

ENVIRONMENTAL BIOLOGY

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Department Assistant: Catherine Cook

Mission

The mission of the Environmental Biology major is to provide students with an understanding of the structure, function and interrelationships of diverse living systems within the context of earth's changing environment. It addresses some of the most important issues of our time—climate change and declining biological diversity—and efforts to address these problems. To this end, students take courses in both the Environmental Science and Biology departments, including laboratory and field courses that help them learn how to design and test hypotheses, use modern scientific equipment, interpret data, and evaluate and solve problems. Students learn scientific communication skills by critiquing research articles, writing laboratory reports and research papers, and participating in oral presentations and debates.

Environmental Biology students are encouraged to become involved in research under the guidance of a faculty member at Barnard or elsewhere in New York City. Our 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 pursue successful careers in research, teaching or the allied health sciences. The Environmental Biology major is appropriate for students interested in careers as diverse as university-level research and teaching, curatorial work and research in natural history museums and parks, environmental education, and decision-making in environmental policy, law, public health, and government agencies.

Student Learning Outcomes

- Discuss the structure, function, and interrelationships of key environmental systems: climate, earth, life
- Demonstrate an appreciation of the many different life forms on planet Earth
- Design and execute an independent scientific analysis, including the formulation of a testable hypothesis and assembling a logical chain of reasoning ranging from observation to inference
- Locate, integrate, and evaluate information from multiple and disparate sources
- Apply appropriate analytical and quantitative approaches including calculating statistics and displaying data to interpret relationships, trends and make predictions about past and future changes
- Resolve uncertain, complex problems in the lab and field
- Clearly communicate analyses, interpretations and significance through variable media: oral presentation, poster, proposal, research or review article, report

The program in Environmental Biology is jointly administered by the departments of Biology and Environmental Science, and students should maintain contact with the advisers in both departments. A major

in Environmental Biology provides a strong background for students interested in the intersection of Biology and Environmental Science. 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. Students who elect the Environmental Biology major will enroll in introductory and advanced courses in Biology and Environmental Science and related fields. All Environmental Biology majors complete a senior essay either in the Biology or Environmental Science departments.

Students may substitute courses taught at Columbia (in the Departments of Biology, E3B, Earth and Environmental Sciences, or Statistics) or at other institutions with the prior approval of both major advisers. Students interested in Environmental Biology often choose to spend a semester abroad in the field. Courses completed in such programs may be accepted in fulfillment of some major requirements.

Students may also pursue an interdisciplinary program by electing a major in either Biology or Environmental Science and a minor in the other discipline, or by planning a double major.

There is no minor in Environmental Biology.

Advisers: Hilary Callahan (Biological Sciences), Paul Hertz (Biological Sciences), Brian Mailloux (Environmental Science), Krista McGuire (Biological Sciences), Martin Stute (Environmental Science)

Requirements for the Major

For requirement details, see Environmental Biology Major Worksheet, [envbioworksheet.doc](#).

Introductory Biology, Chemistry, and Environmental Science with Laboratory

BIOL BC1500	INTRO ORGANISMAL/EVOL BIOL	3.50
BIOL BC1501	Introductory Lab in Organismal and Evolutionary Biology	2
BIOL BC1502	INTRO CELL AND MOLECULAR BIOL	3
BIOL BC1503	Introductory Lab in Cell and Molecular Biology	2
EESC UN2100	Earth's Environmental Systems: The Climate System	4.5
EESC UN2200	EARTH'S ENVIRONMENTAL SYSTEMS: THE SOLID EARTH	4.5
CHEM BC2001	GENERAL CHEMISTRY I	5.00
CHEM BC3230 - CHEM BC3328 or CHEM BC2002	ORGANIC CHEMISTRY I-LEC and INTRO ORGANIC CHEMISTRY-LAB General Chemistry II	5-5.5
Ecology Lecture		
BIOL BC2272 or BIOL BC3380	Ecology Applied Ecology and Evolution	3
Ecology Laboratory		
BIOL BC2873	Laboratory in Ecology	3
Organismal Biology Lecture		
Select one of the following:		3
BIOL BC2240	Plant Evolution and Diversity	
BIOL BC2262	Vertebrate Biology	
BIOL BC3320	Microbiology	

Biology Lecture

Select one additional lecture course in Biology (not including those listed above under organismal biology)

Environmental Methodology

Select one of the following:		3
EESC BC3014	Field Methods in Environmental Science	
EESC BC3016	Environmental Measurements	
EESC BC3025	Hydrology	
EESC GU4050	Global Assessment and Monitoring Using Remote Sensing	
EAAE E4009	GIS-RES,ENVIR,INFRASTRUCTR MGT	
SDEV UN3390	GIS for Sustainable Development	
SDEV UN3450	SPATIAL ANALYSIS FOR SDEV	
Environmental Science		
Select one additional course in Environmental Science.		
Data Handling		
Select one of the following:		3
BIOL BC2286	Statistics and Research Design	
EESC BC3017	Environmental Data Analysis	
EEEB UN3005	INTRO-STAT-ECOLOGY # EVOL BIOL	
Senior Essay		
Select one of the following:		
BIOL BC3590	Senior Seminar	
BIOL BC3593	Senior Thesis Research & Seminar	
- BIOL BC3594	and Senior Thesis Research & Seminar	
EESC BC3800	Senior Research Seminar	
- EESC BC3801	and Senior Research Seminar (x,y)	

Note: Calculus, Physics, and a second year of Chemistry are recommended for students planning advanced study in Environmental Biology.

Advice for the Environmental Biology Major

Adviser: Co-Chair, Brian Mailloux

Students may substitute courses taught at Columbia (in the Departments of Biology, Earth and Environmental Sciences, or Statistics) or at other institutions with the prior approval of both major advisers. Calculus, Physics, and a second year of Chemistry are recommended for students planning graduate study in Environmental Biology. Students interested in Environmental Biology often choose to spend a semester "abroad", at the [School for Field Studies](#) program, the [Organization for Tropical Studies](#), or at comparable programs offered by other institutions. We encourage students to take advantage of such opportunities, and we expect that most of the courses they complete in these programs will be accepted in lieu of some of the major requirements. 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 who elect a major in Environmental Biology will have a major adviser in each department. Although one member of the faculty will serve as the primary adviser, requests to substitute courses from Columbia or other institutions must be approved by both major advisers. Internships or some type of work or field experience are extremely valuable in preparing students for careers in the environment. Go to the Environmental Science website for [Opportunities & Affiliations](#) for listings or see [Beyond Barnard](#). Studies have shown that students who have had related work experience are more attractive to employers and graduate schools.

Students should check the catalogue and the department for additional information on the major 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 Biology Major is 51.5 points.

See also Senior Research Seminar for information on senior thesis requirements completed in Environmental Science Department.

Cross-Listed Courses
Biological Sciences (Barnard)

BIOL BC1500 INTRO ORGANISMAL/EVOL BIOL. 3.50 points.
Prerequisites: This course is suitable for majors & fulfillment of pre-health requirements. A high school biology background or equivalent preparation is highly recommended. For those without this background seeking to major in biology, BIOL BC1002 & BIOL BC1012 are recommended in the fall of their freshmen year, followed by the year-long 1500-level lecture & lab sequence. BIOL BC1500 & BIOL BC1502 do not have to be taken in a fall to spring sequence. Course suitable for fulfillment of premedical requirements. Detailed introduction to biological phenomena above the cellular level; development, anatomy, and physiology of plants and animals; physiological, population, behavioral, and community ecology; evolutionary theory; analysis of micro-evolutionary events; and systematics

Fall 2022: BIOL BC1500					
Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 1500	001/00651	M W F 9:00am - 9:50am 304 Barnard Hall	John Glendinning, Abigail Gutierrez, Henry Truong	3.50	231/230

BIOL BC1501 Introductory Lab in Organismal and Evolutionary Biology. 2 points.

Prerequisites: BIOL BC1500 lecture is a pre- or co-requisite (preferred). Students must also enroll for a section of BIOL BC1511 recitation. A high school biology background or equivalent preparation is highly recommended. This course is suitable for fulfillment of biology major and pre-health requirements. Enrollment is limited to 16 students per section. A laboratory-based introduction to the major groups of living organisms; anatomy, physiology, evolution, and systematics; and laboratory techniques for studying and comparing functional adaptations.

Fall 2022: BIOL BC1501

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 1501	001/00179	M 1:10pm - 4:00pm 912 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	15/15
BIOL 1501	002/00180	M 1:10pm - 4:00pm 913 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	16/15
BIOL 1501	003/00181	T 9:10am - 12:00pm 912 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	14/15
BIOL 1501	004/00182	T 9:10am - 12:00pm 913 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	16/15
BIOL 1501	005/00183	T 1:10pm - 4:00pm 912 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	14/15
BIOL 1501	006/00184	T 1:10pm - 4:00pm 913 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	16/15
BIOL 1501	007/00185	W 10:10am - 1:00pm 912 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	16/15
BIOL 1501	008/00186	W 10:10am - 1:00pm 913 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	15/15
BIOL 1501	009/00187	Th 9:10am - 12:00pm 912 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	16/15
BIOL 1501	010/00188	Th 9:10am - 12:00pm 913 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	0/15
BIOL 1501	011/00189	Th 1:10pm - 4:00pm 912 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	15/15
BIOL 1501	012/00190	Th 1:10pm - 4:00pm 913 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	13/15
BIOL 1501	013/00191	F 10:10am - 1:00pm 912 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	15/15

BIOL BC1502 INTRO CELL AND MOLECULAR BIOL. 3.50 points.

Prerequisites: BIOL BC1002 or equivalent preparation. Course suitable for fulfillment of premedical requirements. Together with BIOL BC1500 this course is part of a yearlong introductory sequence. BIOL BC1500 and BIOL BC1502 do not need to be taken in sequence. Detailed introduction to cellular and subcellular biology: cell structures and functions, energy metabolism, biogenesis of cell components, biology of inheritance, molecular genetics, regulation of gene expression, and genes in development

Spring 2023: BIOL BC1502

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 1502	001/00309	M W F 9:00am - 9:50am 304 Barnard Hall	Jonathan Snow, Abigail Gutierrez, Henry Truong	3.50	234/230

BIOL BC1503 Introductory Lab in Cell and Molecular Biology. 2 points.

Prerequisites: BIOL BC1502 lecture is a pre- or co-requisite (preferred). Students must also enroll for a section of BIOL BC1513 recitation. A high school biology background or equivalent preparation (such as BIOL BC1002 & BIOL BC1012) is highly recommended. This course is suitable for fulfillment of biology major and pre-health requirements. Enrollment is limited to 16 students per section; must attend first lab to hold place. A laboratory-based introduction to cell and molecular biology. Both classic and modern approaches are used to investigate principles of heredity as well as the structure and function of cells and their molecular components. Lab exercises introduce practical techniques and data analysis.

Spring 2023: BIOL BC1503

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 1503	001/00308	M 1:10pm - 4:00pm 912 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	16/15
BIOL 1503	002/00305	M 1:10pm - 4:00pm 913 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	14/15
BIOL 1503	003/00311	T 9:10am - 12:00pm 912 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	15/15
BIOL 1503	004/00312	T 9:10am - 12:00pm 913 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	16/15
BIOL 1503	005/00313	T 1:10pm - 4:00pm 912 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	16/15
BIOL 1503	006/00314	T 1:10pm - 4:00pm 913 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	16/15
BIOL 1503	007/00315	W 10:10am - 1:00pm 912 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	16/15
BIOL 1503	008/00317	W 10:10am - 1:00pm 913 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	15/15
BIOL 1503	009/00318	Th 9:10am - 12:00pm 912 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	14/15
BIOL 1503	010/00319	Th 9:10am - 12:00pm 913 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	11/15
BIOL 1503	011/00321	Th 1:10pm - 4:00pm 912 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	14/15
BIOL 1503	012/00323	Th 1:10pm - 4:00pm 913 Altschul Hall	Jessica Goldstein, Abigail Gutierrez, Henry Truong	2	14/15
BIOL 1503	013/00324	F 10:10am - 1:00pm 912 Altschul Hall	Jessica Goldstein,	2	15/15

BIOL BC2240 Plant Evolution and Diversity. 3 points.

Not offered during 2022-23 academic year.

Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, BIOL BC1503 or the equivalent.

Survey of plant biology emphasizing evolutionary and ecological perspectives on mating and reproduction, physiology, anatomy, and morphology.

Fall 2022: BIOL BC2240

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 2240	001/00196	Th 1:00pm - 4:00pm 903 Altschul Hall	Hilary Callahan	3	23/40

BIOL BC2262 Vertebrate Biology. 3 points.

Not offered during 2022-23 academic year.

Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, and BIOL BC1503 or the equivalent.

Systematic survey of the Phylum Chordata: fossil history, biogeography, systematics, natural history, body architecture, energetics, locomotion, feeding, and behavior.

BIOL BC2272 Ecology. 3 points.

Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, BIOL BC1503 or the equivalent. This course is a pre- or co-requisite for BIOL BC2873 Laboratory in Ecology.

Introduction to evolutionary ecology; life history strategies, population growth, competition, predator-prey interactions, population regulation, species diversity, community organization, and biogeography. Lectures integrate theory with empirical studies.

Spring 2023: BIOL BC2272

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 2272	001/00347	T Th 11:40am - 12:55pm 805 Altschul Hall	Hilary Callahan	3	20/40

BIOL BC2286 Statistics and Research Design. 3 points.

Not offered during 2022-23 academic year.

Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, BIOL BC1503 or the equivalent, college-level algebra or the equivalent. General Educational Requirement: Quantitative and Deductive Reasoning (QUA) Introduction to basic principles of statistics and experimental design. Topics include common statistical procedure, analysis of data, sampling populations, power analysis, and the design of experiments. This course differs from traditional statistics courses by explicitly integrating statistics into research process.

BIOL BC2873 Laboratory in Ecology. 3 points.

Not offered during 2022-23 academic year.

Prerequisites: BIOL BC2272 (which can be taken as a pre- or co-requisite). Enrollment is limited to 16; must attend first lab to hold place.

The definition of ecological problems in experimentally tractable ways; the design of experiments and analysis of ecological data; class projects on population ecology. Students conduct individual projects during last month of term.

BIOL BC3320 Microbiology. 3 points.

Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, BIOL BC1503, and BIOL BC2100 or the equivalent. This course is a pre-requisite for BIOL BC3321 Laboratory in Microbiology.

Survey of the diversity, cellular organization, physiology, and genetics of the major microbial groups. Also includes aspects of applied microbiology and biotechnology, the function of microorganisms in the environment, and the role of microbes in human diseases.

Fall 2022: BIOL BC3320

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3320	001/00201	T Th 10:10am - 11:25am 302 Barnard Hall	JJ Miranda	3	43/99

BIOL BC3591 GUIDED RESEARCH # SEMINAR. 4.00 points.

Per Semester

The introductory biology sequence is a pre-requisite for this yearlong course (BIOL BC1500, BIOL BC1501, BIOL BC1502, and BIOL BC1503). An independent research project in Biology under the guidance of a faculty member and suiting the needs of the individual student. A Barnard research mentor (if your lab is at Barnard) or internal adviser in the Biology Department (if your lab is elsewhere) must approve your planned research before you enroll in this year-long course. A Project Approval Form must be submitted to the department in the fall. Attendance at a weekly seminar is required. By the end of the year, students enrolled in BIOL BC3591-BIOL BC3592 will write a scientific paper and give a poster presentation of their work at the Barnard Biology Research Symposium. Completion of this year-long course fulfills two upper-level laboratory requirements for the major. Must be taken in sequence, beginning in the fall

Fall 2022: BIOL BC3591

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3591	001/00206	M 1:10pm - 3:00pm 113 Milstein Center	Jessica Goldstein, Alison Pischedda, JJ Miranda	4.00	11/10
BIOL 3591	002/00207	M 1:10pm - 3:00pm 308 Diana Center	Jessica Goldstein, Alison Pischedda, JJ Miranda	4.00	10/10

BIOL BC3592 GUIDED RESEARCH # SEMINAR. 4.00 points.

Per Semester

The introductory biology sequence is a pre-requisite for this yearlong course (BIOL BC1500, BIOL BC1501, BIOL BC1502, and BIOL BC1503). An independent research project in Biology under the guidance of a faculty member and suiting the needs of the individual student. A Barnard research mentor (if your lab is at Barnard) or internal adviser in the Biology Department (if your lab is elsewhere) must approve your planned research before you enroll in this year-long course. A Project Approval Form must be submitted to the department in the fall. Attendance at a weekly seminar is required. By the end of the year, students enrolled in BIOL BC3591-BIOL BC3592 will write a scientific paper and give a poster presentation of their work at the Barnard Biology Research Symposium. Completion of this year-long course fulfills two upper-level laboratory requirements for the major. Must be taken in sequence, beginning in the fall

Spring 2023: BIOL BC3592

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3592	001/00362	M 1:10pm - 3:00pm LI018 Milstein Center	Jessica Goldstein, Alison Pischedda, JJ Miranda	4.00	11/11
BIOL 3592	002/00363	M 1:10pm - 3:00pm 903 Altschul Hall	Jessica Goldstein, Alison Pischedda, JJ Miranda	4.00	10/11

BIOL BC3593 Senior Thesis Research & Seminar. 4 points.

Per Semester

Prerequisites: Permission of a faculty sponsor and the department. Cannot be taken concurrently with BIOL BC3591 or BIOL BC3592. Same as BIOL BC3591-BIOL BC3592, including attendance at a weekly seminar. By the end of the year, students enrolled in BIOL BC3593-BIOL BC3594 will write a scientific paper and orally present their work at the Barnard Biology Research Symposium.

A Barnard research mentor (if your lab is at Barnard) or internal adviser in the Biology Department (if your lab is elsewhere) must approve your planned research before you enroll in this year-long course. A [Project Approval Form](#) must be submitted to the department in the fall. Completion of this year-long course fulfills the senior capstone requirement for the major; it cannot be taken at the same time as BIOL BC3591-BIOL BC3592. Must be taken in sequence, beginning in the fall.

Fall 2022: BIOL BC3593

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3593	001/00208	M 1:10pm - 3:00pm 318 Milbank Hall	Jessica Goldstein, Alison Pischedda, JJ Miranda	4	8/14

BIOL BC3594 Senior Thesis Research & Seminar. 4 points.

Prerequisites: Permission of a faculty sponsor and the department.

Cannot be taken concurrently with BIOL BC3591 or BIOL BC3592.

Same as BIOL BC3591-BIOL BC3592, including attendance at a weekly seminar. By the end of the year, students enrolled in BIOL BC3593-BIOL BC3594 will write a scientific paper and orally present their work at the Barnard Biology Research Symposium.

A Barnard research mentor (if your lab is at Barnard) or internal adviser in the Biology Department (if your lab is elsewhere) must approve your planned research before you enroll in this year-long course.

A [Project Approval Form](#) must be submitted to the department in the fall. Completion of this year-long course fulfills the senior capstone requirement for the major; it cannot be taken at the same time as BIOL BC3591-BIOL BC3592. Must be taken in sequence, beginning in the fall.

Spring 2023: BIOL BC3594

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3594	001/00365	M 1:10pm - 3:00pm 308 Diana Center	Jessica Goldstein, Alison Pischedda, JJ Miranda	4	8/11

Chemistry (Barnard)**CHEM BC2001 GENERAL CHEMISTRY I. 5.00 points.**

Students enrolled in CHEM BC2001 must also register for a section of CHEM BC2012.

Corequisites: CHEM BC2012

Atoms; elements and compounds; gases; solutions; equilibrium; acid-base, precipitation, and oxidation-reduction reactions; thermochemistry. Laboratory one day a week. Laboratory experience with both qualitative and quantitative techniques. Counts towards Lab Science Requirement

Fall 2022: CHEM BC2001

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
CHEM 2001	001/00415	T Th 8:40am - 9:55am 202 Altschul Hall	Marisa Buzzeo	5.00	67/70
CHEM 2001	002/00414	T Th 11:40am - 12:55pm 405 Milbank Hall	Marisa Buzzeo, 5.00 Michael Campbell		72/72
CHEM 2001	003/00416	T Th 10:10am - 11:25am 903 Altschul Hall	Marisa Buzzeo, 5.00 Andrew Crowther		49/65

CHEM BC2002 General Chemistry II. 5 points.

Not offered during 2022-23 academic year.

Prerequisites: CHEM BC2001 or permission of the instructor. Students who have completed CHEM BC3230 or its equivalent may not subsequently receive credit toward the degree for CHEM BC2002.

Lecture: TuTh 8:40-9:55; Lab lecture and laboratory: M 1:10-5:00.

Corequisites: Counts towards Lab Science requirement.

Kinetics and mechanisms of chemical reactions; nuclear chemistry and radioactivity; atomic and molecular structure; selected topics in environmental chemistry, organic chemistry, and biochemistry.

CHEM BC3230 ORGANIC CHEMISTRY I-LEC. 3.00 points.

Prerequisites: CHEM BC2001 or equivalent. Credit will not be given for any course below the 3000 level after completing CHEM BC3230 or its equivalent. Lecture: MWF 10:00 - 10:50 AM

Corequisites: With lab, counts towards Lab Science requirement.

Prerequisites: CHEM BC2001 or equivalent. Credit will not be given for any course below the 3000 level after completing CHEM BC3230 or its equivalent. Corequisites: With lab, counts towards Lab Science requirement. Atomic and molecular structure; stereochemistry of organic molecules; introduction to organic reactions, reaction mechanisms, and synthesis

Spring 2023: CHEM BC3230

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
CHEM 3230	001/00411	M W F 10:00am - 10:50am 202 Altschul Hall	Christian Rojas	3.00	175/200

CHEM BC3328 INTRO ORGANIC CHEMISTRY-LAB. 2.50 points.

Prerequisites: (CHEM BC2001) General Chemistry I with lab.

Corequisites: CHEM BC3230

Prerequisites: (CHEM BC2001) General Chemistry I with lab. Corequisites:

CHEM BC3230 Basic techniques of experimental organic chemistry.

Principles and methods of separation, purification, and characterization of organic compounds. Selected organic reactions

Fall 2022: CHEM BC3328

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
CHEM 3328	001/00439	Th 8:30am - 12:20pm 214 Milbank Hall	Meenakshi Rao	2.50	5/20

Spring 2023: CHEM BC3328

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
CHEM 3328	001/00417	M 1:10pm - 2:00pm 805 Altschul Hall	Meenakshi Rao, Craig Allen	2.50	20/23
CHEM 3328	001/00417	M 2:00pm - 5:00pm 716 Altschul Hall	Meenakshi Rao, Craig Allen	2.50	20/23
CHEM 3328	002/00418	T 1:10pm - 2:00pm 805 Altschul Hall	Meenakshi Rao, Marina Orman, Jean Vadakkan	2.50	22/23
CHEM 3328	002/00418	T 2:00pm - 5:00pm 716 Altschul Hall	Meenakshi Rao, Marina Orman, Jean Vadakkan	2.50	22/23
CHEM 3328	003/00419	W 1:10pm - 2:00pm 805 Altschul Hall	Meenakshi Rao, Grace Lee	2.50	20/23
CHEM 3328	003/00419	W 2:00pm - 5:00pm 716 Altschul Hall	Meenakshi Rao, Grace Lee	2.50	20/23
CHEM 3328	004/00420	Th 1:10pm - 2:00pm 805 Altschul Hall	Meenakshi Rao, Jean Vadakkan, Craig Allen	2.50	22/23
CHEM 3328	004/00420	Th 2:00pm - 5:00pm 716 Altschul Hall	Meenakshi Rao, Jean Vadakkan, Craig Allen	2.50	22/23
CHEM 3328	005/00421	F 1:10pm - 2:00pm 805 Altschul Hall	Meenakshi Rao, Marina Orman, Jean Vadakkan	2.50	21/23
CHEM 3328	005/00421	F 2:00pm - 5:00pm 716 Altschul Hall	Meenakshi Rao, Marina Orman, Jean Vadakkan	2.50	21/23
CHEM 3328	006/00422	T 8:30am - 9:30am 805 Altschul Hall	Meenakshi Rao, Craig Allen, Jonelle White	2.50	19/18
CHEM 3328	006/00422	T 9:30am - 12:20pm 716 Altschul Hall	Meenakshi Rao, Craig Allen, Jonelle White	2.50	19/18
CHEM 3328	007/00423	Th 8:30am - 9:30am 805 Altschul Hall	Meenakshi Rao, Romina Mancusso	2.50	19/18
CHEM 3328	007/00423	Th 9:30am - 12:20pm 716 Altschul Hall	Meenakshi Rao, Romina Mancusso	2.50	19/18

Environmental Science (Barnard)**EESC V2100 Earth's Environmental Systems: Climate. 4.5 points.**

BC: Partial Fulfillment of General Education Requirement: Laboratory Science (SCI)., BC: Fulfillment of General Education Requirement: Quantitative and Deductive Reasoning (QUA)., Lab Required

Prerequisites: High school algebra. Recommended preparation: High school chemistry/physics, and one semester college science. Enrollment limited.

Studies formation of winds, storms, and ocean currents. Recent influence of human activity: global warming, and climate change. Laboratory exploration of topics through demonstrations, experimentation, computer data analysis, and modeling.

EESC V2200 Earth's Environmental Systems: Solid Earth. 4.5 points.

BC: Partial Fulfillment of General Education Requirement: Laboratory Science (SCI)., Lab Required

Studies plate tectonics: Origin and development of continents, ocean basins, mountain systems on land and sea. Earthquakes, landslides, volcanoes, diamonds, oil. Land-use planning for resource development and conservation. Laboratory exploration of topics through demonstrations, experimentation, computer data analysis, and modeling.

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 Measurements. 3 points.

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.

Spring 2023: EESC BC3016

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 3016	001/00264	M W 10:10am - 12:00pm 403 Altschul Hall	Brian Mailloux	3	11/12
EESC 3016	002/00265	M W 2:10pm - 4:00pm 403 Altschul Hall	Brian Mailloux	3	13/14

EESC BC3017 Environmental Data Analysis. 3 points.

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 2022: EESC BC3017

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 3017	001/00640	T Th 2:10pm - 4:00pm 222 Milbank Hall	Mike He	3	25/25

Spring 2023: EESC BC3017

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 3017	001/00266	M W 4:10pm - 6:00pm 222 Milbank Hall	Mike He	3	24/25

EESC BC3025 Hydrology. 3 points.

BC: Fulfillment of General Education Requirement: Quantitative and Deductive Reasoning (QUA).

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).*

EESC BC3800 Senior Research Seminar. 3 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. Prerequisite to *EESC W3901*.

Fall 2022: EESC BC3800

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
EESC 3800	001/00643	Th 4:10pm - 6:00pm 903 Altschul Hall	Martin Stute, Jenna Lawrence, Logan Brenner	3	40/50