Evolving at the Crossroads of the Natural and Social Sciences

The Department of Ecology, Evolution & Environmental Biology (E3B) at Columbia University was established in 2001. Although we are a relatively new department, we have grown rapidly in the past decade. We now have an internationally diverse student body and a broad network of supporters at Columbia and throughout New York City. Our affiliated faculty members come from departments at Columbia as well as from the American Museum of Natural History, the New York Botanical Garden, the Wildlife Conservation Society, and the EcoHealth Alliance. Together, we provide an unparalleled breadth and depth of research opportunities for our students.

In creating E3B, Columbia University recognized that the fields of ecology, evolutionary biology, and environmental biology constitute a distinct subdivision of the biological sciences with its own set of intellectual foci, theoretical foundations, scales of analysis, and methodologies.

E3B’s 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 multi-disciplinary perspective to understand life on Earth from the level of organisms to global processes that sustain humanity and all life.

To achieve this multi-disciplinary perspective, the department maintains close ties to over 70 faculty members beyond its central core. Thus, many faculty members who teach, advise, and train students in research are based in other departments on the Columbia campus or at the partner institutions. Through this collaboration, the department is able to tap into a broad array of scientific and intellectual resources in the greater New York City area. The academic staff covers the areas of plant and animal systematics; evolutionary and population genetics; ecosystem science; demography and population biology; behavioral and community ecology; and related fields of epidemiology, ethnobiology, public health, and environmental policy. Harnessing the expertise of this diverse faculty and the institutions of which they are a part, E3B covers a vast area of inquiry into the evolutionary, genetic, and ecological relationships among all living things.

Facilities and Collaborative Institutions

The Department of Ecology, Evolution, and Environmental Biology (E3B)

In addition to the off-campus facilities detailed below, the Columbia community offers academic excellence in a range of natural and social science disciplines that are directly related to biodiversity conservation including: evolution, systematics, genetics, behavioral ecology, public health, business, economics, political science, anthropology, and public and international policy. These disciplines are embodied in world-class departments, schools, and facilities at Columbia. The divisions that bring their resources to bear on issues most relevant to E3B’s mission are: the Lamont-Doherty Earth Observatory, the School of International and Public Affairs, the Goddard Institute for Space Studies, the International Research Institute for Climate Prediction, the Black Rock Forest Reserve in New York State, the Rosenthal Center for Alternative/Complementary Medicine, the Division of Environmental Health Sciences at the School of Public Health, and the Center for International Earth Science Information Network (CIESIN). Several of these units of the University are networked through the Earth Institute at Columbia, a division of the University that acts as an intramural network of environmental programs and supplies logistical support for constituent programs, through planning, research, seminars, and conferences. All of the above schools, centers, and institutes contribute to finding solutions for the world’s environmental challenges.

The Earth Institute Center for Environmental Sustainability (EICES)

The Earth Institute Center for Environmental Sustainability (EICES), formerly known as the Center for Environmental Research and Conservation (CERC), is actively involved in protecting biodiversity and ecosystems. The Earth Institute Center for Environmental Sustainability is dedicated to the development of a rich, robust, and vibrant world within which we can secure a sustainable future. Through a diverse array of strategic partners in science, education, and outreach, the center builds unique programs that promote human well-being through the preservation, restoration, and management of biodiversity, and the services our ecosystems provide.

The Center for Environmental Research and Conservation (CERC), a leading provider of cutting-edge environmental research, education, and training, since its inception in 1994, has grown into two institutions—an Earth institute center and a Secretariat for a major environmental consortium. The center’s new name is the Earth Institute Center for Environmental Sustainability (EICES, pronounced “i-sees”). EICES also continues, however, as the Secretariat for the Consortium for Environmental Research and Conservation, continuing 15 years of collaborations between the Earth Institute, the American Museum of Natural History, the New York Botanical Garden, The Wildlife Conservation Society, and EcoHealth Alliance on biodiversity conservation.

American Museum of Natural History

The American Museum of Natural History is one of the world’s preeminent scientific, educational, and cultural institutions. Since its founding in 1869, the Museum has advanced its global mission to discover, interpret, and disseminate information about human cultures, the natural world, and the universe through a wide-reaching program of scientific research, education, and exhibitions. The institution comprises 45 permanent exhibition halls, state-of-the-art research laboratories, one of the largest natural history libraries in the Western Hemisphere, and a permanent collection of 32 million specimens and cultural artifacts. With a scientific staff of more than 200, the Museum supports research divisions in anthropology, paleontology, invertebrate and vertebrate zoology, and the physical sciences. The Museum’s scientific staff pursues a broad agenda of advanced scientific research, investigating the origins and evolution of life on Earth, the world’s myriad species, the rich variety of human culture, and the complex processes that have formed and continue to shape planet Earth and the universe beyond.

The Museum’s Center for Biodiversity and Conservation (CBC) was created in June 1993 to advance the use of scientific data to mitigate threats to biodiversity. CBC programs integrate research, education, and...
outreach so that people, a key force in the rapid loss of biodiversity, will become participants in its conservation. The CBC works with partners throughout the world to build professional and institutional capacities for biodiversity conservation and heightens public understanding and stewardship of biodiversity. CBC projects are under way in the Bahamas, Bolivia, Madagascar, Mexico, Vietnam, and the Metropolitan New York region.

The Museum’s scientific facilities include: two molecular systematics laboratories equipped with modern high-throughput technology; the interdepartmental laboratories, which include a state-of-the-art imaging facility that provides analytical microscopy, energy dispersive spectrometry, science visualization, and image analysis to support the Museum’s scientific activities; a powerful parallel-computing facility, including a cluster of the world’s fastest computers, positioned to make significant contributions to bioinformatics; and a frozen tissue facility with the capacity to store one million DNA samples.

New York Botanical Garden
The New York Botanical Garden (NYBG), with its 7 million specimen herbarium, the largest in the Western Hemisphere, and its LuEsther T. Mertz Library, the largest botanical and horticultural reference collection on a single site in the Americas, comprises one of the very best locations in the world to study plant science. NYBG’s systematic botanists discover, decipher, and describe the world’s plant and fungal diversity; and its economic botanists study the varied links between plants and people. The Enid A. Haupt Conservatory, the largest Victorian glasshouse in the United States, features some 6,000 species in a newly installed “Plants of the World” exhibit. The new International Plant Science Center stores the Garden collection under state-of-the-art environmental conditions and has nine study rooms for visiting scholars. All specimens are available for on-site study or loan.

In recent years, NYBG has endeavored to grow and expand its research efforts, supporting international field projects in some two dozen different countries, ranging from Brazil to Indonesia. In 1994, AMNH and NYBG established the Lewis and Dorothy Cullman Program for Molecular Systematics Studies to promote the use of molecular techniques in phylogenetic studies of plant groups. This program offers many opportunities for research in conservation genetics. NYBG operates both the Institute for Economic Botany (IEB) and the Institute of Systematic Botany (ISB). The ISB builds on the Garden’s long tradition of intensive and distinguished research in systematic botany—the study of the kinds and diversity of plants and their relationships—to develop the knowledge and means for responding effectively to the biodiversity crisis.

The Garden has also established a molecular and anatomical laboratory program, which includes light and electron microscopes, and has made enormous advances in digitizing its collection. There is currently a searchable on-line library catalog and specimen database collection with some half million unique records. Field sites around the world provide numerous opportunities for work in important ecosystems of unique biodiversity.

Wildlife Conservation Society
The Wildlife Conservation Society (WCS), founded in 1895 as the New York Zoological Society, works to save wildlife and wild lands throughout the world. In addition to supporting the nation’s largest system of zoological facilities—the Bronx Zoo; the New York Aquarium; the Wildlife Centers in Central Park, Prospect Park, and Flushing Meadow Park; and the Wildlife Survival Center on St. Catherine’s Island, Georgia—WCS maintains a commitment to field-based conservation science.

With 60 staff scientists and more than 100 research fellows, WCS has the largest professional field staff of any U.S.-based international conservation organization. Currently, WCS conducts nearly 300 field projects throughout the Americas, Asia, and Africa. The field program is supported by a staff of conservation scientists based in New York who also conduct their own research.

WCS’s field-based programs complement the organization’s expertise in veterinary medicine, captive breeding, animal care, genetics, and landscape ecology, most of which are based at the Bronx Zoo headquarters. WCS’s Conservation Genetics program places an emphasis on a rigorous, logical foundation for the scientific paradigms used in conservation biology and is linked to a joint Conservation Genetics program with the American Museum of Natural History. The Wildlife Health Sciences division is responsible for the health care of more than 17,000 wild animals in the five New York parks and wildlife centers. The departments of Clinical Care, Pathology, Nutrition, and Field Veterinary Programs provide the highest quality of care to wildlife.

EcoHealth Alliance
EcoHealth Alliance is an international organization of scientists dedicated to the conservation of biodiversity. For more than 40 years, EcoHealth Alliance has focused its efforts on conservation. Today, they are known for innovative research on the intricate relationships between wildlife, ecosystems, and human health.

EcoHealth Alliance’s work spans the U.S. and more than 20 countries in Central and South America, the Caribbean, Africa, and Asia to research ways for people and wildlife to share bioscapes for their mutual survival. Their strength is built on innovations in research, education, and training and accessibility to international conservation partners.

Internationally, EHA programs support conservationists in over a dozen countries at the local level to save endangered species and their habitats, and to protect delicate ecosystems for the benefit of wildlife and humans.

Academic Programs
The Department of Ecology, Evolution, and Environmental Biology runs two undergraduate majors/concentrations. The primary major is in environmental biology and the second is evolutionary biology of the human species. The foci and requirements vary substantially and are intended for students with different academic interests.

The environmental biology major emphasizes those areas of biology and other disciplines essential for students who intend to pursue careers in the conservation of Earth’s living resources. It is designed to prepare students for graduate study in ecology and evolutionary biology, conservation biology, environmental policy and related areas, or for direct entry into conservation-related or science teaching careers.

Interdisciplinary knowledge is paramount to solving environmental biology issues, and a wide breadth of courses is thus essential, as is exposure to current work. Conservation internships are available through partner institutions and serve as research experience leading to the development of the required senior thesis.

Declaration of the environmental biology major must be approved by the director of undergraduate studies and filed in the departmental office located on the 10th floor of Schermerhorn Extension.

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 is also known as biological anthropology. As an interdisciplinary major, students are also encouraged to draw on courses in related fields including biology, anthropology, geology, and psychology as part of their studies.

Professors
Marina Cords (also Anthropology)
Ruth DeFries (also Climate School)
Maria Diuk-Wasser
Kevin Griffin (also Earth and Environmental Sciences)
Shahid Naem
Dustin Rubenstein
Maria Uriarte

Associate Professors
Duncan Menge

Assistant Professors
Andrés Bendesky
Deren Eaton

Lecturers
Bekka Brodie
Matthew Palmer
Jill Shapiro

Adjunct Faculty/Research Scientists
Columbia University
Hilary Callahan (Barnard Biology)
Steven Cohen (SIPA)
Lisa Dale
Adela Gondek (SIPA)
Paul Hertz (Barnard)
Darcy Kelley (Biology)
Allison Lopatkin (Barnard Biology)
Alba Morales-Jimenez
Brian Morton (Barnard Biology)
Paul Olsen (Lamont-Doherty)
Dorothy Peteet (Lamont-Doherty)
Miguel Pinedo Vasquez
Alison Pischedda (Barnard Biology)
Robert Pollack
Marya Pollack
Paige West (Barnard)
Natalie Boelman (Lamont-Doherty)

American Museum of Natural History
Felicity Arengo
Mary Blair
Frank Burbank
Joel Cracraft
Suzanne Macey
Anna MacPherson
Christopher Raxworthy
Robert Rockwell
Nancy Simmons

Brian Smith
Jessica Ware

The New York Botanical Garden
Alex McAlvay
Michael Balick
Dennis Stevenson

Wildlife Conservation Society
Howard Rosenbaum
Scott Silver
Patrick R. Thomas

Ecohealth Alliance
Peter Daszak
Kevin Olival
Mindy Rostal

Guidelines for all Ecology, Evolution, and Environmental Biology Majors and Concentrators
The grade of D is not accepted for any course offered in fulfillment of the requirements toward the majors or concentrations.

Major in Environmental Biology
The major in environmental biology requires 50 points, distributed as follows:

Lower Division Courses
Two terms of introductory or environmental biology such as the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEEB UN2001</td>
<td>Environment Biology I: Elements to Organisms</td>
</tr>
<tr>
<td>EEEB UN2002</td>
<td>Environment Biology II: Organisms to the Biosphere</td>
</tr>
</tbody>
</table>

Two terms of environmental science such as the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EESC UN2100</td>
<td>Earth’s Environmental Systems: The Climate System</td>
</tr>
<tr>
<td>EESC UN2200</td>
<td>EARTH’S ENVIRONMENTAL SYSTEMS: THE SOLID EARTH</td>
</tr>
</tbody>
</table>

Two terms of chemistry such as the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM UN1403</td>
<td>GENERAL CHEMISTRY I-LECTU</td>
</tr>
<tr>
<td>CHEM UN1404</td>
<td>and GENERAL CHEMISTRY II-LECTURES</td>
</tr>
</tbody>
</table>

One term of physics such as the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS UN1201</td>
<td>General Physics I</td>
</tr>
</tbody>
</table>

One term of statistics such as the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEEB UN3005</td>
<td>Introduction to Statistics for Ecology and Evolutionary Biology</td>
</tr>
</tbody>
</table>
Lower Division Courses

The ecology and evolution track within the environmental biology major requires 50 points, distributed as follows:

<table>
<thead>
<tr>
<th>Course</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL BC2286</td>
<td>Statistics and Research Design</td>
</tr>
<tr>
<td>STAT UN1101</td>
<td>Introduction to Statistics</td>
</tr>
<tr>
<td>STAT UN1201</td>
<td>Calculus-Based Introduction to Statistics</td>
</tr>
</tbody>
</table>

One term of calculus such as the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH UN1101</td>
<td>CALCULUS I</td>
</tr>
<tr>
<td>MATH UN1102</td>
<td>CALCULUS II</td>
</tr>
<tr>
<td>MATH UN1201</td>
<td>Calculus III</td>
</tr>
<tr>
<td>MATH UN1202</td>
<td>CALCULUS IV</td>
</tr>
</tbody>
</table>

Upper Division Courses

Students must complete five advanced elective courses (generally 3000-level or above) satisfying the following distribution. At least one of these courses must include a laboratory component. For more information and a list of appropriate courses, contact the director of undergraduate studies.

1. Ecology, behavior, or conservation biology;
2. Evolution or genetics;
3. Morphology, physiology, or diversity;
4. Policy or economics;
5. One additional course from the preceding four groups.

Students must also complete a senior thesis, which involves completing a research internship (generally in the summer before the senior year) and completing at least one semester of the thesis research seminar, EEEB UN3991-EEEB UN3992 Senior Seminar. Enrollment in both semesters of the seminar, starting in the spring of the junior year, is recommended.

Students planning on continuing into graduate studies in environmental biology or related fields are encouraged to take organic chemistry and genetics.

Ecology and Evolution Track within the Environmental Biology Major

The ecology and evolution track within the environmental biology major requires 50 points, distributed as follows:

Lower Division Courses

Two terms of introductory or environmental biology such as the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Requirement</th>
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</thead>
<tbody>
<tr>
<td>EEEB UN2001</td>
<td>Environmental Biology I: Elements to Or organisms</td>
</tr>
<tr>
<td>- EEEB UN2002</td>
<td>and Environmental Biology II: Organisms to the Biosphere</td>
</tr>
</tbody>
</table>

Two terms of chemistry such as the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM UN1403</td>
<td>GENERAL CHEMISTRY I-LECTU</td>
</tr>
<tr>
<td>- CHEM UN1404</td>
<td>and GENERAL CHEMISTRY II-LECTURES</td>
</tr>
</tbody>
</table>

Chemistry laboratory such as the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM UN500</td>
<td>GENERAL CHEMISTRY LABORATORY</td>
</tr>
</tbody>
</table>

Two terms of physics such as the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS UN1201</td>
<td>General Physics I</td>
</tr>
<tr>
<td>- PHYS UN1202</td>
<td>and General Physics II</td>
</tr>
</tbody>
</table>

One term of statistics such as the following:

<table>
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<tr>
<th>Course</th>
<th>Requirement</th>
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</thead>
<tbody>
<tr>
<td>EEEB UN3005</td>
<td>Introduction to Statistics for Ecology and Evolutionary Biology</td>
</tr>
<tr>
<td>BIOL BC2286</td>
<td>Statistics and Research Design</td>
</tr>
<tr>
<td>STAT UN1101</td>
<td>Introduction to Statistics</td>
</tr>
</tbody>
</table>

Upper Division Courses

Students must complete five advanced elective courses (generally 3000-level or above) satisfying the following distribution. At least one of these courses must include a laboratory component. For more information and a list of appropriate courses, contact the director of undergraduate studies.

1. Three courses in ecology, evolution, conservation biology, or behavior;
2. One course in genetics. BIOL UN3031 GENETICS or BIOL BC2100 Molecular and Mendelian Genetics is recommended;
3. One course in morphology, physiology, or diversity.

Students must also complete a senior thesis, which involves completing a research internship (generally in the summer before the senior year) and completing at least one semester of the thesis research seminar, EEEB UN3991-EEEB UN3992 Senior Seminar. Enrollment in both semesters of the seminar, starting in the spring of the junior year, is recommended.

Students planning on continuing into graduate studies in ecology or evolutionary biology are encouraged to take organic chemistry.

Major in Evolutionary Biology of the Human Species

The major in evolutionary biology of the human species requires 36 points, distributed as described below.

Students must take a minimum of 20 points from approved biological anthropology courses. The additional courses may be taken in other departments with adviser approval. These include up to 6 points of introductory biology/chemistry or calculus (in any combination). Please speak with the major adviser about the extended list of courses from related areas including Biology, Psychology, Archaeology, Anthropology, Earth and Environmental Science, and Statistics that count toward this program.

For example, students interested in focusing on paleoanthropology would complement the requirements with additional courses in human evolution and morphology, evolutionary biology and theory, archaeology, genetics, and statistics. Those interested in primate behavior would supplement the requirements with classes in behavioral biology, ecology, and statistics.

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEEB UN1010</td>
<td>Human Origins and Evolution</td>
</tr>
<tr>
<td>EEEB UN1011</td>
<td>Behavioral Biology of the Living Primates</td>
</tr>
</tbody>
</table>
**Alternate options may be possible for all courses other than EEEB UN1010 Human Origins and Evolution and EEEB UN1011 Behavioral Biology of the Living Primates. These will be considered on an individual basis in consultation with the major/concentration adviser.**

**Consortium Course**

EEEB UN3240  Challenges and Strategies of Primate Conservation (This is the recommended conservation course but this requirement can be fulfilled with other classes such as Conservation Biology, Zoo Conservation, Ecology, Behavior and Conservation of Mammals, SEE-U in Jordan or Brazil, or other relevant offerings.)

**Theoretical Foundation from Archaeology**

Select one course of the following: Nearly all archaeology courses (save for Rise of Civilization) can fulfill this requirement. Check with the advisor.

**Anthropology**

ANTH UN1007  The Origins of Human Society
ANTH UN2028  Think Like an Archaeologist: Introduction to Method & Theory
ANTH UN3064  Death and the Body
ANTH UN3823  Archaeology Engaged: The Past in the Public Eye

**Breadth Requirement**

Select a minimum of one course from each of the three sections (may overlap seminar requirement for majors):

**Genetics/Human Variation**

BIOL BC2100  Molecular and Mendelian Genetics
BIOL UN3031  GENETICS
BIOL GU4560  Evolution in the age of genomics
ANTH UN3970  Biological Basis of Human Variation
EEEB GU3400  HUMAN ADAPTATION
EEEB GU4700  Race: The Tangled History of a Biological Concept

**Primate Behavioral Biology and Ecology**

EEEB UN3940  Current Controversies in Primate Behavior and Ecology
BIOL BC2272  Ecology
BIOL BC2280  Animal Behavior
PSYC UN2420  Animal Behavior
PSYC BC1119  Systems and Behavioral Neuroscience
PSYC UN2450  Behavioral Neuroscience
PSYC BC3372  Comparative Cognition
PSYC UN3450  Evolution of Intelligence, Animal Communication, # Language
PSYC UN3460  Evolution of Behavior (Seminar)
PSYC UN3470  Brain Evolution: Becoming Human (Seminar)
EEEB GU4010  The Evolutionary Basis of Human Behavior
EEEB GU4134  Behavioral Ecology
EEEB GU4201  Ecology, Behavior, and Conservation of Mammals (can count for either breadth requirement or conservation requirement, but not both)

**Human Evolution/Morphology**

EEEB UN3208  Explorations in Primate Anatomy
EEEB UN3215  Forensic Osteology
EEEB UN3220  The Evolution of Human Growth and Development
ANTH GU4147  Human Skeletal Biology I
ANTH GU4148  The Human Skeletal Biology II
EEEB UN3204  Dynamics of Human Evolution
EEEB UN3910  THE NEANDERTALS
ANTH GU4002  Controversial Topics in Human Evolution
ANTH GU4200  FOSSIL EVIDENCE FOR HUMAN EVOLUTION
BIOL BC2278  Evolution
BIOL UN3208  Introduction to Evolutionary Biology
EEEB UN3030  The Biology, Systematics, and Evolutionary History of the ‘Apes’
BIOL BC2262  Vertebrate Biology
BIOL UN3006  PHYSIOLOGY
BIOL BC3360  Physiology
EEEB GU4200  Introduction to Mammalogy

**Seminar**

Selection at least one of the following seminars. May also count toward the breadth requirement.

EEEB UN3204  Dynamics of Human Evolution
EEEB UN3910  THE NEANDERTALS
EEEB UN3940  Current Controversies in Primate Behavior and Ecology
ANTH UN3970  Biological Basis of Human Variation
EEEB UN3993  EBHS SENIOR THESIS SEMINAR
EEEB UN3994  EBHS SENIOR THESIS SEMINAR
ANTH GU4200  Controversial Topics in Human Evolution (Fulfills the seminar requirement for the major)

Additional courses in the student’s area of focus to complete the required 36 points overall including a minimum of 20 points of approved biological anthropology courses.

Students intending to pursue graduate study in this field should broaden their foundation by taking an introductory biology course (optimally either EEEB UN2001 Environmental Biology I: Elements to Organisms or EEEB UN2002 Environmental Biology II: Organisms to the Biosphere) or an advanced evolution course, a genetics course, and a statistics course. We recommend that those interested in either biological anthropology or bioarchaeology take a foundation cultural anthropology course such as ANTH UN1002 The Interpretation of Culture, ANTH UN2004 INTRO TO SOC # CULTURAL THEORY, ANTH UN2005 THE ETHNOGRAPHIC IMAGINATION, or ANTH UN3040 Anthropological Theory I. Students interested in forensic anthropology should take chemistry in lieu of biology (though the latter is recommended as a foundation course for all students). The adviser makes additional recommendations dependent on the student’s area of focus.

**Approved Biological Anthropology Courses**

Paleoanthropology and Morphology

EEEB UN1010  Human Origins and Evolution
EEEB UN3204  Dynamics of Human Evolution
EEEB UN3208  Explorations in Primate Anatomy
Upper Division Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>EEEB UN3087</td>
<td>Conservation Biology</td>
</tr>
</tbody>
</table>

Two other 3000- or 4000-level courses from the advanced environmental biology courses listed for the major.

Concentration in Evolutionary Biology of the Human Species

The concentration in evolutionary biology of the human species requires 20 points including the required introductory courses EEEB UN1010 Human Origins and Evolution, EEEB UN1011 Behavioral Biology of the Living Primates, an approved conservation course (optimally Primate Conservation), and three courses for the breadth distribution requirements as described for the major. Students must take a minimum of 15 points from approved biological anthropology courses as described for the major (two introductory classes count toward that total). The additional courses may be taken in other departments with adviser approval.

Concentrators do not have to complete the theoretical foundation course from archaeology or a seminar.

Special Concentration in Environmental Science for Environmental Biology Majors

The Department of Earth and Environmental Sciences sponsors a special concentration which must be done in conjunction with the environmental biology major. Students should be aware that they must complete the environmental biology major in order to receive credit for the special concentration.

The special concentration in environmental science requires a minimum of 31.5 points, distributed as follows:

Introductory Environmental Science (13.5 points)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EESC UN2100</td>
<td>Earth’s Environmental Systems: The Climate System</td>
</tr>
<tr>
<td>EESC UN2200</td>
<td>EARTH’S ENVIRONMENTAL SYSTEMS: THE SOLID EARTH</td>
</tr>
<tr>
<td>EESC UN2300</td>
<td>Earth’s Environmental Systems: The Life System (equivalent to EEEB UN2002)</td>
</tr>
</tbody>
</table>

Introductory Science (6 points)

Two courses in chemistry, physics, mathematics, or environmental biology from the supporting mathematics and science list for the environmental science major.

Advanced Environmental Science (12 points)

Select four of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EESC UN3015</td>
<td>The Earth’s Carbon Cycle</td>
</tr>
<tr>
<td>EESC BC3017</td>
<td>Environmental Data Analysis</td>
</tr>
<tr>
<td>EESC BC3025</td>
<td>Hydrology</td>
</tr>
<tr>
<td>EESC GU4008</td>
<td>Introduction to Atmospheric Science</td>
</tr>
<tr>
<td>EESC GU4050</td>
<td>Global Assessment and Monitoring Using Remote Sensing</td>
</tr>
<tr>
<td>EESC GU4223</td>
<td>SEDIMENTARY GEOLOGY</td>
</tr>
<tr>
<td>EESC GU4550</td>
<td>Plant Ecophysiology</td>
</tr>
<tr>
<td>EESC GU4835</td>
<td>Wetlands and Climate Change</td>
</tr>
<tr>
<td>EESC GU4885</td>
<td>The Chemistry of Continental Waters</td>
</tr>
</tbody>
</table>
Special Concentration in Environmental Biology for Environmental Science Majors

The Department of Ecology, Evolution, and Environmental Biology sponsors a special concentration which must be done in conjunction with the environmental science major. Students should be aware that they must complete the environmental science major in order to receive credit for the special concentration.

The special concentration in environmental biology requires a minimum of 39 points, distributed as follows:

**Introductory Environmental Biology and Environmental Science (17 points)**

EEEB UN2001  Environmental Biology I: Elements to Organisms

EEEB UN2002  Environmental Biology II: Organisms to the Biosphere (equivalent to EESC UN2300)

EESC UN2100  Earth's Environmental Systems: The Climate System

EESC UN2200  EARTH'S ENVIRONMENTAL SYSTEMS: THE SOLID EARTH

**Introductory Science (13 points)**

Select one of the following chemistry sequences:

**CHEM UN1403**  GENERAL CHEMISTRY I-LECTU
- **CHEM UN1404**  and GENERAL CHEMISTRY II-LECTURES

**CHEM UN1604**  2ND TERM GEN CHEM (INTENSIVE) and intensive General Chemistry Laboratory
- **CHEM UN2507**

One term of statistics such as the following:

EEEB UN3005  Introduction to Statistics for Ecology and Evolutionary Biology

BiOL BC2286  Statistics and Research Design

STAT UN1101  Introduction to Statistics

STAT UN1201  Calculus-Based Introduction to Statistics

EEEB UN3087  Conservation Biology

**Advanced Environmental Biology (9 points)**

Three additional advanced environmental biology courses (3000-level and above), each chosen from a different curricular area (evolution/genetics, ecology/behavior/conservation, anatomy/physiology/diversity, biology laboratory courses).

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Fall 2022

EEEB UN1010 Human Origins and Evolution. 3 points.
CC/GS: Partial Fulfillment of Science Requirement
Lab fee: $25. Taught every fall.

This is an introductory course in human evolution. Building on a foundation of evolutionary theory, students explore primate behavioral morphology and then trace the last 65 million years of primate evolution from the earliest Paleocene forms to the fossil remains of earliest humans and human relatives. Along with Behavioral Biology of the Living Primates this serves as a core required class for the EBHS program.

**Fall 2022: EEEB UN1010**

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<tr>
<th>Course Number</th>
<th>Section/Call Number</th>
<th>Times/Location</th>
<th>Instructor</th>
<th>Points</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEEB 1010</td>
<td>001/11996</td>
<td>M W 11:40am - 12:55pm</td>
<td>Jill Shapiro</td>
<td>3</td>
<td>63/86</td>
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EEEB UN2001 Environmental Biology I: Elements to Organisms. 3 points.
CC/GS: Partial Fulfillment of Science Requirement

Introductory biology course for majors in biology or environmental biology, emphasizing the ecological and evolutionary context of modern biology.

**Fall 2022: EEEB UN2001**

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<th>Course Number</th>
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<th>Instructor</th>
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<tr>
<td>EEEB 2001</td>
<td>001/12407</td>
<td>M W 1:10pm - 2:25pm</td>
<td>Shahid Naeem, Andres Bendesky</td>
<td>3</td>
<td>53/60</td>
</tr>
</tbody>
</table>

EESC UN2330 SCIENCE FOR SUSTAINABLE DEVPT. 3 points.
CC/GS: Partial Fulfillment of Science Requirement

The course provides students with the natural science basis to appreciate co-dependencies of natural and human systems, which are central to understanding sustainable development. After completing the course, students should be able to incorporate scientific approaches into their research or policy decisions and be able to use scientific methods of data analysis. The semester will highlight the climate system and solutions from both physical and ecological perspectives; water resources; food production and the cycling of nutrients; and the role of biodiversity in sustainable development. The course emphasizes key scientific concepts such as uncertainty, experimental versus observational approaches, prediction and predictability, the use of models and other essential methodological aspects.

**Fall 2022: EESC UN2330**

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<tr>
<th>Course Number</th>
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<th>Times/Location</th>
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<th>Enrollment</th>
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<tbody>
<tr>
<td>EESC 2330</td>
<td>001/11580</td>
<td>T Th 2:40pm - 3:55pm</td>
<td>John Mutter, Jenna Lawrence</td>
<td>3</td>
<td>120/120</td>
</tr>
</tbody>
</table>
**EEEB UN3005 Introduction to Statistics for Ecology and Evolutionary Biology. 3 points.**
Prerequisites: some background in ecology, evolutionary biology, and/or statistics is recommended.
An introduction to the theoretical principles and practical application of statistical methods in ecology and evolutionary biology. The course will cover the conceptual basis for a range of statistical techniques through a series of lectures using examples from the primary literature. The application of these techniques will be taught through the use of statistical software in computer-based laboratory sessions.

**EEEB UN3015 INTRO-STAT-ECOLGY/EVOL BIO-LAB. 0.00 points.**
Required Lab for EEEB UN3005. An introduction to the theoretical principles and practical application of statistical methods in ecology and evolutionary biology. The course will cover the conceptual basis for a range of statistical techniques through a series of lectures using examples from the primary literature. The application of these techniques will be taught through the use of statistical software in computer-based laboratory sessions.

**EEEB UN3991 Senior Seminar. 3 points.**
Open only to seniors.
Guided, independent, indepth research experience culminating in the senior essay. Weekly meetings are held to review work in progress, to share results through oral and written reports, and to consider career options for further work in this field.

**EEEB UN3993 EBHS SENIOR THESIS SEMINAR. 3.00 points.**
Four points for the year-long course.
Prerequisites: the instructor’s permission and senior standing as a major in The Evolutionary Biology of the Human Species (EBHS).
Prerequisites: the instructor’s permission and senior standing as a major or concentrator in The Evolutionary Biology of the Human Species (EBHS). Year-long seminar in which senior EBHS majors develop a research project and write a senior thesis. Regular meetings are held to discuss research and writing strategies, review work in progress, and share results through oral and written reports.

**EEEB GU4100 FOREST ECOLOGY. 4 points.**
Prerequisites: one year of college biology.
EEEB GU4100 Forest Ecology focuses on interpreting and understanding pattern and process in forested ecosystems. These ecosystems include the assemblages of trees and the biological communities and environments in which they exist. The complex interactions among the organisms and the physical environment are a major focus of this course. The course involves lecture, literature discussion, and field laboratory components, with an emphasis on the analysis and interpretation of student-collected data. FRIDAY MEETINGS WILL RUN ALL DAY IN SEPTEMBER and OCTOBER.
particular behaviors and morphologies in different primate species. To understand the sexual lives of primates. Focusing on mating and reproductive behavior with an explicitly evolutionary perspective, we will explore the main problems primates face: finding appropriate food, avoiding being eaten themselves, reproducing in the face of competition, and dealing with social partners. Along with Human Origins & Evolution, this serves as a core required class for the EBHS program.

Prerequisites: Corequisite EEEB UN1111

Study of non-human primate behavior from the perspective of phylogeny, adaptation, physiology and anatomy, and life history. Focuses on the four main problems primates face: finding appropriate food, avoiding being eaten themselves, reproducing in the face of competition, and dealing with social partners. Along with Human Origins & Evolution, this serves as a core required class for the EBHS program.

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Prerequisites: Corequisite EEEB UN1111

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EEEB UN2002 Environmental Biology II: Organisms to the Biosphere. 4 points.
CC/GS: Partial Fulfillment of Science Requirement

Prerequisites: EEEB UN2001
Second semester of introductory biology sequence for majors in environmental biology and environmental science, emphasizing the ecological and evolutionary aspects of biology. Also intended for those interested in an introduction to the principles of ecology and evolutionary biology.

Spring 2022: EEEB UN2002
Course Number: 001/11963
Times/Location: M W 11:40am - 12:55pm
Instructor: Matthew Palmer, Sonya Dyhrman
Enrollment: 20/60

EEEB UN3008 Animal Behavior and the Endocrine System. 3.00 points.
Why do birds sing in the spring? How does a tadpole become a frog? In this course, we will dive into the mechanisms that drive the fascinating behaviors of animals. Students will first learn about hormones, chemical messengers within the body, and how they function within the endocrine system. Then, we will focus on the manner in which hormones both regulate and respond to specific types of animal behavior: mating and reproduction, aggression, stress, sociality, and parental care. Through these topics, students will engage with and learn to critically assess scientific literature. This course is reading and writing intensive; students will have weekly readings from the textbook and from theoretical and empirical scientific papers, and will write weekly reflection papers. Students will also contribute to a community of learning through discussion groups and peer review sessions. At the end of the semester, students will use the skills they have built throughout the course to investigate a question of their choosing, propose potential hypotheses, and complete a scientific literature review contributing to the field of behavioral endocrinology. Additional skills required to complete this paper are bolstered by weekly exercises in select topics (e.g. interpreting figures, claims assessment techniques, conducting a literature search, etc.). These exercises will also encourage students to think critically about the biases and implications for how science in this field is conducted.

Spring 2022: EEEB UN3008
Course Number: 001/14395
Times/Location: M W 2:40pm - 3:55pm
Instructor: Stefanie Siller
Enrollment: 10/17

EEEB UN3011 Behavioral Biology of the Living Primates. 3 points.
CC/GS: Partial Fulfillment of Science Requirement

Prerequisites: introductory biology course in organismal biology and the instructor's permission. Corequisite EEEB UN3111
Survey of non-human primate behavior from the perspective of phylogeny, adaptation, physiology and anatomy, and life history. Focus on the four main problems primates face: finding appropriate food, avoid being eaten themselves, reproducing in the face of competition, and dealing with social partners.

Spring 2022: EEEB UN3011
Course Number: 001/11963
Times/Location: M W 1:10pm - 2:25pm
Instructor: Marina Cords
Enrollment: 6/10

EEEB UN3087 Conservation Biology. 3 points.
CC/GS: Partial Fulfillment of Science Requirement

Prerequisites: introductory organismal biology course, ideally EEEB UN2002.
Applications of biological principles to the conservation of biodiversity. Because conservation biology is a cross-disciplinary field, some of the social, philosophical, and economic dimensions of biological conservation are also addressed.

Spring 2022: EEEB UN3087
Course Number: 001/11974
Times/Location: M 4:10pm - 6:00pm
Instructor: Dustin Partridge
Enrollment: 17/26

EEEB UN3215 Forensic Osteology. 3 points.
CC/GS: Partial Fulfillment of Science Requirement

Taught every other year. Enrollment limited to 15. Priority given at first class session to EBHS majors/concentrators.

Prerequisites: no prior experience with skeletal anatomy required. Not appropriate for students who have already taken either EEEB GU4147 or EEEB GU4148.
An exploration of the hidden clues in your skeleton. Students learn the techniques of aging, sexing, assessing ancestry, and the effects of disease, trauma and culture on human bone.

Spring 2022: EEEB UN3215
Course Number: 001/11978
Times/Location: M 4:10pm - 6:00pm
Instructor: Jill Shapiro
Enrollment: 15/16

EEEB UN3910 THE NEANDERTALS. 4.00 points.
CC/GS: Partial Fulfillment of Science Requirement

Offered every other year/rotating with Dynamics of Human Evolution. Enrollment limited to 13. Priority given at first class session to EBHS majors/concentrators. Not offered during 2022-23 academic year.

Prerequisites: EEEB UN1010 Human Species or ANTH UN1007. Nearly two hundred after discovery, Neandertals remain one of most enigmatic hominin taxa. What do we understand today about their biology, subsistence, culture, cognitive abilities, and eventual fate? Are they simply extinct relatives or do their genes continue in many of us today? In this seminar we will examine the primary research in an attempt to find answers to some of these questions.

Spring 2022: EEEB UN3910
Course Number: 001/11984
Times/Location: Th 4:10pm - 6:00pm
Instructor: Jill Shapiro
Enrollment: 11/12
EEEB GU4015 Animal Commn: Primate Persp. 3.00 points.

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<th>Enrollment</th>
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<tr>
<td>EEEB 4015</td>
<td>001/14117</td>
<td>Th 10:10am - 11:25am</td>
<td>Alba Lucia Morales Jimenez</td>
<td>3.00</td>
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</table>

EEEB GU4126 Introduction to Conservation Genetics. 3 points.

Not offered during 2022-23 academic year.

In this course, we will use evolutionary genetic principles and population genetic models to describe the extent and distribution of genetic variation in populations and species, and determine ways to conserve it. A basic knowledge of genetics and mathematics is assumed.

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<th>Enrollment</th>
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<tr>
<td>EEEB 4126</td>
<td>001/12139</td>
<td>Th 12:10pm - 2:00pm</td>
<td>Rachel Welt</td>
<td>3</td>
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<td>1015 Ext Schermerhorn Hall</td>
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EEEB GU4127 Disease Ecology. 3 points.

Enrollment limited to 25.

Prerequisites: the instructor’s permission.

Introduction to the ecology and epidemiology of infectious diseases of humans and wildlife.

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<tr>
<td>EEEB 4127</td>
<td>001/12140</td>
<td>M W 10:10am - 11:25am</td>
<td>Maria Diuk-Wasser</td>
<td>3</td>
<td>15/25</td>
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<td></td>
<td>1015 Ext Schermerhorn Hall</td>
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EEEB GU4135 Urban Ecology and Design. 3 points.

Prerequisites: One year of introductory biology or permission from the instructor

Urban Ecology and Design will explore and evaluate the ecological potential of the designed urban environment. Students will work in interdisciplinary groups to study and evaluate the relationships between urban design and ecological performance through a series of case studies, field explorations, and studio visits. New York City will be used as a test site for analysis and students will work together to evaluate urban systems with regards to vegetation, wildlife, sediment management, water, energy, and pollution using techniques of visual mapping and the application of quantitative scientific criteria over multiple scales. The course offers a deeper understanding of the relationships that drive urban ecosystems, a critical evaluation of commonly used urban design techniques, and insights into how to better design functional ecosystems within the urban context.

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<th>Times/Location</th>
<th>Instructor</th>
<th>Points</th>
<th>Enrollment</th>
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<tr>
<td>EEEB 4135</td>
<td>001/12653</td>
<td>F 11:00am - 1:00pm</td>
<td>Matthew Palmer</td>
<td>3</td>
<td>29/40</td>
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<tr>
<td></td>
<td></td>
<td>227 Seeley W. Mudd Building</td>
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EEEB GU4200 Introduction to Mammalogy. 3.00 points.

CC/GS: Partial Fulfillment of Science Requirement

Prerequisites: Introductory course in Biology or Evolution.

This taxon-based course provides students with a basic understanding of the diversity and natural history of the mammals. Broad coverage of mammalian biology includes: morphological adaptations, evolutionary history and biogeography.

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<th>Enrollment</th>
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<tr>
<td>EEEB 4200</td>
<td>001/12602</td>
<td>Th 6:10pm - 8:00pm</td>
<td>Scott Silver</td>
<td>3.00</td>
<td>13/15</td>
</tr>
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<td></td>
<td></td>
<td>1015 Ext Schermerhorn Hall</td>
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EEEB GU4260 Food, Ecology, and Globalization. 3 points.
Enrollment limited to 30.

Prerequisites: the instructor’s permission.
This class examines the social, ecological, and political economic roles of what and how we eat from a global perspective.

EEEB GU4321 Human Nature: DNA, Race & Identity. 4 points.
The course focuses on human identity, beginning with the individual and progressing to communal and global viewpoints using a framework of perspectives from biology, genetics, medicine, psychiatry, religion and the law.

EEEB GU4340 HUMAN ADAPTATION. 3.00 points.
CC/GS: Partial Fulfillment of Science Requirement

Prerequisites: EEEB W1010 Human Species or ANTH V1007 Origins of Human Society or the instructor’s permission.
This course explores human adaptation from a biological, ecological and evolutionary perspective. From our earliest hominin ancestors in Africa to our own species’ subsequent dispersal throughout the world, our lineage has encountered innumerable environmental pressures. Using morphological, physiological and behavioral/cultural evidence, we will examine the responses to these pressures that helped shape our unique lineage and allowed it to adapt to a diverse array of environments

Of Related Interest

Economics
ECON GU4625 Economics of the Environment

Earth and Environmental Sciences
EESC UN2330 SCIENCE FOR SUSTAINABLE DEVPT
EESC GU4050 Global Assessment and Monitoring Using Remote Sensing
EESC GU4550 Plant Ecophysiology
EESC GU4835 Wetlands and Climate Change

Political Science
POLS GU4730 Game Theory and Political Theory