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 prehealth programs), and environmental engineering.

Admission to the Major

Freshman applicants may apply directly to the major, or 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 and/or change of college, please see the College of Natural Resources Undergraduate Student Handbook (https://nature.berkeley.edu/handbook) .

Honors Program

Students with a GPA of 3.6 or higher may enroll in the College of Natural Resources 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 Senior Research Seminar in Environmental Sciences and ESPM H175L Senior Research Laboratory in Environmental Sciences fall of their senior year, and ESPM H175B Senior Research Seminar in Environmental Sciences and ESPM H175L Senior Research Laboratory in Environmental Sciences spring of their senior year. For further information on the CNR Honors Program, please see the College of Natural Resources website (http://nature.berkeley.edu/site/honors_program.php) .

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/archive/2016-17/undergraduate/degree-programs/conservation-resource-studies) (Major and Minor)
Forestry and Natural Resources (http://guide.berkeley.edu/archive/2016-17/undergraduate/degree-programs/forestry-natural-resources) (Major and Minor)
Molecular Environmental Biology (http://guide.berkeley.edu/archive/2016-17/undergraduate/degree-programs/molecular-environmental-biology) (Major only)
Society and Environment (http://guide.berkeley.edu/archive/2016-17/undergraduate/degree-programs/society-environment) (Major only)

Students in this major choose a concentration in biological, physical, or social sciences based on 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.

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 are 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
ESPM 6	Environmental Biology
ESPM C10	Environmental Issues
ESPM 15	Introduction to Environmental Sciences
ESPM C46	Climate Change and the Future of California

ESPM Social Science Core (select one):

ESPM 3	The Political Ecologies of Spain and California in Comparative Perspective Offered only through the UC Berkeley Global Edge program
ESPM C11	Americans and the Global Forest
ESPM C12/ ENGLISH C77	Introduction to Environmental Studies
ESPM 50AC	Introduction to Culture and Natural Resource Management
ESPM 60	Environmental Policy, Administration, and Law

Environmental Economics

ENVECON C1/ECON C3	Introduction to Environmental Economics and Policy

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

Chemistry (two courses):

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

Biology (two courses):

BIOLOGY 1A & 1AL	General Biology Lecture and General Biology Laboratory
BIOLOGY 1B	General Biology Lecture and Laboratory

Physics (one course):

PHYSICS 8A	Introductory Physics

Physical Science Concentration

Math (two courses):

MATH 1A & MATH 1B	Calculus and Calculus

Chemistry (two courses):

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

Biology (select one biology sequence):

BIOLOGY 1A & 1AL & BIOLOGY 1B	General Biology Lecture and General Biology Laboratory and General Biology Lecture and Laboratory

BIOLOGY 1B, plus one of the following: INTEGBI 153, INTEGBI 154, ESPM 102A, ESPM 111, ESPM 113, ESPM 114, ESPM 115B, or ESPM 116B

Physics (2 courses):

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

Social Science Concentration

Math (select one calculus sequence):

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

Chemistry (two courses):

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

Biology (select one biology sequence):

BIOLOGY 1A & 1AL & BIOLOGY 1B	General Biology Lecture and General Biology Laboratory and General Biology Lecture and Laboratory

BIOLOGY 1B, plus one of the following: INTEGBI 153, INTEGBI 154, ESPM 102A, ESPM 111, ESPM 113, ESPM 114, ESPM 115B, or ESPM 116B

Physics (one course):

PHYSICS 8A	Introductory Physics

Upper Division Requirements

Statistics (must be completed before spring semester of student's junior year) [1]

Select one of the following:

ESPM 173	Introduction to Ecological Data Analysis
PB HLTH 141	Introduction to Biostatistics
PB HLTH 142	Introduction to Probability and Statistics in Biology and Public Health
STAT 131A	Introduction to Probability and Statistics for Life Scientists

Intro to Methods of Environmental Science [1]

ESPM 100ES	Introduction to the Methods of Environmental Science (must be taken spring of junior year)

Senior Research Seminar: First Half (select one): [1, 2]

ESPM 175A & ESPM 175L	Senior Research Seminar in Environmental Sciences and Senior Research Laboratory in Environmental Sciences (must be taken fall of senior year)
ESPM H175A & ESPM H175L	Senior Research Seminar in Environmental Sciences and Senior Research Laboratory in Environmental Sciences (must be taken fall of senior year)

Senior Research Seminar: Second Half (select one) [1, 2]

ESPM 175B & ESPM 175L	Senior Research Seminar in Environmental Sciences and Senior Research Laboratory in Environmental Sciences (must be taken spring of senior year)
ESPM H175B & ESPM H175L	Senior Research Seminar in Environmental Sciences and Senior Research Laboratory in Environmental Sciences (must be taken spring of senior year)

Environmental Modeling (select one): ESPM C183/EEP C183 satisfies the modeling requirement only if taken Spring 2015 or earlier

ENE,RES 102	Quantitative Aspects of Global Environmental Problems
ESPM 102C	Resource Management Satisfies the modeling requirement if taken Spring 2016 or later.
ESPM C104/ ENVECON C11	Modeling and Management of Biological Resources

Human Environment Interactions (select one):

ANTHRO 137	Energy, Culture and Social Organization
ESPM 102D	Climate and Energy Policy
ESPM 151	Society, Environment, and Culture
ESPM 155AC	Sociology and Political Ecology of Agro-Food Systems formerly ESPM 155
ESPM 160AC/ HISTORY 120A	American Environmental and Cultural History
ESPM 161	Environmental Philosophy and Ethics
ESPM 162	Bioethics and Society
ESPM 163AC/ SOCIOL 137AC	Environmental Justice: Race, Class, Equity, and the Environment
ESPM 166	Natural Resource Policy and Indigenous Peoples
ESPM C167/ PB HLTH C160	Environmental Health and Development
ESPM 168	Political Ecology
ESPM 169	International Environmental Politics
ESPM 186	Management and Conservation of Rangeland Ecosystems
ENE,RES 175	Water and Development
ENE,RES 180	Ecological Economics in Historical Context
ENVECON C101/ ECON C125	Environmental Economics
ENVECON 131	Globalization and the Natural Environment
ENVECON 140AC	Economics of Race, Agriculture, and the Environment
ENVECON 153	Population, Environment, and Development
ENVECON 162	Economics of Water Resources
GEOG 130	Food and the Environment
GEOG 138	Global Environmental Politics

Area of Concentration Elective

Select one 3-5 unit elective from area of concentration (see list below)

Additional ES Elective

Select one 2-5 unit elective from any area of concentration (see list below)

[1] These four courses must be completed in the sequence listed, beginning the fall semester of the student's junior year. 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 adviser.

[2] The ESPM H175 sequence is for ES students who have an overall 3.6 or above GPA and will enroll in the CNR honors program.

Upper Division Electives by Concentration

Biological Sciences Concentration Electives

CHEM 103	Inorganic Chemistry in Living Systems	3
CHEM 112A	Course Not Available	
CHEM 112B	Course Not Available	
CHEM 115	Organic Chemistry--Advanced Laboratory Methods	4
CHEM C130/ MCELLBI C100A	Biophysical Chemistry: Physical Principles and the Molecules of Life	4
CIV ENG 101	Fluid Mechanics of Rivers, Streams, and Wetlands	3
CIV ENG 107	Climate Change Mitigation	3
CIV ENG 113N	Course Not Available	3
CIV ENG 114	Environmental Microbiology	3
EPS/INTEGBI C100/ GEOG C146	Communicating Ocean Science	4
ENE,RES 101	Ecology and Society	3
ENE,RES 102	Quantitative Aspects of Global Environmental Problems	4
ESPM 102A	Terrestrial Resource Ecology	4
ESPM 102B & 102BL	Natural Resource Sampling and Laboratory in Natural Resource Sampling	4
ESPM C103/ INTEGBI C156	Principles of Conservation Biology	4
ESPM C104/ ENVECON C115	Modeling and Management of Biological Resources	4
ESPM 105A	Sierra Nevada Ecology	4
ESPM 106	American Wildlife: Management and Policy in the 21st Century	3
ESPM C107/ INTEGBI 158LF	Biology and Geomorphology of Tropical Islands	13
ESPM 108A	Trees: Taxonomy, Growth, and Structures	3
ESPM 108B	Environmental Change Genetics	3
ESPM 110	Primate Ecology	4
ESPM 111	Ecosystem Ecology	4
ESPM 112	Microbial Ecology	3
ESPM 113	Insect Ecology	3
ESPM 114	Wildlife Ecology	3
ESPM 115B	Biology of Aquatic Insects	2
ESPM C115C/ INTEGBI C176L	Fish Ecology	3
ESPM 116B	Range Ecology, Improvements, and Management	3
ESPM 116C	Tropical Forest Ecology	3
ESPM 117	Urban Garden Ecosystems	4
ESPM 118	Agricultural Ecology	4
ESPM 119	Chemical Ecology	2
ESPM 120	Soil Characteristics	3

ESPM 121	Development and Classification of Soils	3
ESPM C126/ INTEGBI C144	Animal Behavior	4
ESPM/EPS C129	Biometeorology	3
ESPM 131	Soil Microbial Ecology	3
ESPM 134	Fire, Insects, and Diseases in Forest Ecosystems	3
ESPM C138/ MCELLBI C114/ PLANTBI C114	Introduction to Comparative Virology	4
ESPM 140	General Entomology	4
ESPM 144	Insect Physiology	3
ESPM 146L	Medical and Veterinary Entomology Laboratory	1
ESPM 147	Field Entomology	1
ESPM C148/ NUSCTX C114	Pesticide Chemistry and Toxicology	3
ESPM/INTEGBI C149	Molecular Ecology	4
ESPM 152	Global Change Biology	3
ESPM 156	Course Not Available	3
ESPM 158	Biodiversity Conservation in Working Landscapes	4
ESPM 162	Bioethics and Society	4
ESPM 172	Photogrammetry and Remote Sensing	3
ESPM 173	Introduction to Ecological Data Analysis	3
ESPM 174	Design and Analysis of Ecological Research	4
ESPM 181A	Fire Ecology	3
ESPM 184	Agroforestry Systems	3
ESPM 185	Applied Forest Ecology	4
ESPM 186	Management and Conservation of Rangeland Ecosystems	4
ESPM 187	Restoration Ecology	4
ESPM 188	Case Histories in Wildlife Management	2
GEOG 147	Communicating Climate Science	3
GEOG 148	Biogeography	4
GEOG/LD ARCH C188	Geographic Information Systems	4
INTEGBI 102LF	Introduction to California Plant Life with Laboratory	4
INTEGBI 103LF	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 117	Medical Ethnobotany	2
INTEGBI 146LF	Behavioral Ecology with Laboratory	5
INTEGBI 151 & 151L	Plant Physiological Ecology and Plant Physiological Ecology Laboratory	6
INTEGBI 152	Environmental Toxicology	4
INTEGBI 153	Ecology	3
INTEGBI 154 & 154L	Plant Ecology and Plant Ecology Laboratory	5
INTEGBI 157LF	Ecosystems of California	4
INTEGBI 162	Ecological Genetics	4
INTEGBI 163	Molecular and Genomic Evolution	3
INTEGBI 168 & 168L	Systematics of Vascular Plants and Systematics of Vascular Plants with Laboratory	6
INTEGBI 173LF	Mammalogy with Laboratory	5
INTEGBI 174LF	Ornithology with Laboratory	4
INTEGBI 175LF	Herpetology with Laboratory	4
LD ARCH 110	Ecological Analysis	3
MCELLBI 102	Survey of the Principles of Biochemistry and Molecular Biology	4
NUSCTX 110	Toxicology	4
PLANTBI C110L	Biology of Fungi with Laboratory	4
PLANTBI C112 & C112L	General Microbiology and General Microbiology Laboratory	6
PLANTBI/ MCELLBI C116	Microbial Diversity	3
PLANTBI 120 & 120L	Biology of Algae and Laboratory for Biology of Algae	4
PLANTBI 122	Bioenergy	2
PLANTBI 180	Environmental Plant Biology	2
PB HLTH 140	Course Not Available	
PB HLTH 150A	Introduction to Epidemiology and Human Disease	4
PB HLTH 150B	Introduction to Environmental Health Sciences	3
PB HLTH 162A & PB HLTH 162L	Public Health Microbiology and Public Health Microbiology Laboratory	4
PB HLTH 170B	Course Not Available	3

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
CHEM 103	Inorganic Chemistry in Living Systems	3
CHEM 104A	Advanced Inorganic Chemistry	3
CHEM 104B	Advanced Inorganic Chemistry	3
CHEM 105	Instrumental Methods in Analytical Chemistry	4
CHEM 112A	Course Not Available	
CHEM 112B	Course Not Available	
CHEM 120A	Physical Chemistry	3
CHEM 120B	Physical Chemistry	3
CHEM 125	Physical Chemistry Laboratory	3
CHEM C130/ MCELLBI C100A	Biophysical Chemistry: Physical Principles and the Molecules of Life	4
CHEM 130B	Biophysical Chemistry	3
CHEM 135	Chemical Biology	3
CHEM/EPS C182	Atmospheric Chemistry and Physics Laboratory	3
CIV ENG 100	Elementary Fluid Mechanics	4
CIV ENG 101	Fluid Mechanics of Rivers, Streams, and Wetlands	3
CIV ENG 103	Introduction to Hydrology	3
CIV ENG 107	Climate Change Mitigation	3
CIV ENG 111	Environmental Engineering	3
CIV ENG 113N	Course Not Available	3
CIV ENG 115	Water Chemistry	3
CIV ENG 171	Rock Mechanics	3
CIV ENG 173	Groundwater and Seepage	3

EPS/INTEGBI C100/ GEOG C146	Communicating Ocean Science	4
EPS 100A	Minerals: Their Constitution and Origin	4
EPS 100B	Genesis and Interpretation of Rocks	4
EPS 101	Field Geology and Digital Mapping	4
EPS 117	Geomorphology	4
EPS 119	Geologic Field Studies	2
EPS 131	Geochemistry	4
EPS C146/ GEOG C145	Geological Oceanography	4
EPS C181/ GEOG C139	Atmospheric Physics and Dynamics	3
ENE,RES C100/ PUB POL C184	Energy and Society	4
ENE,RES 102	Quantitative Aspects of Global Environmental Problems	4
ENGIN 115	Engineering Thermodynamics	4
ESPM 102B & 102BL	Natural Resource Sampling and Laboratory in Natural Resource Sampling	4
ESPM 120	Soil Characteristics	3
ESPM 121	Development and Classification of Soils	3
ESPM 122	Field Study of Soil Development	1
ESPM C128/ CIV ENG C116	Chemistry of Soils	3
ESPM/EPS C129	Biometeorology	3
ESPM C130/ GEOG C136	Terrestrial Hydrology	4
ESPM 131	Soil Microbial Ecology	3
ESPM C148/ NUSCTX C114	Pesticide Chemistry and Toxicology	3
ESPM 164	GIS and Environmental Science	3
ESPM 172	Photogrammetry and Remote Sensing	3
ESPM 173	Introduction to Ecological Data Analysis	3
ESPM 174	Design and Analysis of Ecological Research	4
ESPM/ EPS C180/ CIV ENG C106	Air Pollution	3
ESPM 181A	Fire Ecology	3
GEOG 140A	Physical Landscapes: Process and Form	4
GEOG 142	Climate Dynamics	4
GEOG 143	Global Change Biogeochemistry	3
GEOG 144	Principles of Meteorology	3
GEOG 180	Field Methods for Physical Geography	5
GEOG 183	Cartographic Representation	5
GEOG/LD ARCH C188	Geographic Information Systems	4
INTEGBI 106A	Physical and Chemical Environment of the Ocean	4
LD ARCH 120	Topographic Form and Design Technology	3
MATH 121A	Mathematical Tools for the Physical Sciences	4
MATH 121B	Mathematical Tools for the Physical Sciences	4
MEC ENG 106	Fluid Mechanics	3

Social Sciences Concentration Electives

CIV ENG 107	Climate Change Mitigation	3
DEMOG/SOCIOL C126	Sex, Death, and Data	4
DEMOG/ECON C175	Economic Demography	4
ECON/ ENVECON C102	Natural Resource Economics	4
ECON C125/ ENVECON C101	Environmental Economics	4
ECON C171/ ENVECON C151	Economic Development	4
ECON/DEMOG C175	Economic Demography	4
ENE,RES C100/ PUB POL C184	Energy and Society	4
ENE,RES 101	Ecology and Society	3
ENE,RES 102	Quantitative Aspects of Global Environmental Problems	4
ENE,RES 175	Water and Development	4
ENE,RES 180	Ecological Economics in Historical Context	3
ENGIN 125	Ethics, Engineering, and Society	3
ENGIN 157AC	Engineering, The Environment, and Society	4
ENVECON 100	Microeconomic Theory with Application to Natural Resources	4
ENVECON C101/ ECON C125	Environmental Economics	4
ENVECON/ ECON C102	Natural Resource Economics	4
ENVECON C115/ ESPM C104	Modeling and Management of Biological Resources	4
ENVECON 131	Globalization and the Natural Environment	3
ENVECON 147	Regulation of Energy and the Environment	4
ENVECON C151/ ECON C171	Economic Development	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
ESPM 102C	Resource Management	4
ESPM 102D	Climate and Energy Policy	4
ESPM C104/ ENVECON C115	Modeling and Management of Biological Resources	4
ESPM 117	Urban Garden Ecosystems	4
ESPM 151	Society, Environment, and Culture	4
ESPM 155AC	Sociology and Political Ecology of Agro-Food Systems formerly ESPM 155	4
ESPM/NUSCTX C159	Human Diet	4
ESPM 160AC/ HISTORY 120AC	American Environmental and Cultural History	4
ESPM 161	Environmental Philosophy and Ethics	4
ESPM 162	Bioethics and Society	4
ESPM 163AC/ SOCIOL 137AC	Environmental Justice: Race, Class, Equity, and the Environment	4

ESPM 165	International Rural Development Policy	4
ESPM 166	Natural Resource Policy and Indigenous Peoples	4
ESPM C167/ PB HLTH C160	Environmental Health and Development	4
ESPM 168	Political Ecology	4
ESPM 169	International Environmental Politics	4
ESPM 173	Introduction to Ecological Data Analysis	3
ESPM 174	Design and Analysis of Ecological Research	4
ESPM 183	Forest Ecosystem Management and Planning	4
GEOG 130	Food and the Environment	4
GEOG 147	Communicating Climate Science	3
GEOG/LD ARCH C188	Geographic Information Systems	4
INTEGBI 117	Medical Ethnobotany	2
LD ARCH 110	Ecological Analysis	3
LD ARCH 130	Sustainable Landscapes and Cities	4
PB HLTH 140	Course Not Available	

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. Breadth courses are built into CNR major requirements. The EEP major is the only CNR major that requires the entire 7 course breadth. As the foundation of a liberal arts education, breadth courses give students a view into the intellectual life of the University while introducing them to a multitude of perspectives and approaches to research and scholarship. Engaging students in new disciplines and with peers from other majors, the breadth experience strengthens interdisciplinary connections and context that prepares Berkeley graduates to understand and solve the complex issues of their day.

High School Exam Credit

CNR students may apply high school exam credit (Advanced Placement, International Baccalaureate, A-Level Exam) towards many College and Major Requirements. See AP Exam Equivalency Chart and Higher Level IB Exam Equivalency Chart in the CNR Student Handbook (https://nature.berkeley.edu/handbook) for more information.

Units 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 College of Natural Resources.
- 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.

Semester Unit Minimum

All CNR students must enroll in at least 13 units each fall and spring semester.

Semester Unit Maximum

To request permission to take more than 19.5 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. 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. CNR does not limit the number of total units a student can accrue.

Senior Residence Requirement

After reaching senior status (90 semester units earned), students must complete at least 24 of the remaining 30 units in at least two semesters in residence at the College of Natural Resources. To count as residence, a semester must consist of at least four passed units. 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 four units of coursework are completed.

Modified Senior Residence Requirement

Participants in the UC Education Abroad Program (UCEAP) 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.

Most students automatically fulfill 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.

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, 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.

In the 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, double major, or minor, contact the undergraduate adviser for your intended major. Visit our website (https://nature.berkeley.edu/advising/meet-cnr-advisors) to explore all of our advising services.

Undergraduate Adviser, Environmental Sciences

Carina Galicia
cgalicia@berkeley.edu
260 Mulford Hall
510-643-9479
Contact Carina via email or visit 260 Mulford Hall to schedule an appointment.
Advising hours: Monday to Friday, 9 to noon and 1 to 4 p.m. Our office is closed from noon to 1 p.m.

Career Services Overview

The UC Berkeley Career Center (https://career.berkeley.edu) prepares undergraduates, graduate students, and alumni to make informed decisions about their futures 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 help all students achieve:

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

Common Career Paths for Environmental Sciences Majors

Career Destinations Survey

Every year the Career Center surveys graduating seniors (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) 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) , 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: Sales (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) 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) .

Career and Internship Resources

The Career Center 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.
- **Career Counseling** (https://career.berkeley.edu/Info/MakeAppt) **:** 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) **:** Resources to explore career options, identify career goals, and develop effective career plans.
- **Events and Workshops** (https://career.berkeley.edu/Info/Events) **:** Over 70 events each semester including workshops, alumni networking events, career panels, conferences, and on-campus Career Chats.
- **Career Fairs and Employer Information Sessions** (https://career.berkeley.edu/Callisto/Infosession) **:** We offer 14 career fairs each year across a variety of 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) .

*The above services are available to all currently enrolled UC Berkeley students and members of the Career Center's Alumni Advantage (https://career.berkeley.edu/Alumni/AlumniAdv) program.

ENV SCI 8X Climate Change: The Interface of Science and Public Policy 2 Units

Terms offered: Prior to 2007
The possible impacts of climate changes enhanced by or following from human activities create challenges for planners, policy-makers, industrialists, and all citizens of the globe. This course seeks to examine the science of climate change and the policy issues that follow from that change.
Climate Change: The Interface of Science and Public Policy: Read More [+]
Hours & Format

Summer: 6 weeks - 5 hours of lecture per week

Additional Details

Subject/Course Level: Environmental Sciences/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Berry

Climate Change: The Interface of Science and Public Policy: Read Less [-]

ENV SCI 10 Introduction to Environmental Sciences 3 Units

Terms offered: Fall 2013, Spring 2013, Fall 2012
A survey of biological and physical environmental problems, focusing on geologic hazards, water and air quality, water supply, solid waste, introduced and endangered species, preservation of wetland ecosystems. Interaction of technical, social, and political approaches to environmental management.
Introduction to Environmental Sciences: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Environmental Sciences/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Introduction to Environmental Sciences: Read Less [-]

ENV SCI 10L Field Study in Environmental Sciences 1 Unit

Terms offered: Fall 2010, Fall 2009, Fall 2008
Field and laboratory studies of Strawberry Creek throughout its course from the hills to the Bay are used to exemplify integration of the physical, biological, and social components of science-based approaches to environmental management.
Field Study in Environmental Sciences: Read More [+]
Rules & Requirements

Prerequisites: 10 (must be taken concurrently)

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of fieldwork per week

Additional Details

Subject/Course Level: Environmental Sciences/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Instructors: Berry, Kondolf

Field Study in Environmental Sciences: Read Less [-]

ENV SCI 24 Freshman Seminar 1 Unit

Terms offered: Fall 2010, Fall 2009, Spring 2009
The Freshman Seminar Program has been designed to provide new students with the opportunity to explore an intellectual topic with a faculty member in a small-seminar setting. Freshman Seminars are offered in all campus departments, and topics vary from department to department and semester to semester. Enrollment limited to fifteen freshmen.
Freshman Seminar: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit as topic varies. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Environmental Sciences/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

Freshman Seminar: Read Less [-]

ENV SCI 84 Sophomore Seminar 1 or 2 Units

Terms offered: Spring 2011, Fall 2010, Spring 2010
Sophomore seminars are small interactive courses offered by faculty members in departments all across the campus. Sophomore seminars offer opportunity for close, regular intellectual contact between faculty members and students in the crucial second year. The topics vary from department to department and semester to semester. Enrollment limited to 15 sophomores.
Sophomore Seminar: Read More [+]
Rules & Requirements

Prerequisites: At discretion of instructor

Repeat rules: Course may be repeated for credit as topic varies. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring:
5 weeks - 3-6 hours of seminar per week
10 weeks - 1.5-3 hours of seminar per week
15 weeks - 1-2 hours of seminar per week

Summer:
6 weeks - 2.5-5 hours of seminar per week
8 weeks - 1.5-3.5 hours of seminar and 2-4 hours of seminar per week

Additional Details

Subject/Course Level: Environmental Sciences/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

Sophomore Seminar: Read Less [-]

ENV SCI 100 Introduction to the Methods of Environmental Science 4 Units

Terms offered: Spring 2013, Spring 2012, Spring 2011
Introduction to basic methods used in environmental research by biological, physical, and social scientists. The course is designed to teach skills necessary for majors to conduct independent thesis research in the required senior seminar, 196A-196B/196L. Topics include development of research questions, sampling methods, experimental design, statistical analysis, scientific writing and graphics, and introductions to special techniques for characterizing environmental conditions and features. This course is the prerequisite to 196A, from which the senior thesis topic statement is determined.
Introduction to the Methods of Environmental Science: Read More [+]
Rules & Requirements

Prerequisites: Environmental science statistics requirement. Open only to declared environmental sciences majors

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture, 1 hour of discussion, and 1.5 hours of fieldwork per week

Additional Details

Subject/Course Level: Environmental Sciences/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Introduction to the Methods of Environmental Science: Read Less [-]

ENV SCI 125 Environments of the San Francisco Bay Area 3 Units

Terms offered: Spring 2011, Spring 2010, Spring 2009
The weather and climate, plants and animals, geology, landforms, and soils of the Bay Area, with an emphasis on the interaction of these physical elements, their modification by humans, and problems deriving from human use.
Environments of the San Francisco Bay Area: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Environmental Sciences/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Instructor: Berry

Environments of the San Francisco Bay Area: Read Less [-]