



A Guide to
Educational Programs in
**Environmental and
Sustainable Development**
at **Columbia University**

THE EARTH INSTITUTE
COLUMBIA UNIVERSITY



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Overview

Columbia University and its affiliates offer an array of undergraduate, postbaccalaureate, masters, doctoral and certificate programs in the fields of environmental studies and sustainable development. This guide provides an overview of some thirty educational programs at Columbia that address environmental and sustainable development issues. These academic offerings represent one of the largest and richest collections of environmental education programs in the world.

Our programs draw from the vast research enterprise of the Earth Institute to educate students about some of the world's most challenging problems. The Earth Institute comprises researchers, academicians, and practitioners who are affiliated with schools and research centers across Columbia University. In addition to teaching and conducting research, faculty also serve as advisors to students. In this way, students learn directly from experts who seek to understand the origin, evolution and future of the natural world. The Earth Institute also offers co-curricular programs designed to expose students to its innovative work while allowing them to contribute to ongoing research projects. The co-curricular programs include research assistantships, internships and travel funding for fieldwork.

Our students also have the opportunity to enrich their learning by participating in a wide range of conferences, lectures, and seminars that take place at the Earth Institute, on issues related to environmental science, policy and sustainable development. To learn more about the Earth Institute's education, research and co-curricular programs, please visit our website at earth.columbia.edu

Undergraduate Programs

The Earth Institute provides a wide array of resources for undergraduates to complement their environmental and sustainable development education at Columbia University. In collaboration with research centers, programs, and academic departments, the Earth Institute has created many opportunities for Barnard College, Columbia College, and The Fu Foundation School of Engineering and Applied Science students to get involved in environmental and sustainable development, both inside the classroom and out.



Earth and Environmental Engineering (B.S.)

School: The Fu Foundation School of Engineering and Applied Science

Primary Contact:

Dawn Delvalle, Department Administrator

dd2264@columbia.edu, 212-854-7065

<http://bulletin.engineering.columbia.edu/earth-and-environmental-engineering>

Commitment: Full-time

MISSION

The Earth and Environmental Engineering (EEE) program fosters education and research in the development and application of technology for the sustainable development, use, and integrated management of the Earth's resources. Resources are identified as minerals, energy, water, air, and land, as well as the physical, chemical, and biological components of the environment.

CAREER PREPARATION

Graduates of the Earth and Environmental Engineering program will be equipped with the necessary tools to understand and implement the underlying principles used in the engineering of processes and systems. Graduates of the program pursue careers in industry, government agencies, and other organizations concerned with the environment and the provision of primary and secondary materials and energy, while others continue their education in related disciplines.

MAJOR REQUIREMENTS

Earth and environmental engineering is an inherently broad and multidisciplinary field. Therefore the approach of the EEE curriculum is to expose students to multiple facets within this engineering specialty, while focusing in depth on one of three particular problem areas that are of critical importance in the 21st century. A strong foundation in basic math, sciences and liberal arts is also an important part of the EEE curriculum, since these fundamentals are needed to understand and address the technical and socioeconomic aspects of all environmental problems.

First- and Second-Year Requirements (51–61 credits)

- Mathematics (11–12 credits)
- Chemistry and Physics (9–13.5 credits)
- Nontechnical Electives (12–15 credits)
- Technical Electives (10–11.5 credits)
- Computer Science (3 credits)
- Physical Education (2 credits)
- Gateway Lab (4 credits)

Third- and Fourth-Year Requirements (65–67 credits)

- Earth and Environmental Engineering (20 credits)
- Civil Engineering/Earth and Environmental Engineering (9 credits)
- Engineering Mechanics (up to 4 credits)
- Chemical Engineering (up to 3 credits)
- Materials Sciences (up to 4 credits)
- Mechanical Engineering (up to 6 credits)
- Technical Electives (18 credits)
- Nontechnical Electives (12–15 credits)

For a full list of courses in this program:

www.eee.columbia.edu/directory/courselist.html?mode=interactive

APPLICATION INFORMATION

For more information about applying to the program:

<http://bulletin.engineering.columbia.edu/undergraduate-program-3>

Earth and Environmental Sciences (B.A.)

School: Columbia College, School of General Studies

Primary Contact:

Sidney Hemming, Director of Undergraduate Studies, sidney@ldeo.columbia.edu

Terry Plank, Director of Undergraduate Studies, tplank@ldeo.columbia.edu

<http://eesc.columbia.edu/programs/undergraduate-program>

Commitment: Full-time

MISSION

The undergraduate majors in earth and environmental sciences provide an understanding of the natural functioning of our planet and consider the consequences of human interactions with it. The program for majors aims to convey an understanding of how the climate, life and solid earth systems interact at a level that will encourage students to think creatively about earth system processes and how to address multidisciplinary environmental problems.

CAREER PREPARATION

The breadth of material covered provides an excellent science background for those planning on entry level positions in environmental consulting, management or resource development, as well as entering the professions of law, business, diplomacy, public policy, teaching, journalism, etc. At the same time, the program provides sufficient depth so that graduates will be prepared for graduate school in the earth sciences. The program can be adjusted to accommodate students with particular career goals in mind.

ENVIRONMENTAL SCIENCE MAJOR REQUIREMENTS

In addition to foundational courses in earth systems, the curriculum provides an introduction to the mix of basic science relevant to the environment: physics, chemistry, biology, and mathematics. Students are given the opportunity to select upper-level courses based on their interest. All students are required to complete a research project with an adviser, which will culminate in a senior thesis.

Environmental science majors have an option to complete the special concentration in environmental biology for environmental science majors.

Major in Environmental Science Requirements (approx. 47 credits)

- Foundational Earth Sciences (13.5 credits)
- V2100 Earth's Environmental Systems: Climate (4.5 credits)

- V2200 Earth's Environmental Systems: Solid Earth (4.5 credits)
- V2300 Earth's Environmental Systems: Life (4.5 credits)
- Math and Science Courses (12.5-13.5 credits)
- Capstone Experience (6 credits)
- Advanced Coursework (15 credits)
- Focus Areas Include Environmental Geology, Environmental Geochemistry, Hydrology, Climate Change, and Energy and Resources

EARTH SCIENCE MAJOR REQUIREMENTS

The major in earth science follows a similar rationale but is designed to allow students to pursue particular fields within the earth sciences in greater depth. Compared with the environmental science major, one less introductory course is required, while one additional advanced course should be part of the plan of study. The research and senior thesis capstone requirements are the same as for the environmental science major, with the option of a summer field course off campus.

Major in Earth Science Requirements (approx. 45.5 credits)

- Foundational Earth Sciences Courses (9 credits)
EESC V2200 Earth's Environmental Systems:
Solid Earth and one of the following:
- EESC V2100 Earth's Environmental Systems: Climate (4.5 credits)
- EESC V2300 Earth's Environmental Systems: Life (4.5 credits)
- Math and Science Courses (12.5-13.5 credits)

Includes three semesters of Chemistry and Physics (at least 9.5 credits)

- Capstone: Research and Thesis or a 6- to 8-week approved summer field geology course (6 credits)
- Advanced Coursework (18 credits)
- Focus Areas Include Geological Science, Geochemistry, Atmosphere and Ocean Science, Solid Earth Geophysics, Climate, and Paleontology

CONCENTRATION REQUIREMENTS

The concentration in environmental science and the concentration in earth science are designed to give students an understanding of how Earth works and an introduction to the methods used to investigate earth processes, including their capabilities and limitations. Concentrators often join social professions (business, law, medicine, etc.) and take with them a strong scientific background. They take the same introductory courses as the majors, but fewer basic science and upper-level courses are required.

Concentration in Environmental Science Requirements (approx. 25.5 credits)

- Foundational Environmental Sciences (13.5 credits)
- EESC V2200 Earth's Environmental Systems: Solid Earth
- EESC V2100 Earth's Environmental Systems: Climate
- EESC V2300 Earth's Environmental Systems: Life
- Math and Science (6-7 credits)
- Related Field Course Work (at least 6 credits)

Concentration in Earth Science Requirements (25 credits)

- Foundational Earth Sciences (9 credits)
- EESC V2200 Earth's Environmental Systems: Solid Earth
- EESC V2100 Earth's Environmental Systems: Climate *OR* EESC V2300 Earth's Environmental Systems: Life
- Math and Science (6 credits)
- Related Field Course Work (at least 10 credits)

SPECIAL CONCENTRATION REQUIREMENTS

In addition to the environmental science and earth science concentrations, the department sponsors a special concentration, which must be completed in conjunction with the environmental biology major.

Special Concentration in Environmental Science for Majors in Environmental Biology (31.5 credits)

- Foundational Environmental Sciences (9 credits)
- EESC V2100 Earth's Environmental Systems: Climate
- EESC V2200: Earth's Environmental Systems: Solid Earth
- EESC V2300 Earth's Environmental Systems: Life
- Introductory Sciences (10.5 credits)
- 4 Advanced Courses from the Environmental Science Curriculum (12 credits)

Special Concentration in Environmental Biology for Majors in Environmental Science (39 Credits)

- Foundational Environmental Sciences (12 credits)
- EESC V2100 Earth's Environmental Systems: Climate
- EESC V2200 Earth's Environmental Systems: Solid Earth
- EEBB W2001 Environmental Bio I
- EEBB W2002 Environmental Bio II (same as EESC 2300 Earth's Environmental Systems: Life)
- Introductory Sciences (18 credits)
- 3 Advanced Earth and Environmental Sciences Courses (9 credits)

For a full list of courses in this program: Columbia College: www.college.columbia.edu/bulletin/depts/dees.php?tab=courses General Studies: www.gs.columbia.edu/courses

APPLICATION INFORMATION

You must apply to Columbia College or the School of General Studies. Check application deadlines on the Columbia University website.

For more information about the program in Earth and Environmental Sciences, visit the program website: <http://eesc.columbia.edu/undergraduate-program>



Environmental Biology (B.A.)

School: Columbia College and General Studies
Primary Contact: **Matthew Palmer**, Director of Undergraduate Studies
mp2434@columbia.edu, 212-854-4767
www.columbia.edu/cu/e3b/undergrad.html
Commitment: Full time

Our mission is to educate a new generation of scientists and practitioners in the theory and methods of ecology, evolution, and environmental biology. Our educational programs emphasize a multidisciplinary perspective on Earth's declining biodiversity, integrating an understanding from the biological sciences with insights from relevant fields in the physical and social sciences.

CAREER PREPARATION

Through the degree programs offered in Ecology, Evolution, and Environmental Biology (E3B), graduates are prepared for numerous career fields. Majors in these programs are trained to either enter the rapidly evolving environmental workforce or to pursue graduate studies.

ENVIRONMENTAL BIOLOGY MAJOR REQUIREMENTS

The environmental biology major provides students with a strong foundation in areas of organismal biology including evolution, systematics, ecology, population biology, behavior, and biodiversity conservation, as well as an exposure to social sciences such as economics and environmental policy.

Major in Environmental Biology Requirements (min. 50 credits)

- Introductory Courses (32 Credits)
- Advanced Environmental Biology Courses (15 credits)
- Thesis Research (3-6 credits)

TRACK IN ECOLOGY AND EVOLUTION

Students who would prefer a course of study to prepare for careers in life sciences (including ecology, evolutionary biology, and health sciences related to the environment - medical school, veterinary schools, or schools of public health) may choose the track in ecology and evolution. It is also minimum of 50 credits, but differs from the Environmental Biology major by omitting the environmental science and policy/economics courses and requiring a second course in mathematics and physics, a chemistry lab, and a course in genetics.

CONCENTRATION IN ENVIRONMENTAL BIOLOGY

While students intending to pursue graduate studies are advised to undertake the environmental biology major, E3B also offers a concentration in environmental biology for students whose main academic focus is elsewhere (e.g. law, economics, history), but who wish to pursue some organized study in the field. The concentration includes fewer introductory and upper division courses, no research internship and no thesis research seminar.

Major in Evolutionary Biology of the Human Species Requirements

The major in evolutionary biology of the human species provides students with a foundation in the interrelated spheres of behavior, ecology, genetics, evolution, morphology, patterns of growth, adaptation and forensics. Using the framework of

evolution and with attention to the interplay between biology and culture, research in these areas is applied to our own species and to our closest relatives to understand who we are and where we came from. This integrated biological study of the human species is also known as biological anthropology. For more information, contact Jill Shapiro (jss19@columbia.edu)

Major in Evolutionary Biology of the Human Species Requirements (36 credits)

- Introductory Level Core Paleo/Primate Classes (6 credits)
- Conservation Requirement (3 credits)
- Theoretical Foundations (Arch/Culture) (6 credits)
- Breadth Distribution (9 credits)
- Seminar (4 credits—may overlap breadth)
- Senior thesis-optional (4 credits)
- Additional advanced level courses (8-12 credits)

20/36 credits must be from an approved list of bioanthro courses--list includes intro core classes.

CONCENTRATION IN EVOLUTIONARY BIOLOGY OF THE HUMAN SPECIES

While students intending to pursue graduate studies are advised to undertake the major, E3B also offers a concentration in the subject. The concentration (20 credits total/15 bioanthro credits) has the same core, conservation and breadth distribution requirements but students are not required to take the theoretical foundation classes or a seminar.

APPLICATION INFORMATION

Admission deadlines: Major declaration is in early to mid-spring. For more information about the deadlines: www.columbia.edu/cu/e3b/undergrad.html

Environmental Biology, Barnard (B.A.)

School: Barnard College
Primary Contact: **Stephanie Pfirman**, Program Co-Chair
spfirman@barnard.edu, 212-854-5120
www.barnard.edu/envsci/programs/envbiomajor.htm
Commitment: Full time

MISSION

The environmental biology major is designed to provide students with a broad education in the field as well as an opportunity to cover a specific aspect of

biology in depth if they desire. The Departments of Environmental Science and Biology jointly administer the environmental biology program. Majors take

courses in both departments and should maintain contact with advisers in each.

CAREER PREPARATION

The major is suitable for students who intend to pursue a research career in conservation biology, ecology, or environmental biology, as well as for students interested in environmental law or policy. Career opportunities are possible in natural history museums and parks, environmental education, environmental advocacy and government agencies, among others.

MAJOR IN ENVIRONMENTAL BIOLOGY REQUIREMENTS

- Biology (4 courses)
- Organismal Biology (1 course)
- Environmental Science (3 courses)
- Introductory Chemistry (2 courses)
- Data Handling (1 course)
- Senior Thesis

For more information on this program's curriculum:
<http://envsci.barnard.edu/majors/environmental-biology>

APPLICATION INFORMATION

For information on the online or physical application:
<http://barnard.edu/admiss/applying/download.html>

Environmental Policy, Barnard (B.A.)

School: Barnard College

Primary Contact:

Stephanie Pfirman, Program Co-Chair

spfirman@barnard.edu, 212-854-5120

www.barnard.edu/envsci/programs/envaffmajor.htm

Commitment: Full time

MAJOR IN ENVIRONMENTAL POLICY REQUIREMENTS

- Natural Science Foundation (4 courses)
- Quantitative Assessment (2 courses)
- Decision-Making Foundation (3 courses)
- Natural Science Elective (1 course)
- Social Science Elective (1 course)
- Junior Research (1 course)
- Senior Research Thesis

MISSION

Environmental policy is a growing field at the intersection of science and society. It focuses on political institutions, societal processes, and individual choices that lead to environmental stress, along with the impact of environmental stress on institutions, processes, and individuals and the development of approaches to reduce environmental impact.

CAREER PREPARATION

The environmental policy program is designed to equip students to play effective roles as citizens or career professionals who can actively engage in environmental decision making and policy. Majors learn to analyze and evaluate environmental, political, and economic systems and public policies in the context of environmental concerns.

For more information on the curriculum for this program:

<http://envsci.barnard.edu/majors/environmental-policy>

APPLICATION INFORMATION

For information on the online or physical application:
<http://barnard.edu/admiss/applying/download.html>

Environmental Science, Barnard (B.A.)

School: Barnard College

Primary Contact:

Stephanie Pfirman, Program Co-Chair

spfirman@barnard.edu, 212-854-5120

www.barnard.edu/envsci/programs/envscimajor.htm

Commitment: Full time

REQUIREMENTS FOR THE MINOR

Students wishing to minor in environmental science must have a plan approved by the Environmental Science Department chair. Five courses are required, including two laboratory science courses (such as EESC BC1001, EESC BC1002, EESC V2100, EESC V2200, EESC V2300) and three electives that form a coherent program.

MISSION

Environmental science provides a scientific basis for management of earth systems. It focuses on the interaction between human activities, resources, and the environment. As the human population grows and technology advances, pressures on Earth's natural systems are becoming increasingly intense and complex. Environmental science is an exciting field where science is used to best serve society.

conservation. Majors acquire an understanding of earth systems by taking courses in the natural sciences as well as courses investigating environmental stress. The program aims to teach students to critically evaluate the diverse information necessary for sound environmental analysis.

For a full list of courses in this program,

<http://envsci.barnard.edu/catalogue/department/environmental-science/courses>

CAREER PREPARATION

The environmental science curriculum recognizes the need for well-trained scientists to cope with balancing human requirements and environmental

MAJOR IN ENVIRONMENTAL SCIENCE REQUIREMENTS

- Core Sciences (4 courses with labs)
- Basic Sciences (2 courses)
- Quantitative Methods (2 courses)
- Environmental Electives (4 courses)
- Senior Thesis

APPLICATION INFORMATION

For information on the online or physical application:

<http://barnard.edu/admiss/applying/download.html>

Sustainable Development (B.A.)

Schools: Columbia College, School of General Studies

Primary Contact:

Natalie Unwin-Kuroneri, Associate Director of Education

natalie@ei.columbia.edu, 212-854-8536

sdev.ei.columbia.edu

Commitment: Full time

MISSION

Achieving sustainable development requires systemic and integrated approaches that consider the complex interactions between the planet's natural and social systems, while working at multiple levels of society, from the local to the global. This interdisciplinary program provides students with a well-rounded education geared to the very real and complex challenges of sustainable development and our emerging understanding of how to address them. Students explore how to move toward a trajectory of sustainability that will allow future generations to pursue further progress in human well-being without causing irreparable harm to the planet. Study abroad and internships are strongly encouraged, particularly as a basis for thesis research and to provide students with practical experience early in their professional development.

CAREER PREPARATION

Graduates of the program develop a strong foundation in the natural and social sciences and expertise in critical areas of sustainable development such as water, health, climate change, and food. They possess cutting-edge skills in economics and GIS modeling and have the capacity to engage in critical thinking based on their comprehensive knowledge of science, policy, and the values and beliefs that influence decision making.

Graduates are uniquely prepared to approach issues of sustainable development from all angles in the public, private, and nonprofit sectors. Alumni are currently working in organizations such as the Clinton Global Initiative, ICF International, Teach for America, Unilever and the U.S. Environmental Protection Agency. Graduates have also gone on to pursue advanced degrees in public policy, law, and medicine.

UNDERGRADUATE MAJOR IN SUSTAINABLE DEVELOPMENT REQUIREMENTS

The major in sustainable development extends from the philosophical, ideological, and structural traditions of the Columbia Core Curriculum. Students wishing to complete the major in sustainable development should work with the program adviser to decide on course selection and sequencing.

A minimum of **15** courses and a practicum are required for the major, divided as follows:

MAJOR IN SUSTAINABLE DEVELOPMENT REQUIREMENTS

- Sustainable Development Foundation (3 courses)
- SDEV W1900 Introduction to Sustainable Development Seminar
- SDEV W2300 Challenges of Sustainable Development
- EESC W2330 Science for Sustainable Development
- Basic Disciplinary Foundation (5 courses)
- Analysis and Solutions to Complex Problems (2 courses)
- Skills/Actions (2 courses)
- Electives (Practicum and 2 courses)
- Capstone Workshop (1 course)

UNDERGRADUATE SPECIAL CONCENTRATION IN SUSTAINABLE DEVELOPMENT REQUIREMENTS

The special concentration in sustainable development is not a stand-alone concentration; it is intended to serve as a complement to the disciplinary specialization and methodological training inherent in a concentration or major. In order to graduate, a student must complete a concentration or major in addition to the special concentration.

A minimum of **9** courses and a practicum are required for the concentration as follows:

Special Concentration in Sustainable Development

- Sustainable Development Foundation (3 courses)
- SDEV W1900 Introduction to Sustainable Development Seminar
- SDEV W2300 Challenges of Sustainable Development
- EESC W2330 Science for Sustainable Development
- Natural Science Systems (1 course)
- Human Science Systems (1 course)
- Analysis and Solutions to Complex Problems (2 courses)
- Skills/Actions (1 course)
- Practicum
- Capstone Workshop (1 course)

For a full list of courses in this program: Columbia College:
www.college.columbia.edu/bulletin/depts/sustdev.php
General Studies:
<https://gs.columbia.edu/courses>

APPLICATION INFORMATION

You must apply to Columbia College or the School of General Studies: Check application deadlines on the Columbia University website. Students may then declare the program in the spring of their sophomore year by submitting a major or special concentration declaration form.

Postbaccalaureate Program

Post-baccalaureate Certificate Program in Ecology, Evolution and Environmental Biology

School: School of Continuing Education

Primary Contact:

e3b@columbia.edu

<http://ce.columbia.edu/certificates/ecology-evolution-and-environmental-biology>

Commitment: Full time and part time

The program requirements are described in detail on the program website:

<http://ce.columbia.edu/certificates/ecology-evolution-and-environmental-biology-certificate>

For a full list of courses in this program:

http://www.columbia.edu/cu/e3b/postbac_curriculum.html

APPLICATION INFORMATION

Admission deadlines: Applications are due in early spring and are administered by the School of Continuing Education.

For more information about the deadlines:

<http://ce.columbia.edu/certificates/ecology-evolution-and-environmental-biology>

MISSION

Our mission is to educate a new generation of scientists and practitioners in the theory and methods of ecology, evolution, and environmental biology. Our educational programs emphasize a multidisciplinary perspective on Earth's declining biodiversity, integrating an understanding from the biological sciences with insights from relevant fields in the physical and social sciences.

CAREER PREPARATION

The degree and certificate programs offered in Ecology, Evolution, and Environmental Biology (E3B), graduates are prepared for numerous career fields. Majors in these programs are trained to either enter the rapidly evolving environmental workforce or to pursue graduate studies.

REQUIREMENTS FOR POST-BACCALAUREATE PROGRAM IN ECOLOGY, EVOLUTION AND ENVIRONMENTAL BIOLOGY

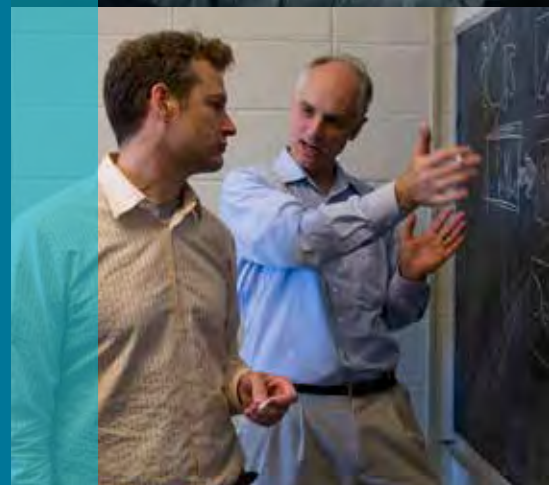
For students who have recently completed a degree in a field other than environmental science or biology, but would like to further their education in this field, E3B offers a postbaccalaureate program through the School of Continuing Education. The program is geared toward students who expect to apply to graduate programs in an environmental discipline. It can also provide a solid grounding for students wishing to pursue positions in research, conservation or management of natural systems. The curriculum is highly flexible and tailored to students' individual needs. Recommended courses for those with no prior background include the core sciences of biology, chemistry, statistics and environmental science, in addition to conservation biology and two upper-division electives. Students are required to complete most courses within the E3B department, but can pursue selected electives in other departments upon approval of the faculty advisor. In addition to students aiming to pursue graduate studies or professional positions, we also welcome those who simply wish to learn more about environmental biology through a rigorous curriculum.



Master's Programs

Students interested in continuing their education in earth and environmental sciences and engineering, or integrating their scientific interests with a career in public policy, management, education, or conservation, will find a graduate program to suit their needs at Columbia University.

Our unique affiliation with top-level science and research institutes, together with an immense interdisciplinary effort within Columbia University departments and schools, provides an array of programs expressly designed for M.S. and M.A. students.



M.A. in Climate and Society

School: Graduate School of Arts and Sciences, Department of Earth and Environmental Sciences

Primary Contact:

Cynthia Thomson, Assistant Director
cthomson@iri.columbia.edu, 212-854-9896

<http://climatesociety.ei.columbia.edu>

Commitment: Full time

MISSION

The 12-month M.A. in Climate and Society trains professionals and academics to understand and cope with the impacts of climate variability and climate change on society and the environment. This rigorous program emphasizes the problems of developing societies. Students complete the program in three semesters: fall, spring, and summer. Drawing on the educational and research facilities of Columbia University, the M.A. in Climate and Society combines elements of established programs in earth sciences, earth engineering, international relations, political science, sociology, and economics with unique classes in interdisciplinary applications specially designed for the program's students.

CAREER PREPARATION

At the end of 12 intensive and rewarding months, graduates are prepared to address environmental issues from positions in government, business, teaching, and nongovernmental organizations. Others continue their academic careers in the social or natural sciences.

M.A. IN CLIMATE AND SOCIETY REQUIREMENTS

This is a 12-month program requiring 34 credit hours. Students begin study as a cohort in the fall semester. To provide a common set of skills and a shared professional working knowledge, core courses are a significant component of the program.

M.A. in Climate and Society Requirements (34 credits)

- EESC W4400: Dynamics of Climate Variability and Change (3 credits)
- EESC W4401: Quantitative Models of Climate-Sensitive Natural and Human Systems (4 credits)
- EESC W4403: Managing Climate Variability and Adapting to Climate Change (3 credits)
- EESC W4404: Regional Climate and Climate Impacts (3 credits)
- EESC W4407: Applications in Climate and Society (3 credits)
- Related Electives (12 credits)
- A choice between a summer internship or research thesis (6 credits)

For more information on the curriculum and core courses:

<http://climatesociety.ei.columbia.edu/curriculum>

APPLICATION INFORMATION

Application information for this program: <http://climatesociety.ei.columbia.edu/admissions>

M.A. in Conservation Biology

School: Graduate School of Arts and Sciences

Primary Contact:

Joshua Drew, Program Director
jd2977@columbia.edu, 212-854-7807

www.columbia.edu/cu/e3b/ma.html

Commitment: Full time or part time

MISSION

The Master of Arts in Conservation Biology focuses on conservation as a holistic practice. Starting with a strong foundation in the biological science we integrate environmental policy and economic and education concepts to help students develop a curriculum uniquely suited to carrying out conservation in the field, classroom or boardroom. Our mission is to fully equip students with the intellectual, technical and crosscutting skills necessary to succeed as the next generation of conservation biologists.

CAREER PREPARATION

The interdisciplinary approach provides students with a range of options for building their careers. Graduates may continue their education in a Ph.D. program or enter the job market directly as scientific researchers, teachers, or administrators in a nongovernmental organization or government agency dedicated to the conservation of natural resources.

M.A. IN CONSERVATION BIOLOGY REQUIREMENTS

The M.A. in conservation biology is a two-year program. The total number of credits is 49. The 2-credit difference results from the different course requirements for the two options.

M.A. in Conservation Biology Requirements (47 credits)

- EEEB W4122 Fundamentals of Ecology and Evolution (4 credits)
- EEEB G6905 Graduate Seminar in Conservation Biology (3 credits)
- EEEB 4850/4851 MA Thesis Development Seminar (6 credits)
- Electives in Conservation Science, Environmental Economics, and Related Fields (min. 23 credits)
- Policy Electives (9 credits)

M.A. CAPSTONE PROJECT

Students prepare a capstone project which may be a M.A. thesis based on original research, which is evaluated by a three-member thesis committee selected to match students' interests. The thesis research is presented to the entire department before graduation. Students who do not wish to do empirical research may do a M.A. capstone project, which summarizes novel research and is evaluated by a three-member committee.

Examples include evaluation of conservation financing options for NGOs and integrating conservation education into museum designs.

For more information on requirements: www.columbia.edu/cu/e3b/docs/E3B_Handbook%202012-2013.pdf

APPLICATION INFORMATION

For information on applying to the Graduate School of Arts and Sciences, visit the program page or go to <http://gsas.columbia.edu/>. The application can be found at <http://gsas.columbia.edu/apply>

M.I.A./M.P.A. Energy and Environment Concentration (EE)

School: School of International and Public Affairs

Primary Contact:

Ellen Morris, Director, Energy and Environmental Policy Concentration

em2507@columbia.edu, 212-851-9554

<http://sipa.columbia.edu/academics/concentrations/eep/index.html>

Commitment: Full time

MISSION

The energy and environment (EE) concentration of the Master's in International Affairs (M.I.A.) or Master's in Public Administration (M.P.A.) at the School of International and Public Affairs (SIPA) provides students with the analytical tools and substantive knowledge required to address the key economic and environmental challenges of the 21st century and to pursue leadership careers in the fields of energy and environment in the public, private, or nonprofit sectors. There are three tracks within EE: the International Energy Policy and Management track, the Sustainable Energy Policy track, and the Environmental Policy and Management track.

The aim is to cover energy and environmental issues in a holistic way that gives SIPA students experience and skills across a range of subjects, in different market economies, and in different contexts. Students graduate from SIPA with a set of technical, analytic, and decision-making tools along with a broadened perspective that allows them to tackle any number of issues in the public and private sectors. While shortages of many finite natural resources such as water and food must be addressed to create a truly sustainable economy, no single resource issue is more problematic than the need for energy to power the developed and

developing nations of the world. Because energy and the environment are intimately connected to society's productivity and sustainability, our ability to properly protect, develop, and manage our natural assets requires well-trained leaders.

CAREER PREPARATION

In the EE concentration, students gain a balanced view of energy and environment. This covers many areas, including sustainability, economics, international development, technologies, enterprise development, management, policies, and regulatory frameworks in the context of national, international, and regional issues. Students develop critical thinking skills that foster creativity and independent thinking to tackle pressing issues related to energy and environmental policy, technology innovations, environmental and economic sustainability, and the role of business at all scales. EE incorporates this interdisciplinary approach to the study of energy and environmental issues so its graduates are well equipped to prove themselves as the enlightened leaders and policymakers of their generation.

M.I.A./M.P.A. CONCENTRATION IN ENERGY AND ENVIRONMENT PROGRAM REQUIREMENTS

Students in the M.I.A. and M.P.A. programs are required to take a yearlong course in international economics, two

international politics courses (Conceptual Foundations of International Politics and one course in interstate relations), and one-semester courses in statistics, management, and financial management. M.I.A. candidates must also fulfill a language requirement. All M.P.A. candidates are required to complete an internship.

INTERNATIONAL ENERGY MANAGEMENT AND POLICY TRACK International Energy Management and Policy Requirements (15 credits)

- IEMP Track Concentration Requirements (3 courses)
- INAF U6072 Energy Systems Fundamentals (3 credits)
- INAF U6301 Corporate Finance (3 credits)
- INAF U6065 Economics of Energy (3 credits)
- IEMP Track Electives (at least 1 course)
- e.g., EAIA W4200 Alternative Energy Resources (3 credits)
- e.g., INAF U6680 US Energy Security: Geopolitics of Oil and Gas (3 credits)
- Environment Elective (at least 1 course)
- e.g., INAF U6243 International Relations and the Environment (3 credits)
- e.g., INAF U6056 Political, Economic, and Environmental Policy (3 credits)

SUSTAINABLE ENERGY POLICY TRACK

Sustainable Energy Policy Requirements (15 credits)

- Sustainable Energy Policy Track Concentration Requirements (3 courses)
- INAF U6072 Energy Systems and Business Fundamentals (3 credits)
- INAF U6065 Economics of Energy (3 credits)
- INAF U6242 U.S. Energy Policy (3 credits) *OR* INAF U6061 Global Energy Policy (3 credits)
- Sustainable Energy Policy Electives (at least 1 course)

- e.g., EAIA W4200 Alternative Energy Resources (3 credits)
- e.g., INAF U6042 Energy, Business, and Economic Development (3 credits)
- Environment Elective (at least 1 course)
- e.g., INAF U6243 International Relations and the Environment (3 credits)
- e.g., ENVP U6056 Political, Economic, and Environmental Policy (3 credits)

ENVIRONMENTAL POLICY AND MANAGEMENT CONCENTRATION

Environmental Policy and Management Requirements (15 credits)

- Environment Track Concentration Requirement (1 course)
- SDEV U6240 Environmental Science for Sustainable Development (3 credits)

- Environment Policy Electives (at least 2 courses)
- e.g., INAF U4727 Environmental Politics and Policy Management (3 credits)
- e.g., INAF U6243 International Relations of the Environment (3 credits)
- Environment Economics and Finance Elective (1 course)
- e.g., ENVP U6250 Poverty, Inequality, and the Environment (3 credits)
- e.g., INAF U6068 Economic Analysis of Environmental Policies (3 credits)
- Energy Elective (1 course)
- e.g., INAF U6242 U.S. Energy Policy (3 credits)
- e.g., INAF U8778 Urban Energy Systems and Policy (3 credits)

APPLICATION INFORMATION

For more information on SIPA's applications process:

http://sipa.columbia.edu/resources_services/admissions/apply.html

M.P.A. in Development Practice

School: School of International and Public Affairs

Primary Contact:

Glenn Denning, Director, M.P.A. in Development Practice

gdenning@ei.columbia.edu, 212-854-4787

www.sipa.columbia.edu/mpa-dp

Commitment: Full time

- U6500 Quantitative Analysis (3 credits)
- U6255 Development Practice Lab (3 credits)
- U4040 Professional Development (0.5 credits)
- U6411 Global Food Systems (3 credits)
- U6413 Global Health Practice (3 credits)
- Infrastructure course (one among a list provided; 3 credits)
- U6260 Management for Development Professionals (3 credits)
- SDEV U9240 Human Ecology and Sustainable Development (Spring: 3 Credits)
- Global Classroom: Foundations of Sustainable Development (3 credits)
- U9015 Summer Field Placement (3 credits)

For more information about the course requirements:

<http://earth.columbia.edu/articles/view/2595#curriculum>

APPLICATION INFORMATION

For information about admissions and the application process:

www.sipa.columbia.edu/resources_services/admissions/apply.html

Previous work experience in a low- or middle-income country setting is required. Most successful candidates will have a minimum of two years of relevant work experience.

MISSION

The M.P.A. in Development Practice (M.P.A. D.P.) trains current and aspiring practitioners to understand, develop and implement integrated approaches to sustainable development. Drawing on the educational and research facilities of Columbia University, the M.P.A. D.P. emphasizes practical knowledge and skills in food systems, public health, education, infrastructure, environmental sustainability, business enterprise, economics and management. During the 22-month program, these areas are covered through a combination of formal courses, seminars, special events and internship opportunities. Direct, hands-on field experience in all areas is obtained through the mid-program field internship.

CAREER PREPARATION

Drawing upon The Earth Institute's rich scientific expertise and SIPA's outstanding international record in public policy research and education, the M.P.A. D.P. curriculum trains students to integrate the many fields of development, including food systems, public health, education, infrastructure, environmental sustainability and business enterprise.

Technical knowledge in each sector is underscored by practical, crosscutting skills such as project design and management, monitoring and evaluation, budgeting and financial management, decision-making and human resource management.

M.P.A. IN DEVELOPMENT PRACTICE REQUIREMENTS

All students in the program take part in the core and elective courses, complemented by a three-month structured field internship that emphasizes integrated approaches to sustainable development.

Other than the below courses, students are required to take the three-point Global Classroom: Foundations of Sustainable Development course and a professional field placement in the summer.

Core Requirements for the M.P.A. in Development Practice (45 credits)

- U4200/U4201 Economics for International and Public Affairs (Year-long: 6 credits) OR
- U6400/U6401 Economic Analysis for International and Public Affairs (Year-long: 6 credits)

M.P.A. in Environmental Science and Policy

School: School of International and Public Affairs

Primary Contact:

Sarah Tweedie, Assistant Director
st2745@columbia.edu, 212-851-0261
<http://mpaenvironment.ei.columbia.edu>
Commitment: Full time

- ENVP U8213 Microeconomics and Policy Analysis I (3 credits)
- ENVP U6310 Quantitative Techniques and Systems Analysis in Policymaking and Management I (3 credits)
- ENVP U6225 Ethics, Values, and Justice (3 credits)
- ENVP U9230 The Workshop in Applied Earth Systems Management II (3 credits)
- * ENVP U6320 Political Context of Public and Private Management (3 credits)

MISSION

The 12-month, three-semester Master of Public Administration in Environmental Science and Policy trains public managers and policymakers to apply innovative, systems-based thinking to environmental issues. The program emphasizes practical skills and is enriched by ecological and planetary science, challenging students to think systemically and act pragmatically.

CAREER PREPARATION

Graduates of the program are creating a new profession of earth systems problem solvers: individuals who are prepared for leadership positions in local, state, and federal government agencies, as well as in nonprofit organizations and the environmental divisions of private corporations. They are also well suited for designing cost-effective programs and implementing policies. Most importantly, their work is guided by a deep understanding of earth systems, allowing them to craft the solutions necessary for our increasingly complex environmental problems.

MPA IN ENVIRONMENTAL SCIENCE AND POLICY REQUIREMENTS

Students complete a total of 54 credits over three semesters.

Requirements for MPA in Environmental Science and Policy (54 credits)

• Summer

- ENVP U6220 Environmental Chemistry (2 credits)
- ENVP U6221 Risk Assessment and Environmental Toxicology (2 credits)
- ENVP U6115 Climatology (2 credits)
- ENVP U6116 Hydrology (2 credits)
- ENVP U6111 Principles of Ecology (2 credits)
- ENVP U6112 Urban Ecology (2 credits)
- ENVP U9229 Workshop in Applied Earth Systems Management I (3 credits)
- ENVP U6241 Earth Systems and Environmental Politics, Policy, and Management (3 credits)
- ENVP U6246- Analytics in Environmental Science & Policy (1 credit)

• Fall

- ENVP U6234 Sustainability Management (3 credits)

• Spring

- ENVP U8201 Financial Management (3 credits)
- ENVP U8216 Microeconomics and Policy Analysis II (3 credits)
- ENVP U9232 The Workshop in Applied Earth Systems Policy Analysis (5 credits)
- * ENVP U6224 Environmental Data Analysis (3 credits)
- * ENVP U6230 Sustainable Economic Development (3 credits)
- * *recommended, but not required, elective*

For more information about required course work:

http://mpaenvironment.ei.columbia.edu/?id=curriculum#course_schedule

APPLICATION INFORMATION

Information about the physical or online application, as well as application dates, can be found at

<http://mpaenvironment.ei.columbia.edu/?id=admissions-apply>

M.P.H. in Environmental Health Sciences

School: Mailman School of Public Health

Primary Contact:

Greg Freyer, Director of Educational Affairs
gaf1@columbia.edu, 212-342-0457
www.mailman.hs.columbia.edu/ehs/index.html

Commitment: Full-time, two-year program, including a state-recognized certificate upon completion

allow students to supplement their education within EHS by acquiring an additional expertise in a specific discipline. The current certificates available within the Department of Environmental Health Sciences are Molecular Epidemiology, Toxicology, Environmental Health Policy, Climate, and Health or Global Health. Each of these tracks considers national, international, and global environmental policy issues.

MISSION

Environmental health sciences (EHS) is a rapidly expanding field that requires a broad range of basic and applied scientific skills. The M.P.H. in Environmental Health Sciences is designed to prepare students for employment in settings concerned with environmental and occupational exposures to chemical

and physical agents. Research activities of the faculty aim to generate scientific data to serve as the underpinnings of environmental policy decisions. In addition to completing a core environmental health sciences curriculum, students will choose from a school-wide selection of certificates within the field of public health, including EHS. This will

CAREER PREPARATION

Our students have an extremely high career placement rate, typically securing full-time employment or higher education degrees upon graduation. The employment is in varied settings including chemical and pharmaceutical industries, federal or local environmental protection agencies, domestic and international health depart-

ments, hospitals, environmental consulting firms, international organizations, and public interest groups. Some of our students also go on to pursue medical or doctoral degree programs.

M.P.H. IN ENVIRONMENTAL HEALTH SCIENCES REQUIREMENTS

All students in EHS will be required to take school-wide courses as part of an integrated curriculum. The core curriculum consists of five broad areas of study that include Foundation of Public Health; Biological and Environmental Determinants of Health; Social, Behavioral, and Structural Determinants of Health; Health Systems; and Research Methods.

In addition to the integrated core course, all Mailman students will take the course Leadership and Innovation plus an interdisciplinary team-based “case-based” course called Integration of Science and Practice. For more information on the core requirements and other required integrated courses, Leadership and Innovation, and Integration of Science and Practice, visit the Mailman prospective student website:

<http://publichealth.columbia.edu/degree-programs/columbia-mph/the-core>

At the department level, all students must complete a series of classes aimed at enriching their knowledge of current environmental health issues. Then students complete classes in a specific topic area, such as toxicology or climate and health, which leads to acquiring a Certificate. These classes comprise the fundamental knowledge of the field of

EHS and focus on building practical skill sets, necessary for career developments. For example how to work with, analyze, and present data, as well as understanding risk assessment, policy implications, and health consequences associated with exposure to environmental toxicants. The core courses are listed below.

In addition to core classes, there will be course requirements for the M.P.H. that will vary depending upon certificate selection. There are currently five certificates available within the department: Molecular Epidemiology, Toxicology, Environmental Health Policy, Climate and Health, or Global Health. Each of these tracks considers national, international, and global environmental policy issues. Each has a set of required courses that will help students to develop an expertise within each of these discipline areas. For additional information and a sample schedule of courses:

<http://publichealth.columbia.edu/degree-programs/columbia-mph/certificate-program>

All students regardless of certificate selection are required to fulfill a practicum experience. The practicum experience varies from laboratory research to governmental agency involvement to relevant summer or part-time work in nongovernment agencies or businesses that carry out work relevant to environmental health. School-wide and department-based workshops will be offered to help assist students in the practicum selection and evaluation process. In the new, integrated curriculum,

courses will not focus on a credit system, but rather students will need to fulfill a blend of school-wide, department, and certificate requirements. The tuition will be based on a flat-fee schedule, enabling all students to carry a full-time course load for two years toward the M.P.H.

School-wide Requirements for the Master of Public Health Program

- Foundations of Public Health Biological and Environmental Determinants of Human Health
- Social, Behavioral, and Structural Determinants of Human Health
- Health Systems
- Research Methods
- Leadership and Innovation
- Integration of Science and Practice

Department of Environmental Health Sciences Requirements

- Environmental Determinants of Human Health II
- Analysis of EHS Data
- Fundamentals of Toxicology
- Risk Assessment and Communication
- Critical Thinking and Analysis in EHS

For additional course information, www.mailman.columbia.edu/academics/courses

APPLICATION INFORMATION

For information about the application process and deadlines: <http://publichealth.columbia.edu/>

M.S. in Earth Resources Engineering

School: The Fu Foundation School of Engineering and Applied Science
Primary Contact:

Dawn Delvalle, Department Administrator
dd2264@columbia.edu, 212-854-7065
www.engineering.columbia.edu/bulletin/
Commitment: Full time or part time

MISSION

The M.S. in Earth Resources Engineering (M.S. E.R.E.) is designed for engineers and scientists who plan to pursue, or are already engaged in, environmental management/development careers. The focus of the program is the environmentally sound development and processing of resources (minerals, energy, and water)

and the recycling or proper disposal of used materials. The program also includes technologies for assessment and remediation of past damage to the environment. Students can choose a pace that allows them to complete the M.S. E.R.E. requirements while being employed.

CAREER PREPARATION

M.S. E.R.E. graduates are specially qualified to work for engineering, financial, and operating companies engaged in mining and mineral processing ventures; the environmental industry; environmental groups in all industries; and for city, state, and federal agencies responsible for the environment and energy/resource conservation.

M.S. IN EARTH RESOURCES ENGINEERING REQUIREMENTS

For students with a B.S. in engineering, at least 30 credits (10 courses) are required.

It is recommended that students take 8 courses and complete a 6-credit thesis. However, variations are acceptable.

For students with a B.S. or a B.A. (preferably with a science major), up to 48 credits (16 courses) may be required for makeup courses. A number of concentrations are available for the M.S.E. E.R.E., and students may choose courses that match their interests and career plans. Students may choose from the concentrations below.

Water Resources and Climate Risks Concentration Requirements (30 credits)

- EAEE E4257y Environmental Data Analysis and Modeling (3 credits)
- EESC W4400x Dynamics of Climate Variability and Climate Change (3 credits)
- EESC W4404y Regional Climate and Climate Impacts (3 credits)
- Concentration Electives (min. 15 credits)
- Research or Thesis (3–6 credits)

Sustainable Energy Concentration Requirements (30 credits)

- EAEE E4001 Industrial Ecology of Earth Resources (3 credits)
- EAEE E4002 Alternative Energy Resources (3 credits)

- EAEE E6208 Combustion Chemistry and Processes (3 credits)
- MECE E4211 Energy: Sources and Conversion (3 credits)
- Concentration Electives (min. 15 credits)
- Research or Thesis (3–6 credits)

Integrated Waste Management Concentration Requirements (30 credits)

- EAEE E4001 Industrial Ecology of Earth Resources (3 credits)
- EAEE E4160 Solid and Hazardous Waste Management (3 credits)
- EAEE E4150 Air Pollution Prevention and Control (3 credits)
- Additional Course in Earth and Environmental Engineering (3 credits)
- Concentration Electives (min. 15 credits)
- Research or Thesis (3–6 credits)

Environmental Health Engineering Concentration Requirements (30 credits)

- Quantitative Introduction (3 credits)
- Pollution Control (3 credits)
- Fluid Mechanics (3 credits)

- Environmental Chemistry or Biology (3 credits)
- Risk or Management Course (3 credits)
- Environmental Health Sciences (6 credits)
- Environmental Planning (3 credits)
- Thesis (6 credits)

M.S. THESIS/M.S. ESSAY

M.S. candidates may carry out a research project and write a master's thesis worth 3 to 6 credits.

For more information on courses: www.engineering.columbia.edu/bulletin

APPLICATION INFORMATION

Application materials may be downloaded here: www.seas.columbia

M.S. in Sustainability Management

School: School of Continuing Education
Primary Contact:

Allison Ladue, Associate Director
aladue@ei.columbia.edu, 212-851-9361
sustainability.ei.columbia.edu
Commitment: Full time or part time

MISSION

The M.S. in Sustainability Management program draws upon the most sophisticated environmental measurement tools, cutting-edge environmental science, and world-class management and policy studies to help students fully understand the systematic and organizational role of sustainability in any organization. Taking a bold and innovative approach to sustainability, which prioritizes the protection of earth systems and resources, as well as the spread of social and economic opportunities for all people, the M.S. in Sustainability Management is training a new generation of problem-solving management professionals. The program melds academic leadership, scientific rigor, and professional practice to form a unique, interdisciplinary community

dedicated to making lasting advances in global sustainability practice.

CAREER PREPARATION

Graduates are able to analyze environmental services, climate, water, and energy in order to maximize efficient usage and minimize negative impacts. This program provides practical training for both full-time and part-time students seeking to further their careers as sustainability professionals or transition into a sustainability field.

M.S. IN SUSTAINABILITY MANAGEMENT REQUIREMENTS

The M.S. in Sustainability Management is a 36-credit program that includes five required areas of study: integrative courses in sustainability management, economics and quantitative analysis, the

physical dimensions of sustainability management, public policy, and general and financial management.

M.S. in Sustainability Management (36 credits)

- Integrative Courses in Sustainability Management (9 credits)
- Required: SUMA K4100 Sustainability Management
- Required: SUMA K4200 Integrative Capstone Workshop (3 credits)
- One additional course in Sustainability Management
- Economics/Quantitative Analysis (9 credits)
- Physical Dimensions of Sustainability (9 credits)
- Public Policy (3 credits)
- Financial Management (6 credits)

APPLICATION INFORMATION

For more information on applying to the program: sustainability.ei.columbia.edu

Executive M.P.A. Concentration in Environmental Policy and Sustainability Management

School: School of International and Public Affairs

Primary Contacts:

Valerie Zimmer, Assistant Director of Marketing and Recruitment

vz2134@columbia.edu, 212-851-9550

www.earth.columbia.edu/articles/view/2980

Commitment: Part time or full time for international students requiring F-1 visas

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MISSION

The Executive Master of Public Policy and Administration (EMPA) program at Columbia is deeply committed to preparing its graduates to play leadership roles in public service in local, state, and federal governmental agencies as well as nonprofit organizations, private corporations, banks, and consulting firms dealing with critical public policy issues. The program trains professionals to be competent and sophisticated public managers by incorporating broad questions of public affairs and the specific analytic, managerial, and communication skills of management and policy analysis into the curriculum.

CAREER PREPARATION

The EMPA program is designed for the experienced and ambitious executive who is looking for a top-quality, practical graduate program but cannot take the time to pursue full-time study. Employers in the private and nonprofit sectors are attracted by the EMPA's rigorous program in quantitative and managerial analysis, which also provides a deep understanding of governmental processes.

EXECUTIVE M.P.A. CONCENTRATION REQUIREMENTS (45 CREDITS)

- Accounting (3 credits)
- Sustainability Management (3 credits)
- Quantitative Techniques (3 credits)
- Microeconomics and Policy Analysis I and II (6 credits)
- Financial Management (3 credits)
- Portfolio Presentation Workshop (3 credits)
- Context Electives (24 credits)

For more information about course offerings:

sipa.columbia.edu/empa-curriculum

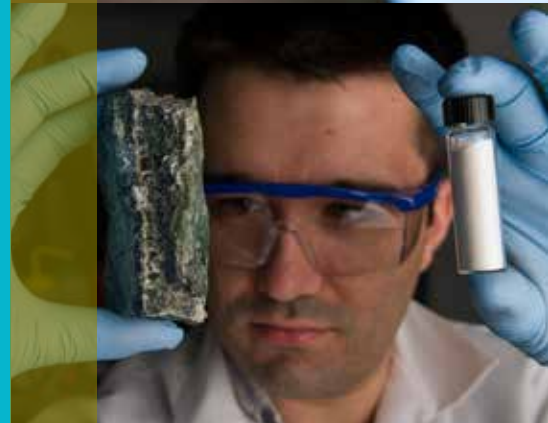
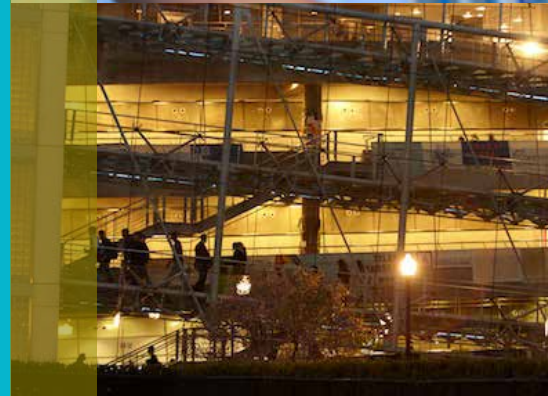
APPLICATION INFORMATION

Applications are available either online or in hard copy. For more information about applications:

apply.sipa.columbia.edu/apply/

Doctoral Programs

From geophysics to environmental economics, earth and environmental science doctoral students will find a series of multidisciplinary Ph.D. program options tapping the extensive resources of Columbia University's science departments and institutes, as well as those of our partners.



Doctoral Programs in Earth and Environmental Engineering

Schools: The Fu Foundation School of Engineering and Applied Science, Graduate School of Arts and Sciences

Primary Contact:

Dawn Delvalle, Department Administrator

dd2264@columbia.edu, 212-854-7065

www.eee.columbia.edu/pages/academics/graduateprogram/DoctoralDegrees.html

Commitment: Full time

MISSION

The Department of Earth and Environmental Engineering offers two doctoral degrees: the Eng.Sc.D., administered by The Fu Foundation School of Engineering and Applied Science, and the Ph.D., administered by the Graduate School of Arts and Sciences. Qualifying examinations and all other intellectual and performance requirements for these degrees are the same. The scope includes the design and use of sensors for measurement at molecular scale; the understanding of surface, colloid, aqueous, and high-temperature phenomena; the integrated management of multiple resources; and the mitigation of natural and environmental hazards at regional to global scales.

CAREER PREPARATION

Graduates will be well versed in research pertaining to material flows through the economy, management of resources, environmental contaminants, and energy. Many students choose cross-disciplinary research projects such as policy and economic effects on resource extraction, processing, transport, and disposal, and modeling of the environmental impacts from industrial activities at different scales. Graduates will be prepared to enter the job force and deal with the management of the interaction between human activities, earth resources, and ecosystems.

REQUIREMENTS FOR THE DOCTORAL DEGREES

Courses of study are selected by students and their advisers; 45 credits are required by the Graduate School of Arts and Sciences in order for students to graduate. For information on the curriculum:

<http://eesc.columbia.edu/programs/graduate/phd/requirements-phd>

APPLICATION INFORMATION

For information on the application and admissions processes:

www.gsas.columbia.edu/content/apply-gsas or at <http://engineering.columbia.edu/admissions-0>

Ph.D. in Earth and Environmental Sciences

School: Graduate School of Arts and Sciences

Primary Contact:

Carol Mountain, Senior Administrative Manager

carolm@ideo.columbia.edu, 845-365-8551

<http://eesc.columbia.edu/programs/graduate/phd>

Commitment: Full time

MISSION AND CAREER PREPARATION

The Ph.D. program aims to train broadly educated earth scientists for careers in academia, research, government, and industry. Along the way, our students move swiftly from receiving knowledge to creating it. All the facilities and equipment necessary for modern studies in the earth sciences are available for the use of students in the department whose research is conducted at one of three affiliated institutions: the Lamont-Doherty Earth Observatory, the American Museum of Natural History, or the Goddard Institute for Space Studies.

PH.D. IN EARTH AND ENVIRONMENTAL SCIENCES REQUIREMENTS

The Ph.D. program is designed so that students earn an M.A. and an M.Phil. during their course of study in the Ph.D. program. Students may enter with an M.A. in a related field from another institution and must earn the M.Phil. before continuing for the Ph.D. A student may not become a candidate for the Ph.D. degree without first fulfilling the requirements for the M.A. and M.Phil. degrees. Specific course requirements will vary depending on the student's chosen area of research. Students must

write and defend a dissertation. Students must complete 45 credit hours. Courses are selected by the students and their advisers to fit with the student's research focus.

For more information about the curriculum:

<http://eesc.columbia.edu/programs/graduate/phd/requirements-phd>.

APPLICATION INFORMATION

For more information on the applications process:

<http://eesc.columbia.edu/programs/graduate/phd/admissions>

Doctoral Programs in Environmental Health Sciences

School: Mailman School of Public Health

Primary Contact: **Greg A. Freyer**, Director of Academic Affairs in Environmental Health Services, gaf1@columbia.edu, 212-305-3959

PhD: <http://www.mailman.columbia.edu/academic-departments/environmental-health/academic-programs/phd-program>; DrPH: <http://www.mailman.columbia.edu/academic-departments/environmental-health/academic-programs/drph-program>

Commitment: Full time and part time

MISSION

Our programs seek to integrate skills in basic biomedical sciences and public health into an interdisciplinary training experience for the next generation of environmental health scientists. Ph.D. candidates will acquire skills in modern scientific methods and techniques to enable them to solve problems related to environmental exposures and their effects on human health. This includes understanding of the physiological, cellular, and molecular mechanisms of environmental agents on various disease processes, such as cancer, neurodegenerative diseases, asthma, and obesity; an appreciation for environmental health risk assessment and policy; as well as an appreciation of the impact of climate change on human health.

CAREER PREPARATION

Graduates are qualified to obtain senior positions within health-related organizations, academia, and industry. Career fields of graduates include faculty positions, senior roles in research and management, as well as careers in government organization, consulting, and work with community-based organizations.

COURSE REQUIREMENTS

Students complete their coursework during the first two years in the program. A few courses are required of all PhD candidates, but the majority of courses are chosen based on the broad topic area in which they will be conducting their thesis work. Appropriate courses are selected by the student and in consultation with the director

of the program or his or her mentor. All entering students must take G6300 Biochemistry and Molecular Biology I in their first year of the program. There is also a required weekly Journal Club for all doctoral students, in addition to a weekly required Departmental Seminar. Other course requirements vary according to track and student background. Other course work will depend on the particular area of research within the department, which includes environmental toxicology, neurotoxicology, molecular epidemiology, and climate and health.

REQUIREMENTS AND APPLICATION INFORMATION

Applicants must have a bachelor's degree, preferably in life sciences. A complete application must include all official academic transcripts, three letters of recommendation, a resume/CV, a personal statement describing your fit/interest within the department, any relevant writing samples (i.e., published and scholarly papers), and official GRE scores.

All Ph.D. students in EHS are accepted through the Mailman School of Public Health. For more information about this process: <http://publichealth.columbia.edu/apply/application-components>.

Dr.P.H. in Environmental Health Sciences

MISSION

The Dr.P.H. program is designed for professionals interested in advancing their careers, particularly in research, advocacy, policy, and administrative positions in an area of specialization within the field of environmental health. The Dr.P.H. program shares the learning objectives of the Ph.D. program but is better suited for students interested in a focus on applied, practical, or real-world research problems in a subspecialty area within environmental health sciences.

in research, management, or data analysis at governmental regulatory agencies; research positions within pharmaceutical industries; leadership roles in government organizations involved with environmental and health protection; consulting; international organizations such as the UN, community-based organizations, and nongovernmental organizations involved with advocating environmental policy.

COURSE REQUIREMENTS

All entering students must participate in a weekly Journal Club for all doctoral students, in addition to a weekly required

Departmental Seminar. Other course requirements vary according to track and student background. Other course work will depend on the particular area of research within the department, which includes environmental toxicology, neurotoxicology, molecular epidemiology, and climate and health. There is a 30-credit minimum requirement for graduation.

REQUIREMENTS AND APPLICATION INFORMATION

Dr.P.H. students are accepted through the Mailman School of Public Health. For more information about the application: <http://publichealth.columbia.edu/apply/application-components> <http://publichealth.columbia.edu/apply/application-components>.

CAREER PREPARATION

Graduates are prepared for senior roles

Ph.D. in Sustainable Development

School: School of International and Public Affairs

Primary Contact: **Mona Khalidi**, Assistant Dean mk2388@columbia.edu, 212-854-2277

www.sipa.columbia.edu/phd/index.html

Commitment: Full time

MISSION

The interdisciplinary Ph.D. in Sustainable Development was established in 2004 and is designed to train future researchers, university teachers, and world leaders in the social and natural science disciplines germane to sustainable development. By combining elements of a traditional graduate education in social science—particularly economics—with graduate-

level training in the natural sciences, the program uniquely situates its graduates to undertake the most demanding quantitative analytical research and policy assessments in sustainable development. Six students are admitted per year and the program length is five years.

CAREER PREPARATION

Graduates pursue academic careers in interdisciplinary graduate and undergraduate programs in the United States and abroad as well as research positions in government, NGOs, and the private sector. Foci could be in policy and the environment, development economics, and energy policy as well as in the more traditional disciplines.

PH.D. IN SUSTAINABLE DEVELOPMENT REQUIREMENTS

Students must complete 60 credits with a B+ average (no grade may be less than

B-). In addition to this course work, students will participate in integrative seminars, complete an M.A. thesis and an M.Phil., and write a Ph.D. dissertation. Students who are fully supported by the school must also complete six semesters as a teaching or research assistant. Requests for advanced standing based on studies completed elsewhere are evaluated after the first academic year and do not apply to core courses.

Core Requirements for the Ph.D. in Sustainable Development (60 credits)

- Economics (9 credits)
- Econometrics (9 credits)
- Sustainable Development (12 credits)
 - Human Ecology (3 credits)
 - Environmental Science for Sustainable Development (3 credits)
 - Politics of Sustainable Development (3 credits)

- Environmental and Resource Economics (3 credits)
- Social Science Electives (6 credits)
- Natural Sciences Electives (12 credits)
- Other Electives (12 credits)

For more information about the curriculum: http://sipa.columbia.edu/academics/degree_programs/phd/curriculum.html

APPLICATION INFORMATION

For more information about the application process: <http://new.sipa.columbia.edu/academics/programs/phd-in-sustainable-development/applying-to-the-program>

The application deadline is December 15th of every year, and following is the link to the GSAS application website: <https://apply.gsas.columbia.edu/apply/>

Ph.D. Programs in the Department of Ecology, Evolution, and Environmental Biology (E3B)

School: Graduate School of Arts and Sciences
 Primary Contact: **Maria Uriarte**, Director of Graduate Studies
mu2126@columbia.edu, 212-854-1494
www.columbia.edu/cu/e3b/phd_requirements.html
 Commitment: Full time

PH.D. IN EVOLUTIONARY PRIMATOLOGY REQUIREMENTS (40 CREDITS)

In addition to the courses below, students must also complete three internships, the scholarly language requirement, two to four semesters of teaching assistantships, and advanced examinations. The Ph.D. program is also designed so that students earn an M.A. and an M.Phil. during their course of study for the Ph.D. program. Students must write a dissertation. Requirements for the Ph.D. in Evolutionary Primatology include:

- Core Requirements
 - Evolutionary Primatology (3 credits)
 - Primate Behavior, Ecology, and Conservation
 - Genetics (9 credits)
- Other Requirements
 - NYCEP Seminar (2 semesters)
 - Advanced Related Course Work

For more information on the curricula: www.columbia.edu/cu/e3b/phd_requirements.html#reqs

APPLICATION INFORMATION

Full-time residence units (RU): Six units of full-time residency are required by the Graduate School of Arts and Sciences (four to five for students with advanced standing). These RUs include the two that make up the linked environmental policy certificate. For more information about the application process: <http://www.gsas.columbia.edu/apply>

MISSION

E3B offers two Ph.D. programs: one in ecology and evolutionary biology, and one in evolutionary primatology. The Ecology and Evolutionary Biology (EEB) program is designed to provide the broad education needed to describe, understand, and conserve Earth's biological diversity in all its forms. Matriculating students will develop the skills needed to conduct ecological, behavioral, systematic, molecular, and other evolutionary biological research, and develop the ability to formulate and implement environmental policy.

CAREER PREPARATION

Graduates often pursue academic careers as researchers and teachers, or professional positions in national or international conservation, and in environmental and multilateral aid organizations.

PH.D. IN ECOLOGY AND EVOLUTIONARY BIOLOGY REQUIREMENTS (40 CREDITS)

The Ph.D. program is designed as a five year program. Forty (40) total science

credits are required to complete the program, with the exception of students entering with "advanced standing" status, who must complete 20 credits. Requirements for the EEB Ph.D. include:

- Core Requirements (First Year)
 - EEEB W4122 Fundamentals of Ecology and Evolution (4 credits)
 - EEEB G6990 Conservation Biology (3 credits)
- Other Requirements
 - Research Seminar (4 years)
 - Completion of Certificate in Environmental Policy (24 credits)
 - Broader Context Electives (2 courses)
 - Thesis Development Seminar (6 credits, 2nd year)

In addition to the above courses, students are required to complete a teaching assistantship, and oral examinations. The Ph.D. program is also designed so that students earn an M.A. and an M.Phil. during their course of study for the Ph.D. program. Students must write a dissertation.

Certificate Programs

Certification of Professional Achievement in Sustainability Analytics

School: School of Continuing Education

Primary Contact:

Allison Ladue, Associate Director

aladue@ei.columbia.edu, 212-851-9361

<http://earth.columbia.edu/sustainabilityanalytics>

Commitment: Part-time or Full-time

Students who complete the certification will have a strong framework that can be used to benchmark performance against financial and environmental indicators across a wide variety of industries and to develop future sustainability initiatives within organizations.

CERTIFICATION OF PROFESSIONAL ACHIEVEMENT IN SUSTAINABILITY ANALYTICS REQUIREMENTS (12 credits)

- Four courses in the identification, measurement, analysis, and reporting of sustainability indicators (12 credits)

For more information about the curriculum: earth.columbia.edu/sustainabilityanalytics

APPLICATION INFORMATION

For more information: earth.columbia.edu/sustainabilityanalytics

MISSION

The management adage “What gets measured gets done” is particularly true as it relates to the implementation of sustainability initiatives. The Certification of Professional Achievement in Sustainability Analytics trains professionals to develop skills in analytic methods and quantitative analysis that enable practitioners to measure, report, and communicate the sustainability of organizations, products, and services.

CAREER PREPARATION

The Certification of Professional Achievement in Sustainability Analytics is ideal for sustainability professionals in the New York City metropolitan region. Upon completion of this program, students will possess the knowledge and tools to track sustainability indicators, analyze and interpret data, and report upon the findings to industry, nonprofit, and government decision makers. The certification focuses on key topics in reporting, accounting, metrics and indices, and monitoring procedures.

Certification of Professional Achievement in Sustainable Water Management

School: School of Continuing Education

Primary Contact:

Allison Ladue, Associate Director

aladue@ei.columbia.edu, 212-851-9361

<http://sustainability.ei.columbia.edu/certificate-programs/sustainable-water-management/>

Commitment: Part-time

CERTIFICATION OF PROFESSIONAL ACHIEVEMENT IN SUSTAINABLE WATER MANAGEMENT REQUIREMENTS (12 credits)

Three required courses focused on the science, policy, and management of water systems: The Science of Sustainable Water, Water Governance, and Water Systems Analysis. Students complete one elective course, with elective offerings including water in agriculture, water quality and health, water and energy security, and urban infrastructure. (12 credits)

For more information about the curriculum: <http://sustainability.ei.columbia.edu/certificate-programs/sustainable-water-management/>

APPLICATION INFORMATION

For more information: <http://sustainability.ei.columbia.edu/certificate-programs/sustainable-water-management/admissions/>

MISSION

As the world’s population continues to grow in excess of 7 billion people, the demand for access to water has risen. At the same time, the impacts of climate change are making it more difficult to ensure the supply of safe water to the populations that need it most. The Certification of Professional Achievement in Sustainable Water Management equips professionals with the skills to conduct integrated water management and water systems analysis.

CAREER PREPARATION

The Certification of Professional Achievement in Sustainable Water Management is ideal for professionals, ranging from urban planners for local governments to operations managers for large supply chains to NGO workers focused on issues of health in developing communities. These professionals will gain sophisticated and multidisciplinary training in water issues. Upon completion of the program, graduates will have the skills necessary to improve water access, delivery, and quality.

Evening Certificate in Conservation and Environmental Sustainability

Earth Institute Center for Environmental Sustainability (EICES)
Primary Contact: **Desmond Beirne**, Manager of Education Programs
djb2104@columbia.edu, 212-854-0149
<http://eices.columbia.edu/education-training/certificate/>

MISSION

The Earth Institute's Executive Education Certificate Program provides professionals with the knowledge and tools to be effective environmental leaders and decision makers in the 21st century. It is an evening program in which environmental issues are discussed, debated and examined, where participants develop an in-depth understanding of conservation science and practice through case studies and a focus on Environmental Policy, Management and Finance. Certificate courses are taught by Columbia University professors and researchers from the Consortium for

Environmental Research and Conservation as well as adjunct faculty who are current practitioners in the public and private sector. This breadth of experience and diverse set of perspectives inform curriculum development to reflect scientific expertise and current hands-on approaches to environmental sustainability.

CAREER PREPARATION

Through the Certificate Program, professionals from all sectors can gain the knowledge and tools to make sound decisions about business activities and policy practices that impact the environment.

REQUIREMENTS FOR CERTIFICATE IN CONSERVATION AND ENVIRONMENTAL SUSTAINABILITY (12 courses)

course based, not credit based

- Science Fundamentals (5 courses)
- Case Studies (3 courses)
- Practical Tools (1 course)
- Environmental Policy, Management, and Finance (3 courses)
- Independent Study (optional)
- Classes are held from 6:00 to 8:00 p.m. at Columbia University in New York City (with access to all University facilities)
- Courses meet once a week for five weeks

For a complete list of course offerings:
<http://eices.columbia.edu/education-training/certificate/courses>

APPLICATION INFORMATION

Information on how to register for courses is available at:
<http://eices.columbia.edu>

Summer Programs

Summer Ecosystem Experiences for Undergraduates (SEE-U)

Earth Institute Center for Environmental Sustainability (EICES)
Primary Contact: **Desmond Beirne**, Manager of Education Programs
djb2104@columbia.edu, 212-854-0149
<http://eices.columbia.edu/education-training/see-u>
Commitment: Undergraduate study abroad, 6 credits

MISSION

The Earth Institute's Summer Ecosystem Experiences for Undergraduates (SEE-U) provides undergraduate students of all majors an opportunity to learn about ecology and environmental sustainability in unique natural settings through applied research and field techniques. Five-week, 6-credit SEE-U programs are held in three distinct ecosystems sites in Jordan, India, and Brazil. The SEE-U program is designed to expose students to ecological fieldwork in unique and interesting natural settings. The "real world" laboratories of tropical, temperate, and endangered ecosystems allow for firsthand knowledge and understanding that could be elusive in the more traditional classroom setting. SEE-U

instructors engage students in thinking about the broader implications of the experience in relation to issues of biodiversity, climate change, and sustainability.

CAREER PREPARATION

SEE-U is a thorough and robust introduction to field conservation ecology. It highlights major threats to biodiversity and equips students with tools useful in combatting those threats. Students come away from the program with an appreciation for the scientific method and how to apply it, as well as an informed perspective on the role of nature and its conservation, and its

connection to genuine sustainable development.

SEE-U REQUIREMENTS

More information about the SEE-U program course curriculum and structure is available at:
<http://eices.columbia.edu/education-training/see-u/course-requirements/>

APPLICATION INFORMATION

Students in good academic standing from all majors at all accredited colleges or universities may apply.

For non-Columbia students, Columbia maintains high academic standards, and it is likely that your institution will accept these credits as fulfillment of academic requirements.

FELLOWSHIP

EICES offers rolling admissions for the SEE-U program. You may apply at any time. Applications are considered as they are received and there are a limited number of spaces available for our various field sites.

Fellowships and Training Programs

The Marie Tharp Visiting Fellowship

Lamont-Doherty Earth Observatory

Primary Contact:

Kuheli Dutt, Program Director, Assistant Director for Academic Affairs and Diversity
kuheli.dutt@columbia.edu, 845-365-8603

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The Marie Tharp Fellowships are fellowships for up to three months that can be taken at any of the research units of departments affiliated with the Earth Institute. Typically, two to three fellowships are awarded per year. These prestigious fellowships are awarded to

earth scientists outside of Columbia University to collaborate with researchers at the University. This fellowship was started with an NSF-ADVANCE grant to promote the cause of women in science. The fellowship is named after Marie Tharp, who was the first to map the

details of the ocean floor on a global scale. She published the pivotal interpretation of mid-ocean ridges that was crucial to the eventual acceptance of theories of plate tectonics and continental drift.

APPLICATION INFORMATION

For application deadlines and procedures for 2013–2014, please contact Kuheli Dutt: kdutt@ldeo.columbia.edu

Sustainability Essentials Training (SET) Program

The Earth Institute, Columbia University

Primary Contact:

Nancy Degnan, Director, Sustainability Essentials Training Program
ald1@columbia.edu 212-854-8310 and
Gabriella Cohen, Program Coordinator,
gcohen@ei.columbia.edu, 212-851-2092
earth.columbia.edu/set

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MISSION

While the use of the word, “sustainability,” is now commonplace, understanding how we can achieve it remains a challenge. The Earth Institute has developed the Sustainability Essentials Training Program for people who wish to explore the concepts and principles of sustainability and who want to learn how to introduce sustainability practices into their organizations, new projects, and other aspects of their lives.

SET is a non-credit training Program designed to address the four central areas of achieving sustainability. The Program offers well-designed lectures and participatory learning experiences designed to address four key questions:

- What is sustainability and how does one manage it in any organization?
- How can government policy and regulation speed the transition to a sustainable economy?
- How do we create a built environment, including workplaces, buildings, and infrastructure, while conserving water and energy and reducing environmental damage?
- How can we finance sustainability initiatives that may be risky and involve a long time gap between investment and pay-off?

CAREER PREPARATION

The Sustainability Essentials Program is designed to supplement a variety of careers with training in the fundamentals

of sustainability. Participants in the program include: students of other disciplines (engineering, architecture, international policy,) teachers at the secondary level, small business owners, and those who work at non-profit organizations.

ACADEMIC REQUIREMENTS

The Sustainability Essentials Training Program is designed to be accessible for a variety of participants and does not have any prerequisite requirements.

APPLICATION INFORMATION

We have a streamlined registration process, you can register online at our website here: earth.columbia.edu/set



Photo Credits: Eileen Barroso, Desmond Beirne, Michael Divito, Jonathan Nichols, NASA, Alan Orling

earth.columbia.edu/education



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