical Science Concentration

Math (two courses):

- MATH 1A Calculus
- & MATH 1B Calculus

Chemistry (two courses):

- CHEM 1A General Chemistry
- & 1AL General Chemistry Laboratory
- CHEM 3A Chemical Structure and Reactivity
- & 3AL Organic Chemistry Laboratory

Biology (select one biology sequence):

- BIOLOGY 1A General Biology Lecture
- & 1AL General Biology Laboratory
- BIOLOGY 1B, plus one of the following: INTEGBI 153, INTEGBI 154, ESPM C103, ESPM 111, ESPM 113, ESPM 114, ESPM 115B, ESPM 116B, or ESPM 152

Physics (two courses):

- PHYSICS 7A Physics for Scientists and Engineers
- & PHYSICS 7B Physics for Scientists and Engineers (Math 53 strongly recommended for Physics 7B)

Social Science Concentration

Math (select one calculus sequence):

- MATH 16A Analytic Geometry and Calculus
- & MATH 16B Analytic Geometry and Calculus
- MATH 1A Calculus
- & MATH 1B Calculus

Chemistry (two courses):

- CHEM 1A General Chemistry
- & 1AL General Chemistry Laboratory
- CHEM 3A Chemical Structure and Reactivity
- & 3AL Organic Chemistry Laboratory
- or CHEM 1B General Chemistry

Biology (select one biology sequence):

- BIOLOGY 1A General Biology Lecture
- & 1AL General Biology Laboratory
- BIOLOGY 1B, plus one of the following: INTEGBI 153, INTEGBI 154, ESPM C103, ESPM 111, ESPM 113, ESPM 114, ESPM 115B, ESPM 116B, or ESPM 152

Physics (one course):

- PHYSICS 8A Introductory Physics [4]

Upper Division Requirements

Statistics (must be completed before spring semester of junior year):

Select one of the following:

- ESPM 173 Introduction to Ecological Data Analysis [3]
- PB HLTH 141 Introduction to Biostatistics [5]

- STAT C131A Statistical Methods for Data Science

Intro to Methods of Environmental Science (must be taken spring of junior year):
### Environmental Sciences

#### Upper Division Electives by Concentration

**Biological Sciences Concentration Electives**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 103</td>
<td>Inorganic Chemistry in Living Systems</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 115</td>
<td>Organic Chemistry—Advanced Laboratory Methods</td>
<td>4</td>
</tr>
<tr>
<td>CHEM C130/</td>
<td>Biophysical Chemistry: Physical Principles and the</td>
<td>4</td>
</tr>
<tr>
<td>MCELLBI C100A</td>
<td>Molecules of Life</td>
<td></td>
</tr>
<tr>
<td>CIV ENG 107</td>
<td>Climate Change Mitigation</td>
<td>3</td>
</tr>
<tr>
<td>CIV ENG 113</td>
<td>Ecological Engineering for Water Quality</td>
<td>3</td>
</tr>
<tr>
<td>CIV ENG 114</td>
<td>Environmental Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>ENG/IAS 157AC</td>
<td>Engineering, The Environment, and Society</td>
<td>4</td>
</tr>
<tr>
<td>ENE,RES 102</td>
<td>Quantitative Aspects of Global Environmental</td>
<td>4</td>
</tr>
<tr>
<td>GEOG 100</td>
<td>Communicating Ocean Science</td>
<td>4</td>
</tr>
<tr>
<td>ESPM 102B</td>
<td>Natural Resource Sampling</td>
<td>4</td>
</tr>
<tr>
<td>&amp; 102BL</td>
<td>and Laboratory in Natural Resource Sampling</td>
<td></td>
</tr>
<tr>
<td>ESPM C103/</td>
<td>Principles of Conservation Biology</td>
<td>4</td>
</tr>
<tr>
<td>INTEGBI C156</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ESPM C104/</td>
<td>Modeling and Management of Biological Resources</td>
<td>4</td>
</tr>
<tr>
<td>ENVECON C115</td>
<td>Resources</td>
<td></td>
</tr>
<tr>
<td>ESPM 105A</td>
<td>Sierra Nevada Ecology</td>
<td>4</td>
</tr>
<tr>
<td>ESPM 106</td>
<td>American Wildlife: Management and Policy in the</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>21st Century</td>
<td></td>
</tr>
<tr>
<td>ESPM C107/</td>
<td>Biology and Geomorphology of Tropical Islands</td>
<td>15</td>
</tr>
<tr>
<td>INTEGBI 158LF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ESPM 108A</td>
<td>Trees: Taxonomy, Growth, and Structures</td>
<td>3</td>
</tr>
<tr>
<td>ESPM 108B</td>
<td>Environmental Change Genetics</td>
<td>3</td>
</tr>
</tbody>
</table>

1. These three courses must be completed in the sequence listed, beginning the spring semester of the student's junior year. Statistics must be completed before starting this series. Students who plan to study abroad or otherwise not continuously enroll at UC Berkeley for their junior and senior years should meet with the ES advisor.

2. The ESPM H175 sequence is for ES students who have an overall 3.6 or above GPA and want to participate in the Rausser College Honors Program.

3. ESPM C183/EEP C183 satisfies the modeling requirement only if taken Spring 2015 or earlier.
Environmental Sciences

INTEGBI 102LF  Invertebrate Zoology with Laboratory 5
INTEGBI 104LF  Natural History of the Vertebrates with Laboratory 5
INTEGBI 106A  Physical and Chemical Environment of the Ocean 4
INTEGBI 117LF  Medical Ethnobotany Laboratory 2
INTEGBI C144  Animal Behavior 4
INTEGBI 146LF  Behavioral Ecology with Laboratory 5
INTEGBI 151  Plant Physiological Ecology 6
& 151L  and Plant Physiological Ecology Laboratory 4
INTEGBI 152  Environmental Toxicology 4
INTEGBI C153  Ecology 3
INTEGBI 154  Plant Ecology 5
& 154L  and Plant Ecology Laboratory 4
INTEGBI C156  Principles of Conservation Biology 4
INTEGBI 157LF  Ecosystems of California 4
INTEGBI 158LF  Biology and Geomorphology of Tropical Islands 13
INTEGBI 162  Ecological Genetics 4
INTEGBI 163  Molecular and Genomic Evolution 3
INTEGBI 154L  Plant Ecology Laboratory 2
INTEGBI 173LF  Mammalogy with Laboratory 5
INTEGBI 174LF  Ornithology with Laboratory 4
INTEGBI 175LF  Herpetology with Laboratory 4
LD ARCH 110  Ecological Analysis 3
LD ARCH C188  Geographic Information Science 4
MCELLBI 102  Survey of the Principles of Biochemistry and 4
Molecular Biology
MCELLBI C112  General Microbiology 6
& C112L  and General Microbiology Laboratory 4
MCELLBI C114  Introduction to Comparative Virology 4
MCELLBI C116  Microbial Diversity 3
NUSCTX 110  Toxicology 4
PLANTBI C110L  Biology of Fungi with Laboratory 4
PLANTBI C112  General Microbiology 6
& C112L  and General Microbiology Laboratory 4
PLANTBI C114  Introduction to Comparative Virology 4
PLANTBI/  Microbial Diversity 3
MCELLBI C116
PLANTBI 120  Biology of Algae 4
& 120L  and Laboratory for Biology of Algae
PLANTBI 122  Bioenergy 2
PLANTBI 180  Environmental Plant Biology 2
PB HLTH 150A  Introduction to Epidemiology and Human Disease 4
PB HLTH 150B  Human Health and the Environment in a Changing 3
World
PB HLTH 162A  Public Health Microbiology 4
& PB HLTH 162L  and Course Not Available

Physical Sciences Concentration Electives
ARCH 140  Energy and Environment 4
ARCH 149  Special Topics in Energy and Environment 1-4
CHM ENG 140  Introduction to Chemical Process Analysis 4
CHM ENG 141  Chemical Engineering Thermodynamics 4
CHM ENG 142  Chemical Kinetics and Reaction Engineering 4
CHM ENG 150A  Transport Processes 4
CHM ENG 150B  Transport and Separation Processes 4
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 103</td>
<td>Inorganic Chemistry in Living Systems</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 104A</td>
<td>Advanced Inorganic Chemistry</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 104B</td>
<td>Advanced Inorganic Chemistry</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 105</td>
<td>Instrumental Methods in Analytical Chemistry</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 120A</td>
<td>Physical Chemistry</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 120B</td>
<td>Physical Chemistry</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 125</td>
<td>Physical Chemistry Laboratory</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>CHEM C130/</td>
<td>Biophysical Chemistry: Physical Principles and the Molecules of Life</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>MCELLB/C100A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 130B</td>
<td>Biophysical Chemistry</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 135</td>
<td>Chemical Biology</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>CHEM/EPS C182</td>
<td>Atmospheric Chemistry and Physics Laboratory</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>CIV ENG 100</td>
<td>Elementary Fluid Mechanics</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>CIV ENG C103N</td>
<td>Terrestrial Hydrology</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>CIV ENG C106</td>
<td>Air Pollution</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>CIV ENG 107</td>
<td>Climate Change Mitigation</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>CIV ENG 111</td>
<td>Environmental Engineering</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>CIV ENG 113</td>
<td>Ecological Engineering for Water Quality Improvement</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>CIV ENG 115</td>
<td>Water Chemistry</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>CIV ENG C116</td>
<td>Chemistry of Soils</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>CIV ENG 171</td>
<td>Rock Mechanics</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>CIV ENG 173</td>
<td>Groundwater and Seepage</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>ENGIN/IAS 157AC</td>
<td>Engineering, The Environment, and Society</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>EPS/INTEGBI C100/ GEOF C146</td>
<td>Communicating Ocean Science</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>EPS 100A</td>
<td>Minerals: Their Constitution and Origin</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>EPS 100B</td>
<td>Genesis and Interpretation of Rocks</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>EPS 101</td>
<td>Field Geology and Digital Mapping</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>EPS 102</td>
<td>History and Evolution of Planet Earth</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>EPS 117</td>
<td>Geomorphology</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>EPS 119</td>
<td>Geologic Field Studies</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>EPS 131</td>
<td>Geochemistry</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>EPS C180</td>
<td>Air Pollution</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>EPS C181/ GEOF C139</td>
<td>Atmospheric Physics and Dynamics</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>EPS C182</td>
<td>Atmospheric Chemistry and Physics Laboratory</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>ENE,RES C100/ PUB POL C184</td>
<td>Energy and Society</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ENE,RES 102</td>
<td>Quantitative Aspects of Global Environmental Problems</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ESPM 101A</td>
<td>The Politics and Practice of Sustainability Transitions</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ESPM 102B &amp; 102BL</td>
<td>Natural Resource Sampling and Laboratory in Natural Resource Sampling</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ESPM 120</td>
<td>Science of Soils</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>ESPM 121</td>
<td>Development and Classification of Soils</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>ESPM 122</td>
<td>Field Study of Soil Development</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>ESPM C128/ CIV ENG C116</td>
<td>Chemistry of Soils</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>ESPM/EPS C129</td>
<td>Biometeorology</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>ESPM C130/ GEOF C136</td>
<td>Terrestrial Hydrology</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ESPM 131</td>
<td>Soil Microbiology and Biogeochemistry</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ESPM C148/ NUSCTX C114</td>
<td>Pesticide Chemistry and Toxicology</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>ESPM 157</td>
<td>Data Science in Global Change Ecology</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ESPM 164</td>
<td>GIS and Environmental Science</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>ESPM C170</td>
<td>Carbon Cycle Dynamics</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>ESPM 172</td>
<td>Remote Sensing of the Environment</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>ESPM 173</td>
<td>Introduction to Ecological Data Analysis</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>ESPM 174</td>
<td>Design and Analysis of Ecological Research</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ESPM/ EPS C180/ CIV ENG C106</td>
<td>Air Pollution</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>ESPM 181A</td>
<td>Fire Ecology</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>GEOG C139</td>
<td>Atmospheric Physics and Dynamics</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>GEOG 140A</td>
<td>Physical Landscapes: Process and Form</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>GEOG 142</td>
<td>Climate Dynamics</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>GEOG 143</td>
<td>Global Change Biogeochemistry</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>GEOG 144</td>
<td>Principles of Meteorology</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>GEOG 145</td>
<td>Platform Geographies</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>GEOG C146</td>
<td>Communicating Ocean Science</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>GEOG 180</td>
<td>Field Methods for Physical Geography</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>GEOG 183</td>
<td>Cartographic Representation</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>GEOG/LD ARCH C188</td>
<td>Geographic Information Science</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>GLOBAL 126</td>
<td>Development and the Environment</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>INTEGBI 106A</td>
<td>Physical and Chemical Environment of the Ocean</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>LD ARCH 120</td>
<td>Topographic Form and Design Technology</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>LD ARCH C188</td>
<td>Geographic Information Science</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>MATH 121A</td>
<td>Mathematical Tools for the Physical Sciences</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>MATH 121B</td>
<td>Mathematical Tools for the Physical Sciences</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>MEC ENG 106</td>
<td>Fluid Mechanics</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

**Social Sciences Concentration Electives**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIV ENG 107</td>
<td>Climate Change Mitigation</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>DEMOG/SOCIOl C126</td>
<td>Sex, Death, and Data</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>DEMOG/ECON C175</td>
<td>Economic Demography</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ECON/ ENVECON C102</td>
<td>Natural Resource Economics</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ECON C125/ ENVECON C101</td>
<td>Environmental Economics</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ECON C171/ ENVECON C151</td>
<td>Development Economics</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ECON/DEMOG C175</td>
<td>Economic Demography</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ENE,RES C100</td>
<td>Energy and Society</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ENE,RES 101</td>
<td>Ecology and Society</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>ENE,RES 102</td>
<td>Quantitative Aspects of Global Environmental Problems</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ENE,RES 175</td>
<td>Water and Development</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ENE,RES 180</td>
<td>Ecological Economics in Historical Context</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>
ENGIN 125 Ethics, Engineering, and Society 3
ENGIN 157AC Engineering, The Environment, and Society 4
ENVECON 100 Intermediate Microeconomics with Applications to Sustainability 4
ENVECON C101/ Environmental Economics 4
ECON C125 4
ENVECON/ ENVECON C102 Natural Resource Economics 4
ENVECON C115/ Modeling and Management of Biological ESPM C104 Resources 4
ENVECON 131 Globalization and the Natural Environment 3
ENVECON 147 Regulation of Energy and the Environment 4
ENVECON C151/ Development Economics 4
ECON C171 4
ENVECON 153 Population, Environment, and Development 3
ENVECON 161 Advanced Topics in Environmental and Resource Economics 4
ENVECON 162 Economics of Water Resources 3
EPS 102 History and Evolution of Planet Earth 4
ESPM 101A The Politics and Practice of Sustainability Transitions 4
ESPM 102C Resource Management 4
ESPM 102D Climate and Energy Policy 4
ESPM C104/ ESPM C115 Resources 4
ENVECON 117 Urban Garden Ecosystems 4
ENVECON 151 Society, Environment, and Culture 4
ENVECON 155AC Sociology and Political Ecology of Agro-Food Systems, formerly ESPM 155 4
ENVECON 157 Data Science in Global Change Ecology 4
ESPM 160AC/ ESPM 160AC HIST 120AC American Environmental and Cultural History 4
ESP 161 Environmental Philosophy and Ethics 4
ESP 162 Bioethics and Society 4
ESPM 163AC/ ESPM 163AC SOCIO 137AC Environmental Justice: Race, Class, Equity, and the Environment 4
ESPM 165 International Rural Development Policy 4
ESPM C167/ PB HLTH C160 Environmental Health and Development 4
ESPM 168 Political Ecology 4
ESPM 169 International Environmental Politics 4
ESPM 183 Forest Ecosystem Management and Planning 4
GEOG 130 Food and the Environment 4
GEOG/LD ARCH C188 Geographic Information Science 4
INTEGB 117 Medical Ethnobotany & 117LF and Medical Ethnobotany Laboratory 4
GLOBAL 126 Development and the Environment 4
LD ARCH 110 Ecological Analysis 3
LD ARCH 130 Sustainable Landscapes and Cities 4
LD ARCH C188 Geographic Information Science 4
SOCIO 126 Sex, Death, and Data 4
SOCIO 137AC Environmental Justice: Race, Class, Equity, and the Environment 4

Reading and Composition (http://guide.berkeley.edu/undergraduate/colleges-schools/natural-resources/reading-composition-requirement/)

In order to provide a solid foundation in reading, writing and critical thinking all majors in the College require two semesters of lower division work in composition. Students must complete a first-level reading and composition course by the end of their second semester and a second-level course by the end of their fourth semester.

Foreign Language (http://guide.berkeley.edu/undergraduate/colleges-schools/natural-resources/foreign-language-requirement/): EEP Majors only

The Foreign Language requirement is only required by Environmental Economics and Policy (EEP) majors. It may be satisfied by demonstrating proficiency in reading comprehension, writing, and conversation in a foreign language equivalent to the second semester college level, either by passing an exam or by completing approved course work.

Quantitative Reasoning (http://guide.berkeley.edu/undergraduate/colleges-schools/natural-resources/quantitative-reasoning-requirement/): EEP Majors only

The Quantitative Reasoning requirement is only required by Environmental Economics and Policy (EEP) majors. The requirement may be satisfied by exam or by taking an approved course.

Undergraduate Breadth

Undergraduate breadth provide Berkeley students with a rich and varied educational experience outside of their major program and many students complete their breadth courses in their first two years. Breadth courses are built into the Rausser College major requirements and each major requires a different number of breath courses and categories. The EEP major is the only college major that requires the entire 7 course breadth. Refer to the major snapshots on each Rausser College major page (https://nature.berkeley.edu/advising/majors-minors/) for additional information.

High School Exam Credit


Unit Requirements

Students must complete at least 120 semester units of courses subject to certain guidelines:

- At least 36 units must be upper division courses, including a minimum of 15 units of upper division courses in the Rausser College.
- A maximum of 16 units of Special Studies coursework (courses numbered 97, 98, 99, 197, 198, or 199) is allowed towards the 120 units; a maximum of four is allowed in a given semester.
- A maximum of 4 units of Physical Education from any school attended will count towards the 120 units.
- Students may receive unit credit for courses graded P (including P/ NP units taken through EAP) up to a limit of one-third of the total units taken and passed on the Berkeley campus at the time of graduation.
Courses taken for P/NP in the Spring 2020 semester will not count toward this limit.

**Semester Unit Minimum**

All Rausser College students must enroll in at least 12 units each fall and spring semester.

**Semester Unit Maximum**

To request permission to take more than 20.5 units in a semester, please see the major adviser.

**Semester Limit**

Students admitted as freshmen must graduate within 8 fall/spring semesters at UC Berkeley. Students admitted as transfer students must graduate within 4 fall/spring semesters at UC Berkeley. Students who go on EAP and UCDC can petition for additional semesters. Other UC-affiliated programs, such as the Gump Station in Moorea, may also be considered. Summer session, UC Extension and non-UC study abroad programs do not count towards this semester limit. Students approved for double majors or simultaneous degrees in two colleges may be granted an additional semester. Rausser College does not limit the number of total units a student can accrue.

**Senior Residence Requirement**

Once you achieve and exceed 90 units (senior status), you must complete at least 24 of the remaining 30 units in residence at the Rausser College of Natural Resources over at least 2 semesters. To count as residence, a semester must consist of at least 6 passed units taken while the student is a member of Rausser. At least one of the two terms must be a fall or spring semester. Senior residence terms do not need to be completed consecutively. All courses offered on campus for the fall, spring, and summer terms by Berkeley departments and programs and all Berkeley online (‘W’) courses count. Inter-campus Visitor, Education Abroad Program, UC Berkeley Washington Program, and UC Berkeley Extension units do not count toward this requirement. Students may use Summer Session to satisfy one semester of the Senior Residence Requirement, provided that 6 units of coursework are completed.

**Modified Senior Residence Requirement**

Participants in a fall, spring or summer UC Education Abroad Program (UCEAP), Berkeley Summer Abroad, or the UC Berkeley Washington Program may meet a modified Senior Residence Requirement by completing 24 of their final 60 semester units in residence (excluding UCEAP). At least 12 of these 24 units must be completed after senior status is reached. International travel study programs sponsored by Summer Sessions and education abroad programs offered outside of the UC system do not qualify for modified senior residence. Most students automatically satisfy the residence requirement by attending classes here for four years. In general, there is no need to be concerned about this requirement, unless students go abroad for a semester or year or want to take courses at another institution or through University Extension during their senior year. In these cases, students should make an appointment to see an adviser to determine how they can meet the Senior Residence Requirement.

**Grade Requirements**

- A 2.0 UC GPA is required for graduation.
- A 2.0 average in all upper division courses required of the major program is required for graduation.
- A grade of at least C- is required in all courses for the major. Major and minor coursework taken in Spring 2020, Fall 2020, and Spring 2021 may be completed with P/NP grading option. See more details below.

**Changes in Policies and Procedures during the COVID-19 Pandemic**

**Fall 2020, Spring 2021, SUMMER 2021**

After much consultation across the colleges of UC Berkeley, and via our college Executive Committee, the following decisions have been made about the selection of the P/NP grade option (CPN) by undergraduate students during the Fall 2020 & Spring 2021 semesters for the Rausser College of Natural Resources.

- College Course Requirements: Reading and Composition, Quantitative Reasoning, and Foreign Language requirements normally satisfied with letter grades may be met with a passed (P) grade during the Fall 2020 semester. This does not include the system-wide Entry Level Writing requirement. College Writing R1A must be taken for a letter grade and completed with a C or better to fulfill the Entry Level Writing requirement.

**Satisfying the Entry Level Writing requirement**

- Students on AP must take all coursework for letter grades.
- Students currently in good standing who earn NP grades, Incompletes, or failing letter grades for more than 50% of units will be placed on academic probation and will be required to meet with their college advisor and complete an Academic Success Plan for the subsequent semester.
- Students on AP must take all coursework for letter grades. Students on AP may be removed from probationary status with sufficient letter graded course work to raise their cumulative GPA above 2.0.
- Students on Academic Probation who do not attain sufficient letter-graded coursework to be removed from AP (ie. enough “P” grades will remain in good standing.
- Students on Academic Probation who do not attain sufficient letter-graded coursework to be removed from AP (ie. enough grade points to raise cumulative GPA above 2.0 cumulative GPA) will remain on AP for the subsequent semester and must complete an Academic Success Plan with their college advisor.
College adjusted college requirements as follows:

In light of the substantial disruptions to instruction caused by the novel coronavirus emergency, the Berkeley Division of the Academic Senate made changes to grading options for the Spring 2020 semester. Rausser College adjusted college requirements as follows:

- **Term Probation:** Students in this category are placed on academic probation if their GPA falls below 1.5 in any fall or spring semester (“Term”). To get back into good standing, you must earn a UC Berkeley term GPA of 2.0 the following regular semester (fall/spring) and maintain an overall GPA of 2.0. If you fail to meet these conditions, you will be subject to dismissal from the University. For Fall 2020 & Spring 2021, the terms for Term Probation have been modified.

- Rausser CNR students currently in good standing who earn all “P” grades will remain in good standing and will not be placed on Term Probation.

- **Transferring Credit:** If you are taking coursework through another institution in Fall 2020 & Spring 2021, P grades earned will be accepted for all degree requirements. Note: This does not include the systemwide Entry Level Writing requirement. College Writing R1A must be taken for a letter grade and completed with a C or better to fulfill the Entry Level Writing requirement.

For additional information, please see Changes to Policies and Procedures for Fall 2020, Spring 2021, & Summer 2021 (https://nature.berkeley.edu/advising/AY-2020-2021-policy-adjustments/).

**Spring 2020**

In light of the substantial disruptions to instruction caused by the novel coronavirus emergency, the Berkeley Division of the Academic Senate made changes to grading options for the Spring 2020 semester. Rausser College adjusted college requirements as follows:

- **College Course Requirements:** All passing course work taken in Spring 2020 may be used for college requirements regardless of the grading option selected.

- **Requirements to Graduate:** To graduate, Rausser College students usually must have at least a 2.0 cumulative UC GPA to graduate, both overall and in the upper-division courses required for their major. For Spring 2020, students with at least a 1.9 cumulative GPA overall and in the upper-division courses required for their major to graduate will be considered as having met the requirement.

- **Academic Probation:** Recognizing the challenges to teaching and learning during the COVID-19 pandemic, Rausser College of Natural Resources will not be penalizing any students’ academic progress for Spring 2020.

- Students in good academic standing who earn all “P” grades will remain in good standing.

- Students, who are in good standing, who earn NP grades, Incompletes, or failing grades for more than 50% of units will be required to meet with their college advisor and complete an Academic Success Plan for Fall 2020 by September 11, 2020, but will not be placed on Academic Probation.

- Students on Academic Probation may be removed from probationary status with sufficient letter graded course work to raise their cumulative GPA above 2.0.

- Students on Academic Probation who do not attain sufficient letter-graded coursework to be removed from AP (i.e. enough grade points to raise cumulative GPA above 2.0 cumulative GPA) will remain on AP for Fall 2020 and must complete an Academic Success Plan with their college advisor by September 11, 2020.

- **Term Probation:** Recognizing the challenges to teaching and learning during the COVID-19 pandemic, Rausser College of Natural Resources will not be penalizing any students’ academic progress for Spring 2020.

- Students in good academic standing who earn all “P” grades will remain in good standing.

- Students on Term Probation, but not AP, may be removed from probationary status with passing grades in at least 50% of units for Spring 2020.

- Students on Term Probation at the start of Spring 2020 who earn NP, Incomplete, or failing grades for more than 50% of units must complete an Academic Success Plan with their college advisor by September 11, 2020 and will remain on Term Probation.

- **Transferring Credit:** If you are taking coursework through another institution in Spring 2020 (i.e. through Concurrent Enrollment or instead of being enrolled in Spring 2020 at UC Berkeley) and that institution has moved to a P/NP-default or P/NP-only grading model, P grades earned will be accepted for all degree requirements.

For additional information, please see Changes to Policies and Procedures for Spring 2020 (https://nature.berkeley.edu/advising/spring-2020-changing-policies-faq/).

**Learning Goals for the Major**

1. Develop a broad, interdisciplinary framework for approaching complex, interconnected environmental problems facing our world at multiple scales.

2. Develop strong analytic and quantitative skills needed to identify problems, develop a program to address the problem, execute a rigorous analysis of the issue, and reach independent conclusions.

3. Develop a rigorous scientific base across multiple disciplines (social, biological, and physical sciences) but with a strong concentration in one area so as to develop depth of expertise in that field.

4. Learn how to communicate findings effectively to the scientific community, government agencies, non-government environmental organizations, and the public.

**Skills**

1. Recognition of and knowledge about environmental problems and areas of research.

2. Comprehensive training in basic mathematics and the biological and physical sciences (calculus, biology, chemistry, and physics).

3. Introduction to the social science concepts and methods (environmental economics, a course in human environment interactions).
4. Training in sampling and experimental design, and quantitative methods of data analysis and interpretation (statistics, introduction to estimation and modeling techniques).
5. Development of critical thinking and evaluation skills.
6. Training in general research methods.
7. Training in written communication, especially scientific writing.
8. Training in oral and visual communication skills.
9. Additional training in specialized research methods in the student’s area of concentration.

Major Maps help undergraduate students discover academic, co-curricular, and discovery opportunities at UC Berkeley based on intended major or field of interest. Developed by the Division of Undergraduate Education in collaboration with academic departments, these experience maps will help you:

- **Explore** your major and gain a better understanding of your field of study
- **Connect** with people and programs that inspire and sustain your creativity, drive, curiosity and success
- **Discover** opportunities for independent inquiry, enterprise, and creative expression
- **Engage** locally and globally to broaden your perspectives and change the world
- **Reflect** on your academic career and prepare for life after Berkeley

Use the major map below as a guide to planning your undergraduate journey and designing your own unique Berkeley experience.

View the Environmental Sciences Major Map PDF. ([https://ue.berkeley.edu/sites/default/files/environmental_sciences.pdf](https://ue.berkeley.edu/sites/default/files/environmental_sciences.pdf))

At the Rausser College of Natural Resources, we provide holistic, individual advising services to prospective and current students who are pursuing major and minors in our college. We assist with a range of issues including course selection, academic decision-making, achieving personal and academic goals, and maximizing the Berkeley experience.

If you are looking to explore your options, or you are ready to declare a major or minor, contact the undergraduate advisor for your intended major. To schedule an appointment or get in touch, please follow the instructions on our website ([https://nature.berkeley.edu/advising/meet-rausser-advisors/](https://nature.berkeley.edu/advising/meet-rausser-advisors/)).

**Undergraduate Academic Advisor, Environmental Sciences**
Jenny Miner
envsci.ugrad@berkeley.edu
260 Mulford Hall
510-642-4249

**Common Career Paths for Environmental Sciences Majors**

**Career Destinations Survey**

Every year the Career Center surveys graduating seniors ([https://career.berkeley.edu/Survey/Survey/](https://career.berkeley.edu/Survey/Survey/)) about their post-graduation plans to better understand the career outcomes of our alumni including: career fields, job titles, specific employers, entry-level salaries, and graduate/professional school destinations. The data profiles by major provide an impressive overview of the diverse interests and achievements of recent graduates from UC Berkeley, including specific data for the Environmental Sciences ([https://career.berkeley.edu/sites/default/files/pdf/Survey/2015EnvSci.pdf](https://career.berkeley.edu/sites/default/files/pdf/Survey/2015EnvSci.pdf)) major within the College of Natural Resources. Each annual data set includes the August, December, and May graduating cohorts for that survey year. This data is designed to provide students, alumni, and employers with critical information about where Cal students go after graduation. As expected, college major does not restrict the employment or graduate school options that Cal students pursue. With careful planning ([https://career.berkeley.edu/Plan/Plan/](https://career.berkeley.edu/Plan/Plan/)), you can develop career-related skills and experiences that can prepare you for almost any job or graduate school field.

**Sample Career Pathways**

Environmental Sciences majors go on to pursue a wide variety of career options including, but not limited to:

- **Federal Government Agencies** (e.g. Environmental Protection Agency; Department of Agriculture/environmental remediation & compliance: soil, water, air & sediments)
- **Nonprofit Organizations** (Environment & Sustainability focused): Administration, management, public relations, fundraising/development, program coordination, grant writing, volunteer management
- **Business** (e.g. solar), regulatory/compliance; corporate social responsibility (CSR), environmental consulting
- **Waste Management**: Risk assessment, quality control, logistics, planning, recycling, transportation, public health
- **Air & Water Quality Management**: Testing/analysis, watershed management, stream restoration, sustainable infrastructure, risk assessment, compliance/permitting
- **Soil Science**: Waste disposal, environmental compliance, landfill operation and monitoring, fertilizer technology, agricultural production, research, organic farming
- **Planning and Conservation**: Natural resource management, sustainability programs, water resources, transportation and aviation planning, building/zoning, land use/acquisition, recreation and parks management, mining
- **Education/Environmental Education**: Teaching (elementary, secondary, post-secondary, research); public/community education, public health, outdoor education
- **Communications**: Technical writing, editing, illustrating, photography, public relations
- **Health/Medical**: Physician, allied health professions, nutrition, alternative medicine
- **Environmental Law**: Political action/lobbying, regulatory affairs, science policy, patent law, public interest, environmental law, mediation

Visit our Connecting Majors to Careers ([https://career.berkeley.edu/InfoLab/Majors2Careers/](https://career.berkeley.edu/InfoLab/Majors2Careers/)) resource to explore additional career paths most commonly associated with over 80 majors, including Environmental Sciences ([http://whatcanidowiththismajor.com/major/wp-content/uploads/2011/05/environmentalstudies-science3.pdf](http://whatcanidowiththismajor.com/major/wp-content/uploads/2011/05/environmentalstudies-science3.pdf)).

**Career Services Overview**

The UC Berkeley Career Center ([https://career.berkeley.edu/](https://career.berkeley.edu/)) is dedicated to advancing equity and access to career resources for every student by providing comprehensive resources, programs, and counseling on career development, internships, employment, and graduate school. Whether it be through a resume critique, an alumni
networking event, or an interviewing skills workshop, the Career Center is committed to helping all students achieve:

- **Career Clarity**: Providing students the opportunity to identify their career direction
- **Career Competitiveness**: Providing students the opportunity to enhance their marketability via real-world experiences
- **Career Connections**: Providing students opportunities to engage with alumni and employers

The Career Center utilizes Handshake (https://berkeley.joinhandshake.com/), a powerful recruiting platform that uses cutting-edge technology to help students more easily connect with employers, jobs, internships, events, resources, as well as access to career coaching appointments.

**Career and Internship Resources**

The UC Berkeley Career Center (https://career.berkeley.edu/) offers a wide variety of programs and resources to support students of all majors and class levels.

- **Job Search Tools** (https://career.berkeley.edu/Tools/Tools/):
  Resume and cover letter writing, job search strategies, networking tools, interviewing skills, and more, can be found in their Career Readiness Workbook. (https://issuu.com/calcareercenter/docs/cr_workbook_19-20_2/)

- **24/7 Online Resources** (https://career.berkeley.edu/Resources/GoTo): Their Go-To Resources are here to help you engage and grow in your career development.

- **Career Counseling** (https://career.berkeley.edu/Info/MakeAppt/):
  They offer a wide variety of scheduled and drop-in appointment options based on major and topic.

- **Internships** (https://career.berkeley.edu/Internships/Internships/):
  Internship listings, search strategies, FAQs, and more.

- **Career Exploration** (https://career.berkeley.edu/Info/CareerExp/):
  Discover their resources to help you explore career options, identify career goals, and develop effective career plans.

- **Events and Workshops** (https://career.berkeley.edu/Info/Events/):
  They deliver over 80 events each semester including workshops, alumni networking events, career panels, conferences, and Alumni Career Chats.

- **Career Fairs** (https://career.berkeley.edu/Fairs/Fairs/) and **Employer Information Sessions** (https://career.berkeley.edu/Callisto/Infosession):
  They offer a variety of career fairs each year across different career fields and partner with numerous employers for on-campus information sessions.

- **Graduate and Professional School** (https://career.berkeley.edu/Info/GradProf/):
  Counseling and resources to help students research and apply for graduate and professional school including medical school (https://career.berkeley.edu/Medical/Medical/) and law school (https://career.berkeley.edu/Law/Law/).