ENVIRONMENTAL SCIENCE

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212-854-5618
Department Assistant: Catherine Cook

The Department of Environmental Science

Mission

Barnard College's Environmental Science Department provides highly motivated young women with challenging and rewarding programs in Environmental Science, Environmental Biology, and Environmental Policy. High academic standards, multidisciplinary courses, and training in methodologies such as field work, measurements, and data analysis, ready our students with the tools needed to think critically, evaluate and solve problems, and understand and communicate science to address the needs of society. Faculty members are nationally and internationally recognized scholars and educators, active in research and curriculum development. Courses are innovative, featuring multimedia and technologically advanced resources. The urban setting, the proximity to the Hudson River, and the numerous affiliations we maintain with Columbia University through Lamont#Doherty Earth Observatory, the Earth Institute, and the School of Public Health, as well as Black Rock Forest, the American Museum of Natural History and other institutions, allow us to offer undergraduates unparalleled opportunities for student research and educational experiences. Upon successful completion of our program, our students are well prepared to continue their academic studies as graduate students or to pursue successful careers in a wide range of fields.

Student Learning Outcomes

We expect that students graduating with an environmental major will learn to:

- recognize the history, structure, function, interactions, and trends of key environmental systems: climate, earth, life, socio#political;
- assemble a logical chain of reasoning ranging from observation to inference and action, not only to identify and characterize a problem, but also to find solutions:
  - design an independent scientific inquiry, from methods to interpretation;
  - locate, organize, analyze, integrate, synthesize, and evaluate complex information from multiple and disparate sources;
- apply appropriate analytical and quantitative approaches:
  - organize, visualize, and statistically analyze environmental data, and interpret relationships, trends and make predictions about future changes;
- handle uncertain, complex, real-world problems in the lab, field, community, and workplace:
  - observe analytically and integrate diverse information from variable sources outside of the classroom;
  - think critically, creatively, resourcefully, and strategically, including identifying steps needed to reach goals, manage projects, evaluate progress, and adapt approaches, developing both self reliance, and civic#mindedness;
  - develop spatial literacy, understand the role of maps and 2-3 dimensional spatial systems; effectively process, reason, problem solve and communicate issues within a spacial context;
  - utilize advances in environmental sciences and technology to resolve issues and anticipate implications;
  - clearly communicate complex analyses, interpretations and significance through variable media (oral presentation, poster, proposal, research article, report), to audiences ranging from scientific to policy, and the general public;
  - collaborate in teams, with peers and mentors, and work with others in diverse group settings, developing flexibility and leadership skills.

Environmental Science provides a scientific basis for management of earth systems. It focuses on the interaction between human activities, resources, and the environment. As 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. The department offers two majors, Environmental Science and Environmental Policy. A third major, Environmental Biology, is offered in conjunction with the Department of Biological Sciences.

The curriculum recognizes the need for well-trained scientists to cope with balancing human requirements and environmental conservation. Majors acquire an understanding of earth systems by taking courses in the natural sciences, as well as courses investigating environmental stress. Students learn to critically evaluate the diverse information necessary for sound environmental analysis. Our courses foster an interdisciplinary approach to environmental problem-solving.

Internships or some type of work or field experience are extremely valuable in preparing students for a career in Environmental Science. We strongly encourage students to consider an internship in the summer before the senior year because it may lay the foundation for the senior thesis. Studies have shown that students who have had related work experience are more attractive to employers and graduate schools.

Students interested in environmental science might want to consider a semester or summer program at the SEE-U, SEA Semester at Woods Hole, the School for Field Studies, the Organization for Tropical Studies, or some other field program. In addition, we recommend that those students planning to go abroad in the junior year elect to do so in the Fall Semester rather than the Spring Semester in order to take best advantage of senior seminar research planning and programming.

Students wishing to go on to graduate school or careers in earth science and the physical sciences should take at least two semesters each of calculus, physics, and chemistry. Those considering graduate school or careers in biological/chemical fields are recommended to take calculus as well as upper-level courses in biology and chemistry, and may wish to consider enrolling in an Environmental Biology major or minors in these fields. Students interested in pursuing further work in environmental policy, economics, environmental law, journalism, or teaching may consider enrolling in an Environmental Policy major or pursuing a double major, a special major, or a major/minor combination in relevant fields.

Chair: Brian Mailloux (Professor)
Professor: Martin Stute
Assistant Professors: Logan Brenner, Elizabeth Cook
Senior Lecturers: Terryanne Maenza-Gmelch (Laboratory Director), Sedelia Rodriguez (Laboratory Instructor)
Adjunct Professors: Jenna Lawrence, Mike He, Dana Neacşu

Environmental Science Major

Environmental Science provides a scientific basis for management of earth systems. It focuses on the interaction between human activities, resources, and the environment. As 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.

Requirements for the Environmental Science Major

For requirement details, see Environmental Science Major Worksheet, on the Environmental Science Major page.

Part A		
The following four courses with labs:		
EESC UN2100	EARTH'S ENVIRO SYST: CLIM SYST	4.5
EESC UN2200	EARTH'S ENVIRONMENTAL SYSTEMS: THE SOLID EARTH	4.5
CHEM BC2001	GENERAL CHEMISTRY I	5.00
BIOL BC1500 & BIOL BC1501	INTRO ORGANISMAL/EVOL BIOL and INTRO LAB/ORGANISMAL#EVOL BIO	4.5-5
or EESC UN2300	EARTH'S ENVIRO SYST: LIFE SYST	
*Students may NOT receive credit for BOTH BIOL BC1500, 1501 AND EESC UN2300.		
Part B		
Select two courses:		
CHEM BC3230	ORGANIC CHEMISTRY I-LEC	3
CHEM BC3328	INTRO ORGANIC CHEMISTRY-LAB (recommended)	
CHEM BC2002	General Chemistry II	5
CHEM BC3231	ORGANIC CHEMISTRY II-LEC	3
BIOL BC1502	INTRO CELL AND MOLECULAR BIOL	3.50
BIOL BC1503	INTRO LAB CELLULAR#MOLEC BIO (recommended)	
PHYS V1201	General Physics I	3
PHYS V1202	General Physics II	3
PHYS BC2001	MECHANICS - LECTURE LAB	4.5
PHYS BC2002	ELECTRICITY#MAGNETISM-LEC LAB	4.5
PHYS BC3001	CLASSICAL WAVES - LECTURE LAB	5
Part C		
Select two courses in calculus, statistics, data analysis, and/or economics		
MATH UN1101	CALCULUS I (or other Calculus class)	3
MATH UN1102	CALCULUS II (or other Calculus class)	3
EESC BC3017	ENVIRONMENTAL DATA ANALYSIS (or other statistical or data analysis class)	3
ECON BC1003	Introduction to Economic Reasoning	4
or ECON UN1105	PRINCIPLES OF ECONOMICS	
Part D		
Select four electives courses. For details, see Environmental Science Major Worksheet on the departmental website (link above).		
Part E		
EESC BC3800 & EESC BC3801	ENVIR SCIENCE SENIOR SEMINAR and ENVIR SCIENCE SENIOR SEM II (provide credit for the senior thesis)	6

Advice for the Environmental Science Major

Adviser: Co-Chair, Brian Mailloux

Students with a strong science background who are interested in majoring in Environmental Science are advised to take EESC UN2100 EARTH'S ENVIRO SYST: CLIM SYST early on, followed by EESC UN2200 EARTH'S ENVIRONMENTAL SYSTEMS: THE SOLID EARTH. These two courses are required for all Environmental Science majors.

If you are interested in exploring Environmental Science or are concerned about your science background, you could take EESC BC1001 Environmental Science I in the fall. In the spring, you can shift into the major sequence of EESC UN2100 EARTH'S ENVIRO SYST: CLIM SYST.

EESC BC1001 Environmental Science I may be taken as a major elective*, however, the course must be completed prior to taking EESC UN2100, UN2200 or UN2300.

We recommend that Environmental Science majors take CHEM BC2001 GENERAL CHEMISTRY I and BIOL BC1500 INTRO ORGANISMAL/ EVOL BIOL, plus the corresponding lab, BIOL BC1501 INTRO LAB/ ORGANISMAL#EVOL BIO, early in their academic career at Barnard in order to prepare for upper level courses with prerequisites. Students with concerns about their science preparation should not take both at the same time. If you want advice on taking an Introductory Biology course, visit Biology, and for advice on taking an Introductory Physics course, visit Physics.

Students should check the catalogue and the department for additional information on the major, minor and courses offered by Barnard and Columbia. Classes with grades less than C- or taken pass/fail can not be counted towards the major. The minimum number of course points for the Environmental Science Major is 48.5 points.

See also Senior Research Seminar for information on senior thesis requirements.

Requirements for the Environmental Science Minor

Students wishing to minor in Environmental Science should have a plan approved by the Environmental Science Department Minor Advisor, Sedelia Rodriguez by the end of their junior year.

5 courses are required, meeting the following criteria:

- At least 3 of the 5 courses taken at Barnard/Columbia
- 1 laboratory science course
- 4 electives
  - 3 credits per course or higher
  - 3 courses at 3000 level or above
  - At least 2 courses based in the natural sciences

Elective courses listed below may be substituted only with the approval of the Minor Advisor and complete an Environmental Science Minor Worksheet. Please note that many of the courses below are not offered every year.

Select one laboratory science course (with corresponding labs) from the following:		9
EESC BC1001	Environmental Science I	4.5
EESC UN1011	Earth: Origin, Evolution, Processes, Future	4
EESC UN2100	EARTH'S ENVIRO SYST: CLIM SYST	4.5
EESC UN2200	EARTH'S ENVIRONMENTAL SYSTEMS: THE SOLID EARTH	4.5

EESC UN2300	EARTH'S ENVIRO SYST: LIFE SYST (students must enroll in the corresponding LAB course, EESC UN2310.)	4.5
Select at least two Natural Science Electives:		
BIOL BC2272	ECOLOGY	3
BIOL BC3320	MICROBIOLOGY	3
EAEE E2002		3
EEEB UN3087	CONSERVATION BIOLOGY	3
EESC BC3001	CONSERVATION AND PRESERVATION	3
EESC BC3012	BROWNFIELDS	3
EESC BC3013	SHORELINES AND STREAMS	3
EESC BC3014	Field Methods in Environmental Science	3
EESC BC3016	ENVIRONMENTAL MEASURMENTS	3
EESC BC3017	ENVIRONMENTAL DATA ANALYSIS	3
EESC BC3021	FORESTS AND ENVIRONMENTAL CHANGE	3
EESC BC3023	The Hudson: The Estuary, The River, and Our Environment	3
EESC BC3025	HYDROLOGY	3
EESC BC3026	BIRD,PLANT #LAND-USE DYNAMICS	3
EESC BC3032	Agricultural and Urban Land Use: Human-Environment Interactions	4
EESC BC3033	Waste Management	3
EESC BC3043	WATER, SANITATION # HEALTH	3
EESC BC3050	BIG DATA WITH PYTHON	3
EESC UN1600	EARTH RESOURCES # SUSTAIN DEV	3
EESC UN2330	SCIENCE FOR SUSTAINABLE DEVPT	3
PUBH UN3100	FUNDAMENTALS OF GLOBAL HEALTH	3
SDEV UN3390	GIS FOR SUSTAINABLE DEVELOPMNT	3
SDEV UN3450	SPATIAL ANALYSIS FOR SDEV	3
URBS UN3200	Spatial Analysis: GIS Methods and Urban Case Studies	4
Minors in Environmental Science are required to complete five courses, each of which should be three credits or above, and at least three of the five courses must be taken at Barnard/Columbia. Of the four electives, two courses must be based in the natural sciences and three courses must be at 3000 level or above. (For Electives for the Environmental Science Minor, please see link for Minor Requirements Worksheet above. Any substitutions must have the approval of the Minor Advisor.)		9

Students wishing to minor in Environmental Science who are interested in field programs and seek minor credit must contact Sedelia Rodriguez. The only current field program within Columbia University is SEE-U.

There is currently no minor in Environmental Biology or Environment and Sustainability.

Environment and Sustainability Major

Sustainability is a growing field focusing on finding solutions in an ever-changing environment. Majors develop an understanding of the processes and stresses of earth's systems, handle environmental data and make reasoned assessments, and engage in collaborative and interdisciplinary work required for developing approaches to maintain a sustainable environment.

The Environment and Sustainability major is designed to equip students to play effective roles as citizens or career professionals who can actively engage in environmental decision-making and policy in a rapidly changing environment. Majors learn to analyze and evaluate environmental, political, and economic systems and public policies in the context of environmental concerns, and to use these interdisciplinary skills to navigate development with the environment in mind. The major begins with foundations in the natural sciences, social sciences, and quantitative analysis, followed by upper level electives in both the natural and social sciences, as is a required hands-on, client-based collaborative workshop at the junior level is required. Many exciting opportunities for student research exist on this campus and in the greater metropolitan community.

Environment and Sustainability as did Policy graduates will go on to a variety of careers, including national and international environmental policy, law, economics, journalism, business, public administration, government agencies, corporations, multilateral institutions, nongovernmental organizations, academia, and consulting firms. There is no minor in Environment and Sustainability.

Requirements for the Environment and Sustainability Major

For requirement details, see Environment and Sustainability Major Requirement Worksheet, envsustworksheet.doc on the Environment and Sustainability page.

Part A-1. Natural Science Foundation (all 3 required)		
EESC UN2100	EARTH'S ENVIRO SYST: CLIM SYST	4.5
CHEM BC2001	GENERAL CHEMISTRY I (plus Lab)	5
or EESC BC3016	ENVIRONMENTAL MEASURMENTS	
. . . * Majors can replace General Chemistry with EESC BC3016, Environmental Measurements, but must complement this with either an A-2 or a B-2 course, not also being used for those requirements.		
BIOL BC1500 & BIOL BC1501	INTRO ORGANISMAL/EVOL BIOL and INTRO LAB/ORGANISMAL#EVOL BIO	5
or EEEB UN2002	ENVIRONMENTAL BIOLOGY II	
or EESC UN2300	EARTH'S ENVIRO SYST: LIFE SYST	
or Columbia's SEE-U summer Program (only for those who did not receive credit for EESC BC1001)		
Part A-2. Additional Science Foundation Course (choose 1)		
CHEM BC3230	ORGANIC CHEMISTRY I-LEC	3
CHEM BC2002	General Chemistry II	5
EESC UN2200	EARTH'S ENVIRONMENTAL SYSTEMS: THE SOLID EARTH	4.5
BIOL BC1502 & BIOL BC1503	INTRO CELL AND MOLECULAR BIOL and INTRO LAB CELLULAR#MOLEC BIO	5.5
EESC BC1001	Environmental Science I	4.5
EESC UN1011	Earth: Origin, Evolution, Processes, Future	4
Part B. Quantitative Foundations (1 from each grouping, choose 2 total)		
EESC BC3017	ENVIRONMENTAL DATA ANALYSIS (AND)	3
SDEV UN3390	GIS FOR SUSTAINABLE DEVELOPMNT	3
or SDEV UN3450	SPATIAL ANALYSIS FOR SDEV	
or EAEE E4009	GIS-RES,ENVIR,INFRASTRUCTR MGT	
or EESC BC3016	ENVIRONMENTAL MEASURMENTS	
or EESC BC3050	BIG DATA WITH PYTHON	
or EESC GU4050	GLOBAL ASSMT-REMOTE SENSING	
or URBS UN3200	Spatial Analysis: GIS Methods and Urban Case Studies	
Part C. Social Science Foundation (choose 2)		
ECON BC1003	Introduction to Economic Reasoning	4

or ECON UN1105	PRINCIPLES OF ECONOMICS	
POLS UN1601	INTERNATIONAL POLITICS	4
SDEV UN2300	CHALLENGES OF SUSTAINABLE DEV	3
SDEV UN2320	ECON # FIN MTHDS FOR SDEV	3
ANTH UN1002	THE INTERPRETATION OF CULTURE	3
Part D. Electives (choose 3, at least 1 from each grouping of upper level courses) D1. Natural Science Elective (See Worksheet for full list of courses)		
D2. Social Science Elective (See Worksheet for full list of courses)		
Part E. Workshop Experience		
EESC BC3300	WORKSHOP SUSTAINABLE DEVEL	4
Part F. Senior Research/Thesis (2 courses)		
EESC BC3800	ENVIR SCIENCE SENIOR SEMINAR	3
EESC BC3801	ENVIR SCIENCE SENIOR SEM II	3

Advice for the Environment and Sustainability Major

Advisers: Co-Chair, Martin Stute
Because this Major was approved by the Faculty in Fall 2017 as a updated replacement for the Environmental Policy, any student may elect the Environment and Sustainability major, but only students in the Class of 2019 or 2018 can graduate with a major in Environmental Policy because it is being phased out.

Students with a strong science background who are interested in majoring in Environment and Sustainability are advised to take Earth's Environmental Systems: Climate (EESC UN2100 EARTH'S ENVIRO SYST: CLIM SYST).

If you are interested in exploring Environment and Sustainability or are concerned about your science background, you could take EESC BC1001 Environmental Science I in the fall. In the spring, you would need to find another introductory level Environmental Science course such as EESC UN1011, Earth, Origin, Evolution, Processes, Future (with Lab) or shift into the major sequence of EESC UN2100 EARTH'S ENVIRO SYST: CLIM SYST which is a Natural Science Foundation course. Please also note the following:
For the second Natural Science Foundation course requirement can be fulfilled by Majors in Environment and Sustainability with either CHEM BC2001, General Chemistry or EESC BC3016x, Environmental Measurements along with either another Additional Science Foundations Course or a Quantitative Foundations Analysis/Skills course. There are a few options to fulfill the 3rd Natural Foundation course requirements, so see above or the Environment and Sustainability Major Requirement Worksheet, envsustworksheet.doc for more specifics.

We recommend that Environment and Sustainability majors take CHEM BC2001 GENERAL CHEMISTRY I and BIOL BC1500 INTRO ORGANISMAL/EVOL BIOL plus the corresponding lab, BIOL BC1501 INTRO LAB/ORGANISMAL#EVOL BIO, early in their academic career at Barnard in order to prepare for upper level courses with prerequisites, but it is not recommended that they be taken concurrently. Students with concerns about their science preparation should realize the option of taking EESC BC2016, Environmental Measurements (plus the additional course). If you want advice on taking an Introductory Biology course, visit Biology, and for advice on taking an Introductory Physics course, visit Physics.

Students should check the catalogue and the department for additional information on the major, minor and courses offered by Barnard and Columbia. Classes with grades less than C- or taken pass/fail can not be counted towards the major. The minimum number of course points for the Environment and Sustainability Major is 47.5 points.

See also Senior Research Seminar for information on senior thesis requirements.

Part A-1. Natural Science Foundation (3 courses with corresponding labs)		
EESC UN2100	EARTH'S ENVIRO SYST: CLIM SYST	4.5
CHEM BC2001	GENERAL CHEMISTRY I (plus Lab)	5
BIOL BC1500 & BIOL BC1501	INTRO ORGANISMAL/EVOL BIOL and INTRO LAB/ORGANISMAL#EVOL BIO	5
or EEEB UN2002	ENVIRONMENTAL BIOLOGY II	
or EESC UN2300	EARTH'S ENVIRO SYST: LIFE SYST	
or Columbia's SEE-U summer Program (only for those who did not receive credit for EESC BC1001)		
Part A-2. Additional Science Foundation Course (1 course with corresponding lab)		
CHEM BC3230	ORGANIC CHEMISTRY I-LEC	3
or CHEM BC2002	General Chemistry II	
or EESC UN2200	EARTH'S ENVIRONMENTAL SYSTEMS: THE SOLID EARTH	
or BIOL BC1502	INTRO CELL AND MOLECULAR BIOL	
or EESC BC1001	Environmental Science I	
or EESC BC1002	Environmental Science II	
Part B. Quantitative Assessment (2 courses)		
EESC BC3017	ENVIRONMENTAL DATA ANALYSIS	3
SDEV UN3390	GIS FOR SUSTAINABLE DEVELOPMNT	3
or SDEV UN3450	SPATIAL ANALYSIS FOR SDEV	
or EAEE E4009	GIS-RES,ENVIR,INFRASTRUCTR MGT	
or EESC BC3016	ENVIRONMENTAL MEASURMENTS	
or EESC GU4050	GLOBAL ASSMT-REMOTE SENSING	
or URBS UN3200	Spatial Analysis: GIS Methods and Urban Case Studies	
Part C. Decision-making Foundation (one for each grouping, 3 courses total)		
ECON BC1003	Introduction to Economic Reasoning	3
or ECON UN1105	PRINCIPLES OF ECONOMICS	
ANTH UN1002	THE INTERPRETATION OF CULTURE (with discussion section)	3
or EEEB UN1010	HUMAN ORIGINS # EVOLUTION	
or ANTH V3004	Introduction to Environmental Anthropology	
or SDEV UN2300	CHALLENGES OF SUSTAINABLE DEV	
Part D. Natural Science Elective (1 course) See link for Environmental Policy Major Worksheet above.		
Part E. Social Science Elective (1 course) See link for Environmental Policy Major Worksheet above.		
Part F. Junior Research (1 course) See link for Environmental Policy Major Worksheet above.		
EESC BC3300	WORKSHOP SUSTAINABLE DEVEL (recommended)	4
Part G. Senior Research/Thesis (2 courses)		
EESC BC3800	ENVIR SCIENCE SENIOR SEMINAR	3
EESC BC3801	ENVIR SCIENCE SENIOR SEM II	3

Advisers: Martin Stute (Environmental Science Department), Kimberly Marten (Political Science), Alan Dye (Economics), Paige West (Anthropology), David Weiman (Urban Studies).

Students with a strong science background who are interested in majoring in Environmental Policy are advised to take Earth's Environmental Systems: Climate (EESC UN2100 EARTH'S ENVIRO SYST: CLIM SYST).

If you are interested in exploring Environmental Policy or are concerned about your science background, you could take EESC BC1001 Environmental Science I in the fall.In the spring, you would need to find another introductory level Environmental Science course such as EESC UN1011 Earth, Origin, Evolution, Processes, Future (with Lab) or shift into the major sequence of EESC V2100 Earth's Environmental Systems: Climate which is a Natural Science Foundation course. Please also note the following:

EESC BC1001 Environmental Science I must be taken prior to taking EESC UN2100, UN2200 or UN2300.

We recommend that Environmental Policy majors take CHEM BC2001 GENERAL CHEMISTRY I and BIOL BC1500 INTRO ORGANISMAL/EVOL BIOL plus the corresponding lab, BIOL BC1501 INTRO LAB/ORGANISMAL #EVOL BIO, early in their academic career at Barnard in order to prepare for upper level courses with prerequisites. Students with concerns about their science preparation should not take both at the same time. If you want advice on taking an Introductory Biology course, visit Biology, and for advice on taking an Introductory Physics course, visit Physics.

Students should check the catalogue and the department for additional information on the major, minor and courses offered by Barnard and Columbia. Classes with grades less than C- or taken pass/fail can not be counted towards the major.

See also Senior Research Seminar for information on senior thesis requirements.

EESC BC1001 Environmental Science I. *4.5 points*.
Prerequisites: Prerequisites: Enrollment limited. Students must also sign up for the corresponding lab course, EESC BC1011 to receive credit. Note BC1001 is not required for an environmental policy major.
This class examines the basic principles of environmental science using current local and global environmental news as case studies. Issues covered are climate change, invasive species, water resources, sustainability, *etc*. A major goal is for students to understand the science behind environmental issues. Readings from the scientific literature, various newspaper articles, magazines and an online textbook are carefully coordinated with the topics. Because of our location, the lab curriculum features studies of the Hudson River and its forested shorelines. The lab is closely paired with the lecture and features hands-on and inquiry-based lab and field studies of statistics, data presentation, writing in the format of a scientific paper, data collection (on land and on the Hudson River), water chemistry, microbiology, microscopic and macroscopic life in the river, birds and plants in Riverside Park, biodiversity on a green roof, local geology, topographical maps, compass use, and museum studies. Students must also register for one of the eight lab sections EESCX1011. Students must take both lecture and lab.

Fall 2025: EESC BC1001

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 1001	001/00081	T Th 1:10pm - 2:25pm 405 Milbank Hall	Terryanne Maenza-Gmelch	4.5	0/110

EESC BC1011 Environmental Science I Lab. *0 points*.
Corequisites: EESC BC1001
Students enrolled in EESC BC1001 must enroll in this required lab course. Students cannot enroll in this course unless also enrolled in BC1001.

Fall 2025: EESC BC1011

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 1011	001/00280	M 10:10am - 1:00pm Room TBA	Terryanne Maenza-Gmelch	0	0/16
EESC 1011	002/00282	M 1:10pm - 4:00pm Room TBA	Terryanne Maenza-Gmelch	0	0/16
EESC 1011	003/00281	W 10:10am - 1:00pm Room TBA	Sedelia Rodriguez	0	0/16
EESC 1011	004/00283	W 1:10pm - 4:00pm Room TBA	Sedelia Rodriguez	0	0/16
EESC 1011	005/00284	F 10:10am - 1:00pm Room TBA	Sedelia Rodriguez	0	0/16

EESC BC1007 Earth and Environmental Science in Today's World. *3.00 points*.
In responding to the environmental issues we face today, it is critical to recognize the science behind them. This course will teach students the basic concepts in earth science/geology essential to understanding the mechanisms of our current climate crisis. These foundational concepts are crucial for any student who is interested in not only the natural sciences, but for those who wish to pursue careers related to environmental justice, sustainability, and other social science fields. Students will explore how and where natural resources form, as well as how we are rapidly depleting these reserves. Students will also learn about natural disasters and how these affect certain communities more than others. Students will gain an understanding of the formation of rocks and minerals and their economic significance. Students will be able to use the cumulative knowledge they gained during the first weeks of class to have a better understanding of the global climate issues we face and to use this information to conduct presentations on an environmental topic of their choice. The format of the course will be as follows: Primarily lecture, followed by class discussions, group activities and at least one lab component

EESC UN2100 EARTH'S ENVIRO SYST: CLIM SYST. *4.50 points*.
Prerequisites: high school algebra. Recommended preparation: high school chemistry and physics; and one semester of college science. Origin and development of the atmosphere and oceans, formation of winds, storms and ocean currents, reasons for changes through geologic time. Recent influence of human activity: the ozone hole, global warming, water pollution. Laboratory exploration of topics through demonstrations, experimentation, computer data analysis, and modeling. Students majoring in Earth and Environmental Sciences should plan to take EESC W2100 before their senior year to avoid conflicts with Senior Seminar

Spring 2025: EESC UN2100

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 2100	001/13543	T Th 10:10am - 11:25am 603 Schermerhorn Hall	Gisela Winckler, Mingfang Ting	4.50	45/60
EESC 2100	001/13543	T 4:10pm - 7:00pm 555 Ext Schermerhorn Hall	Gisela Winckler, Mingfang Ting	4.50	45/60

Fall 2025: EESC UN2100

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 2100	001/11410	T Th 10:10am - 11:25am 603 Schermerhorn Hall	Jerry McManus	4.50	0/40
EESC 2100	001/11410	T 4:10pm - 7:00pm 555 Ext Schermerhorn Hall	Jerry McManus	4.50	0/40

EESC UN2200 EARTH'S ENVIRONMENTAL SYSTEMS: THE SOLID EARTH. *4.50 points*.
CC/GS: Partial Fulfillment of Science Requirement
Priority given to Columbia and Barnard earth science, environmental science, and environmental biology majors should enrollment limits be necessary.

Prerequisites: high school algebra and chemistry. Recommended preparation: high school physics.
Recommended preparation: high school chemistry and physics; and one semester of college science. Exploration of how the solid Earth works, today and in the past, focusing on Earth in the Solar system, continents and oceans, the Earth's history, mountain systems on land and sea, minerals and rocks, weathering and erosion, glaciers and ice sheets, the hydrological cycle and rivers, geochronology, plate tectonics, earthquakes, volcanoes, energy resources. Laboratory exploration of topics through examination of rock samples, experimentation, computer data analysis, field exercises, and modeling. Columbia and Barnard majors should plan to take W2200 before their senior year to avoid conflicts with the Senior Seminar

Spring 2025: EESC UN2200

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 2200	001/13546	T Th 2:40pm - 3:55pm 603 Schermerhorn Hall	Sedelia Rodriguez, Sidney Hemming, Steven Goldstein	4.50	33/40
EESC 2200	001/13546	T 4:10pm - 7:00pm 603 Schermerhorn Hall	Sedelia Rodriguez, Sidney Hemming, Steven Goldstein	4.50	33/40
EESC 2200	002/18428	T 2:40pm - 3:55pm 603 Schermerhorn Hall	Sedelia Rodriguez, Sidney Hemming, Steven Goldstein	4.50	10/20
EESC 2200	002/18428	Th 4:10pm - 7:00pm 555 Ext Schermerhorn Hall	Sedelia Rodriguez, Sidney Hemming, Steven Goldstein	4.50	10/20

Fall 2025: EESC UN2200

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 2200	001/11411	T Th 1:10pm - 2:25pm 603 Schermerhorn Hall	Jonathan Kingslake, Jacqueline Austermann	4.50	0/40
EESC 2200	001/11411	Th 4:10pm - 7:00pm 603 Schermerhorn Hall	Jonathan Kingslake, Jacqueline Austermann	4.50	0/40

EESC UN2300 EARTH'S ENVIRO SYST: LIFE SYST. *4.50 points*.
CC/GS: Partial Fulfillment of Science Requirement
Priority given to Columbia and Barnard earth science, environmental science, and environmental biology majors should enrollment limits be reinstated.

Prerequisites: high school algebra. Recommended preparation: high school chemistry and physics.
Prerequisites: high school algebra. Recommended preparation: high school chemistry and physics. Role of life in biogeochemical cycles, relationship of biodiversity and evolution to the physical Earth, vulnerability of ecosystems to environmental change; causes and effects of extinctions through geologic time (dinosaurs and mammoths) and today. Exploration of topics through laboratories, data analysis, and modeling. REQUIRED LAB: EESC UN2310. Students will be expected to choose a lab section during the first week of class from the options listed in the Directory of Classes. Co-meets with EEEB 2002

Spring 2025: EESC UN2300

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 2300	001/14334	M W 11:40am - 12:55pm 833 Seeley W. Mudd Building	Sonya Dyhrman, Matthew Palmer, Paul Olsen	4.50	25/50

EESC BC3001 CONSERVATION AND PRESERVATION. *3.00 points*.
Conservation and preservation is an interdisciplinary study of earth materials, their transformation into art objects and architectural structures, and the philosophy and analytical techniques required to prepare conservation and preservation strategies for these objects and structures. The course is Beyond Barnard being hands-on and field trip oriented with a focus on the Metropolitan Museum of Art and local geology and infrastructure

EESC BC3012 BROWNFIELDS. *3.00 points*.
Prerequisites: One college level science course or permission of the instructor. Anyone who has taken EESC BC1002 Introduction to Environmental Science cannot take this course. Brownfields considers interconnections between groundwater contamination, toxics, human health, government, economics, and law using the award-winning interactive learning simulation Brownfield Action, Through a semester-long, laboratory exploration of a simulated brownfield, students engage in an environmental site assessment and development of a plan for remediation and revitalization

EESC BC3013 SHORELINES AND STREAMS. *3.00 points*.
Prerequisites: Enrollment limited. Four required field trips that take a substantial portion of the day.
Prerequisites: Enrollment limited. Four required field trips that take a substantial portion of the day. An interdisciplinary study of shoreline processes, the larger ecosystems of which they are a part, and the geologic events and human impacts that have brought them through time to their current state. A problem-oriented, field-methods course, providing hands-on experience with tools and observational methods in a variety of outdoor environments. Involves sampling and measurement techniques for rocks and minerals, fossils, water, soil, flora, and fauna, as well as field and laboratory work, data interpretation and analysis, and the creation of a sample collection. Emphasis on the writing process through the reading of Rachel Carsons The Edge of the Sea, a daylong field trip to Montauk Point, and the writing of a term essay on the natural history and origin of a grain of garnet found at the top of the dune at Napeague Bay

EESC BC3014 Field Methods in Environmental Science. *3 points*.
Prerequisites: Enrollment limited. Five required field trips that take a substantial portion of the day.
Problem-oriented, hands-on approach emphasizing the tools, techniques, and observational skills necessary for the understanding of forest ecology and deer management. Field and laboratory work as well as data analysis and interpretation. Field Methods utilizes the outdoor resources of the Hudson River Valley, especially the forest environment at Black Rock Forest, a 4,000-acre preserve near Cornwall, N.Y.

EESC BC3016 ENVIRONMENTAL MEASURMENTS. *3.00 points*.
Prerequisites: Enrollment limited. Required field trip on first Friday of the semester.
Prerequisites: Enrollment limited. Required field trip on first Friday of the semester. Hands-on approach to learning environmental methods. Students take a one-day cruise on the Hudson River to collect environmental samples. These samples are then analyzed throughout the semester to characterize the Hudson River estuary. Standard and advanced techniques to analyze water and sediment samples for nutrients and contaminants are taught

Fall 2025: EESC BC3016

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 3016	001/00285	W F 9:00am - 10:50am Room TBA	Brian Mailloux	3.00	0/15

EESC BC3017 ENVIRONMENTAL DATA ANALYSIS. *3.00 points*.
Prerequisites: One year of college science or EESC V2100 or permission of the instructor.
Prerequisites: One year of college science or EESC V2100 or permission of the instructor. Acquisition, analysis, interpretation, and presentation of environmental data, assessment of spatial and temporal variability. Focus on water quality issues and storm surges. Uses existing and student-generated data sets. Basic principles of statistics and GIS, uses standard software packages including EXCEL and ArcGIS. Includes a half-day field trip on a Saturday or Sunday. General Education Requirement: Quantitative and Deductive Reasoning (QUA)

Fall 2025: EESC BC3017

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 3017	001/00289	T Th 12:10pm - 2:00pm Room TBA		3.00	0/17

EESC BC3019 Energy Resources. *3 points*.
Energy Resources utilizes the physical plant of Barnard and Columbia to involve students in a semester long real-life policy study that explores the interconnections between energy resources and sustainable energy efficiency. Students work collaboratively as a team and interface with college faculty, administration, staff and student organizations to produce and disseminate a professional level policy report describing existing usage of energy, analyzing where change is needed.

EESC BC3023 The Hudson: The Estuary, The River, and Our Environment. *3 points*.
An interdisciplinary study of the relationship between ecosystem function and sustainable human habitation for one of the great rivers of the world. Topics include: geological origins, the watershed, basic hydrology, and estuarine dynamics; habitats and plants, energy flow, and nutrient dynamics; the invertebrates; fishes, fisheries, and other animals; water quality, water supply, and sewage treatment; sediment dynamics and PCBs; colonization and revolution; industrialization and transformation of the landscape; the Storm King controversy, conservation and environmentalism

EESC BC3025 HYDROLOGY. *3.00 points*.
Prerequisites: EESC V2100, physics, or permission of instructor. Includes a weekend field trip. Alternate years. Hands-on study and discussion of the basic physical principles of the water cycle (evaporation, condensation, precipitation, runoff, and subsurface flow), as well as environmentally relevant applications based on case studies. Special focus on the New York City area, the arid Southwest, and the developing world. Coverage of contemporary global water resources issues, including pollution control, sustainable development, and climate change. General Education Requirement: Quantitative and Deductive Reasoning (QUA)

Fall 2025: EESC BC3025

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 3025	001/00290	T Th 8:40am - 9:55am Room TBA	Martin Stute	3.00	0/20

EESC BC3026 BIRD,PLANT #LAND-USE DYNAMICS. *3.00 points*.
Prerequisites: Enrollment limited to 12 students. Permission of the instructor required.
Prerequisites: Enrollment limited to 16 students. One year of college-level science. Primarily for Environmental Majors, Concentrators and Minors. This class looks at the response of wildlife (birds and plants) to climate change and land-use issues from the end of the last glaciation to the present. Case study topics are: (1) land-use and climate change over time: a paleoenvironmental perspective, (2) environmental transformations: impact of invasive plants and birds and pathogens on local environments and (3) migration of Neotropical songbirds between their wintering and breeding grounds: land-use, crisis and conservation. We visit wildlife refuges along a rural-suburban-urban gradient in order to observe and measure the role refuges play in conservation. Format: lecture, student presentations, short labs, data collection/analysis and field trips (some on a weekend day in April in place of the week day meeting)

Spring 2025: EESC BC3026

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 3026	001/00476	W 1:10pm - 3:40pm 555 Ext Schermerhorn Hall	Terryanne Maenza-Gmelch	3.00	17/16

EESC BC3027 Urban Ecosystems. *3.00 points*.
Urban Ecosystems will cover scientific principles, concepts, and methodologies required to understand complex systems and the natural and social-ecological relationships at work in cities. You will learn the basics of ecological process and patterns of ecosystems especially applied in cities, understand how humans interact with and impact ecological processes and patterns in cities, and explore approaches for dealing with current and future urban challenges. Format: Lecture, discussion, small group work, field trips

Spring 2025: EESC BC3027

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 3027	001/00478	T Th 1:10pm - 3:00pm LI001 Milstein Center	Elizabeth Cook	3.00	22/22

EESC BC3028 Volcanoes and the Environment. *3.00 points*.
This course seeks to impart students with knowledge of volcanic eruptions on Earth and the effects on the environment as a whole. The course will focus on the physical mechanisms responsible for eruptions, the effects eruptions have on humans and other living organisms, as well as the environment. The course will investigate how eruptions have contributed to global climate change. The course will also look at the positive effects volcanoes have had on Earth, such as providing nutrient rich soils for growing crops and providing renewable geothermal energy--a cleaner energy resource. Format: lecture, field trip, data collection and analysis, student presentations

Spring 2025: EESC BC3028

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 3028	001/00569	T Th 1:10pm - 2:25pm 119 Milstein Center	Sedelia Rodriguez	3.00	16/20

Fall 2025: EESC BC3028

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 3028	001/00291	F 1:10pm - 4:00pm 113 Milstein Center	Sedelia Rodriguez	3.00	0/16

EESC BC3032 Agricultural and Urban Land Use: Human-Environment Interactions. *4 points*.
BC: Fulfillment of General Education Requirement: Cultures in Comparison (CUL).
Not offered during 2023-2024 academic year.

Prerequisites: One year of college science or permission of instructor. Alternate years.
Human transformation of the terrestrial environment since Paleolithic times. Biophysical processes involved in human-environment interactions. Guidelines for sustainable agricultural and urban development using present and past examples of environmental use and abuse. *General Education Requirement: Cultures in Comparison (CUL).*

EESC BC3033 Waste Management. *3 points*.
Alternate years.

Project-oriented study of waste management issues and policy. Cradle-to-grave analysis of product and waste streams. Analysis of municipal solid waste, landfills, incineration, recycling, sewage waste and sewage treatment.

EESC BC3040 ENVIRONMENTAL LAW. *3.00 points*.
Process-oriented introduction to the law and its use in environmental policy and decision-making. Origins and structure of the U.S. legal system. Emphasis on litigation process and specific cases that elucidate the common law and toxic torts, environmental administrative law, and environmental regulation through application and testing of statutory law in the courts. Emphasis also on the development of legal literacy, research skills, and writing

Spring 2025: EESC BC3040

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 3040	001/00480	F 8:40am - 11:10am 119 Milstein Center	Dana Neacsu	3.00	20/30

EESC BC3043 WATER, SANITATION # HEALTH. *3.00 points*.
Course description: This course focuses on understanding water, sanitation and health from the global south to high income countries and how the necessities of water and sanitation can interact to affect people's lives. Specifically, what are the options for providing cleaner water and improved sanitation in order to reduce the incidence of waterborne diseases, geogenic contaminants, and anthropogenic contaminants and how do these vary across the globe. The class will begin by examining the urban and rural water cycles, how water moves through the environment and then how individuals obtain drinking water. The emphasis will be on water quality and what impacts water quality. The second section will focus on understanding types of sanitation, how they work, and how they can be improved. Approximately half the population in the global south is without improved sanitation and infrastructure throughout high income countries needs updating and replacing. The third section will examine all types of water contaminants including: anthropogenic, geogenic, and microbial. This will include an introduction to public health and epidemiological studies and how different contaminants can impact health. The final portion of the class will integrate the three areas to understand how they interact and how interventions can improve health outcomes. We will use case studies from the US, Africa, Southeast Asia, and Latin America

EESC BC3045 Responding to Climate Change. *3 points*.
Prerequisites: One of the following courses that introduces the structure and functioning of the climate system and processes underlying climate change: EESC V1002, Climate and Society: Case Studies; EESC V2100 Earth's Environmental Systems: Climate; EESC W2330, Science of Sustainable Development; or EAEE E1100, A Better Plant by Design. Analysis of climate change adaptations, responses, and mitigation options. Consideration of impacts of projected climate changes including global water, food and health complemented by regional case studies. Scientific, technologic, economic, political, and behavioral aspects of potential solutions.

EESC BC3050 BIG DATA WITH PYTHON. *3.00 points*.
Big Data is changing how we interact with and understand the environment. Yet analyzing Big Data requires new tools and methods. Students will learn to use Python programming to analyze and visualize large environmental and earths systems data sets in ways that Excel is not equipped to do. This will include both time series and spatial analyses with programming occurring interactively during class and assignments designed to strengthen methods and results. Students will learn to write code in Python, plot, map, sub-select, clean, organize, and perform statistical analyses on large global scale data sets, using the data in analysis, and take any data set no matter how large or complicated

Spring 2025: EESC BC3050

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 3050	001/00481	M W 10:10am - 11:25am LI001 Milstein Center	Brian Mailloux	3.00	40/42

Fall 2025: EESC BC3050

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 3050	001/00881	M W 1:10pm - 2:25pm Room TBA	Brian Mailloux	3.00	0/15

EESC BC3200 Ecotoxicology. *3 points*.
Not offered during 2023-2024 academic year.

Prerequisites: CHEM BC1601, BIOL BC2002, or permission of instructor. Alternate years.
The study of anthropogenic contaminants within our natural environment and their subsequent effects on biological organisms. Effects to be examined: the molecular scale (biochemical pathways of metabolism and detoxification), the organismal scale (target organs, behavioral effects), and the ecosystem scale (species viability). Lectures and hands-on activities are used to teach the material.

EESC BC3300 WORKSHOP SUSTAINABLE DEVEL. *4.00 points*.
Students address real-world issues in sustainable development by working in groups for an external client agency. Instruction in communication, collaboration, and management; meetings with and presentations to clients and academic community. Projects vary from year to year. Readings in the course are project-specific and are identified by the student research teams

Fall 2025: EESC BC3300

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 3300	001/00880	T Th 10:10am - 12:00pm Room TBA		4.00	0/16

EESC BC3800 ENVIR SCIENCE SENIOR SEMINAR. *3.00 points*.
Enrollment limited to senior majors (juniors with the instructor's permission). Provides credit for the senior thesis. The Senior Research Seminar can be taken Spring/Fall or Fall/Spring sequence.

Guided, independent, in-depth research culminating in the senior thesis in the spring. Includes discussion about scientific presentations and posters, data analysis, library research methods and scientific writing. Students review work in progress and share results through oral reports. Weekly seminar to review work in progress and share results through oral and written reports

Fall 2025: EESC BC3800

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 3800	001/00833	Th 4:10pm - 6:00pm 405 Milbank Hall	Martin Stute	3.00	0/70

EESC BC3801 ENVIR SCIENCE SENIOR SEM II. *3.00 points*.
Guided, independent, in-depth research culminating in the senior thesis in the spring. Includes discussion about scientific presentations and posters, data analysis, library research methods and scientific writing. Students review work in progress and share results through oral reports. Weekly seminar to review work in progress and share results through oral and written reports. Prerequisite to EESC W3901

Spring 2025: EESC BC3801

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 3801	001/00482	Th 4:10pm - 6:00pm 405 Milbank Hall	Martin Stute, Jonathan Lambert, Elizabeth Cook	3.00	33/40

EESC BC3021 FORESTS AND ENVIRONMENTAL CHANGE. *3.00 points*.
Prerequisites: Enrollment limited to 16 students. One year of college-level science. Primarily for Environmental Majors, Concentrators and Minors. Lecture, laboratory and field study of regional forest types from upland to coast and from urban to rural, forest ecosystem services, impacts of land-use and climate change on forests, reconstruction of past forests, forest pests, forest fires and forest conservation (corridors). Field trip sites for data collection may include: maritime, pine barrens, eastern deciduous and NYC urban forests. Format: lecture, student presentations, short labs, data collection/analysis and field trips (some on a weekend day in April in place of the week day meeting)

Cross-Listed Courses

There are no cross-listed courses for your department.