

Environmental Sciences



Student Handbook

2008-09

College of Natural Resources

University of California, Berkeley

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The Environmental Sciences Major Overview

The Environmental Sciences major has thrived at Berkeley since 1970. The College of Natural Resources began to offer the major jointly with the College of Letters and Science in fall 1998. In April 2003, the Environmental Sciences major was awarded the UC Berkeley Educational Initiatives Award to honor the major's contributions toward establishing the highest levels of excellence at Berkeley. The selection committee specifically cited the Environmental Sciences Major's commitment to interdisciplinary learning and to building a sense of community among students.

Environmental Sciences is an interdisciplinary enterprise that deals with a wide variety of issues arising from the impact of human activities on natural systems. In order to address these problems, students are trained to apply tools and techniques from a variety of disciplines, such as biology, ecology, chemistry, toxicology, geology, hydrology, meteorology, geography, engineering, statistics, behavioral science, policy analysis, economics, and law.

Environmental Sciences provides a rigorous curriculum with a strong emphasis in basic science. The lower division required coursework includes two biology courses, two chemistry courses, two calculus courses, plus courses in physics, economics, and environmental science. In the upper division, students take electives in their area of interest and courses in statistics, research methodology, and environmental modeling to prepare for the senior research thesis seminar, ES 196A and 196B. In the research seminar, students utilize and apply the tools that they acquired in their previous courses in order to design and conduct a research project of their choosing. Students learn how to formulate testable hypotheses about biological, physical, or social patterns and processes associated with an existing or potential environmental problem. They collect data to evaluate their hypotheses and present their results in a professional manner. This experience fosters the development of critical and objective thinking, a skill that will help ensure the credibility of their future work on environmental issues.

Career Opportunities

Graduates of the Environmental Sciences program may hold influential positions in local, state and federal agencies such as the EPA or work for private environmental consulting firms. Many go on to graduate studies in the natural sciences, public health, environmental policy and planning, law or medicine. Whatever career path students choose, their solid background in the basic sciences allows graduates of Environmental Sciences to play major roles in solving some of the most critical challenges facing the world today. The Career Center at 2111 Bancroft Way or <http://career.berkeley.edu> has a wealth of information on careers for UC Berkeley graduates. Sharron O'Connor, a Career Center counselor, is the liaison for ES students. Contact her at 510-642-1716 or soconnor@berkeley.edu

Advising and Other Resources

Advising

If you need help navigating your courses or are interested in learning about all the resources available to you on the Berkeley campus, the Environmental Sciences advisor is the person to see. She is a great link between faculty and students and between students and campus. The ES advisor knows about faculty, course offerings, scholarships, internships, and career opportunities. She'll assist you with long range program planning, meeting graduation requirements, and department regulations, policies, and information. And not to worry, all issues discussed between students and advisors are confidential. The current ES advisor is Susan Kishi, she can be reached at (510) 643-9479 or via email at kishi@nature.berkeley.edu.

ES Co-Directors

The College of Natural Resources' co-director for ES is Professor Steve Welter. He can be reached at 510 642-7171. Professor Matt Kondolf from Landscape Architecture & Environmental Planning in the College of Environmental Design is the other co-director (kondolf@berkeley.edu, 300 Wurster Hall). Faculty advising is also available from the ES Advisory Board. A list of members is available on the ES website, <http://environmentalsciences.berkeley.edu/faculty.html>. There you will also find out more about our faculty's research interests.

Office of Instruction and Student Affairs

General questions about the College of Natural Resources should be directed to the CNR Office of Instruction and Student Affairs in 260 Mulford Hall, 510-642-0542 or cnrteaching@nature.berkeley.edu.

CNR Student Resource Center

The CNR Student Resource Center in 260 Mulford exists to enrich educational opportunities for all ES students (CNR and L&S) and other students in the College of Natural Resources. It houses a computer lab of 10 workstations, career resources, graduate school information, bulletin boards, and course reserves. In addition, there is space for students to meet in small groups or one-on-one. The Resource Center is open Monday-Friday from 9:00 - 5:00 during the fall and spring semesters. Please call for summer hours, 642-0542.

Environmental Sciences Students Association

Environmental Sciences Students Association (ESSA) represents the undergraduate Environmental Sciences students in both the College of Natural Resources and the College of Letters and Science. ESSA serves as an academic, professional, and social student group that provides members with forums for discussion with each other, various environmental professionals, and the faculty on campus. It also teams up with the Career Center to provide workshops and information regarding summer internship opportunities, research positions, and various volunteer positions and projects. For directions on subscribing to the ESSA mailing list email essa@nature.berkeley.edu or see the ESSA web site: <http://nature.berkeley.edu/essa/>, or ESSA Facebook site.

Advising and Other Resources Cont...

The Student Learning Center

As the primary academic support service for students, the SLC assists students in transitioning to Cal, navigating the academic terrain, creating networks of resources, and achieving academic success. Through tutoring, study groups, workshops and courses, they support students in a variety of courses. For more information please visit the SLC website at <http://slc.berkeley.edu> or visit them in the Cesar Chavez Student Center. You can also reach them by calling 510-642-7332.

The Disabled Students' Program

The DSP offers a wide range of services, accommodations, and auxiliary services for students with disabilities. These services are individually designed and based on the specific needs of each student as identified by DSP's Specialists. DSP is located at 260 Cesar Chavez Student Center. Call for more information (Voice: 510-642-0518; TYY: 510-642-6376) or visit the website at <http://dsp.berkeley.edu>.

The Transfer, Re-entry, and Student Parent Center

The TRSP Center provides a range of transitional support services for new and continuing students at Cal. The goal of the center is to introduce transfer students to the many resources, services, and opportunities that Cal has to offer. The center is located at 100 Cesar Chavez Student Center and the website is <http://transfer.berkeley.edu>.

Tang Center

University Health Services (UHS) at the Tang Center provides comprehensive medical care, counseling, health promotion, and public health services to Berkeley students and several other local institutions. A comprehensive counseling center, staffed by psychiatrists, psychologists and licensed therapists, the center offers individual and group counseling, and includes a complete career counseling library. The health promotion unit offers programs and services for keeping students healthy and safe, including many opportunities for students to get involved in shaping the public health of the campus. The UHS Tang Center is located at 2222 Bancroft Way (Tel: 510-642-2000; TTY/TDD Tel: 510-643-1233. For a more comprehensive look at all the services that the Tang Center has to offer please visit their website at: <http://www.uhs.berkeley.edu>

Residential Living Academic Centers

These centers are located at Clark Kerr, Foothill/Bowles/Stern, Unit 1, Unit 2, and Unit 3. The centers offer tutoring, study groups, faculty programs, learning skills courses & workshops, academic & career advising and computer facilities. The computing centers are equipped with a large number of computer workstations with the latest hardware and software programs and are connected to the Campus Network (including the library catalog system-GLADIS and MELVYL-and the Internet, World Wide Web, and e-mail).

The Cal Corps Public Service Center

The Cal Corps Public Service Center is a good resource to help learn about volunteer and public service opportunities: (<http://students.berkeley.edu/calcorps/>). Check out the Placement Database to find out about volunteer opportunities in advocacy, health & medicine, education, children & youth, housing & homeless, computers & technology, seniors, arts, culture, etc. Sign up for their E-newsletter.

Campus Life & Leadership Office

The Campus Life & Leadership Office encourages students to become involved on campus and in the community. Search for Student Organizations and leadership opportunities on their website: <http://students.berkeley.edu/osl/osl.asp>

General Information: Getting a Degree

Structure of the Environmental Sciences Major

Unlike the College's other majors, the Environmental Sciences major does not reside in a specific department. Rather, it is an interdisciplinary major administered jointly by the College of Natural Resources and the College of Letters and Science, and is overseen by an interdisciplinary faculty board representing many departments and several colleges on campus. As a result, CNR ES majors must satisfy the L&S College Requirements, namely the L&S Essential Skills requirements and L&S Seven Course Breadth requirement. Although ES is jointly offered by the two colleges, ES students in CNR must still comply with CNR rules and administrative policies for adding and dropping classes, withdrawal, etc. These policies are explained in the CNR Student Handbook and the General Catalog.

Note: ES majors who transfer to a different CNR major will have to satisfy CNR college requirements.

Earning your Degree

The degree requirements for Environmental Sciences majors in the College of Natural Resources (CNR) and the College of Letters & Science (L&S) are identical. However, students in L&S earn a Bachelor of Arts (BA) degree and students in CNR earn a Bachelor of Science degree (BS).

To earn a Bachelor of Science degree from UC Berkeley in Environmental Sciences, students must satisfy four different "levels" of requirements: University, Campus, College, and Major requirements. At each level, there are course requirements, unit requirements, and G.P.A. requirements. In an effort to help ES students navigate through these many requirements we have compiled the following information in an attempt to answer many of the common questions students have. We have attempted to make the information as complete as possible, however it is your responsibility to consult with the ES advisor for updates. In addition, students should also consult the CNR Undergraduate Handbook and the UC Berkeley General Catalog for information regarding policies, deadlines, and requirements.

University and Campus Requirements

University Requirements

The Entry-Level Writing requirement (formerly known as Subject A) and the American History and Institutions requirement are under the jurisdiction of the University, not CNR. All UCB students (including ES majors) must fulfill these university requirements. Information on the Entry-Level Writing requirement and the American History and Institutions requirements can be found in the General Catalog. To verify that you have satisfied each requirement, contact the Office of the Registrar, 120 Sproul Hall, tel: 510-643-7490, or check online with Bear Facts (<http://bearfacts.berkeley.edu>). Here are brief descriptions:

Entry-Level Writing Requirement

Every new undergraduate student must fulfill this requirement in English composition during the first year at the University. The General Catalog describes in detail several ways that the requirement may be satisfied, <http://www.berkeley.edu/catalog/undergrad/requirements.html>. Students who have not fulfilled the Entry-Level Writing requirement prior to enrolling at UC Berkeley should enroll in College Writing 1A. Direct questions to the College Writing Programs office, 112 Wheeler Hall, tel: 510-642-5570, <http://www-writing.berkeley.edu>.

American History and Institutions

These requirements are designed to ensure that students have a basic understanding of U.S. history and governmental institutions. They are normally satisfied with high school courses. Detailed information is in the General Catalog, <http://www.berkeley.edu/catalog/undergrad/requirements.html> or on the American History and Institutions Office's web site at <http://teaching.berkeley.edu/ahi>. You may also contact the Office of Undergraduate Admissions and Relations with Schools, 110 Sproul Hall, 510-642-3175 for further information.

Berkeley Campus Requirement

American Cultures: One course

All students must satisfy the Berkeley campus's American Cultures requirement. This requirement is designed to increase students' understanding of issues pertaining to race, culture, and ethnicity in American history and society. Students must achieve at least a C- or Pass grade in the class.

More information is available in the General Catalog or at the American Cultures web site: <http://amercult.berkeley.edu>. Most courses that satisfy this requirement have a suffix of "AC" (for example, ESPM 50AC). You may find the list of all AC courses offered in a specific semester by clicking the appropriate link on the American Cultures web site or by entering the relevant search criteria in the online schedule of classes <http://schedule.berkeley.edu/index.html>

The AC course may "double-count" with other requirements. Several of the courses that fulfill the ES major's upper division Human Environmental Interactions requirement, will also fulfill the Berkeley campus' American Cultures requirement. Some even do 'triple duty' by also fulfilling the Historical Studies Breadth Requirement, such as

ESPM 160AC/History 120AC: *American Environmental History*, and
ESPM 163AC/Sociology 128AC: *Environmental Justice: Race, Class, Equity, and the Environment*

For other examples of courses fulfilling more than one requirement, see page 7.

College Requirements: Essential Skills

Because Letters and Science and CNR jointly administer Environmental Sciences, Environmental Sciences majors must fulfill L&S's College requirements. The only other exception in CNR is the Environmental Economics and Policy (EEP) major, which since 2004 is also offered jointly by both L&S and CNR. The following requirements need to be fulfilled by ES and EEP majors, not by students in other CNR majors. ES majors who transfer to a different CNR major will have to satisfy CNR requirements and will not have to satisfy the Foreign Language and Seven-Course Breadth requirements.

The most common ways to satisfy each Essential Skills requirement are explained below. Complete information can be found at <http://ls-advise.berkeley.edu/requirements/lsreq.html> or in the Letters and Science document, "Earning Your Degree." Reference copies of "Earning Your Degree" are available in the CNR Resource Center or students can get their own copy in 113 Campbell Hall.

Essential Skills

□ **Reading and Composition: (two courses)**

The Reading and Composition (R&C) requirement **must be completed before reaching junior status**.

To satisfy the R&C requirement, students must take one course from the designated R&C "A" list and one course from the designated R&C "B" list. R&C classes may not be taken Pass/No Pass; students must receive a letter grade of C- or higher to fulfill the requirement. Students may use first-half ("A") and second-half ("B") courses from different departments.

To find which courses are offered in any given semester, search the online schedule of classes <http://schedule.berkeley.edu>, or use the "Search R&C" link from the L&S Orientation web site <http://ls-orientation.berkeley.edu/7breadth/search.php>. A complete list of courses that fulfill the requirement is available at <http://ls-advise.berkeley.edu/requirements/rc.html>.

Note: The University Entry-Level Writing requirement must be completed before enrolling in a course to fulfill the R&C requirement. College Writing 1A fulfills the Entry-Level Writing and the first half of the R&C requirement.

Part or all of the R&C requirement may also be satisfied by AP scores. See the AP equivalency chart on page 13. Transfer students should see the ES advisor about their status or use the Articulation Agreement web site, <http://www.assist.org>.

□ **Quantitative Reasoning**

Quantitative Reasoning (QR) is satisfied by the ES major's math requirement, Math 16A or 1A, with a letter grade of at least C-. The Quantitative Reasoning class may not be taken Pass/No Pass. See the ES advisor or <http://ls-advise.berkeley.edu/requirements/qr.html> for other methods of satisfying the QR requirement.

□ **Foreign Language**

Typically, students fulfill the Foreign Language (FL) requirement with their high school work (**a letter grade of C- or higher** in the third year of a high school foreign language). AP scores of 3 or higher in a foreign language or transfer courses also fulfill the requirement. At Berkeley, students may take the second semester of a foreign language and earn a C- or higher to satisfy the requirement. See the ES advisor or <http://ls-advise.berkeley.edu/requirements/fl.html> about other ways to fulfill the requirement.

College Requirements: Seven-Course Breadth

Because the College of Letters and Science and CNR jointly administer Environmental Sciences, Environmental Sciences majors must fulfill L&S's College requirements. The following Seven-Course Breadth requirements only apply to ES and EEP majors, not to other CNR majors. **But don't be alarmed, many of these requirements can be fulfilled by course work that you are already taking to complete ES major requirements.**

Seven-Course Breadth of Knowledge

One course is required from each of the following categories:

Arts and Literature

- Biological Science
 - Historical Studies
 - International Studies (or participation in the UC Education Abroad Program)
 - Philosophy and Values
 - Physical Science
 - Social and Behavioral Science
- Students can find a complete list of courses for each breadth requirement approved for the current academic year in the Letters and Science document, "Earning Your Degree" or at <http://ls-advise.berkeley.edu/requirements/lsreq.html#7breadth>. Reference copies of "Earning Your Degree" are available in the CNR Resource Center, or students can get their own copy in 113 Campbell. Courses are updated each year. **Courses will only fulfill a breadth requirement if they are on the list for the year when the course is taken.**

Students must earn a letter grade of C- or higher or a P grade. No more than two courses may be from the same department. A single course may not be used to fulfill more than one breadth requirement. Courses must be a minimum of 2 units each. You may not use courses numbered 98, 99, or above 190 for breadth credit. Advanced Placement credit does **not** fulfill breadth requirements.

Courses taken for the seven-course breadth can "double-count" with major requirements. In other words, one course can satisfy both a major requirement and a breadth requirement. Students can also double-count a breadth requirement with the American Cultures requirement. Breadth requirements may be taken for a letter grade or P/NP; however, **courses that are also going to be used for major requirements must be taken for a letter grade.**

Some breadth requirements are satisfied by required ES courses:

Breadth Requirement	Lower division courses required for the major
Biological Science	Bio 1A/1AL, Bio 1B, Bio 11/L, ES 10
Physical Science	Physics 7A, 7B, 8A, Chem 1A, Chem 1B, Chem 3A/L, ES 10
Social & Behavioral Science	EEP 1, ES 10

Other breadth requirements can also be fulfilled by courses used for the ES major. Here is a sampling:

Breadth Requirement	Course* (This list is not exhaustive)	ES requirement area
Historical Studies	ESPM 160AC	Human Environment Interactions (HEI)
International Studies	Geography 130; ESPM 155, 165, 168	Human Environment Interactions
	ESPM C107, 169	ES elective courses
Philosophy & Values	ESPM 161	Social Science Elective
	ESPM 163AC**	Social Science & HEI

* See the ES advisor for information about satisfying Breadth Areas with other ES courses.

** ESPM 160AC and 163AC are also American Cultures classes. These classes fulfill three requirements each!

Lower Division ES Requirements

The lower division coursework for Environmental Sciences is designed to give students a solid understanding of basic science. Students will apply this knowledge to real-life environmental problems in their upper division courses.

Environmental Sciences majors choose one of three concentrations: Biological Science, Physical Science, or Social Science. Although there are slight differences in the lower division courses for each concentration area, all students take courses in biology, chemistry, economics, math, physics, environmental science, and economics. Students should choose a concentration based on their intended research area. The lower division required courses for each concentration are listed below.

Students may fulfill some lower division requirements with AP scores. See page 13.

All courses must be taken for a letter grade.

	Biological Science Concentration	Physical Science Concentration	Social Science Concentration
Biology Courses	Biology 1A/1AL-1B	Biology 1A/1AL-1B Or Biology 11/L plus one of the following: Integrative Biology 153, 154, ESPM 102A, 111, 113, 114, 115B, 116A, 116B	Biology 1A/1AL-1B or Biology 11/L plus one of the following: Integrative Biology 153, 154, ESPM 102A, 111, 113, 114, 115B, 116A, 116B
Chemistry Courses	Chemistry 1A-3A/L	Chemistry 1A-3A/L	Chemistry 1A-3A/L <i>or</i> Chemistry 1A-1B
Math Courses	Math 1A-1B <i>or</i> Math 16A-16B	Math 1A-1B	Math 1A-1B <i>or</i> Math 16A-16B
Physics Courses	Physics 8A	Physics 7A-7B	Physics 8A
Other Courses	<ul style="list-style-type: none"> <li style="text-align: center;">• Environmental Sciences 10/L <li style="text-align: center;"><i>and</i> <li style="text-align: center;">• Environmental Economics and Policy C1/ Economics C3 		

Upper Division ES Requirements

Upper Division Coursework

The upper division ES courses blend core requirements with a great deal of flexibility, allowing students to tailor their coursework to their own research interests. Just as in the lower division courses, upper division coursework is interdisciplinary. During their senior year students reach the capstone of the major by completing their yearlong senior research seminar and lab in Environmental Sciences (ES 196A, 196B, and 196L).

Scheduling

Students must take their upper division statistics course prior to enrolling in ES 100. ES 100, which is only taught in spring semesters, must be completed before students enroll in ES 196A/L. In turn, ES 196A/L is a prerequisite to ES 196B/L. This creates a chain of four classes beginning in fall of the junior year. Students who plan to study abroad or otherwise not continuously enroll at Berkeley for their junior and senior years should talk to the ES advisor about planning options.

ES 196A, 196B, and 196L

Environmental Sciences majors finish their degree with a yearlong research project, ES 196A/B and ES 196L. In 196A/B, each student investigates an environmental problem or issue of his or her own choosing. In addition to working closely with the instructors for the course, a student also may choose to work one-on-one with a faculty member who helps guide the student's research as a thesis advisor.

The thesis seminar is a demanding but rewarding opportunity for students to make use of the skills and knowledge gained in previous coursework by applying them to real environmental problems. Students gain experience in designing and executing independent research and in presenting research results effectively in oral and written form. A good thesis can be a persuasive demonstration of a student's capabilities as he or she applies for graduate school or a first job. For many students this project fundamentally determines their professional directions after graduation.

In ES 196, students are expected to:

- identify a testable question or problem
- design a protocol for gathering relevant information
- generate or locate the information specified in the protocol
- analyze the information and derive an objective conclusion
- present results in a written thesis and as an oral report

For more information about Environmental Sciences 196A/196B and 196L, see the ES 196 web site, <http://nature.berkeley.edu/classes/es196>. This site includes suggestions for possible thesis topics, information about the structure of the course, descriptions of previous projects, and much more.

Upper Division ES Requirements: All Areas of Concentration

All courses must be completed for a LETTER grade (not P/NP).

□ Upper Division Statistics

This requirement must be taken prior to ES 100 and no later than fall of the student's junior year.

Choose one of the following:

- **Statistics 131A (4 units)** Statistical Inferences for Social and Life Scientists
- **Public Health 141 (4 units)** Introduction to Biostatistics. Offered only during Summer
- **Public Health 142 (4 units)** Introduction to Probability & Statistics in Biology & Public Health
Extremely difficult to enroll in this course unless you are a Public Health major

□ Environmental Sciences 100 (4 units) Introduction to Methods and Problems in Environmental Science (offered spring only)

Prerequisite: Upper Division Statistics requirement

ES 100 must be completed prior to ES 196A/L and no later than spring of the student's junior year.

□ Environmental Modeling (offered spring only)

Choose one of the following:

- **Energy and Resources 102 (4 units)** Quantitative Aspects of Global Environmental Problems
- **ESPM C104/Env. Econ and Policy C115 (4 units)** Modeling and Management of Biological Resources

□ Human-Environment Interactions

Choose one of the following:

- **EPS 170 AC/L&S 170 AC (4 units)** Crossroads of Earth Resources and Society
- **EEP C101/Econ C125 (4 units)** Environmental Economics
- **EEP 153 (4 units)** Population, Environment & Development
- **ES 125 (3 units)** Environments of the SF Bay Area
- **ESPM 102D (4 units)** Resource and Environmental Policy
- **ESPM 155 (4 units)** Sociology of Natural Resources
- **ESPM 160AC/Hist 120AC (4 units)** American Environmental and Cultural History
- **ESPM 163AC/Sociol 128AC (3 units)** Environ. Justice: Race, Class, Equity, and Environment
- **ESPM 165 (4 units)** International Rural Development Policy
- **ESPM 168 (4 units)** Political Ecology
- **Geography 130 (4 units)** Natural Resources and Population

□ Elective in the Area of Concentration

One 3 or 4 unit upper division course in the chosen area of concentration (Biological, Physical, Social Science). Please refer to Appendix or <http://environmentalsciences.berkeley.edu>

□ Senior Research Lab Seminar/Lab ES 196A/L (3 units/1 unit) and 196B/L (3 units/1 unit)

Taken during the student's final year. ES 196A (fall only) ES 196B (spring only) (Prerequisite: ES 100)

□ Additional Electives

All students are required to complete a minimum of 30 upper division units in the major. If the above courses do not total 30 units, students may take any remaining units from courses on any of the major elective lists.

Unit and GPA Requirement

Environmental Sciences majors are subject to the following rules regarding units and grades.

Unit Requirements

- ❑ At least 120 units are required to graduate.
- ❑ At least 30 upper division units in Environmental Sciences are required. All courses taken to fulfill ES requirements (ES 100, the environmental modeling course, the Human-Environment Interactions class, etc.) count toward the 30 unit minimum.
- ❑ At least 36 upper division units **overall** are required to graduate. Units taken to fulfill the ES requirement of 30 upper division units in the major count as part of the 36 upper division units. In other words, a student must take a minimum of 30 upper division units in Environmental Sciences plus enough additional upper division units to total 36 units. The remaining units needed to reach 36 upper division units may come from **any** department, including ES. They may include 198 or 199 course work.
- ❑ No more than one third of the total units attempted at Berkeley may be taken Pass/No Pass.

Maximum Allowable Units for Certain Kinds of Courses

- ❑ No more than 4 units of physical education activities may apply toward the B.S. degree.
- ❑ No more than 16 units of special studies courses numbered 98, 99, 197, 198, and 199 may apply toward the B.S. degree, unless an exception is approved by the CNR College Advisor.
- ❑ No more than 5 units of computing service courses (CS 3, 3S, 9; IDS 110, 110L; Engin 77, 77N) may apply toward the B.S. degree.
- ❑ No more than 6 units from courses numbered 300-499 may apply toward the B.S. degree.

Grades/Scholarship Requirements

- ❑ All major requirements must be taken for a letter grade.
- ❑ Students must earn at least a:
 - "C" average (2.0 GPA) in all courses undertaken at UC including UC Summer Session courses and UC Education Abroad Program, but excluding UC Extension courses that are not concurrent enrollment courses.
 - "C" average (2.0 GPA) in all courses required for the ES major overall.
 - "C" average (2.0 GPA) in all upper division courses undertaken at Berkeley for the ES major.

Residency Requirement

- ❑ After 90 units toward the bachelor's degree have been completed, at least 24 of the remaining units must be completed at Berkeley. These 24 units must be completed in the semester in which 90 units are exceeded plus at least one additional semester. Special provisions are made for students in the campus study abroad program. Direct questions about senior residency to the Office of Instruction and Student Affairs, 260 Mulford, 510-642-0542.

Degree Requirement Checklist

The following chart summarizes the Bachelor of Science requirements for ES majors. Because requirements may change, be sure to verify completion of requirements with the ES advisor.

	Requirement	Notes
University Knowledge Requirements Pg. 5	<input type="checkbox"/> Entry-Level Writing Requirement	Must be completed by the end of the student's first year at UCB. More details in the General Catalog or at http://www.berkeley.edu/catalog/undergrad/requirements.html
	<input type="checkbox"/> American History	Usually satisfied through high school work. Verify through Office of Undergraduate Admissions and Relations with Schools. More details in the General Catalog
	<input type="checkbox"/> American Institutions	or://teaching.berkeley.edu/AHI
Berkeley Campus Requirement	<input type="checkbox"/> American Cultures	Usually designated by the "AC" suffix. More details in the General Catalog or http://amercult.berkeley.edu Each term, a list of available courses may be found by following the link from the American Cultures web site.
College Essential Skills Pg. 6	<input type="checkbox"/> Reading and Composition, A and B	More details: http://ls-advise.berkeley.edu/requirements/rc.html
	<input type="checkbox"/> Quantitative Reasoning	More details: http://ls-advise.berkeley.edu/requirements/qr.html
	<input type="checkbox"/> Foreign Language	More details: http://ls-advise.berkeley.edu/requirements/fl.html
College: Seven Course Breadth of Knowledge (L&S) HB Page 7	<input type="checkbox"/> Arts and Literature	List of approved courses: http://ls-advise.berkeley.edu/requirements/lsreq.html#7breadth or "Earning Your Degree"
	<input type="checkbox"/> Biological Science	
	<input type="checkbox"/> Historical Studies	
	<input type="checkbox"/> International Studies	
	<input type="checkbox"/> Philosophy and Values	
	<input type="checkbox"/> Physical Science	
ES Major Requirements Lower division: Pg 8 Upper division: Pg 9 and 10	<input type="checkbox"/> Social and Behavioral Sciences	
	<input type="checkbox"/> Lower division biology courses	Courses depend on concentration
	<input type="checkbox"/> Lower division chemistry courses	Courses depend on concentration
	<input type="checkbox"/> Lower division math courses	Courses depend on concentration
	<input type="checkbox"/> Lower division physics course(s)	Course(s) depend on concentration
	<input type="checkbox"/> EEP 1 or Econ 3	
	<input type="checkbox"/> ES 10	
	<input type="checkbox"/> Upper division Statistics (one class)	Prerequisite for ES 100
	<input type="checkbox"/> ES 100	Prerequisite for ES 196A/L. Offered spring semester only
	<input type="checkbox"/> ERG 102 or ESPM C104/EEP C115	Offered spring semester only
	<input type="checkbox"/> Human-Environment Interactions class	
	<input type="checkbox"/> Area of Concentration UD Elective (one class)	Biological: Physical: Social: See Appendix or online at http://environmentalsciences.berkeley.edu/udelectives.html
	<input type="checkbox"/> ES 196A/L and 196B/L	http://nature.berkeley.edu/classes/es196/
<input type="checkbox"/> 30 upper division units in major	Elective lists are in Appendix or online at http://environmentalsciences.berkeley.edu/udelectives.html	
University, College, and Major: Scholarship and Unit Requirements Pg. 11	<input type="checkbox"/> "C" average (2.0 GPA) in all courses	
	<input type="checkbox"/> "C" average (2.0 GPA) in all major requirements	
	<input type="checkbox"/> "C" average (2.0 GPA) in all upper division major requirements	
	<input type="checkbox"/> minimum 30 upper division units in the major	
	<input type="checkbox"/> 36 upper division units overall	30 upper division units in ES plus 6 more units from any dept.
	<input type="checkbox"/> minimum 120 units total	
	<input type="checkbox"/> Maximum of 16 Independent Study units	
	<input type="checkbox"/> Maximum of 4 P.E. units	
	<input type="checkbox"/> No more than 1/3 of total units taken P/NP	
	<input type="checkbox"/> Senior Residency	Office of Instruction and Student Affairs, 260 Mulford
<input type="checkbox"/> 18 upper division units in residence	Office of Instruction and Student Affairs, 260 Mulford	

Advanced Placement Exam

Students may use AP exam scores to fulfill lower division Environmental Sciences requirements. The chart shows AP scores and course equivalencies. However, using AP scores in lieu of taking the course at UCB is not required. Students may choose, without penalty, to take a class for which they already earned a good score. They will then no longer earn unit credit toward graduation for the AP exam.

High school AP work, no matter how demanding, is not necessarily the same as college level work. Berkeley professors' expectations of what students should know can differ greatly from what high school students might expect. Students who decide to skip a course based on an AP score should be prepared for a higher level workload in the next course.

Exam	Score	Requirement Fulfilled
Biology	3	none
	4 or 5	Biology 1A/1AL* or Biology 11/L. <i>* The ES faculty strongly urges all students in the Biological Science Concentration to take Biology 1A/1AL regardless of AP credit.</i>
Chemistry	4 or 5	Chemistry 1A
Economics: Micro	3	none
	4 or 5	EEP 1/Econ 3
English Literature and Composition	3	Entry-Level Writing requirement
	4	First half of Reading and Composition requirement (R&C "A" course)
	5	Both halves of Reading and Composition requirement ("A" and "B")
English Language and Composition	3	Entry-Level Writing requirement
	4 or 5	First half of Reading and Composition requirement (R&C "A" course)
Environmental Science	4 or 5	ES 10
Math AB	3, 4, or 5	Math 16A or Math 1A
Math BC	3 or 4	Math 16A or Math 1A
	5	Math 1A <i>and</i> Math 1B
Physics		none

Students who have **International Baccalaureate** credit should talk to the ES advisor about using it to satisfy requirements. The University grants advanced standing units for most Higher Level exams completed with a grade of 5, 6, or 7. We do not grant credit for Subsidiary Level exams.

Other Academic Information

Minor Programs

All Environmental Sciences majors may pursue one of the many minors offered at UC Berkeley. Minors may be completed in any School or College, not just the College of Natural Resources. When completing a minor program in another College, you do not need to complete any additional College requirements. Contact the offering department for details on minor requirements. There is no minor in Environmental Sciences.

Double Majors/Simultaneous Degrees

ES majors may, with the approval of the CNR Dean's Office, pursue a double major (completing two majors within CNR) or simultaneous degrees (completing ES and a major outside of CNR). If you pursue a simultaneous degree you will need to complete the College Requirements of both Colleges or Schools. No more than two upper division classes may "double count," that is, fulfill requirements for both degrees. See the ES advisor and the Office of Instruction and Student Affairs for more information.

Distinction in General Scholarship for Environmental Sciences Majors

To be eligible for Distinction in General Scholarship, students must meet the following conditions when they graduate:

- ❑ A minimum of 50 semester units at the University of California
- ❑ At least 43 of these units must be undertaken for a letter grade
- ❑ A minimum of 30 units taken at Berkeley
- ❑ A cumulative grade point average that ranks them in their college in the top 3 percent for highest distinction, the next 7 percent for high distinction, and the next 10 percent for distinction.

The qualifying GPAs change each year. See an advisor in the CNR Office of Instruction and Student Affairs, 260 Mulford, for the current list of GPAs used to determine level of distinction.

<http://nature.berkeley.edu/site/achievements.php>

Honors in Environmental Sciences

In order to graduate with Honors in Environmental Sciences, ES majors in CNR must participate in the College Honors Program. This program is designed to support undergraduate students interested in developing, executing, and evaluating a year-long **independent** research project under the guidance of a faculty mentor. This project must be completed as independent study units Nat Res H196. The project must be completed by the student on his/her own, with the guidance of a faculty research mentor, *but not as part of the ES Senior Research Seminar ES 196A, ES 196B.*

Students who successfully complete the Honors Program will earn recognition at graduation and will also receive a notation of Honors in their major on their diploma. The Honors Symposium, held once each semester, gives all Honors students the opportunity to present their research to fellow students, faculty, Deans, friends, and family. For details on the CNR Honors Program see

http://nature.berkeley.edu/site/honors_program.php

Planning Your Degree

It is important to note that you are ultimately responsible for your educational program. It can be a bit complicated and overwhelming, so do not hesitate to seek advice from the ES advisor and the Office of Instruction and Student Affairs. Here are some guidelines to keep in mind:

- Course numbers 1-99 are lower division courses, and courses numbered 100-199 are upper division courses. Courses 200 and above are graduate level courses.
- Pay attention to the prerequisites for all courses. The professor will expect you to have a certain level of knowledge before enrolling in his/her course. Set yourself up to be prepared rather than overwhelmed.
- Some classes are only offered in the fall semester, others only in the spring semester, and some are offered both semesters (as noted in the General Catalog). Plan accordingly. ES 100 and the Environmental Modeling classes are spring only courses.
- **While you are registered as a UC Berkeley student, you may not take courses at another university or college - including community colleges – during the Fall or Spring semester.** Exceptions can be made, but you must petition for concurrent enrollment (i.e. taking courses at Cal and another institution at the same time) through the CNR Office of Instruction and Student Affairs. In the summer, you are allowed to take courses from institutions other than Cal. See the ES advisor for help in figuring out the right courses to take and how to transfer credit.
- No more than 1/3 of the total units you take at Cal may be graded Passed/Not Passed. If you choose to take a course Pass/No Pass, you will not be issued a letter grade for the course. You will receive a "P" (Passes) on your transcript and unit credit for the course if you earn a grade of C- or higher; if you earn below a C- you receive a "NP" (Not Passed) on your transcript and no unit credit for the course.
- **All courses required by the college and for the major must be taken for a letter grade.**
- If you are planning to go on to graduate school, be aware that many academic and professional programs may have specific course requirements that you will need to build into your program with your free elective units. For example, most medical schools require Chemistry 3B, which is not a part of the ES major. Consult the Career Center website to find out about courses required for health programs (<http://career.berkeley.edu/Health/Health.stm>) or visit the center to find out more about other graduate degree programs. **Note:** If you do use some of your free elective units to satisfy a course requirement for graduate school, you should take the course for a letter grade.
- There is a maximum limit of 4 units of field/group/independent study courses (courses numbered 97, 98, 99, 197, 198, 199) per semester. Only 16 units of field/group/independent study courses may count towards graduation, unless a petition for an exception is submitted to and approved by the CNR Office of Instruction and Student Affairs (260 Mulford Hall)
- **Take advantage of the wonderful variety of courses Cal and the UC-wide Education Abroad Programs have to offer.** Plan ahead to participate in environmental science programs **abroad in Australia, New Zealand, Costa Rica, Barbados, Ireland, or the United Kingdom.** Use your elective units to branch out and try a variety of experiences – subjects that you were never exposed to in high school or community college. For more information visit the UC Berkeley Study Abroad office, 160 Stephens Hall or their website: <http://ias.berkeley.edu/bpsa/> .
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Choosing Your Fall Freshman Classes

The following fall schedules are designed to get you started on the right foot at Cal. The schedules combine your ES major requirements, a Reading and Composition course (since R&C classes offer essential preparation for other courses at Cal), and electives and/or freshman seminars.

Because ES is a science major, it is important that you start taking chemistry and math early in your college career. Chemistry and math are foundational science courses and prerequisites for other lower division science requirements.

Choose the first term schedule below that best meets your academic background and educational goals. Be sure you ask an ES advisor if you have any questions about your particular academic situation. You must take **at least 13 units** each semester.

Plan 1: Strongly recommended for students with a strong science and math background

- Math 16A/Math 1A 4/3 units
- Chemistry 1A/L 4 units
- Reading and Composition 4 units
- elective or freshman seminar 1-4 units

If you are not comfortable taking both Math and Chemistry in your first term at Cal, consider Plan 2 OR Plan 3.

Plan 2: Recommended for students with a good science background

- Chemistry 1A/L 4 units
- ES 10/ES 10L 4 units
- Reading and Composition 4 units
- elective or freshman seminar 1-4 units

Plan 3: Recommended for students with a good math background

- Math 16A/Math 1A 4/3 units
- ES 10/ES 10L 4 units
- Reading and Composition 4 units
- elective or freshman seminar 1-4 units

Non-Science Option: If you do not feel that you have a strong science or math background, you may choose the following non-science option. However, this option puts you behind in terms of completing your lower division Environmental Sciences requirements and is the least recommended schedule for ES majors.

- ES 10/ES 10L 4 units
- Reading and Composition 4 units
- CNR class 3-4 units
- American Cultures or Breadth Req. 3-4 units
- Optional: freshman seminar 1-3 units

WHAT MATH COURSE IS RIGHT FOR ME?

- **Choosing between Math 16A and Math 1A:**

Math 16A-16B covers many of the same basic topics as Math 1A-1B, but lacks in-depth calculus and is less rigorous and demanding. It is important to note that Math 16A-16B is a terminal, one-year calculus sequence; in order to take Math 53 or 54, you must pass Math 1A-1B with a letter grade of C- or better. Students who think that they might want to take more than just a year of math should take the Math 1 series.

- **Are you not ready for calculus?**

If you are not ready to take calculus as your first math course at Cal, then **you must take Math 32 in your first semester**. Mathematics 32, Precalculus, is designed to prepare students for Mathematics 1A or 16A. The prerequisite for Math 32 is 3 years of high school mathematics. Choose from one of these plans:

If you have a good science background:

Math 32	4 units
Chemistry 1A	4 units
Reading and Composition	4 units
elective or freshman seminar	1-4 units

Option if you do not have a strong science background:

Math 32	4 units
ES 10/ES 10L	4 units
Reading and Composition	4 units
elective or freshman seminar	1-4 units

Math AP Exams: What does my score mean?

AP exams can exempt a student from one or both of the calculus courses required for ES. See the chart below. However, students are *not* required to skip courses based on AP scores.

The Math Department has found that while an AP score of 3 or 4 shows that a student is ready to take college calculus, it is not an accurate indicator of how a student will do in a college math course. High school calculus is not necessarily the same as college calculus. If your AP score would allow you to enroll in Math 1B or 16B, but you feel that your math background is not as strong as you would like then you can enroll in Math 1A or Math 16A. However, you will not get any unit credit for the AP exam. For example, if you received a 3 on the AB Math and you take Math 1A, you will no longer receive 2.7 units for the AP test, but you will receive 4 units for Math 1A.

The Math department recommends that students take the math placement exam to best determine their placement. You'll find it online at http://math.berkeley.edu/courses_placement.html

Math AP scores:

Exam	Score	Equivalent course(s)	Enroll in:
AB	3,4, or 5	Math 1A or Math 16A	Math 1B* or Math 16B*
BC	3 or 4	Math 1A or Math 16A	Math 1B* or Math 16B*
BC	5	Math 1A & 1B	optional: Math 53 or 54

* Or, if you are not comfortable starting in Math 1B or 16B, you may enroll in Math 1A or 16A.

AP English scores (For AP credit in other subjects see page 13 of the ES Student Handbook)

English AP scores *for ES majors only*:

Exam	Score	Equivalent course(s)	Enroll in:
Language and Composition	4 or 5	first half R&C	R&C "B" course
Literature and Composition	4	first half R&C	R&C "B" course
Literature and Composition	5	both halves R&C	R&C requirement fulfilled. Enroll in another ES requirement or elective.

Creating Your Four Year Plan

When creating your four-year course plan, you want to take foundational courses first. For ES, the foundational courses are the lower division ES requirements (especially math and chemistry) and the Reading and Composition courses. Together, they give you the tools to be successful in other courses. They are the basis upon which upper division courses build. In the upper division you will have more opportunities to individualize your program.

Although course offerings can change, you can still create a “blue print” of your four years at Cal. Using the chart on the next page, map out all of your degree requirements. Once you get all of the courses on paper, you will be able to see how everything fits together. Of course you will make changes, but at least everything is on paper so you can see it.

If you are a freshman, you should plan to complete these courses in your first two years:

- Entry-Level Writing and the Reading and Composition requirement
- Most if not all of the lower division requirements for your concentration
- Of the breadth requirements complete four or five courses
- One or two Freshman Seminars (although not requirements, these freshman-only courses can greatly enrich your education)

If you are a transfer student, your scheduling priorities include:

- Remaining lower division courses for your concentration
- Reading & Composition requirement (if not already satisfied)
- Upper division ES courses, especially the upper division statistics requirement
- Any remaining Seven-Course Breadth requirements (if you are not IGETC certified)
- American Cultures requirement.
- Electives (i.e. courses of interest, professional preparation, internships, a minor, etc.)

The following are illustrations of academic plans. They are meant as guidelines only to show how you can complete a degree program in four years. You can adopt these plans or come up with a variation of your own. If you do make any changes, be sure that you are completing your prerequisite courses before starting on upper division work.

Be sure you check in with the ES advisor periodically to make sure you are completing course requirements in a timely manner... and to avoid any surprises as you get closer to graduation!

Sample Four Year Plans

These represent possible four-year schedules for ES students. Students should talk to the ES advisor about their particular circumstances, as many other combinations of classes are possible. It is also possible to overlap some requirements. For example, ESPM 160AC/History 120AC or ESPM 163AC/Sociology 128AC fulfill Human-Environment Interactions (HEI), American Cultures, and a 7-course Breadth requirement. Overlapping requirements will give students more opportunities to take electives.

Please also note that students must average 15 units each term in order to reach the 120 unit minimum in eight semesters. Thus, a student cannot always choose the minimum number of units (13) each term and still graduate in four years.

"M" is for major requirements, "B" is for breadth requirements, and "E" is for electives.

Plan 1: Biological Science or Social Science Concentration

Freshman Year Fall		
Course	Units	Type
Chem 1A	4	M
Math 1A	4	M
R & C 1A	4	B
Fr. Seminar	1	E
<i>Sem/Cum units</i>		13 13

Freshman Year Spring		
Course	Units	Type
Chem 3A/L	5	M
Math 1B	4	M
7-course Br.	3-4	B
Fr. Seminar	1	E
<i>Sem/Cum units</i>		13-14/26-27

Sophomore Year Fall		
Course	Units	Type
Bio 1B	4	M
ES 10/10L	4	M
R & C 1B	4	B
Elective	3-4	E
<i>Sem/Cum units</i>		15-16/41-43

Sophomore Year Spring		
Course	Units	Type
Bio 1A/1AL	5	M
Physics 8A	4	M
EEP 1	4	M
Elective	3-4	E
<i>Sem/Cum units</i>		16-17/56-59

Junior Year Fall		
Course	Units	Type
UD stats	4	M
HEI	3-4	M
7-course Br.	3-4	B
Elective	3-4	E
<i>Sem/Cum units</i>		13-16 69-75

Junior Year Spring		
Course	Units	Type
ES 100	4	M
ERG 102	4	M
7-course Br.	3-4	B
Elective	3-4	E
<i>Sem/Cum units</i>		14-16 83-91

Senior Year Fall		
Course	Units	Type
ES 196A/L	4	M
Emph. elect	3-4	M
Am. Cult.	3-4	B
Elective	3-4	E
<i>Sem/Cum units</i>		13-16 96-107

Senior Year Spring		
Course	Units	Type
ES 196B/L	4	M
ES elective	3-4	M
7-course Br.	3-4	B
Elective	3-4	E
<i>Sem/Cum units</i>		13-16 109-123

Plan 2: Social Science Concentration

Freshman Year Fall		
Course	Units	Type
Math 16A	3	M
ES 10/10L	4	M
R & C 1A	4	B
Elective	3-4	E
<i>Sem/Cum units</i>		14-15 14-15

Freshman Year Spring		
Course	Units	Type
Math 16B	3	M
Chem 1A	4	M
R & C 1B	4	B
Fr. Seminar	1	E
Elective	1-4	E
<i>Sem/Cum units</i>		13-16 27-31

Sophomore Year Fall		
Course	Units	Type
Physics 8A	4	M
EEP 1	4	M
Am. Cult.	3-4	B
Elective	3-4	E
<i>Sem/Cum units</i>		14-16 41-47

Sophomore Year Spring		
Course	Units	Type
Chem 1B	4	M
Bio 11/L	5	M
7-course Br.	3-4	B
Elective	3-4	E
<i>Sem/Cum units</i>		15-17 56-64

Junior Year Fall		
Course	Units	Type
UD stats	4	M
Emph. elect	3-4	M
UD Bio class	3-4	M
Elective	3-4	E
<i>Sem/Cum units</i>		13-16 69-80

Junior Year Spring		
Course	Units	Type
ES 100	4	M
ERG 102	4	M
7-course Br.	3-4	B
Elective	3-4	E
<i>Sem/Cum units</i>		14-16 83-96

Senior Year Fall		
Course	Units	Type
ES 196A/L	4	M
HEI	3-4	M
7-course Br.	3-4	B
Elective	3-4	E
<i>Sem/Cum units</i>		13-16 96-112

Senior Year Spring		
Course	Units	Type
ES 196B/L	4	M
ES elective	3-4	M
7-course Br.	3-4	B
Elective	3-4	E
<i>Sem/Cum units</i>		13-16 109-128

Plan 3: Biological Science or Social Science Concentration

Freshman Year Fall		
Course	Units	Type
Chem 1A	4	M
ES 10/10L	4	M
R & C 1A	4	B
Fr. Seminar	1	E
<i>Sem/Cum units 13 13</i>		

Freshman Year Spring		
Course	Units	Type
Chem 3A/L	5	M
Math 16A	3	M
7-course Br.	4	B
Fr. Seminar	1	E
<i>Sem/Cum units 13 26</i>		

Sophomore Year Fall		
Course	Units	Type
Bio 1B	4	M
Math 16B	3	M
R & C 1B	4	B
Elective	3-4	E
<i>Sem/Cum units 14-15/40-41</i>		

Sophomore Year Spring		
Course	Units	Type
Bio 1A/1AL	5	M
EEP 1	4	M
Am. Cult.	3-4	B
Elective	3-4	E
<i>Sem/Cum units 15-17/54-57</i>		

Junior Year Fall		
Course	Units	Type
UD stats	4	M
Emph. elect	3-4	M
Physics 8A	4	M
Elective	3-4	E
<i>Sem/Cum units 14-16 68-73</i>		

Junior Year Spring		
Course	Units	Type
ES 100	4	M
ERG 102	4	M
7-course Br.	3-4	B
Elective	3-4	E
<i>Sem/Cum units 14-16 82-89</i>		

Senior Year Fall		
Course	Units	Type
ES 196A/L	4	M
HEI	3-4	M
7-course Br.	3-4	B
Elective	3-4	E
<i>Sem/Cum units 13-16/95-105</i>		

Senior Year Spring		
Course	Units	Type
ES 196B/L	4	M
ES elective	3-4	M
7-course Br.	3-4	B
Elective	3-4	E
<i>Sem/Cum units 14-106/109-121</i>		

Plan 4: Physical Science Concentration

Freshman Year Fall		
Course	Units	Type
Chem 1A	4	M
Math 1A	4	M
R & C 1A	4	B
Fr. Seminar	1	E
<i>Sem/Cum units 13 13</i>		

Freshman Year Spring		
Course	Units	Type
Chem 3A/L	5	M
Math 1B	4	M
7-course Br.	3-4	B
Am. Cult.	3-4	B
<i>Sem/Cum units 15-17 28-30</i>		

Sophomore Year Fall		
Course	Units	Type
Physics 7A	4	M
ES 10/10L	4	M
R & C 1B	4	B
Elective	3-4	E
<i>Sem/Cum units 15-16 43-46</i>		

Sophomore Year Spring		
Course	Units	Type
Physics 7B	4	M
Bio 11/L	5	M
EEP 1	4	M
Elective	3-4	E
<i>Sem/Cum units 16-17 59-63</i>		

Junior Year Fall		
Course	Units	Type
UD stats	4	M
HEI	3-4	M
UD Bio class	3-4	M
Elective	3-4	E
<i>Sem/Cum units 13-16 72-79</i>		

Junior Year Spring		
Course	Units	Type
ES 100	4	M
ERG 102	4	M
7-course Br.	3-4	B
Elective	3-4	E
<i>Sem/Cum units 14-16 86-95</i>		

Senior Year Fall		
Course	Units	Type
ES 196A/L	4	M
Emph. elect	3-4	M
7-course Br.	3-4	B
Elective	3-4	E
<i>Sem/Cum units 14-16 100-111</i>		

Senior Year Spring		
Course	Units	Type
ES 196B/L	4	M
ES elective	3-4	M
7-course Br.	3-4	B
Elective	3-4	E
<i>Sem/Cum units 13-16 113-127</i>		

Plan 5: Biological Science or Social Science Concentration

Freshman Year Fall		
Course	Units	Type
Math 1A	4	M
ES 10/10L	4	M
R & C 1A	4	B
Fr. Seminar	1	E
<i>Sem/Cum units 13 13</i>		

Freshman Year Spring		
Course	Units	Type
Math 1B	4	M
Chem 1A	4	M
R & C 1B	4	B
Fr. Seminar	1	E
<i>Sem/Cum units 13 26</i>		

Sophomore Year Fall		
Course	Units	Type
Chem 3A/L	5	M
Bio 1B	4	M
Am. Cult.	3-4	B
Elective	3-4	E
<i>Sem/Cum units 15-17 41-43</i>		

Sophomore Year Spring		
Course	Units	Type
Bio 1A/1AL	5	M
EEP 1	4	M
7-course Br.	4	B
Elective	3-4	E
<i>Sem/Cum units 16-17 56-59</i>		

Junior Year Fall		
Course	Units	Type
UD stats	4	M
Emph. elect	3-4	M
Physics 8A	4	M
Elective	3-4	E
<i>Sem/Cum units 14-16 70-75</i>		

Junior Year Spring		
Course	Units	Type
ES 100	4	M
ERG 102	4	M
HEI	3-4	M
Elective	3-4	E
<i>Sem/Cum units 14-16 84-91</i>		

Senior Year Fall		
Course	Units	Type
ES 196A/L	4	M
7-course Br.	3-4	B
7-course Br.	3-4	B
Elective	3-4	E
<i>Sem/Cum units 13-16 97-107</i>		

Senior Year Spring		
Course	Units	Type
ES 196B/L	4	M
ES elective	3-4	M
7-course Br.	3-4	B
Elective	3-4	E
<i>Sem/Cum units 13-16 110-123</i>		

Note: Bio 1A is not a prerequisite for Bio 1B. Most students take Bio 1B prior to Bio 1A because Bio 1B does not require Organic Chemistry (Chem 3A/L), and Bio 1A doesn't. Bio 1B and Chem 3A/L may be taken the same semester.



APPENDIX



Pre-Med and the Environmental Sciences Major

According to the Career Center, the courses in Column 1 are the prerequisite courses required by *most* medical schools. Columns 2, 3, and 4 show how the requirements for the different Environmental Sciences emphases match with the pre-med requirements.

- A check mark, ✓, indicates that the pre-med course is required by the ES major in that emphasis.
- "Optional" means that the pre-med requirement *can* be used to fulfill an ES requirement, but that other courses could also be used. The requirement that the course can fulfill is indicated.
- If nothing is indicated in the box, the pre-med course is not a part of the ES requirements. ES students who are trying to complete the pre-med curriculum will need to take the class as an elective.

Please note that pre-med prerequisites may vary somewhat at your choice of medical schools. Consult with the Career Center for assistance.

	Column 1 <i>Typical Pre-Med Requirements</i>	Column 2 <i>ES Biological Science Emphasis</i>	Column 3 <i>ES Physical Science Emphasis</i>	Column 4 <i>ES Social Science Emphasis</i>
General Chemistry	Chem 1A	✓	✓	✓
	Chem 3A/3AL	✓	✓	Optional. Students can choose Chem 3A/3AL or Chem 1B.
Organic Chemistry	Chem 3B/3BL			
	MCB 102 or MCB 100A & MCB 100B	Optional. MCB 102 can be used as a required upper division ES elective.	Optional. MCB 102 can be used as a required upper division ES elective.	Optional. MCB 102 can be used as a required upper division ES elective.
Physics w/ Lab	Physics 8A	✓	✓	✓
	Physics 8B		✓	
Biology w/ Lab	Biology 1A/1AL	✓	Optional. Bio 1A/1AL can be used as half of the one year biology requirement.	Optional. Bio 1A/1AL can be used as half of the one year biology requirement.
	Biology 1B	✓	Optional. Bio 1B can be used as half of the one year biology requirement.	Optional. Bio 1B can be used as half of the one year biology requirement.
Math	Math 16A	✓	✓	✓
	Math 16B	✓	✓	✓
Statistics	only required by a few medical schools	All emphases: Optional. Students may use Stats 131A to fulfill the upper division ES Statistics requirement.		
English	various	English requirements vary. Many courses that satisfy the ES Reading and Composition requirement are acceptable. Keep the syllabi.		
Non-Sciences	various	Some schools specify a certain number of units in the humanities and social sciences. Breadth requirements for the ES major (any emphasis) should meet these requirements.		

Environmental Sciences:
Biological Science Concentration Progress Sheet
Student Copy

This worksheet summarizes the Environmental Sciences degree requirements. Use it to keep track of your progress toward your degree. Requirements may change, so be sure to check with the ES advisor and the Office of Instruction and Student Affairs in 260 Mulford for official degree checks. *See the ES advisor if you have any questions about the requirements.*

Lower Division	Course	Term	Units	Grade	GPs	Check
Biology:	Biology 1A/1AL					
	Biology 1B					
Chemistry:	Chemistry 1A					
	Chemistry 3A/3AL					
Economics:	EEP C1/Econ C3					
Env. Sciences:	ES 10/L					
Math:	Math 1A &	or	Math 16 A &			
	Math 1B		Math 16 B			
Physics:	Physics 8A					
<ul style="list-style-type: none"> All courses must be taken for a letter grade 						

Upper Division	Course	Term	Units	Grade	GPs	Check
Statistics:	Stats 131A, Pub Hlth 141 (summer) 142 (few seats for non majors)					
Env. Sciences: (spring only)	ES 100					
Env. Modeling: (spring only)	ERG 102 <i>or</i> ESPM C104/EEP C115					
Human-Env Int: (one course)	EPS 170AC/L&S 170AC, EEP 101, 153. ES 125, Geog 130, ESPM 102D, 153, 155, 160AC/Hist 120AC, 163AC/Soc 128AC, 165, 168					
Bio Sci Elective						
Sr. Seminar:	ES 196A					
	ES 196AL					
	ES 196B					
	ES 196BL					
Add'l Electives:						
<ul style="list-style-type: none"> All courses must be taken for a letter grade You must have a total of thirty (30) upper division units in the major Your upper division GPA must be at least a 2.0 Your cumulative major GPA must be at least a 2.0 						

Other Requirements

University Requirements	Course	Term	Units	Grade	GPs	Check
<i>Entry-Level Writing</i>						
<i>American History</i>						
<i>American Institutions</i>						
See the General catalog http://writing.berkeley.edu/newsite/awpexam.htm and http://teaching.berkeley.edu/ahj for more details						

Campus Requirement	Course	Term	Units	Grade	GPs	Check
<i>American Cultures</i>						
<ul style="list-style-type: none"> Letter grade or P/NP. Must earn C- or higher or "P" grade. See the General Catalog or http://amercult.berkeley.edu for more details						

Essential Skills	Course	Term	Units	Grade	GPs	Check
<i>Foreign Language</i>						
<i>Quantitative Reasoning</i>						
<i>R&C Part A</i>						
<i>R&C Part B</i>						
<ul style="list-style-type: none"> Letter grade, only. C- or higher. See the ES advisor or http://ls-advise.berkeley.edu/requirements/fl.html/gr.html , or /rc.html for details.						

7-Course Breadth	Course	Term	Units	Grade	GPs	Check
<i>Arts & Literature</i>						
<i>Biological Science</i>						
<i>Historical Studies</i>						
<i>Int'l Studies</i>						
<i>Philosophy & Values</i>						
<i>Physical Science</i>						
<i>Soc & Behavioral Science</i>						
<ul style="list-style-type: none"> Letter grade or P/NP. Must earn C- or higher or "P" grade. No more than 2 courses from a single department. No AP scores. Course lists: http://ls-advise.berkeley.edu/requirements/lsreq.html#7breadth						

Unit/GPA requirements	
<input type="checkbox"/> 36 upper division units overall	<input type="checkbox"/> Maximum of 4 P.E. units
<input type="checkbox"/> 120 units total	<input type="checkbox"/> No more than 1/3 of total units taken P/NP
<input type="checkbox"/> Minimum 2.0 cumulative UCB GPA	<input type="checkbox"/> Senior Residency
<input type="checkbox"/> Maximum of 16 Independent Study units	<input type="checkbox"/> 18 upper division units in residence

Environmental Sciences
Physical Science Concentration Progress Sheet
Student Copy

This worksheet summarizes the Environmental Sciences degree requirements. Use it to keep track of your progress toward your degree. Requirements may change, so be sure to check with the ES advisor and the Office of Instruction and Student Affairs in 260 Mulford for official degree checks. *See the ES advisor if you have any questions about the requirements.*

Lower Division	Course		Term	Units	Grade	GPs	Check
Biology:	Biology 1A/1AL &	or	Biology 11/L (spring only) &				
	Biology 1B		(one course) IB 153, 154, ESPM 102A, 111, 113, 114, 115B, 116A, 116B				
Chemistry:	Chemistry 1A						
	Chemistry 3A/L						
Economics:	EEP C1/Econ C3						
Env. Sciences:	ES 10						
Math:	Math 1A						
	Math 1B						
Physics:	Physics 7A						
	Physics 7B						

Upper Division	Course	Term	Units	Grade	GPs	Check
Statistics:	Stats 131A, Pub Hlth 141 (summer), or 142 (limited seats for non-majors)					
Env. Sciences: (spring only)	ES 100					
Env. Modeling: (spring only)	ERG 102 or ESPM C104/EEP C115					
Human-Env Int: (one course)	EPS 170AC/L&S 170AC, EEP 101, 153, ES 125, Geog 130, 102D, 153, 155, 160AC/Hist 120AC, 163AC/Soc 128AC, 165, 168					
Phys Sci Elective						
Sr. Seminar:	ES 196A					
	ES 196AL					
	ES 196B					
	ES 196BL					
Add'l Electives:						

- All courses for the major must be taken for a letter grade
- You must have a total of thirty (30) upper division units in the major
- Your upper division GPA must be at least a 2.0
- Your cumulative major GPA must be at least a 2.0

Other Requirements

University Requirements	Course	Term	Units	Grade	GPs	Check
<i>Entry-Level Writing</i>						
<i>American History</i>						
<i>American Institutions</i>						
See the General catalog or http://writing.berkeley.edu/newsite/awpexam.htm and http://teaching.berkeley.edu/ahj for more details						

Campus Requirement	Course	Term	Units	Grade	GPs	Check
<i>American Cultures</i>						
<ul style="list-style-type: none"> Letter grade or P/NP. Must earn C- or higher or "P" grade. See the General Catalog or http://amercult.berkeley.edu for more details						

Essential Skills	Course	Term	Units	Grade	GPs	Check
<i>Foreign Language</i>						
<i>Quantitative Reasoning</i>						
<i>R&C Part A</i>						
<i>R&C Part B</i>						
<ul style="list-style-type: none"> Letter grade, only. C- or higher. See the ES advisor or http://ls-advise.berkeley.edu/requirements/fl.html / qr.html , or /rc.html for details.						

7-Course Breadth	Course	Term	Units	Grade	GPs	Check
<i>Arts & Literature</i>						
<i>Biological Science</i>						
<i>Historical Studies</i>						
<i>Int'l Studies</i>						
<i>Philosophy & Values</i>						
<i>Physical Science</i>						
<i>Soc & Behavioral Science</i>						
<ul style="list-style-type: none"> Letter grade or P/NP. Must earn C- or higher or "P" grade. No more than 2 courses from a single department. No AP scores. Course lists: http://ls-advise.berkeley.edu/requirements/lsreq.html#7breadth						

Unit/GPA requirements	
<input type="checkbox"/> 36 upper division units overall	<input type="checkbox"/> Maximum of 4 P.E. units
<input type="checkbox"/> 120 units total	<input type="checkbox"/> No more than 1/3 of total units taken P/NP
<input type="checkbox"/> Minimum 2.0 cumulative UCB GPA	<input type="checkbox"/> Senior Residency
<input type="checkbox"/> Maximum of 16 Independent Study units	<input type="checkbox"/> 18 upper division units in residence

Environmental Sciences:
Social Science Concentration Progress Sheet
Student Copy

This worksheet summarizes the Environmental Sciences degree requirements. Use it to keep track of your progress toward your degree. Requirements may change, so be sure to check with the ES advisor and the Office of Instruction and Student Affairs in 260 Mulford for official degree checks. *See the ES advisor if you have any questions about the requirements.*

Lower Division	Course		Term	Units	Grade	GPs	Check
Biology:	Bio. 1A &	<i>or</i>	Bio. 11/L (spring only) &				
	Bio. 1B		(one course) ESPM 102A, 111, 113, 114, 115B, 116A, 116B; IB 153, 154				
Chemistry:	Chemistry 1A						
	Chemistry 1B <i>or</i> 3A/L						
Economics:	EEP C1/Econ C3						
Env. Sciences:	ES 10/L						
Math:	Math 1A &	<i>or</i>	Math 16A &				
	Math 1B		Math 16B				
Physics:	Physics 8A						
<ul style="list-style-type: none"> All courses must be taken for a letter grade 							

Upper Division	Course		Term	Units	Grade	GPs	Check
Statistics:	Stats 131A, Pub Hlth 141 (summer), <i>or</i> 142 (very limited seats for non-majors)						
Env. Sciences: (spring only)	ES 100						
Env. Modeling: (spring only)	ERG 102 <i>or</i> ESPM C104/EEP C115						
Human-Env Int: (one course)	EPS 170AC/LNS 170AC, EEP 101, 153, ES 125, Geog 130, ESPM 102D, 153, 155, 160AC/Hist 120AC, 163AC/Soc 128AC, 165, 168						
Soc Sci Elective							
Sr. Seminar:	ES 196A						
	ES 196AL						
	ES 196B						
	ES 196BL						
Add'l Electives:							
<ul style="list-style-type: none"> All courses must be taken for a letter grade You must have a total of thirty (30) upper division units in the major Your upper division GPA must be at least a 2.0 Your cumulative major GPA must be at least a 2.0 							

Other Requirements

University Requirements	Course	Term	Units	Grade	GPs	Check
<i>Entry-Level Writing</i>						
<i>American History</i>						
<i>American Institutions</i>						
See the General catalog or http://writing.berkeley.edu/newsite/awpexam.htm and http://learning.berkeley.edu/AHI for more details						

Campus Requirement	Course	Term	Units	Grade	GPs	Check
<i>American Cultures</i>						
<ul style="list-style-type: none"> Letter grade or P/NP. Must earn C- or higher or "P" grade. See the General Catalog or http://amercult.berkeley.edu for more details						

Essential Skills	Course	Term	Units	Grade	GPs	Check
<i>Foreign Language</i>						
<i>Quantitative Reasoning</i>						
<i>R&C Part A</i>						
<i>R&C Part B</i>						
<ul style="list-style-type: none"> Letter grade, only. C- or higher. See the ES advisor or http://ls-advise.berkeley.edu/requirements/fl.html /qr.html, or /rc.html for details.						

7-Course Breadth	Course	Term	Units	Grade	GPs	Check
<i>Arts & Literature</i>						
<i>Biological Science</i>						
<i>Historical Studies</i>						
<i>Int'l Studies</i>						
<i>Philosophy & Values</i>						
<i>Physical Science</i>						
<i>Soc & Behavioral Science</i>						
<ul style="list-style-type: none"> Letter grade or P/NP. Must earn C- or higher or "P" grade. No more than 2 courses from a single department. No AP scores. Course lists available at http://ls-advise.berkeley.edu/requirements/lsreq.html#7breadth						

Unit/GPA requirements	
<input type="checkbox"/> 36 upper division units overall	<input type="checkbox"/> Maximum of 4 P.E. units
<input type="checkbox"/> 120 units total	<input type="checkbox"/> No more than 1/3 of total units taken P/NP
<input type="checkbox"/> Minimum 2.0 cumulative UCB GPA	<input type="checkbox"/> Senior Residency
<input type="checkbox"/> Maximum of 16 Independent Study units	<input type="checkbox"/> 18 upper division units in residence

Four-Year Planning Guide

Use this worksheet to create a graduation plan. Make sure that all of your ES and breadth requirements are included. Under "type of course" use "M" for major requirements, "B" for breadth requirements, and "E" for electives.

Term: Fall ____ Courses	Units	Type of course
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Term: Spring ____ Courses	Units	Type of course
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Summer ____ Courses	Units	Type of course
_____	_____	_____
_____	_____	_____

Term: Fall ____ Courses	Units	Type of course
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Term: Spring ____ Courses	Units	Type of course
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Summer ____ Courses	Units	Type of course
_____	_____	_____
_____	_____	_____

Term: Fall ____ Courses	Units	Type of course
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Term: Spring ____ Courses	Units	Type of course
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Summer ____ Courses	Units	Type of course
_____	_____	_____
_____	_____	_____

Term: Fall ____ Courses	Units	Type of course
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Term: Spring ____ Courses	Units	Type of course
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Summer ____ Courses	Units	Type of course
_____	_____	_____
_____	_____	_____

Useful Websites

UC Berkeley Links

Environmental Sciences	http://environmentalsciences.berkeley.edu
College of Natural Resources	http://nature.berkeley.edu
American Cultures	http://amercult.berkeley.edu
BearLink (links to all of the UCB student services pages)	http://bearlink.berkeley.edu
The Berkeley Institute of the Environment	http://bie.berkeley.edu/
Calendar: Academic	http://opa.vcbf.berkeley.edu/AcademicCalendar/calendar.cfm
Calendar: Student	http://registrar.berkeley.edu/GeneralInfo/stucal.html
Career Counseling Library	http://www.uhs.berkeley.edu/students/careerlibrary
Career Center: Internships, Jobs, Graduate/Professional School	http://career.berkeley.edu
Computing Services	http://comp-resources.berkeley.edu
De-CAL Office (Democratic Education at Cal)	http://www.dec.al.org
Education Abroad Program (EAP)	http://ias.berkeley.edu/bpsa/
Financial Aid Office	http://students.berkeley.edu/fao/
Freshman and Summer Seminar Program	http://fsp.berkeley.edu
Housing and Dining Services	http://www.housing.berkeley.edu
New Student Services	http://nss.berkeley.edu/
Re-entry Student Center	http://reentry.berkeley.edu
Registrar	http://registrar.berkeley.edu
Research: Undergraduate Research at Berkeley	http://research.berkeley.edu
Research: CNR Sponsored Projects Undergraduate Research	http://nature.berkeley.edu/site/spur.php
Residence Halls Academic Centers	http://www.housing.berkeley.edu/resliving/academic.html
Resource: A reference guide for new Berkeley students	http://resource.berkeley.edu
Scholarships Connection	http://scholarships.berkeley.edu
Student Learning Center	http://slc.berkeley.edu
Student Life Advising Services	http://slas.berkeley.edu
Student Organizations, Campus Life & Leadership	http://students.berkeley.edu/osl/studentgroups/public/index.asp
Transfer Student Center	http://transfer.berkeley.edu
UC Berkeley Washington Center (UC/DC)	http://learning.berkeley.edu/ucdc
University Health Services (Tang Center)	http://www.uhs.berkeley.edu
Workstation and Microcomputer Facilities	http://facility.berkeley.edu

Other Academic Sites

ASSIST: Statewide student transfer information including articulation agreements	http://www.assist.org
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Graduate School Information and Links

Graduate School Entrance Exams

ETS (Educational Testing Service)	http://www.ets.org
GMAT (Graduate Management Admission Test)	http://www.gmac.com

GRE (Graduate Record Examination)	http://www.gre.org
LSAT (Law School Admission Test)	http://lsac.org
MCAT (Medical College Admission Test)	http://www.aamc.org/students/mcat

Web Guides to Graduate School

Gradschools.com	http://www.gradschools.com
Graduate School Guide	http://www.schoolguides.com
Peterson's.com, the Graduate School Channel	http://www.petersons.com/graduate
U.S. News magazine: America's Best Graduate Schools	http://grad-schools.usnews.rankingsandreviews.com/grad

Government Sites

AmeriCorps	http://americorps.org
Bureau of Land Management Volunteer home page	http://www.blm.gov/volunteer
California (State of) home page	http://www.ca.gov
California Department of Water Resources	http://www.dwr.water.ca.gov
NIH: National Institutes of Health	http://www.nih.gov
National Park Service	http://www.nps.gov
NSF: National Science Foundation	http://www.nsf.gov
Peace Corps	http://www.peacecorps.gov
Teach for America	http://www.teachforamerica.org/tfa/
USA Jobs Federal Government Official Job Site	http://usajobs.gov/
US Department of Agriculture	http://www.usda.gov
US Department of Energy	http://www.energy.gov
US Department of the Interior	http://www.doi.gov
US DOE Office of Biological and Environmental Research	http://www.er.doe.gov/production/ober/ober_top.html
US Environmental Protection Agency	http://www.epa.gov

Study and Work Abroad

Berkeley Programs for Study Abroad (EAP)	http://ias.berkeley.edu/bpsa
GoAbroad.com: Comprehensive site for study, travel, and work opportunities	http://goabroad.com
Studyabroad.com: online study abroad information resources	http://studyabroad.com
Transitions Abroad	http://transitionsabroad.com
UC-wide office of EAP (UOEAP)	http://eap.ucop.edu/
Institute of International Education's (IIE's) Guide to study abroad	http://iiepassport.org

Environmental Organizations

Earth Island Institute	http://www.earthisland.org/
Earthwatch	http://www.earthwatch.org
Environmental Protection Agency (EPA)	http://www.epa.gov/
Environmental Defense Fund	http://www.edf.org
National Audubon Society	http://www.audubon.org
National Resources Defense Council	http://www.nrdc.org
Natural Heritage Institute	http://www.n-h-i.org/
The Nature Conservancy	http://nature.org
Sierra Club	http://www.sierraclub.org
World Wildlife Fund	http://www.wwfus.org