2013–2014 Undergraduate Education • Environmental Sciences at Harvard

FIND THE PATH THAT’S RIGHT FOR YOU

Earth & Planetary Sciences
Environmental Sciences & Engineering
Environmental Science & Public Policy
Organismic & Evolutionary Biology
Environmental Sciences at Harvard integrates the physical and biological sciences to study the natural world and provide solutions to environmental problems. It is a highly interdisciplinary field that encompasses a range of scientific disciplines. At Harvard, these disciplines are divided into four concentrations. Each concentration/department has its own unique focus and skills but all provide a key perspective on the environment.

**Earth and Planetary Sciences (EPS)**
**Environmental Sciences and Engineering (ESE)**
**Environmental Science and Public Policy (ESPP)**
**Organismic and Evolutionary Biology (OEB)**

The most effective way to learn about possibilities and opportunities each concentration offers is to contact them directly—and early on—to help work with you to design the best plan of study. Use this handbook as your starting point to find out about requirements, areas of study, and culture; then using the contact information found in each chapter reach out to the head tutors and undergraduate administrators to learn more. There is a wide range of possibilities for students interested in the environment and we look forward to helping you find the path that’s right for you.

### Inside:
**Course Sequence Recommendations**
- Earth and Planetary Sciences
- Environmental Sciences and Engineering
- Environmental Science and Public Policy
- Organismic and Evolutionary Biology
- Harvard University Center for the Environment
- Student Clubs and Organizations

### COURSE SEQUENCE RECOMMENDATIONS

The chart below lists courses each environmental science concentration recommends students consider taking within their first three terms at Harvard. Every student’s plan of study and trajectory is different so we encourage you to contact the departments directly for advice on course selection.

<table>
<thead>
<tr>
<th>Concentration</th>
<th>Earth &amp; Planetary Sciences</th>
<th>Environmental Sciences &amp; Engineering</th>
<th>Environmental Science &amp; Public Policy</th>
<th>Organismic &amp; Evolutionary Biology</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EPS 21 and 22</strong></td>
<td></td>
<td>ES 6</td>
<td>ESPP 10 or ESPP 11</td>
<td>OEB 10</td>
</tr>
<tr>
<td><strong>Chemistry</strong></td>
<td>Physical Sciences 10 &amp; 11 or Physical Sciences 1 or Chemistry 17 or higher</td>
<td>Physical Sciences 10 &amp; 11</td>
<td>Physical Sciences 1, 10 or 11</td>
<td>Life Sciences 1a (or Life &amp; Physical Sciences A) or Life Sciences 1b</td>
</tr>
<tr>
<td><strong>Math</strong></td>
<td>Math 21a,b or Applied Math 21a,b</td>
<td>Math 1a,b and Math 21a,b or Applied Math 21a,b</td>
<td>Math 1a,b and Math 19a,b or Math 21a,b or Applied Math 21a,b</td>
<td>Optional: Above level Math 1a</td>
</tr>
<tr>
<td><strong>Physics</strong></td>
<td>Physical Sciences 12a,b or Physics 15a,b,c or Applied Physics 50a,b</td>
<td>Physical Sciences 12a,b or Physics 15a,b or Physics 16, 15b or Applied Physics 50a,b</td>
<td>Optional</td>
<td>Optional</td>
</tr>
</tbody>
</table>
These are intellectually exciting times for Earth and planetary sciences, which are of unprecedented importance to contemporary society. Our environment is increasingly subject to stresses placed upon it. As never before, we must understand the consequences of human activities for Earth’s atmosphere, its oceans, the land, and the organisms that live on it. Exploring for, extracting, and conserving natural resources are vital to the global political economy. We must mitigate ill effects of earthquakes, landslides, volcanic eruptions, and severe weather by learning to predict their time and place.

The field of Earth and Planetary Sciences (EPS) deals with questions that require a combination of scientific innovation, deep understanding, and an interdisciplinary approach involving all the core sciences. EPS’s research environment is an unparalleled resource for undergraduate education. Concentrators may work with faculty and graduate students on major research projects as a research or field assistant, in the context of course work, or as part of an undergraduate research project. Class sizes are small and student-professor contact is frequent and informal. Students are encouraged to participate in department-sponsored field trips; experiences that build a tight-knit community among undergraduates, graduate students, and faculty. By the time they graduate, each EPS concentrator has become personally acquainted with numerous faculty members in the department, and many complete their studies with a senior thesis based on original research. Earth and Planetary Sciences provides a challenging and sophisticated environment with many career opportunities in the private sector, government, and academic research.

WHY EARTH AND PLANETARY SCIENCES?

EPS OFFERS:

• A science that addresses important societal challenges
• A mid-size department, accessible and friendly
• High faculty to student ratio
• Individual faculty advisor for each EPS concentrator
• Flexible course of study
• Training in the basic sciences leading to focused study in selected subfields
• World-wide summer field research camps and January field experiences
• Research/lab opportunities and summer internships with funding
• Opportunities to conduct original research with guidance from EPS faculty, resulting in a senior thesis

ACTIVITIES:

• Department-sponsored field trips: Canadian Rockies, Hawaii, and sailing off the coast of California or Massachusetts
• Weekend field trips to geological sites
• Seminars/tutorials/special presentations
• Opportunities for informal interaction with faculty and students
• Daily 3:00 pm cookies and tea, weekly Friday 5:00 pm pizza
• Geosociety: a student-run organization whose activities complement the work in and out of the classroom.

To learn more contact Alex Morgan: alexmorgan@college.harvard.edu

...understand the consequences of human activities for Earth’s atmosphere, its oceans, the land, and the organisms that live on it.
WHY I CHOSE EPS

EPS has become a sanctuary for me—it is a place I feel at home whilst being constantly in awe of the incredible scientists around me. Their passion for teaching as well as their research, combines to create a truly unique department where classes are practical and stimulating, with field trips, labs, and ample research opportunities. The department hosts scientists from across the world; there is always something new to discover. Add an incredible advising support system, world-class museum collections, and cutting edge technology and EPS becomes the best department at Harvard.

ELIZABETH FELTS '14
EPS PRIMARY

My first experience with the EPS department was on the Hawaii trip for all undergrads. I met so many amazing people—undergrads, grad students, professors, and staff—that I immediately fell in love with the department and community. The outstanding classes, field trips, and research opportunities make this concentration one of a kind. Through EPS and the GeoSoc, a club started by concentrators, I found my home at Harvard among the most fun, talented, down to earth, accepting, and loving people. I’m happy to say that because of the community, EPS has become my favorite thing about Harvard.

ALEX MORGAN '14
JOINT EPS AND ESE CONCENTRATOR

EPS aims to explain our planet—the planet we sometimes cherish and sometimes exploit using all the logic and reason of the scientific method. For me, such a combination of the practical and the philosophical forms a really attractive intellectual pursuit, and Harvard’s EPS department, specifically, allows for a really attractive undergraduate experience. The professors and graduate students are equally accessible and dedicated, and there’s an unmatched sense of community amongst concentrators.

JULIANNA BRUNINI '14
EPS PRIMARY

Stumbling upon the EPS department was one of the best things to happen to me in college. I had planned to concentrate in science of some sort, but found EPS by chance during freshman year. The subject matter is applicable and fascinating, and the people in the department are genuinely interested in what you have to say. The level of personal attention given to each concentrator is unparalleled, including an endless supply of amazing opportunities for research, field work, and hands-on learning.

JAMES LOONEY '14
EPS PRIMARY

“I the professors all enjoy what they teach and really want you to succeed.”

EARTH AND PLANETARY SCIENCES COURSE SEQUENCE

Earth and Planetary Sciences includes a diverse set of core science disciplines and strong linkages to the other science departments, as well as the School of Engineering & Applied Sciences, the Center for the Environment, the Microbial Sciences Initiative, and the Origins of Life Initiative.

Because Earth’s natural systems (atmosphere, oceans, biosphere, solid Earth) are interconnected, the department spans the boundaries between biology, chemistry, engineering, physics, mathematics, and the Earth sciences. EPS students are trained rigorously in the basic sciences by taking the same foundational courses as students in astrophysics, chemistry, engineering sciences, and physics.

The chart below lists courses EPS recommends students consider taking within their first three terms at Harvard. Each student’s plan of study and trajectory is different so we encourage you to contact us directly for advice on course selection.

EARTH AND PLANETARY SCIENCES COURSE SEQUENCE

<table>
<thead>
<tr>
<th>EPS/GEN-ED</th>
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<tbody>
<tr>
<td>EPS 21</td>
<td>The Dynamic Earth: Geology and Tectonics Through Time and</td>
<td></td>
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<tr>
<td>EPS 22</td>
<td>The Fluid Earth: Oceans, Atmosphere, Climate and Environment and/or</td>
<td></td>
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<tr>
<td>SPU 12</td>
<td>Natural Disasters or</td>
<td></td>
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<tr>
<td>SPU 14</td>
<td>How to Build a Habitable Planet or</td>
<td></td>
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<tr>
<td>SPU 25</td>
<td>Energy: Perspectives, Problems and Prospects or</td>
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<tr>
<td>SPU 29</td>
<td>The Climate-Energy Challenge or</td>
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<tr>
<td>SPU 30</td>
<td>Life as a Planetary Phenomenon</td>
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<table>
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<tr>
<th>MATH</th>
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<tbody>
<tr>
<td>Math 21a</td>
<td>Multivariable Calculus and</td>
</tr>
<tr>
<td>Math 21b</td>
<td>Linear Algebra and Differential Equations or</td>
</tr>
<tr>
<td>Applied Math 21a</td>
<td>Mathematical Methods in the Sciences and</td>
</tr>
<tr>
<td>Applied Math 21b</td>
<td>Mathematical Methods in the Sciences</td>
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<tr>
<th>CHEMISTRY</th>
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<tbody>
<tr>
<td>Physical Sciences 10</td>
<td>Chemistry: A Microscopic Perspective on Molecules, Materials, and Life and</td>
</tr>
<tr>
<td>Physical Sciences 11</td>
<td>Foundations and Frontiers of Modern Chemistry: A Molecular and Global Perspective or</td>
</tr>
<tr>
<td>Physical Sciences 1</td>
<td>Chemical Bonding, Energy, and Reactivity: An Introduction to the Physical Sciences and/or</td>
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<tr>
<td>Chemistry 17</td>
<td>Principles of Organic Chemistry or higher or</td>
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<tr>
<td>ES 164</td>
<td>Environmental Chemistry</td>
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<tr>
<th>PHYSICS</th>
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<tbody>
<tr>
<td>Preferred</td>
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<tr>
<td>Physical Sciences 12a</td>
<td>Mechanics from an Analytic, Numerical and Experimental Perspective and</td>
</tr>
<tr>
<td>Physical Sciences 12b</td>
<td>Electromagnetism and Statistical Physics from an Analytic, Numerical and Experimental Perspective or</td>
</tr>
<tr>
<td>Physics 15a</td>
<td>Introductory Mechanics and Relativity and</td>
</tr>
<tr>
<td>Physics 15b</td>
<td>Introductory Electromagnetism and</td>
</tr>
<tr>
<td>Physics 15c</td>
<td>Wave Phenomena</td>
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<table>
<thead>
<tr>
<th>Accepted</th>
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<tbody>
<tr>
<td>Physical Sciences 2</td>
<td>Mechanics, Elasticity, Fluids, and Diffusion and</td>
</tr>
<tr>
<td>Physical Sciences 3</td>
<td>Electromagnetism, Circuits, Waves, Optics, and Imaging</td>
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</tbody>
</table>
### Earth and Planetary Sciences Concentration Requirements

**1. Earth & Planetary Sciences (2 half-courses)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Term/Year</th>
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<tbody>
<tr>
<td>EPS 21</td>
<td></td>
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<tr>
<td>and EPS 22</td>
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</table>

SPU12, SPU 14, SPU 25, and SPU 29 may substitute for either EPS 21 or 22, only one substitution is permitted.

**2. Mathematics (2 half-courses)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Term/Year</th>
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<tbody>
<tr>
<td>Math 21a &amp; 21b</td>
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<tr>
<td>or</td>
<td>Applied Math 21a &amp; 21b</td>
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</tbody>
</table>

**3. Chemistry (1-2 half-courses)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Term/Year</th>
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<tbody>
<tr>
<td>Physical Sciences 10 &amp; 11</td>
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<tr>
<td>or</td>
<td>Physical Sciences 1 and one additional half-course in Chemistry</td>
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<tr>
<td>or</td>
<td>Chem 17 or higher or Engineering Sciences 164</td>
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**4. Physics (2-3 half-courses)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Term/Year</th>
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<tbody>
<tr>
<td>Physics 12a &amp; 12b or Physics 15a, 15b &amp; 15c</td>
<td></td>
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<tr>
<td>or</td>
<td>Applied Physics 50a or 50b</td>
</tr>
<tr>
<td>or</td>
<td>Physical Sciences 2 &amp; 3</td>
</tr>
</tbody>
</table>

**5. Upper Level EPS Courses (4 half-courses)**

Four additional half courses in EPS, three of which must be numbered 99 or above.

**6. Further Half-Courses (1-3 half courses)**

Four additional half courses in EPS or related field may be required to complete the requirement of at least 14 half courses. Related fields include applied math, astrophysics, biology, chemistry, computer sciences, engineering sciences, ESPP, mathematics, physics, and statistics which count toward the respective concentration requirements.

**7. Tutorial (Minimum 5 sessions)**

Schedule for 2013-2014:

- October 2
- November 6
- December 4
- February 5
- March 5
- April 2

**8. Honors Eligibility**

EPS 99r Senior Thesis Tutorial

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### Earth and Planetary Sciences Secondary Requirements

**1. Introductory Courses (2 Half Courses)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Term/Year</th>
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<tbody>
<tr>
<td>EPS 21</td>
<td></td>
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<tr>
<td>EPS 22</td>
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</tr>
</tbody>
</table>

**2. Upper-Level Courses in EPS (3 Half Courses)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Term/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>To be chosen from EPS 51, 52, 56, 74, 91, 99, 100, 107, 109, 121, 131, 132, 133, 134, 135, 136, 141, 145, 146, 150, 161, 162, 166, 171, 181, 182, 186, 187, and 189.</td>
<td></td>
</tr>
</tbody>
</table>

**3. Department Tutorial Required (Generally taken in the sophomore year. Need to attend 5 EPS tutorials). Non-credit**

Schedule for 2013-2014:

- October 2
- November 6
- December 4
- February 5
- March 5
- April 2

See student handbook to learn about subdisciplines in Atmospheric and Ocean Science, Energy and Climate, Environmental Geoscience, Geobiology, Geochemistry, Geological Science, Planetary Sciences, and Solid Earth Geophysics.
HARVARD ENVIRONMENTAL SCIENCES

WHERE YOUR EPS DEGREE CAN TAKE YOU

PROFESSOR

JENNIFER SMITH '96
DEAN OF THE COLLEGE OF ARTS
AND SCIENCES

ASSOCIATE PROFESSOR OF EARTH
AND PLANETARY SCIENCES AND
ENVIRONMENTAL STUDIES
WASHINGTON UNIVERSITY IN ST. LOUIS

POLICY ADVISOR

KATE TOMFORD '99
CHIEF SUSTAINABILITY POLICY ADVISOR
ILLINOIS ENERGY OFFICE
ILLINOIS DEPARTMENT OF COMMERCE
AND ECONOMIC OPPORTUNITY

As a freshman at Harvard in 1996, I chose to concentrate in Earth and Planetary Sciences to pursue interests I had developed through a summer geology and glaciology field course that I attended in Alaska during high school. Concentrating in EPS provided me with opportunities to take courses across a variety of science departments at Harvard, to interact closely with professors in small classes, and to learn through hands-on experiences in the field, geochemistry labs, and computer labs. Perhaps most importantly for my job today as a policy advisor for the State of Illinois, EPS gave me a comprehensive understanding of the complex interdependencies among the Earth’s physical, chemical, and biological systems. Policymakers are constantly challenged to design regulations and programs based on their interpretation of scientific results, and EPS is an excellent foundation for this work in the dynamic fields of energy, climate, and environmental policy.

PHD CANDIDATE

JON HUSSON '08
FIFTH-YEAR GRADUATE STUDENT
EARTH HISTORY & GEOCHRONOLOGY
PRINCETON UNIVERSITY

I graduated from Harvard in January of 2008. I first learned about the Earth and Planetary Sciences department in the fall of my freshman year, after chatting with an EPS graduate student when on a winter camping trip in the White Mountains. I had first wanted to study Biology but was concerned about the size and tenor of the Bio department; this graduate student recommended an intro EPS class. I loved the small class sizes, friendly and accessible faculty, graduate students, and fellow concentrators, and the ability to get involved with real research easily. As an active hiker and runner, I also loved the field research opportunities at EPS: nothing better than doing science in the deserts of Namibia, the raging rivers of the Canadian Arctic, or the hot springs of South China!

MEDICAL DOCTOR

ALEXA WEINGARDEN ’08
FIFTH-YEAR MD/PHD STUDENT
UNIVERSITY OF MINNESOTA

I was drawn to EPS because, when beginning college, I was interested in pursuing a career in paleontology. It was easy to combine EPS with biology so I could streamline my training. Later, as an undergrad, I decided to enter the field of medicine instead, and found that the courses I’d taken for EPS covered most of the medical school requirements and provided me with invaluable research experience. Because most of the courses required by EPS are at a higher level than those required for medical school admission, I actually feel better prepared than many of my classmates who majored in a biological science.

HIGH SCHOOL SCIENCE TEACHER

DAVID OLESCH ’06

I chose EPS for two reasons: great people and great field trips. The professors and students in the department formed a true community within Harvard, something rare in the undergraduate’s academic world. The field trips cemented the community feeling and gave us a glimpse of the awesome diversity of forms and processes over the natural world. As a kid from a paved over city, EPS taught me a lot. Now I share the spirit and knowledge I gained in EPS with a new generation of environmental scholars as an Earth Science teacher in a New York City high school.

PORTFOLIO MANAGER

ARTHUR WHITE ’94, PHD

I did not know my ideal job nor the trajectory I would follow when I entered my first year at Harvard. I chose what I was most interested in pursuing, while always keeping a thought to what I might be able to do next. After surviving Prof. Brian Wernicke’s Introduction to Geological Sciences, spring 1991, I realized that a geology concentration with EPS, offered me a chance to think about some of the really big questions governing the mechanics of our world combined with the scientific discipline with outdoor adventure. I was thrilled. My senior-year thesis with Prof. Ulrich Petersen on ore deposits in South Greenland Caledonides. Subsequently, I found myself transitioning from academia back to finance, and now I am a portfolio manager overseeing a book of complex investments in the natural resource, energy, and commodities space.

LANDSCAPE ARCHITECT

TIM WONG ’05

I entered Harvard with a love of the outdoors, so it was natural for me to choose EPS as my concentration. My classes in geology taught me how to study the land: an often neglected skill nowadays. After graduation I worked at an environmental consulting firm, cleaning up oil spills and doing environmental assessments. Then I entered graduate school to study landscape architecture, which is the practice of designing parks and outdoor spaces. My background in Earth Science has allowed me to make designs that meld with the land and the natural environment.

EPS CAREERS:

Common employment for graduates with EPS degrees include:
• Education: Teaching at the elementary school through university level
• Legal: Environmental litigation or support in a government agency such as the US Environmental Protection Agency
• Research: Research at university, non-profit, and governmental research facilities
• Public Service: Environmental monitoring and analysis, operation and management of environmental facilities, administration of environmental regulations
• Medical/Veterinary: an EPS degree will prepare you for a career in the medical or veterinary realms

EARTH & PLANETARY SCIENCES
EPS CONTACTS

FALL TERM HEAD TUTOR
ANN PEARSON
HOFFMAN LABS G13
(617) 384-8392
pearson@eps.harvard.edu

SPRING TERM HEAD TUTOR
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GEOLOGY MUSEUM 210
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ACADEMIC ADMINISTRATOR
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Our society's influence on the natural world's ecosystems and resources has never been more prominent or problematic than it is today. In order to better understand and address environmental challenges, environmental scientists and engineers provide technical solutions and advance innovations in environmental measurements, modeling, and control through the application of scientific and engineering principles.

Harvard has long been a pioneer in environmental education and research. This tradition continues today with faculty that are committed to teaching and researching engineered solutions to problems in the atmospheric, terrestrial, and aquatic compartments of the environment.

Undergraduate research and design projects in Environmental Sciences and Engineering cut across departments and schools, and cover topics in environmental technology, atmospheric sciences, environmental chemistry, microbiology, water management, energy, climate, and oceanography.

Students in Environmental Sciences and Engineering (ESE) study the fundamental processes and technologies underlying environmental systems, including natural and polluted waters and soils, the atmosphere, climate, and energy. Students learn to apply these principles to develop solutions to complex environmental problems and to mitigate human impacts on the environment.

Students interested in Environmental Sciences & Engineering have the option to pursue the ESE track of a Bachelor of Arts (A.B.) in Engineering Sciences or an ABET-accredited Bachelor of Science (S.B.) in Engineering Sciences. While students in either degree program take many of the same upper-level ESE courses, the A.B. program offers the opportunity to study complementary disciplines from other natural and social sciences, and the S.B. program provides a broader basis in engineering fundamentals with courses from other engineering areas and design. The broad-based, multidisciplinary curriculum of the Engineering Sciences concentration rivals the more traditional engineering and applied science programs at larger institutions, and offers rigorous preparation for students planning to work as practicing engineers or researchers, entering graduate school, and for those preparing for careers in business, education, government, or law. The program’s structure encourages students to make the most of Harvard’s resources, such as taking courses in other departments, collaborating with researchers from other fields or schools, and taking advantage of the wealth of extracurricular activities available.

WHY ENVIRONMENTAL SCIENCES & ENGINEERING?

ESE OFFERS:

• The opportunity to pursue the technical depth of an engineering degree within the liberal arts and residential life setting of Harvard College
• A direct connection to the cutting-edge research at the School of Engineering and Applied Sciences (SEAS), including undergraduate research opportunities during the regular term and over the summer
• An individual senior capstone design project for all S.B. students, and the opportunity for A.B. students to conduct original research with guidance from SEAS faculty resulting in a senior thesis
• Small classes that give students direct access to professors
• A dedicated advising team for each student, including an individual faculty adviser and the Assistant Director for Undergraduate Studies for Environmental Sciences and Engineering
• Opportunities to learn outside of the classroom through extracurricular activities. For example, Engineers Without Borders is working to improve drinking water quality for a community in the Dominican Republic, and all SEAS students are eligible to apply for Nectar Funding Grants to support their independent co-curricular initiatives in engineering and applied science

ENVIRONMENTAL ENGINEERS

USE SCIENTIFIC AND ENGINEERING PRINCIPLES TO:

• Protect human health from adverse environmental conditions
• Protect local and global environments from deleterious effects of human activities
• Improve environmental quality
WHY I CHOSE ESE

The reason I chose this concentration is that not only is it the smallest track within the engineering department (allowing all the students to know each other as well as the professors) but it is one of the most flexible concentrations. I can take my electives with the Earth and Planetary Sciences Department, which in itself is such a small concentration allowing students to take advantage of a large number of resources. The subject itself is of great interest since I would like to have the skills in the future to get involved in environmental engineering projects, particularly those in underdeveloped countries. In the future, I would like to work on development projects that provide clean energy to rural areas in under-developed countries with scarce resources.

I chose ESE because I wanted to learn about issues concerning the environment from an engineering perspective. I am interested in learning the problems facing the environment and how we as engineers can help solve them.

I have chosen to concentrate in ESE for three main reasons. ESE is: (1) Exciting because it is a new and developing engineering field—combining a variety of classic engineering disciplines with developing social questions that will define important global decisions in the coming decades; (2) Professionally significant because governments and companies alike are focusing increasing efforts on environmental considerations; (3) Socially responsible because the conservation and proper use of Earth’s environment has become one of the world’s most important moral questions.

“I am interested in learning the problems facing the environment and how we as engineers can help solve them.”

ENVIRONMENTAL SCIENCES AND ENGINEERING COURSE SEQUENCE

The curriculum for the Engineering Sciences concentration is highly structured, with advanced courses building on the knowledge acquired in math, science, and introductory engineering coursework. ESE courses provide opportunities for students to receive rigorous training in engineering design, computer modeling, and mathematical, chemical, and biological analysis of natural systems, with examples drawn from aquatic, terrestrial, and atmospheric environments.

The chart below lists the recommended courses for potential ESE concentrators to consider taking within their first four terms at Harvard. Students are cautioned that it is more important to derive a solid understanding of these basic subjects than to complete them quickly without thorough knowledge, as this material is used extensively in many subsequent courses. Each student’s plan of study and trajectory through the curriculum is unique, so we encourage you to contact the Assistant Director for Undergraduate Studies for advice on course selection.

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM</td>
<td>Environmental Science and Technology</td>
</tr>
<tr>
<td>MATH</td>
<td>Introduction to Computer Science I</td>
</tr>
<tr>
<td>PHYS</td>
<td>Calculus, Series, and Differential Equations</td>
</tr>
<tr>
<td>CHEM</td>
<td>Mathematical Methods in the Sciences and</td>
</tr>
<tr>
<td>PHYS</td>
<td>Mathematical Methods in the Sciences</td>
</tr>
<tr>
<td>PHY</td>
<td>Foundations and Frontiers of Modern Chemistry: A Molecular and Global Perspective</td>
</tr>
<tr>
<td>PHY</td>
<td>Physics as a Foundation for Science and Engineering Part I and</td>
</tr>
<tr>
<td>PHY</td>
<td>Physics as a Foundation for Science and Engineering Part I</td>
</tr>
<tr>
<td>PHY</td>
<td>Mechanics and</td>
</tr>
<tr>
<td>PHY</td>
<td>Electromagnetism and Statistical Physics</td>
</tr>
<tr>
<td>PHY</td>
<td>Introductory Mechanics and Relativity and</td>
</tr>
<tr>
<td>PHY</td>
<td>Introductory Electromagnetism</td>
</tr>
<tr>
<td>PHY</td>
<td>Mechanics and Special Relativity and</td>
</tr>
<tr>
<td>PHY</td>
<td>Introductory Electromagnetism</td>
</tr>
</tbody>
</table>

- **ES 6**: Environmental Science and Technology
- **CS 50**: Introduction to Computer Science I
- **Math 1a**: Calculus, Series, and Differential Equations
- **Math 1b**: Mathematical Methods in the Sciences
- **Math 21a**: Linear Algebra and Differential Equations
- **Applied Math 21b**: Mathematical Methods in the Sciences
- **Physical Sciences 10**: Foundations and Frontiers of Modern Chemistry: A Molecular and Global Perspective
- **Applied Physics 50a**: Physics as a Foundation for Science and Engineering Part I
- **Applied Physics 50b**: Physics as a Foundation for Science and Engineering Part II
- **Physical Sciences 12a**: Mechanics
- **Physical Sciences 12b**: Electromagnetism and Statistical Physics
- **Physics 15a**: Introductory Mechanics and Relativity
- **Physics 15b**: Introductory Electromagnetism
- **Physics 16**: Mechanics and Special Relativity
- **Physics 15b**: Introductory Electromagnetism
### AB in Engineering Sciences—Environmental Sciences and Engineering Track (16 Half-Courses)

#### General Engineering Sciences Requirements:

1. **Mathematics**
   - 4 half-courses (begin according to placement)
   - Math 1a & 1b
   - Applied Math 21a & 21b
   - or
   - Math 21a & 21b
   - or
   - Math 23a & 23b

2. **Physics**
   - 2 half-courses
   - Physical Sciences 12a
   - or
   - Physics 15a or 16
   - Applied Physics 50a
   - or
   - Physical Sciences 12b
   - or
   - Physics 15b
   - or
   - Applied Physics 50b

3. **Computer Science**
   - 1 half-course
   - Computer Science 50, 51, or 61

4. **Sophomore Forum**
   - Sophomore year. Non-credit. Spring term.

#### Environmental Sciences and Engineering Track Requirements:

5. **Required**
   - 3 half-courses (begin according to placement)
   - Engineering Sciences 6
   - and
   - CHEMISTRY: (Select 2 from below)
     - Physical Sciences 1
     - Physical Sciences 10 (recommended)
     - Physical Sciences 11 (recommended)
     - Life Sciences 1a

6. **Required**
   - 3 half-courses
   - Engineering Sciences 135, 162, 163, 164, 165
   - Earth and Planetary Sciences 133

7. **Approved Electives**
   - 3 half-courses
   - Engineering Sciences 91r (one term only), 103, 123, 135, 162, 163, 164, 165, 169, 181
   - Engineering Sciences 230, 262, 263, 265, 267, 268
   - Earth and Planetary Sciences 109, 131, 132, 133, 134
   - One from Engineering Sciences 1, 50, 51, 53
   - One from Engineering Sciences 154 or Physics 123
   - One from Engineering Sciences 150, Statistics 110, Applied Math 101, 104, 105, 111, 115, 121, 147

### SB in Engineering Sciences—Environmental Sciences and Engineering Track (20 Half-Courses)

#### General Engineering Sciences Requirements:

1. **Mathematics**
   - 4 half-courses (begin according to placement)
   - Math 1a & 1b
   - Applied Math 21a & 21b or Math 21a & 21b or Math 23a & 23b

   **Probability and Statistics:** One of
   - Applied Mathematics 101, Engineering Sciences 150, or Statistics 110 (if starting in Mathematics 1b, 21a, or 23a, or Applied Mathematics 21a)

   **Applied Mathematics:** One of
   - Applied Mathematics 104, 105, 106, or 107 (if starting in Mathematics 21a or 23a or Applied Mathematics 21a)

2. **Physics**
   - 2 half-courses
   - Physical Sciences 12a
   - or
   - Physics 15a or 16
   - Applied Physics 50a
   - or
   - Physical Sciences 12b
   - or
   - Physics 15b
   - or
   - Applied Physics 50b

3. **Computer Science**
   - 1 half-course
   - Computer Science 50, 51, or 61

4. **Engineering Design**
   - 2 half-courses
   - Engineering Sciences 96
   - and
   - Engineering Sciences 100hf

#### Environmental Sciences and Engineering Track Requirements:

5. **Chemistry**
   - 2 half-courses (begin according to placement)
   - CHEMISTRY: (Select 2 from below)
     - Life Sciences 1a
     - Physical Sciences 1
     - Physical Sciences 10 (recommended)
     - Physical Sciences 11 (recommended)

6. **Environmental Sciences and Engineering Depth**
   - 4 half-courses
   - Engineering Sciences 6, 103, 123, 135, 162, 163, 164, 165, 169
   - or
   - Earth and Planetary Sciences 133

7. **Engineering Breadth**
   - 3 half-courses
   - Choose one upper-level (~100) course from each of the following depth areas (see the Student Handbook for complete list of eligible courses in each area):
     - a. Mechanics and Materials
     - b. Electrical
     - c. Engineering Physics and Chemistry

8. **Engineering Electives**
   - 2 half-courses
   - Select two half-courses on engineering topics from any engineering depth area (see the Student Handbook for complete list of eligible courses)
WHERE YOUR ESE DEGREE CAN TAKE YOU

ENVIRONMENTAL ENGINEER
MARY BOGGS ’06
An ESE degree has helped prepare me for a career in designing and applying remedial solutions to environmentally-hazardous scenarios across the country. The ESE degree helped me by teaching me the science/chemistry/physics behind the air, water, and soil, as well as how to think when attempting to design the solution. I am currently employed at Weston Solutions as an environmental engineer and so far, I have participated in air quality monitoring on the Louisiana Delta in the aftermath of the Deepwater Horizon Oil Spill, the characterization of a volatile organic carbon plume in a confined aquifer underneath the Aberdeen Proving Grounds in Maryland, and the cleanup of lead dust in residences in a small borough in eastern Pennsylvania. I feel I am making a difference by helping the local and national communities in cleaning up our planet and solving these complex problems.

REMEDIATION CONSULTANT
JIM GRUNDY, SB ’09
A degree from the ESE program gives you the technical background and writing skills to excel in the field of environmental remediation consulting. The focus on preparation of scientific reports and papers during the undergraduate ESE program translates well to writing of remedial specifications and regulatory reports, while the subjects learned in the ESE program give you the tools needed to solve remediation problems both in the office and in the field. The ESE program also teaches undergraduates time management and efficiency skills, which are very important skills for success in the competitive world of environmental consulting.

MANAGEMENT CONSULTANT
ALEXANDER ADDINGTON ’07
Since graduation I have been working in management consulting for Oliver Wyman in New York with an ESE degree, able to leverage quantitative background and branch out and work in financial services. I have focused on consulting to the largest financial services firms in the world on strategy, operational and risk concerns. I have also been able to leverage my engineering background for more quantitative projects, many involving complex Excel models including valuation of distressed RMBS and ABS securities.

ESE CAREERS:
Common employment sectors (with example job responsibilities) for graduates with ESE degrees include:

• Education and Research: Teaching at the high school through university level, cutting-edge environmental research at universities and government research centers
• Public Service: Environmental monitoring and analysis, operation and management of environmental facilities, administration of environmental regulations
• Engineering Consulting: Design of treatment facilities and remediation processes, investigations of pollutant transport, studies of energy efficiency and sustainability
• Industry: Evaluate and implement corporate environmental strategies and regulatory compliance
• Non-Governmental Organizations: Technical environmental projects to support the organization’s mission, public education and outreach, environmental policy advocacy

ESE CONTACTS

CONCENTRATION ADVISOR
ZHIMING KuANG
GEOLOGICAL MUSEUM 455
(617) 495-2354
zkuang@seas.harvard.edu

CONCENTRATION ADVISOR
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klovel@seas.harvard.edu

HOW TO FIND US
ON CAMPUS
School of Engineering and Applied Sciences
Pierce Hall
29 Oxford Street
Cambridge, MA 02138
T (617) 496-0542

ONLINE
www.seas.harvard.edu/academics/areas/environmental
All students in the ESPP concentration are required to take courses in biology, chemistry, earth and environmental sciences, economics, government, and mathematics. The concentration offers students an opportunity to specialize in a specific area of either natural or social science relating to the environment. The knowledge from these courses is applied during the junior year in seminars envisaged as a central integrating component of the concentration. Students wishing to graduate with honors are expected to write a thesis applying skills and knowledge gained from their course experience in the pursuit of research on a specific environmental issue.

**ESPP OFFERS:**
- Interdisciplinary approach to solving environmental problems
- Faculty oversight provided by faculty members from FAS (including the departments of EGS, Economics and OEI), the Business School, the Graduate School of Design, the Kennedy School of Government, the School of Public Health and the School for Engineering and Applied Sciences
- All ESPP concentrators have an individual faculty advisor
- Faculty led Junior Tutorial/Seminar program with small class sizes and low student/faculty ratio. Topics include:
  - Energy, Technology and the Environment
  - China's Energy Economy: Perspectives from the Past; Challenges for the Future
  - Conservation Biology
  - Economic Evaluation of Environmental Regulation
  - Environmental Crises, Climate Change and Population Flight
  - Biotechnology, Sustainability and Public Policy
  - The Technology, Economics and Public Policy of Renewable Energy
  - European Environmental Challenges and Policies
  - Environmental Health: Your World and Your Life at Risk
- Departmental and Course Field Trips
- Flexible course offerings
- Research opportunities with funding, and faculty sponsored senior theses

**WHY ENVIRONMENTAL SCIENCE & PUBLIC POLICY?**

The concentration in Environmental Science and Public Policy is designed to provide a multi-disciplinary introduction to current problems of the environment. It is founded on the premise that the ability to form rational judgments concerning many of the complex challenges confronting society today involving the environment requires both an understanding of the underlying scientific and technical issues and an appreciation for the relevant economic, political, legal, historical and ethical dimensions.
WHY I CHOSE ESPP

My favorite ESPP experience was almost certainly the oceanographic research trip (ESPP on a boat!) we took in January 2013. We sailed for a week from Key West, Florida, aboard the Corwith Cramer, a brigantine operated by the SEA Semester program out of Woods Hole. I had never been out to sea, or sailed a ship of any size before, much less completed oceanographic sampling at the same time! But I experienced all of these things, and amongst the company of some of the best people at Harvard! Intellectually, it was especially fun for me as I had taken a class on oceanography from Professor James McCarthy (who led the trip) the previous spring, so I had a chance to put into practice much of the things we had learned. And of course sailing under the night sky with every star twinkling at you while rolling through waves resplendent with bioluminescent phytoplankton is an experience I’ll never forget!

JAKOB LINDAAS ’13
ESPP PRIMARY

My favorite ESPP experience was writing my thesis. I was able to focus on an issue that fascinated me and I appreciated the faculty relationships that I developed throughout the thesis-writing process. Outside of my thesis, I look back on the ESPP 90 seminars that I took as some of the best classroom experiences that I had in college. In ESPP 90s, I worked in a group on an in-depth solar energy project proposal. The assignment simulated the real-life thought process that goes into renewable energy deployment and solidified my interest in the field.

ANDREW COHEN ’13
ESPP PRIMARY

When I graduate next spring and pursue a career in science policy, I will take with me the invaluable experiences of the two ESPP 90 seminars I have taken. These small, focused classes have afforded me the opportunity to interact with experts from across the globe—experts in innovation and technology, genetically modified organisms, energy deployment and solidified my interest in the field.

HANNAH MORRILL ’14
ESPP PRIMARY

What is so wonderful about the ESPP department is that it has allowed me to explore all of my interests within the context of the environment. To be able to continue my Chinese language studies while discovering new interests in the sciences and economics is a valuable opportunity that only ESPP could have offered. In one day, I would go from a lecture in atmospheric chemistry to a seminar on landscape ecology and planning, I could not have asked for a better academic experience.

ETHAN ADDICOTT ’14
ESPP PRIMARY

The social side of ESPP appealed to me when I decided to be an ESPP concentrator, but over the last three years, I have appreciated the importance of the scientific aspects and enjoyed the challenge of getting to grips with them. As a freshman, I would not have been confident to discuss aspects of environmental science, such as attributing real-life climate changes to scientific theory, explaining connections in evidence from across the globe, and clarifying many myths of climate science. Coupling this scientific base with the ESPP classes that focus on economics and politics, I have experienced three years of concepts and case studies that have broadened my knowledge and understanding tremendously.

JUN SHEPARD ’14
ESPP PRIMARY

“In one day, I would go from a lecture in atmospheric chemistry to a seminar on landscape ecology and planning. I could not have asked for a better academic experience.”

ENVIRONMENTAL SCIENCE AND PUBLIC POLICY COURSE SEQUENCE

A true interdisciplinary concentration, we have course requirements in biology, chemistry, earth and environmental sciences, economics, government, and mathematics. It is important for students to take the foundational science courses in their first and second year so they are prepared for more advanced courses later. Students are encouraged to take more advanced courses where appropriate. Please contact the undergraduate coordinator or Head Tutor with questions about placement and course selection.

The chart below lists courses ESPP recommends students consider taking within their first three terms at Harvard. Each student’s plan of study and trajectory is different so we encourage you to contact us directly for advice on course selection.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>MATH</td>
<td>Foundations of Mathematical Thinking</td>
</tr>
<tr>
<td>CHEMISTRY</td>
<td>Environmental Chemistry</td>
</tr>
<tr>
<td>ENVIRONMENTAL SCIENCE</td>
<td>Environmental Science and Technology</td>
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ESPP | ESPP 10 | Environmental Policy |
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<tbody>
<tr>
<td></td>
<td>ESPP 11</td>
<td>Sustainable Development</td>
</tr>
<tr>
<td></td>
<td>MATH</td>
<td>There are several options for fulfilling the requirement of two-half courses in mathematics or statistics. The minimum requirement is Math 1a and 1b. More advanced courses can be chosen. Begin according to placement.</td>
</tr>
</tbody>
</table>

ESPP PRIMARY | OEB 10 | Foundations of Biological Diversity or |
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<tbody>
<tr>
<td></td>
<td>LS 1a</td>
<td>An Integrated Introduction to the Life Sciences: Chemistry, Molecular Biology, and Cell Biology or</td>
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<tr>
<td></td>
<td>LS 1b</td>
<td>An Integrated Introduction to the Life Sciences: Genetics, Genomics, and Evolution</td>
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CHEMISTRY | Physical Sciences 1 | Chemical Bonding, Energy, and Reactivity: An Introduction to the Physical Sciences of Life |
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<tbody>
<tr>
<td>PHYSICS</td>
<td>Physical Sciences 10</td>
<td>Chemistry: A Microscopic Perspective on Molecules, Materials, and Life or</td>
</tr>
<tr>
<td>PHYSICS</td>
<td>Physical Sciences 11</td>
<td>Foundations and Frontiers of Modern Chemistry: A Molecular and Global Perspective</td>
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and one of the following:

CHEMISTRY | Chemistry 17 | Principles of Organic Chemistry or |
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<tbody>
<tr>
<td>CHEMISTRY</td>
<td>Chemistry 20</td>
<td>Organic Chemistry or</td>
</tr>
<tr>
<td>EPS</td>
<td>ES 164</td>
<td>Environmental Chemistry or</td>
</tr>
<tr>
<td>EPS</td>
<td>EPS 135</td>
<td>Physics and Chemistry: In the Context of Energy and Climate at the Global and Molecular Level</td>
</tr>
</tbody>
</table>

and one of the following:

EPS | EPS 22 | The Fluid Earth: Oceans, Atmosphere, Climate and Environment |
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<tbody>
<tr>
<td>ESE</td>
<td>ES 6</td>
<td>Environmental Science and Technology</td>
</tr>
</tbody>
</table>

...
**ENVIRONMENTAL SCIENCE AND PUBLIC POLICY CONCENTRATION REQUIREMENTS***

*(16 Half-Courses)*

*Our current concentration requirements are under review, please consult our website for the most up-to-date requirement information: www.espp.fas.harvard.edu.*

<table>
<thead>
<tr>
<th>1. MATHEMATICS (2 half-courses, begin according to placement)</th>
<th>Math 1a &amp; 1b or 1b and one of the following: Math 18, Math 19a, Math 21a Stats 100, Stats 104, or Applied Math 21a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 19 and Stats 100 or Stats 104 or Math 19a &amp; 19b or Math 21a &amp; 21b or Applied Math 21a &amp; 21b</td>
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</tr>
<tr>
<td>2. BIOLOGICAL SCIENCES (2 half-courses)</td>
<td>OEB 10 or LS 1a or LS 1b and OEB 55</td>
</tr>
<tr>
<td>3. PHYSICAL SCIENCES (1 half-course)</td>
<td>Physical Science 1 or Physical Science 10 or Physical Science 11</td>
</tr>
<tr>
<td>4. ORGANIC/ENVIRONMENTAL CHEMISTRY (1 half-course)</td>
<td>Chemistry 17 or Chemistry 20 or ES 164 or EPS 135</td>
</tr>
<tr>
<td>5. ENVIRONMENTAL SCIENCE &amp; ENGINEERING (2 half-courses)</td>
<td>EPS 22 and EPS 21 or ES 6</td>
</tr>
<tr>
<td>6. ECONOMICS (2 half-courses)</td>
<td>Microeconomics and EC 1661 or EC 1687</td>
</tr>
<tr>
<td>7. GOVERNMENT/PUBLIC POLICY (2 half-courses)</td>
<td>ESPP 10 and ESPP 78</td>
</tr>
<tr>
<td>8. JUNIOR SEMINAR (1 half-course)</td>
<td>ESPP 90</td>
</tr>
<tr>
<td>9. ELECTIVES (3 half-courses)</td>
<td>To reach a total of 16</td>
</tr>
<tr>
<td>10. HONORS ELIGIBILITY</td>
<td>ESPP 98R Senior Thesis Tutorial</td>
</tr>
</tbody>
</table>

**ENVIRONMENTAL SCIENCE AND PUBLIC POLICY SECONDARY REQUIREMENTS**

*(6 Half-Courses)*

**PATHWAY 1 NATURAL SCIENCE CONCENTRATORS**

At least **ONE COURSE** from the following:

- ESPP 10: ENVIRONMENTAL SCIENCE FOR PUBLIC POLICY
- ESPP 78: ENVIRONMENTAL POLITICS

At least **THREE HALF-COURSES** from the following:

- ECON 1010A: MICROECONOMIC THEORY *(ECON 1011A may be substituted)*
- ECON 1661: FUNDAMENTALS OF ENVIRONMENTAL ECONOMICS AND POLICY
- ECON 1687: ADVANCED ECONOMICS OF THE ENVIRONMENT, NATURAL RESOURCES AND CLIMATE CHANGE
- ESPP 78: ENVIRONMENTAL POLITICS *(if ESPP 10 were taken to satisfy requirement 1 listed above)*
- GOV 1100: POLITICAL ECONOMY OF DEVELOPMENT

Up to **TWO HALF-COURSES** chosen from the following:

- OEB 55: ECOLOGY: POPULATIONS, COMMUNITIES AND ECOSYSTEMS
- OEB 157: GLOBAL CHANGE BIOLOGY
- EPS 21: THE DYNAMIC EARTH: GEOLOGY AND TECTONICS THROUGH TIME
- EPS 22: THE FLUID EARTH: OCEANS, ATMOSPHERE, CLIMATE AND ENVIRONMENT
- EPS 109: EARTH RESOURCES AND THE ENVIRONMENT
- ES 6: ENVIRONMENTAL SCIENCE AND TECHNOLOGY
- ES 164: ENVIRONMENTAL CHEMISTRY
- EPS 135 PHYSICS AND CHEMISTRY: IN THE CONTEXT OF ENERGY AND CLIMATE AT THE GLOBAL & MOLECULAR LEVEL

Optional additional elective: With the permission of the instructor, one of the ESPP 90 junior seminars may be substituted for a course in either of the second two requirements sections listed above. Examples of current ESPP 90 topics include: Environmental Crises, Climate Change, and Population Flight; The Technology, Economics & Public Policy of Renewable Energy; Environmental Health and Biotechnology; Sustainability & Public Policy.
ENVIRONMENTAL SCIENCE AND PUBLIC POLICY SECONDARY REQUIREMENTS
(6 HALF-COURSES)

PATHWAY 2 SOCIAL SCIENCE & HUMANITIES CONCENTRATORS

At least **ONE COURSE** from the following:
- ESPP 10: ENVIRONMENTAL SCIENCE FOR PUBLIC POLICY
- ESPP 78: ENVIRONMENTAL POLITICS

At least **THREE HALF-COURSES** chosen from the following:
- OEB 55: ECOLOGY: POPULATIONS, COMMUNITIES AND ECOSYSTEMS
- OEB 157: GLOBAL CHANGE BIOLOGY
- EPS 21: THE DYNAMIC EARTH: GEOLOGY AND TECTONICS THROUGH TIME
- EPS 22: THE FLUID EARTH: OCEANS, ATMOSPHERE, CLIMATE AND ENVIRONMENT
- EPS 109: EARTH RESOURCES AND THE ENVIRONMENT
- ES 6: ENVIRONMENTAL SCIENCE AND TECHNOLOGY
- ES 164: ENVIRONMENTAL CHEMISTRY
- EPS 135 PHYSICS AND CHEMISTRY: IN THE CONTEXT OF ENERGY AND CLIMATE AT THE GLOBAL & MOLECULAR LEVEL

Up to **TWO HALF-COURSES** from the following:
- ECON 1010A: MICROECONOMIC THEORY (ECON 1011A may be substituted)
- ECON 1661: FUNDAMENTALS OF ENVIRONMENTAL ECONOMICS AND POLICY
- ECON 1687: ADVANCED ECONOMICS OF THE ENVIRONMENT, NATURAL RESOURCES AND CLIMATE CHANGE
- ESPP 78: ENVIRONMENTAL POLITICS (if ESPP 10 were taken to satisfy requirement 1 listed above)
- GOV 1100: POLITICAL ECONOMY OF DEVELOPMENT

Optional additional elective: With the permission of the instructor, one of the ESPP 90 junior seminars may be substituted for a course in either of the second two requirements sections listed above. Examples of current ESPP 90 topics include: Ecology & Land Use Planning; The Technology, Economics & Public Policy of Renewable Energy; Environmental Health and Biotechnology; Sustainability & Public Policy.

WHERE YOUR ESPP DEGREE CAN TAKE YOU

**ATTORNEY AMY KOBEJSKI ’00**

I’ve really come to appreciate the depth and breadth of my Environmental Science and Public Policy education as a trial and appellate litigation attorney. The economics and public policy aspects were perhaps most foreign to me when I entered college, and I’ve found them to be particularly useful in reading and understanding legislation and—truly—the world around me every day. My concentration proved extremely valuable in defending a $100 million environmental legal malpractice action, but I also worked on antitrust matters that drew heavily on my economics background. ESPP gave me a phenomenal foundation on which to build specific knowledge as required by my career as a litigator. Moreover, my focus on environmental economics is something I think about nearly everyday when reading about world events.

**CEO ERIC GROSSBERG ’98**

**FOUNDER & CEO OF BRILLIANT EARTH**

My undergraduate studies in ESPP helped me develop the multi-stakeholder approach we use at Brilliant Earth to deliver a socially-responsible and environmentally-friendly fine jewelry product. The ESPP curriculum was excellent preparation for dealing with the complex and competing interests that we encounter daily and was key in developing the social mission that drives our company. It also helped me cultivate my passion for social enterprise and helped me see the ability of business to direct positive social change.

**PROFESSOR FORREST BRISCOE ’95**

**ASSISTANT PROFESSOR SMEAL COLLEGE OF BUSINESS THE PENNSYLVANIA STATE UNIVERSITY**

I wouldn’t trade the ESPP experience for anything. It gave me a community—a really interesting group of people, places, ideas—not too big, not too small—that really fostered my growth at Harvard. One thing I valued a great deal was the chance to work with and get to know the faculty in ESPP. I was interested in exploring both the science side and the policy side, and was able to work on projects with cutting edge researchers in both areas. In ESPP this dove-tailed nicely with what I was doing in my classes, so it felt like everything was integrated and very relevant to the real world. Today, I teach in a business school, and do research on how businesses and other organizations relate to a range of social problems. ESPP was actually great preparation for what I do now: it really got me thinking about how hard it is to apply scientific rigor to problems that have a heavy human component.
EDUCATION MANAGER
MARY FORD ’96
NATIONAL AUDUBON SOCIETY
I’m the Education Manager at the National Audubon Society, and concentrating in ESPP was my first step towards this fascinating, fulfilling career. The interdisciplinary nature of ESPP taught me to think broadly about how to accomplish conservation, and gave me solid grounding in science, policy, economics, and communication skills. The comfort I gained in all those disciplines has served me well throughout my career, which has ranged from studying orangutans in Borneo, to working in a national park in Siberia, to teaching preschool, to working at World Wildlife Fund and Audubon.

ECONOMIST
GERNOT WAGNER ’02
ENVIRONMENTAL DEFENSE FUND
I could not imagine a better preparation than ESPP to tackle the profound and often maddeningly complex challenges facing our planet. I am still in touch with my professors and teaching fellows who mentored me throughout college, and they continue to guide me in my career to this day.

PHD CANDIDATE
MOLLIE HOGAN ’01
DOCTORAL CANDIDATE IN HEALTH SERVICES
UNIVERSITY OF WASHINGTON
I work in global health measurement, and was well prepared for this area of work by ESPP, particularly via the courses on human health and the environment and the quantitative courses (such as calculus, ecology, econometrics). My senior thesis prepared me well for a career in critical independent research. After three years working as a technical officer measuring child health inequalities at the World Health Organization in Geneva, I worked in Thailand for almost four years on a health system priority setting project at the Ministry of Health. I am now working on my doctorate at the University of Washington in Health Services, focusing on the measurement of maternal mortality worldwide.

PROFESSOR
NOELLE ECKLEY SELIN ’99
ASSISTANT PROFESSOR OF ENGINEERING SYSTEMS AND ATMOSPHERIC CHEMISTRY DEPARTMENT OF EARTH, ATMOSPHERIC AND PLANETARY SCIENCES MASSACHUSETTS INSTITUTE OF TECHNOLOGY
My ESPP experience gave me a thorough grounding in both the scientific and policy questions important to understanding the environment. After graduating, I spent a few years working on environmental policy issues in the US and Europe. When I decided to start a PhD program in atmospheric science, I had a solid scientific background in addition to a strong policy focus. I am now a faculty member in an interdisciplinary department, where my work builds on both my science and policy backgrounds. ESPP is a unique program, and my experiences as an ESPP concentrator at Harvard were a strong influence on where I am today. I even still refer back to my senior thesis!

HOW TO FIND US
ON CAMPUS
Geological Museum
24 Oxford Street
Cambridge, MA 02138
T (617) 496-6995
ONLINE
www.espp.harvard.edu
George Evelyn Hutchinson described the history and dynamics of life as an evolutionary play in an ecological theater. The concentration in Organismic and Evolutionary Biology is inherently interdisciplinary, encompassing mathematical and computational biology, functional and genetic approaches to morphology and development, as well as genetics, evolution, and ecology.

OEB asks questions about the function, evolution, and interaction of organisms, both now, in the past, and in the future. What kinds of organisms are there and how are they related? How is an organism’s functional design and behavior related to both its physical environment and its interactions with other organisms? What are the genetic and developmental mechanisms underlying an organism’s morphology, or how is evolution influenced by development and vice versa?

The beauty of biology is revealed through the evolution of its complexity and the interactions of organisms in their environment...
WHY I CHOSE OEB

I loved OEB for the flexibility it gave me to explore any and every aspect of biology—I could pick classes that genuinely interested me without feeling restrained by departmental requirements. OEB classes themselves are phenomenal, and their faculty are incredibly invested in the students and courses they teach—this is evident both in the quality of their teaching and their willingness to mentor students. And, the OEB community is incredible—you are surrounded by peers who love what they do, who are diverse in their interests and talents, and who are collaborative and non-competitive. Being an OEB concentrator was one of the best decisions I made at Harvard—the faculty, the peers, and the coursework made my academic experience at Harvard wonderful.

BONNIE WONG ’13

OEB is an amazing department, there’s a huge variety of classes to take and all the professors are enthusiastic and accessible.

JUSTINE CHOW ’10

ORGANISMIC & EVOLUTIONARY BIOLOGY COURSE SEQUENCE

The study of OEB can be approached in many ways, reflecting primary interest in specific groups (e.g., plants, animals, microorganisms); in a particular level of organization (e.g., ecological systems, evolutionary genetics); in an approach (e.g., biomechanics, developmental biology); or even in a desire to sample broadly across many topics.

Recognizing the value of learning about organisms in their natural habitats, OEB offers a number of courses with significant field components. For some, this involves short trips to local environments of interest; for others, spring break sees the course re-locate to the Tropics. For example, OEB 51 (Invertebrate Biology) goes to coral reefs in Panama, and OEB 167 (Herpetology) to Costa Rica.

The chart below lists courses OEB recommends students consider taking within their first three terms at Harvard. Each student’s plan of study and trajectory is different so we encourage you to contact us directly for advice on course selection.

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<th>LIFE SCIENCES</th>
<th>OEB</th>
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<tr>
<td>Life Sciences 1a</td>
<td>OEB 10</td>
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<tr>
<td>An Integrated Introduction to the Life Sciences: Chemistry, Molecular Biology, and Cell Biology (fall)</td>
<td>Foundations of Biological Diversity (fall)</td>
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<td>or</td>
<td>Senior Thesis</td>
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<tr>
<td>Life Sciences A</td>
<td>Required for highest honors</td>
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<tr>
<td>Foundational Chemistry &amp; Biology (fall)</td>
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<tr>
<td>Life Sciences 1b</td>
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<tr>
<td>An Integrated Introduction to the Life Sciences: Genetics, Genomics, and Evolution (spring)</td>
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*Pre-medical students should consider Physical Sciences 1 (spring) to allow them to take the Organic Chemistry sequence (Chemistry 17-27) as sophomores.

NB: Students with an interest in environmental science are encouraged to take the OEB 10/OEB 55 sequence their second year.

* The OEB concentration is open to all students and does not require an application for admission.
ORGANISMIC AND EVOLUTIONARY BIOLOGY CONCENTRATION REQUIREMENTS  
(13 HALF COURSES)

3 HALF COURSES IN INTRODUCTORY BIOLOGY:  

- LIFE SCIENCES 1a (OR LIFE & PHYSICAL SCIENCES A)  
- LIFE SCIENCES 1b  
- OEB 10

4 HALF COURSES INTRODUCING BROAD FIELDS OF BIOLOGY  
To be chosen from OEB 50, 51, 52, 53, 54, 55, 56, 57, 59; MCB 52, 54, 80, Life Sciences 2, 110, SCRB 10.

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2 ADVANCED-LEVEL HALF COURSES IN BIOLOGY  
(one of which may be a supervised research or reading course)

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4 ADDITIONAL HALF COURSES IN RELATED FIELDS  
To be chosen from offerings in applied mathematics, chemistry, mathematics (above the level of Math 1a), computer science (above the level of Computer Science 1), physics, and statistics.

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ORGANISMIC AND EVOLUTIONARY BIOLOGY SECONDARY REQUIREMENTS  
(5 HALF COURSES)

The faculty of the Department of Organismic and Evolutionary Biology (OEB) study biological systems at all levels from molecules to ecosystems, united by a shared foundation in evolutionary biology. Our department offers courses in a broad range of topics, including (in alphabetical order): anatomy, behavior, biomechanics, development, ecology, entomology, evolution, forestry, genetics, genomics, marine biology, microbiology, molecular evolution, mycology, oceanography, paleontology, physiology, plant sciences, systematics, and zoology. OEB is also happy to give secondary field credit for relevant courses taken during a Study Abroad semester.

Students may have an interest in pursuing a secondary field of study in a particular discipline, or may prefer to sample broadly across the offerings of the department. Rather than draft a set of requirements for each possible field of study, the department chose a flexible set of requirements that should maximize students’ freedom to craft their own programs in consultation with an academic adviser.

A secondary field requires the completion of five half-courses in OEB. For this purpose all courses listed in the OEB section of the Courses of Instruction, including cross-listed courses, as well as Life Sciences 1b and Life Sciences 2, will count as courses in OEB.

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OEB CONTACTS

CONCENTRATION ADVISOR  
ANDREW BERRY  
BiolaBs 1082B  
617-495-0684  
berry@oeb.harvard.edu

HOW TO FIND US

ON CAMPUS  
26 Oxford Street  
Cambridge, MA 02138

ONLINE  
lifesciences.fas.harvard.edu
The Harvard University Center for the Environment (HUCE) encourages research and education about the environment and its many interactions with human society.

The Center draws its strength from faculty members and students across the University who make up a remarkable intellectual community of scholars, researchers, and teachers of diverse fields including chemistry, earth and planetary sciences, engineering and applied sciences, biology, public health and medicine, government, business, economics, religion, and the law. The most pressing problems facing our natural environment are complex, often requiring collaborative investigation by scholars versed in different disciplines. By connecting scholars and practitioners from different disciplines, the Center for the Environment seeks to raise the quality of environmental research at Harvard and beyond.

Through a variety of grants and fellowships, the Center supports research related to the environment at every level, from undergraduates through senior faculty members. By sponsoring symposia, public lectures, and informal student convocations, the Center connects people with an interest in the environment.

HUCE LECTURE SERIES

HUCE hosts a number of lecture series, symposia, conferences, and special events each academic year. Environmental events sponsored by HUCE and the environmental community at large can be found at: http://environment.harvard.edu/events/calendar/list

The Future of Energy lecture series focuses on finding secure, safe, and reliable sources of energy to power world economic growth. The Center has hosted leaders in government, business, and academia. Past lectures can be viewed online at: http://environment.harvard.edu/events/video/archive

Geoengineering: Science and Governance explores the science, technology, governance and ethics of solar geoengineering. In bringing together international experts, participants explore the challenges and opportunities of geoengineering, and analyze how this technology could and should be managed.

Energy Materials at Harvard focuses on how new energy materials, which are central to every energy technology, can help raise energy efficiencies and resolve emissions problems.

Science and Democracy, co-sponsored with the Harvard Kennedy School Program on Science, Technology & Society, explores the benefits and the potential consequences of scientific/technological breakthroughs.

FUNDING SOURCES

Undergraduate students can apply for the Undergraduate Summer Research Fund, which provides financial support for student research projects related to energy and the environment.

The fund offers two types of research experiences for students: one for independent research, and one for faculty-directed research.

Award amounts are usually between $500-$3,000.

To learn more about funding sources, visit: http://environment.harvard.edu/grants

ENVIRONMENTAL COURSE GUIDE

HUCE annually updates the Environmental Course Guide, which is a list of Harvard courses most relevant to energy and environmental studies. The Course Guide is searchable by keyword, school, research area, and semester. Visit http://environment.harvard.edu/student-resources/course-guide/courses/search to access the guide.

FACULTY ASSOCIATE DIRECTORY

Nearly 250 Harvard faculty from a variety of disciplines are affiliated with HUCE. As leading scholars in their fields, they provide expert knowledge on a number of energy and environmentally-related topics.

Faculty Associates represent these schools across the University:
• Faculty of Arts and Sciences
• Graduate School of Design
• Harvard Business School
• Harvard Divinity School
• Harvard Law School
• Harvard Medical School
• Harvard Kennedy School
• School of Engineering & Applied Sciences
• School of Public Health

The database of Faculty Associates, available on our website, is searchable alphabetically, by research area, school/department, and keyword: http://environment.harvard.edu/about/directory/faculty/A

GET CONNECTED

Website: Stay connected to the Center’s news and events at www.environment.harvard.edu

Newsletter: Published twice a year, Environment@Harvard details faculty and student environmental research. Want to join our mailing list? Click the “Sign Up” button on the top navigation bar of our homepage.

Events Calendar: Want to know what events are happening at Harvard and beyond? Subscribe to the Center’s weekly events e-mail. Click the “Sign Up” button on the top navigation bar of our homepage.

Facebook: Visit the Harvard University Center for the Environment Facebook page to learn more about our upcoming events and special programs. “Like” our page today!
STUDENT CLUBS & ORGANIZATIONS

CRIMSON BIKES
http://crimsonbikes.org/about

DYNAMO
www.hcs.harvard.edu/~dynamoweb/

ENGINEERING SOCIETY
www.hcs.harvard.edu/~hces/

ENVIROED
http://www.hs.harvard.edu/eed/

ENVIRONMENTAL ACTION COMMITTEE
http://www.hcs.harvard.edu/~eac/

GEOLOGICAL SOCIETY
http://www.hcs.harvard.edu/~geosoc/

GLOBAL ENERGY INITIATIVE
hcs.harvard.edu

HARVARD COUNCIL ON BUSINESS AND
THE ENVIRONMENT
http://harvardcouncil.com/#1

SOCIETY OF BLACK SCIENTISTS AND
ENGINEERS
http://www.hcs.harvard.edu/hbse/wp/

SOCIETY OF LATINO ENGINEERS AND
SCIENTISTS
hsle@hcs.harvard.edu

MOUNTAINEERING CLUB
www.harvardmountaineering.org

OUTING CLUB
http://harvardoutingclub.org/

SCIENCE CLUB FOR GIRLS
http://www.hcs.harvard.edu/scfg/

SCIENCE REVIEW
hcs.harvard.edu/hsr