



THE MAJOR IN  
ECOLOGY & EVOLUTIONARY BIOLOGY (E&EB)

IN YALE COLLEGE

2023-2024

Yale Ecology & Evolutionary Biology

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## Introduction

Teaching and research in biology at Yale occurs in the three biology departments on Science Hill (Ecology & Evolutionary Biology, Molecular, Cellular, & Developmental Biology, and Molecular Biophysics & Biochemistry), in the Yale School of Medicine, and in the Yale School of Public Health. The depth and breadth of expertise in this community make Yale a leading center for students and scientists.

The Department of Ecology and Evolutionary Biology (E&EB) offers broad education in the biological sciences. By helping us to understand the beauty and complexity of life, it richly supports our curiosity about nature. The subject matter ranges from molecules through cells, organs, organisms, populations, and communities to ecosystems and the ecological and evolutionary processes that have produced and continue to shape them. Biology is currently experiencing an explosion of discovery with important implications for the analysis and treatment of human disease, for the development of biotechnology, and for our capacity to recognize, understand, and deal with human impacts on the environment, including extinctions and global change. The E&EB major delivers some of the major conceptual tools needed to understand these important issues.

The department offers a B.A. or B.S. degree. The B.A. program is appropriate for students who are interested in ecology, evolution and organismal diversity as part of a liberal education but do not intend to pursue graduate work in the discipline. The B.S. program is appropriate for students intending to attend medical or veterinary school or to pursue graduate study in ecology and evolutionary biology, other biological disciplines, or environmental sciences. The two programs share prerequisites but differ in core and senior requirements.

The prerequisites for the E&EB major provide basic scientific literacy. Beyond the prerequisites, either of two tracks will satisfy the E&EB major. The Biodiversity and the Environment track emphasizes courses appropriate for ecology, evolutionary biology, and environmental science careers; the Organismal Biology track emphasizes courses appropriate for pre-medical and pre-veterinary students. Pre-medical and pre-veterinary students in the Organismal Biology track may use courses required by medical schools, but not by the major, as electives.

College seminars do not count toward the requirements of the major.

The department offers a variety of courses without prerequisites for non-majors. These include all 100-level offerings and the 200-level courses that deal with organism groups (e.g., plants, fishes, mammals, birds, insects, and invertebrates).

**Independent Research:** E&EB majors can pursue independent research in both laboratory and field-based projects. With approval, independent research for credit can be conducted under the supervision of faculty members in any department at Yale.

**Studying Abroad:** Participation in study abroad programs is encouraged. Credit for courses taken abroad may apply to the major if approved in advance by the DUS, who will want to see a syllabus that describes content, workload, and methods of evaluating performance. You are strongly encouraged to consult with the DUS before studying abroad.

**Credit/D/Fail:** No course taken to fulfill distribution requirements, as a prerequisite of the E&EB major, or as a requirement of the E&EB major may be taken Credit/D/Fail. All such courses must be taken for a letter grade.

## What does the E&EB Major do for me?

The E&EB major provides excellent preparation for a wide range of careers in medicine, public health, the pharmaceutical industry, science writing, teaching, conservation, climate change, and research. E&EB undergraduates enjoy a high rate of acceptance at medical and graduate schools.

### Lecture Courses for Non-Majors

E&EB offers a number of courses with no prerequisites for students majoring in other subjects.

**E&EB 106/MCDB 106/HLTH 155, Biology of Malaria, Lyme, and Other Vector Borne Diseases.** This introduction to the biology of pathogen transmission from one organism to another by insects focuses on malaria and Lyme disease. Biology of the pathogens including modes of transmission, establishment of infection, host immune responses, and the associated challenges to prevention and treatments.

**E&EB 210/SD&S 101, Introduction to Statistics: Life Sciences.** Statistical and probabilistic analysis of biological issues presented with a unified foundation in basic statistical theory. Problems are drawn from genetics, ecology, epidemiology, and bioinformatics.

**E&EB 225, Evolutionary Biology.** An overview of evolutionary biology as the discipline uniting all of the life sciences. Reading and discussion of scientific papers to explore the dynamic aspects of evolutionary biology. Principles of population genetics, paleontology, and systematics; application of evolutionary thinking in disciplines such as developmental biology, ecology, microbiology, molecular biology, and human medicine.

**E&EB 250, Biology of Terrestrial Arthropods.** Evolutionary history and diversity of terrestrial arthropods (body plan, phylogenetic relationships, fossil record); physiology and functional morphology (water relations, thermoregulation, energetics of flying and singing); reproduction (biology of reproduction, life cycles, metamorphosis, parental care); behavior (migration, communication, mating systems, evolution of sociality); and ecology (parasitism, mutualism, predator-prey interactions, competition, plant-insect interactions).

**E&EB 255, Invertebrates.** An overview of animal diversity that explores themes including animal phylogenetics (evolutionary relationships), comparative studies of evolutionary patterns across species, organism structure and function, and the interaction of organisms with their environments. Most animal lineages are marine invertebrates, so marine invertebrates are the focus of most of the course.

**E&EB 290, Comparative Developmental Anatomy of Vertebrates.** A comparative study of vertebrates that focuses on anatomical diversification over evolutionary time. Topics include major transformations in vertebrate evolution as well as introductions to functional anatomy, vertebrate sensory structures, and evolutionary developmental biology.

## Starting in the E&EB Major

### **BIOL Introductory Courses**

E&EB, MCDB and MB&B combine efforts to teach a yearlong Introductory Biology course consisting of four one-half credit modules. The completion of all these modules is a prerequisite for each of these majors and will probably also be necessary for any student contemplating a career in the health sciences regardless of the student's major.

**BIOL 101, Biochemistry and Biophysics.** Lilian Kabeche, Michael Koelle & Richard Harrington. MW 11:35 – 12:50, 1/2 credit

Introduction to the study of life at the molecular level. Topics include the three-dimensional structures and function of large biological molecules, the human genome, and the design of antiviral drugs to treat HIV/AIDS. Prerequisite: The first of four modules in a yearlong introductory biology sequence; meets for the first half of the term.

**BIOL 102, Principles of Cell Biology and Membrane Physiology.** Richard Harrington & Amaleah Hartman. MW 11:35 – 12:50, 1/2 credit

Introduction to the study of cell biology and membrane physiology. Topics include the organization and functional properties of biological membranes, membrane physiology and signaling, rough endoplasmic reticulum and synthesis of membrane/secretory membrane proteins, endocytosis, the cytoskeleton, and cell division. Prerequisite: The second of four modules in a yearlong introductory biology sequence; meets for the second half of the term.

**BIOL 103, Genes and Development.** Thomas Loreng & Weimin Zhong, MW 11:35 – 12:50, 1/2 credit

Introduction to genes, genetics, and developmental biology. How genes control development and disease; Mendel's rules; examples of organ physiology. Prerequisite: The third of four modules in a year-long introductory biology sequence; meets for the first half of the term.

**BIOL 104, Principles of Ecology and Evolutionary Biology.** Erika Edwards, Thomas Loreng, Thomas Near. MW 11:35 – 12:50, 1/2 credit

Introduction to ecology, evolutionary biology, animal behavior, and the history of life. Evolutionary transitions and natural selection. Adaptation at genic, chromosomal, cellular, organismal, and supra-organismal levels. Distributional and social consequences of suites of organismal adaptations. Prerequisite: The fourth of four modules in a year-long introductory biology sequence; meets for the second half of the term.

## Placement Exam for BIOL Requirement

All students are required to take all four of the BIOL introductory modules as prerequisites for the E&EB, MB&B and MCDB majors. Students with score of 5 on the AP Biology Exam or a score of 7 on the IB Biology exam are eligible to take a Yale-developed placement exam in the biological sciences available to incoming freshmen as an online exam beginning sometime in July. Based on performance on the placement exam, students may be exempted from some of the introductory modules. ***The placement exam option is only allowed to incoming first-years. Students cannot take this exam later in their studies.***

Note that many courses will require one or more of the introductory modules as prerequisites. Please check each course description carefully.

## Prerequisites for the E&EB major

The prerequisites for the major provide core scientific literacy in biology, chemistry, physics, and mathematics. In addition to the introductory biology sequence – BIOL 101, 102, 103, and 104 – the major requires a two-term lecture sequence in general chemistry – CHEM 161, 165 or CHEM 163, 167 – taken with associated laboratories, CHEM 134L and 136L; and one term of organic chemistry – CHEM 174 or 175, or CHEM 220 or 221, – with associated laboratories – CHEM 222L or 223L. Optionally, CHEM 174, 175, taken with CHEM 222L, 223L, satisfies both chemistry requirements. Two terms of lecture courses in physics are required – PHYS 170, 171 or higher – and one term of mathematics – MATH 115 or 116 – or one term of statistics & data science – S&DS 100 or 230. A different statistics course approved by the director of undergraduate studies (DUS) may be substituted for the mathematics prerequisite.

The prerequisites for the major are intended to provide core scientific literacy; they include courses in biology, chemistry, physics, and mathematics. Finishing these introductory courses early allows for a more flexible program in later years, but it is not necessary to complete them before declaring the major.

The introductory biology sequence (BIOL 101, 102, 103, and 104) is required. Also required are a two-term lecture sequence in general chemistry, (CHEM 161 & 165 or CHEM 163 & 167) taken with associated laboratories (CHEM 134L and 136L); one term of mathematics (MATH 115, 116, or 120) or one term of statistics & data science (S&DS 100 or 230).

Students should take four additional courses, for a total of four credits, from among the following options: MATH 115 or 116, MATH 118 or 120, MATH 222 or 225, MATH 230 or 231, MATH 236, 241, 242, 244, 246, 247, 250, 255, S&DS 100-106, 220, 230, 238, 240, CPSC 100, 112, 123, 201, CHEM 174 or 220, CHEM 175 or 221, CHEM 222L, 223L, PHYS 171 or 181, EPS 110, 212, 220, 222, 232, 240, 255. No more than two of these four additional courses may originate in the same department. Further prerequisite options will be determined periodically; please consult Yale Course Search with the course attribute “YC E&EB: Prereq Option” for the most current list.

An online program, ONEXYS for Physics, is offered in the summer by the Mathematics and Physics departments and by the Poorvu Center for Teaching and Learning to review math skills needed in preparation for introductory physics courses.

Acceleration credit awarded in chemistry, mathematics, and physics, or completion of advanced

courses in those departments, may be accepted in place of the corresponding prerequisites for the E&EB major. Students who have mathematics preparation equivalent to MATH 115 or higher are encouraged to take a statistics course (usually S&DS 101–106) and/or additional mathematics or statistics courses such as MATH 120, 121, 222, or 225 and S&DS 220 or 230. Because chemistry courses are prerequisite to several E&EB courses, students are strongly urged to take general chemistry in the first or second year.





## Research Opportunities

Students interested in research can work on a broad spectrum of subjects in E&EB, MCDB, MB&B, Earth & Planetary Studies (EPS), Anthropology and in the Schools of Medicine, Public Health, and the Environment. Those subjects include molecular biology, biochemistry, genetics, cell biology, neurobiology, physiology, environmental sciences, plant science, ecology, evolution, and behavior. Students may work in laboratories for academic credit or experience, and financial support may be available, but students being paid may not receive course credit.

The choice of a research laboratory should be made in consultation with faculty members and the Director of Undergraduate Studies (DUS) or Assistant DUS. Opportunities can be found on the following web sites: <https://eeb.yale.edu/> , <https://biology.yale.edu/> , <https://undergradresearch.yale.edu/> . and <https://www.yura.yale.edu/research-database>. Descriptions of research programs within E&EB can be found below in the section titled *Faculty and Research Interest*. Assistant DUS Marta Wells can also assist students in identifying prospective research advisors.

### Research Courses

During the academic year, seniors with DUS or ADUS approval may take E&EB 475 & 476 or E&EB 495 & 496. These courses are primarily for students who are doing independent research to fulfill the senior requirement. Students who wish to do research earlier in their course of study may take E&EB 469 or E&EB 474 *before* their senior year. These courses do not substitute for other major requirements, but all count towards the 36 credits required for the Yale College degree. For research courses, hours are typically arranged at the mutual convenience of the student and the faculty advisor. Students taking these courses are expected to devote an average of 10 hours per week to their research. Approval from the Yale College Committee on Honors and Academic Standing is required to exceed certain limits. A student must petition that committee for permission to enroll in more than one research course in any one term before the senior year or for more than 2 course credits in research in any one term during the senior year. Permission is also required for a student to enroll in more than three such course credits in the first six terms of enrollment. In the petition, sound academic reasons must be given for exceeding these limits.

Students taking E&EB 475 & 476 are expected to spend at least 10 hours per week in the laboratory of a faculty member over two terms in senior year. Students must re-register each term to be enrolled, and at the completion of *each* term, a paper must be submitted to their professor. ***Please note that taking E&EB 475/476 or E&EB 495/496 does not satisfy the lab requirement or the elective requirement.***

## Summer Research

Yale students can also do full-time research with a faculty member over the summer. Summer research allows students to continue research begun during the previous academic year or to begin research that will be continued during the subsequent academic year. Some faculty members have grant funds that can support students during the summer. Other possibilities for financial support can be found at <http://www.yale.edu/yser/fellowships.html> . Interested students should consult a member of the Yale faculty or the director of undergraduate studies. Academic credit is not granted unless the student is registered in (and paying tuition to) the Yale summer school.

Summer research at other institutions is possible through several programs. Yale does not award academic credit for research done at other institutions, even if done in the context of a course.

Go to [studentgrants.yale.edu](http://studentgrants.yale.edu) to look for sources of money.

Go to [Yale F&ES Career Development Office](#) for internship opportunities.

*USA Summer Programs in Field Stations:*

Biological Field Stations: <http://www.obfs.org/>

Duke University Marine Laboratory: <http://www.nicholas.duke.edu/marinelab/>

Cary Institute of Ecosystems Studies: <http://www.ecostudies.org/about.html>

Marine Biological Laboratory – Woods Hole: <http://www.mbl.edu>

Mountain Lake Biological Station – University of Virginia <http://www.mlbs.virginia.edu>

The School for Field Studies: <http://www.fieldstudies.org>

Shoals Marine Laboratory: <http://www.sml.cornell.edu>

University of Michigan Biological Station: <http://www.lsa.umich.edu/umbs/>

University of Notre Dame Environmental Research Center:  
<https://underc.nd.edu/education/applying-to-underc/>

## Studies Abroad

E&EB majors may participate in programs that include study abroad. Programs approved for a full semester of credit by the Yale College Studies Abroad program include the Organization for Tropical Studies (OTS) in Costa Rica and School for Field Studies in several localities. More detailed information can be found on the web site: <http://www.yale.edu/yalecollege/international/>

Application to both the programs and to the Studies Abroad Committee should be done early in the semester preceding the semester spent abroad. Summer programs also exist that may be used to fulfill some degree requirements, and in some cases credit can be transferred. How the credit in programs abroad might be applied to fulfilling the E&EB major requirements depends on the program chosen and should be discussed with the DUS early in planning in a conversation supported by the syllabus of the proposed course.

Here is some information on opportunities for study abroad in E&EB.

### **Organization for Tropical Studies – Costa Rica, South Africa**

Semester and summer (Costa Rica only) programs available. Study either tropical biology and environmental science in Costa Rica or savanna ecology and conservation in South Africa.

<https://tropicalstudies.org/>

### **Tropical Biology Association – Uganda, Tanzania, Madagascar**

Summer and four-month courses in tropical ecology and conservation. These courses highlight up-to-date concepts and techniques in tropical ecology and conservation.

<http://www.tropical-biology.org>

**School for Field Studies (SFS) – Australia, Bhutan, Cambodia, Chile, Costa Rica, Kenya, Panama, Peru, Tanzania, and Turks and Caicos Islands.** Semester and summer programs available. SFS teaches students field research skills through cooperative work with local communities, conservation organizations, and government agencies.

<http://www.fieldstudies.org>

**Council on International Education Exchange – Africa, Australia, Latin America, Middle East** Semester, academic year, and summer programs available. CIEE offers programs at universities and field stations. Students can choose from a variety of arts and science courses including Biology, Ecology, and Environmental Studies.

<http://www.ciee.org>

### **AustraLearn – Australia, New Zealand**

Semester, academic year, summer, and internship programs available. AustraLearn offers programs at universities in Australia and New Zealand. Students can choose from a variety of arts and science courses including Animal Science, Biology, Botany, Ecology, Environmental Science, Marine Biology, and Zoology.

<http://www.australlearn.org>

### **Denmark International Study (DIS) – Copenhagen**

Semester, academic year, and summer programs available. Students can select from one of the biology disciplines: Marine Biology and Ecology, or Environmental Biology, or Molecular Biology and Genetics, or Medical Practice and Policy. Students may also combine courses from the various disciplines. <http://www.disp.dk/>

**Institute for Study Abroad (ISA)**

Semester or academic year programs available. ISA offers programs at universities in 19 countries. Students can choose from a variety of arts and science courses including Anatomy, Biology, Ecology, Entomology, Environmental Science, Forestry, Genetics, and Zoology.

<http://www.ifsabutler.org/>

**Institute for Tropical Marine Ecology – West Indies**

Semester and summer programs available. Academic programs in marine ecology, research, and conservation.

<http://itme.org/>

**Institute for Tropical Ecology and Conservation ITEC – Panama**

Tropical field courses include lectures, field exercises, and individual research.

<http://www.itec-edu.org/>

## Where to get advice

The advising system for students majoring in E&EB provides clear information on programs of study through the students' four years at Yale. Each student has three formal advisors to guide academic choices but finding the right person for a specific issue can take student initiative.

### The First Year...

Upon entering Yale, each student is assigned to one of the fourteen residential colleges on campus. With this initial assignment, the first-year student encounters a team of three important advisors who help to answer questions and direct the student's choice of classes.

First, each entering student is assigned a *first-year counselor (froco)*, who is a senior living with the first-year class. The froco gives the first years a "student's eye view" of the curriculum, courses and instructors. Valuable as this is, it should not substitute for the advice of a faculty advisor, which is particularly important for first-years who are considering a major in science. The second advisor, also a member of the student's residential college, is usually a faculty fellow of that student's college and sometimes a member of the E&EB department. The faculty advisor is responsible for advising the student about fulfilling distributional requirements in the first year. The third member of the first-year advising team is the student's residential dean. The dean has ultimate authority over the student's decisions for courses and programs of study. If the first-year faculty advisor is not a member of a science department in Yale College, the student is strongly advised to consult with the DUS in the field of the student's primary interest. Prospective science majors should arrange advising meetings before classes start in the fall.

***The most important issue for prospective E&EB majors is taking Chemistry in the first year*** because many courses require two terms of chemistry, sometimes followed by biochemistry. Starting this sequence early is essential. If a first-year student takes a second science course, it should be the introductory Biology sequence (BIOL 101 – 104). One may postpone the laboratory for chemistry until the year after the course is taken, but this is not recommended. Math and other prerequisites can be taken later.

### ...and Beyond

After the first year, a student may continue with the faculty advisor assigned for the first year or choose a new faculty advisor for the sophomore year. E&EB majors should find an advisor in the program as soon as they decide on the major. A list of E&EB faculty and their affiliated colleges can be found in the next section. The sophomore year advisor usually remains a student's advisor for the next two years, but students may switch if they prefer another individual. Students may consult with the E&EB DUS and Assistant DUS to identify an appropriate faculty advisor. When you have identified a faculty advisor, please inform the E&EB Registrar.

The E&EB faculty advisor has four roles: (1) ensuring that the student fulfills the requirements for graduation; (2) ensuring that the student fulfills the requirements of the major; (3) giving guidance on the student's curriculum and future career plans; (4) writing letters of recommendation for the student when requested.

The regular faculty advisor can handle most routine issues. Certain matters need the attention of the DUS or Assistant DUS. The E&EB DUS' names, phone numbers, and email addresses are on the inside cover of this booklet. They can also be reached through the E&EB Registrar.

## **E&EB Peer Mentors**

The E&EB peer mentors are upperclass students who have been trained by the Yale Poorvu Center for Teaching and Learning to assist others in the major. They can provide a student's perspective on questions about what classes to take, whether you might want to do research, which types of research labs are best suited for you, how to balance your coursework with other activities, and a variety of other academic and extracurricular topics. They represent a range of different interests, and you can read about them at <https://eeb.yale.edu/academics/undergraduate-program/peer-mentoring>.

## **Yale Ecology and Evolutionary Biology Undergraduate Group (YEEBUG)**

YEEBUG is an undergraduate organization dedicated to building the E&EB community at Yale. YEEBUG provides a diverse network of other students majoring in E&EB, all of whom are eager to help out whether you are a declared major, thinking about declaring the E&EB major, or are interested in any small aspect of E&EB. YEEBUG holds social events, organizes dinners with professors, leads field trips, and more. If you would like to subscribe to the newsletter, get in touch, or get involved please email [yeebugboard@gmail.com](mailto:yeebugboard@gmail.com).

## **E&EB Faculty and Research Interests**

### **Primary Faculty**



**Adalgisa Caccone**

Lecturer in Ecology and Evolutionary Biology and Senior Research Scientist in Ecology and Evolutionary Biology, School of the Environment, and Epidemiology (Microbial Diseases)

21 Sachem St, ESC 140, New Haven, CT 06511  
[adalgisa.caccone@yale.edu](mailto:adalgisa.caccone@yale.edu) Phone: 203-432-5259

Research Interests: Molecular evolution and conservation genetics.



**Jennifer Coughlan**

Assistant Professor of Ecology and Evolutionary Biology

21 Sachem St, ESC 358, New Haven, CT 06511  
[jennifer.coughlan@yale.edu](mailto:jennifer.coughlan@yale.edu)

Research Interests: Evolutionary genetics, using a charismatic group of wildflowers (*Mimulus*) to understand the genetic basis and evolutionary drivers of adaptation and speciation in nature.



**Mary Beth Decker**

Research Scientist in Ecology and Evolutionary Biology; Lecturer in School of the Environment

165 Prospect St, OML 316B, New Haven, CT 06511  
[marybeth.decker@yale.edu](mailto:marybeth.decker@yale.edu) Phone: 203-432-6293

Research Interests: Biological oceanography, jellyfish blooms in changing coastal and estuarine ecosystems.



**Casey Dunn**

Professor of Ecology and Evolutionary Biology; director of Graduate Studies

164 Prospect St, OML 326A, New Haven, CT 06511  
[casey.dunn@yale.edu](mailto:casey.dunn@yale.edu) Phone: 203-432-3109

Research Interests: Comparative invertebrate zoology. We use phylogenetics to study evolution of genomes, genome function, morphology, and siphonophores.



**Erika Edwards**

Professor of Ecology and Evolutionary Biology; Curator of Botany Peabody Museum of Natural History; Director Marsh Botanical Gardens

165 Prospect St, OML 326B, New Haven, CT 06511  
[erika.edwards@yale.edu](mailto:erika.edwards@yale.edu) Phone: 203-432-3869

Research Interests: Evolution; phylogenetics; plant structure and function; ecological adaptation.



**Vanessa Ezenwa**

Professor of Ecology and Evolutionary Biology

165 Prospect St, OML 427, New Haven, CT 06511  
[vanessa.ezenwa@yale.edu](mailto:vanessa.ezenwa@yale.edu) Phone: 203-432-2614

[Pierson College Fellow]

Research Interests: Disease ecology, behavioral ecology, ecoimmunology, parasitology.



**Walter Jetz – on leave 2023-24**

Professor of Ecology Evolutionary Biology; School of the Environment

165 Prospect St, OML 401, New Haven, CT 06511  
[walter.jetz@yale.edu](mailto:walter.jetz@yale.edu) Phone: 203-432-7540

Research Interests: Macroecology; community ecology; biogeography; global change biology; conservation; ecology and evolution of terrestrial vertebrates.





**Joshua Moyer**

Lecturer of Ecology and Evolutionary Biology

165 Prospect St, OML 103A, New Haven, CT 06511  
[joshua.moyer@yale.edu](mailto:joshua.moyer@yale.edu)

[Saybrook College Fellow]

Research Interests: Functional anatomy & biodiversity of vertebrates, specializing in the ecological morphology & systematics of cartilaginous fishes (sharks and their relatives) using methods in kinematics, animal behavior, gross anatomy & dissection, histology, and biomedical imaging.



**Martha M. Muñoz – on leave 2023-24**

Assistant Professor of Ecology and Evolutionary Biology

165 Prospect St, ESC 368, New Haven, CT 06511  
[martha.munoz@yale.edu](mailto:martha.munoz@yale.edu) Phone: 203-432-9861

[Jonathan Edwards College Fellow]

Research Interests: The Ecology and Evolution of life in motion by integrating physiology, biochemistry, and behavior. We focus on reptiles and amphibians as model systems.



**Thomas Near**

Professor and Chair of Ecology and Evolutionary Biology; Bingham Oceanographic Curator of Ichthyology, Peabody Museum of Natural History, Head of College-Saybrook College

21 Sachem St, ESC 364, New Haven, CT 06511-8934  
[thomas.near@yale.edu](mailto:thomas.near@yale.edu) Phone: 203-432-3002

[Head of Saybrook College]

Research Interests: Evolutionary biology of fishes – retracing how species and lineages are treated to one another, primarily using DNA sequence data to reconstruct the evolutionary relationships of species represented through branching diagrams and phylogenies.



**C. Brandon Ogbunu**

Assistant Professor of Ecology and Evolutionary Biology; member of the Chemical Biology Institute, West Campus

165 Prospect St, OML 253A, New Haven, CT 06511  
[brandon.ogbunu@yale.edu](mailto:brandon.ogbunu@yale.edu) Phone: 203-432-7805

[Saybrook College Fellow]

Research Interests: Systems biology, population genetics, epidemiology, disease ecology and evolution, science and society.



**David M. Post – Returning 2024**

Professor of Ecology and Evolutionary Biology

165 Prospect St, OML 426B, New Haven, CT 06511\_  
[david.post@yale.edu](mailto:david.post@yale.edu) Phone: 203-432-3005

Research Interests: Aquatic ecology; food-web structure and dynamics; eco-evolutionary interactions; environmental change.



**Richard O. Prum**

William Robertson Coe Professor of Ornithology of Ecology and Evolutionary Biology,  
Curator Vertebrate Zoology (Ornithology) Peabody Museum of Natural History

21 Sachem St, ESC 164, New Haven, CT 06511  
[richard.prum@yale.edu](mailto:richard.prum@yale.edu) Phone: 203-432-9423

Research Interests: Evolutionary ornithology, including phylogenetics, behavior, feathers, structural color, evolution and development, sexual selection, and historical biogeography.



**Linda Puth – Returning 2024**

Lecturer in Ecology and Evolutionary Biology

165 Prospect St, New Haven CT 06511\_  
[linda.puth@yale.edu](mailto:linda.puth@yale.edu) Phone: 203-432-8099

[Timothy Dwight Fellow]

Research Interests: Community assembly and the consequences of diversity, primarily in freshwater algae.



**Eric Slessarev – on leave 2023-24**

Assistant Professor of Ecology and Evolutionary Biology

165 Prospect St, New Haven CT 06511  
[eric.slessarev@yale.edu](mailto:eric.slessarev@yale.edu) Phone:

Research Interests: Soil science, terrestrial biogeochemistry, ecosystem-geosphere interactions, carbon and nutrient cycling.



**Carla A. Staver**

Associate Professor of Ecology and Evolutionary Biology; Associate Director of the Yale Institute for Biospheric Studies

165 Prospect St, OML 404, New Haven, CT 06511  
[carla.staver@yale.edu](mailto:carla.staver@yale.edu) Phone: 203-436-9200

Research Interests: Landscape ecology of savannas and forest; fire and herbivore feedbacks; temporal and spatial variability as ecological driver; historical dependence in ecology.



**Alison Sweeney**

Associate Professor of Physics; Ecology and Evolutionary Biology

217 Prospect St, SCL 131, New Haven, CT 06511  
[alison.sweeney@yale.edu](mailto:alison.sweeney@yale.edu) Phone: 203-432-3650

Research Interests: Molecular evolution of self-assembling protein photonic structures in mollusks and optical characterization of the sophisticated roles they play in camouflage and photosynthetic symbiosis.



**Paul Turner**

Rachel Carson Professor of Ecology and Evolutionary Biology; Microbiology Faculty, Yale School of Medicine

165 Prospect St, OML 327B, New Haven, CT 06511  
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Research Interests: Virus evolutionary genetics and genomics, mostly in bacteriophages and arthropod-borne viruses. We use experimental evolution to test basic biology questions, and conduct applied research on virus-based therapies to treat disease.



**David Vasseur**

Professor of Ecology and Evolutionary Biology

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Research Interests: Theoretical ecology; biodiversity-ecosystem function; impacts of environmental variability on population, community, and ecosystem processes; spatial population synchrony.



**Marta Lucia Martinez Wells**

Senior Lecturer of Ecology and Evolutionary Biology

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[Trumbull College Fellow]

Research Interests: Insect behavior and evolution; mating signal and speciation in neuropteran insects.



**Michelle Wong**

Assistant Professor of Ecology and Evolutionary Biology

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Research Interests: Ecosystem ecology, biogeochemistry, plant-soil feedbacks, nutrient cycling.

## Affiliated Faculty



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## **Recommendations for Premedical Students**

Most medical schools require:

One year of Biology plus one year of laboratories (University of Texas medical schools require two years of biology)

Two years of Chemistry plus two years of laboratories

One year of Physics plus laboratories

At least one term of calculus; some require a full year of math

Biochemistry plus laboratory is often recommended by medical schools for pre-medical students and is listed by them under the Chemistry requirements, not Biology.

Many medical schools require two terms of English; some require 2-3 terms.

Increasingly, medical schools are recommending/requiring courses in statistics, psychology, and other social sciences.

Medical schools require that all courses used to fulfill the basic pre-medical requirements be taken for a letter grade, not Credit/D/Fail. In addition, only grades of C or higher are accepted. C- or lower grades are not acceptable.

Students who expect to apply to medical school should consult the Health Professions Advising Program (HPAP) at the Office of Career Strategy (OCS) located at 55 Whitney Avenue (203-432-0803), preferably during their first term at Yale. Catalogues for every American and most Canadian medical schools are available on the Internet.

Some state-supported medical schools and a few private medical schools have additional course requirements in the humanities and social sciences. All pre-medical students should check the requirements of their state-supported medical schools, as more than 70% of applicants matriculate in such schools. Individual medical school course requirements for American and Canadian applicants can be found in the AAMC publication, Medical School Admission Requirements (MSAR), available in the Health Professions Department at the Office of Undergraduate Career Services. Also see <https://students-residents.aamc.org/>

The HPAP publishes an informational bulletin with general information, *Preparing to Become a Health Care Professional*, plus specific information for those about to apply for admission to medical school (primarily junior and seniors), *Applying to Medical School*.

Students who are interested in applying as MD/PhD applicants should obtain a copy of the OCS publication, *General Information about MD/PhD Programs*. All are available on the OCS website at [www.yale.edu/career/students/gradprof/medschool](http://www.yale.edu/career/students/gradprof/medschool) or at the OCS office.



## Facilities

The offices and laboratories of the primary faculty members in EEB are in two buildings on Science Hill – Osborn Memorial Laboratories (OML) and the Environmental Sciences Center (ESC) – and on West Campus (YWC). Joint appointees are housed in their home departments. Other laboratories are in the buildings listed below.

**Libraries:** The several science libraries collectively constitute one of the greatest collections of biological literature in the world. The Marx Science and Social Science Library (formerly CSSSI), Peabody Museum (ornithology and entomology), Kline Geology Library (paleobiology), School of the Environment, (forestry and environmental biology), Engineering Library and Medical Library (biomedical sciences) together represent a collection of approximately one million volumes.

The Marx Library is in the concourse level of the Kline Biology Tower. It houses both the literature of sciences and social sciences and supports computing and analysis with its StatLab. Please visit their web site for additional information. [marx.library.yale.edu](http://marx.library.yale.edu)

**Computer Facilities:** Yale Information and Technology Services (ITS) provides both mainframe and microcomputer resources to the student community. A software library is available for download. Biomedical Computer Facilities, located at the Medical School's Center for Medical Informatics and accessed through remote or local terminals, are available for DNA and protein sequence analysis. The residential colleges are fully networked for access to Yale computing facilities and the Internet. [medicine.yale.edu/ycmi](http://medicine.yale.edu/ycmi)

**Peabody Museum of Natural History:** With collections dating to 1825 and now numbering over 2,000,000 units, Yale's Peabody Museum is a major resource for research and teaching in the biological sciences. Of interest to those studying the history and diversity of life are its world-famous holdings of fossil vertebrates, including dinosaurs (150,000 units), fossil invertebrates (275,000 units), and fossil plants (100,000 units), as well as its collections of modern birds (100,000 units), insects (1,250,000 units), other animals (300,000 units), and plants (250,000 units). Students may do research and work with any of the scientific staff members of the Museum. [peabody.yale.edu/education/yale-community/research-work](http://peabody.yale.edu/education/yale-community/research-work)

**Genomics and Molecular Biology Facilities:** University services for all aspects of molecular biological research are available in various Yale facilities. These include oligonucleotide synthesis, DNA sequencing, monoclonal and polyclonal antibody preparation, peptide synthesis, cell sorting, and amino acid analysis. In addition, facilities are available for mass spectrometry and X-ray crystallography. Equipment to generate and analyze DNA chips and protein microarrays are located both at the Yale Medical School and in the Department of Molecular, Cellular, and Developmental Biology (MCDB). Mass spectrometry, high throughput chemical genomic screening, and next generation genomic DNA sequencing including Roche/454 and Illumina/Solexa are available in the MCDB Department. In addition, the laboratories for teaching and faculty research are equipped with state-of-the-art instrumentation and equipment for specific projects.

**Imaging Facilities:** MCDB operates a modern light microscope imaging facility supervised by Dr. Joseph Wolenski. These microscopes are available to the Yale scientific community at competitive hourly rates. Equipment includes two Zeiss LSM 510 confocal inverted microscopes, one with near-infrared two-photon imaging capabilities and a temperature- controlled stage. MCDB also houses a spinning disk confocal microscope and a Nikon wide field microscope equipped with a color camera for histological slides and a sensitive CCD camera for fluorescence imaging.

**Structural Analysis/Electron Microscopy Facilities:** MCDB operates a Structural Analysis Laboratory that includes both scanning and transmission electron microscopes and related equipment for processing, sectioning, and imaging support. These facilities are used in both teaching and research and are core resources also available to members of E&EB and other Science Hill departments.

**Yale Institute for Biospheric Studies (YIBS)**, located on the first floor of the Environmental Science Center, is the umbrella environmental science center on campus. We support and inspire the environmental community at Yale through research and training, grants and fellowships, and weekly seminars and events. We use a collaborative and cross-disciplinary approach to study the entire biosphere: from molecules to landscapes, and everything in between. [yibs.yale.edu](http://yibs.yale.edu)

**The Center for Genetic Analyses of Biodiversity (CGAB)** within YIBS offers one-on-one training and workshops to teach students how to select and use genetic markers and analytical tools. In addition to standard molecular lab equipment, it offers many pieces to assist with modern techniques such as creating libraries for Next Generation Sequencing. [cgab.yale.edu](http://cgab.yale.edu)

**Yale Center for Earth Observation (YCEO)** is a centralized source of remote sensing hardware, software, and expertise for the Yale community. Assistance is available to help users in the selection, procurement, and analysis of satellite images for their research. This research and teaching lab is one of the [Yale Institute of Biospheric Studies \(YIBS\)](http://yibs.yale.edu) research centers, and is co-sponsored by the [Yale School of the Environment](http://yale.edu/school-of-the-environment). Visit: [yceo.yale.edu](http://yceo.yale.edu)

**Plant and Animal Husbandry:** Numerous controlled-environment growth chambers, constant temperature rooms, greenhouses and plant tissue culture facilities are available for environmentally controlled growth of plant materials. The major animal care facility for small mammals for the Arts and Sciences campus is also located on Science Hill.

**Herbarium:** The Yale Herbarium (currently housed in the Peabody Museum) consists of 350,000 systematically arranged plant specimens from the algae to vascular plants. The collection includes significant type specimens in the mosses and ferns with a representation of most families and important genera of the flowering plants. [peabody.yale.edu/explore/collections/botany](http://peabody.yale.edu/explore/collections/botany)

**Marsh Botanical Garden:** The University's botanic garden and arboretum is located north of OML on the grounds of Marsh Hall at Prospect Street and Hillside Terrace. The garden features a diverse collection of native and exotic trees, shrubs, and perennials highlighting plant communities and environmental change. The greenhouses feature plants from tropical regions and arid climates as well as economically important crops. Erika Edwards (Professor of Ecology and Evolutionary Biology) is the Director of the Marsh Botanical Gardens. Kunso Kim is the Associate Director. Garden Staff includes Chris Bolick, Plant Research Facilities Manager, David Garinger, Curator of Greenhouse Plant Collections, Robert Rak, Research Aide and Nathan Guzzo, Horticulturist. [marshbotanicalgarden.yale.edu](http://marshbotanicalgarden.yale.edu).

**Yale's West Campus:** The Core Facilities on Yale's West Campus currently include: Yale Center for Molecular Discovery, Yale Center for Genome Analysis, West Campus Analytical Core, West Campus Imaging Core, West Campus Materials Characterization Core, and West

Campus Cleanroom. The Krios cryo-electron microscope, a technology that is enabling scientists to visualize the molecules of biological life in atomic detail, was unveiled at Yale in 2017. For more information visit: [westcampus.yale.edu/core-centers](http://westcampus.yale.edu/core-centers)

**Yale Nature Preserve:** This tract in the Westville section of New Haven adjoins the Yale Golf Course. It is heavily wooded and has a central pond. Many groups of terrestrial and freshwater organisms are well represented in natural communities.

**Yale Forests:** There are more than 10,000 acres of Yale Forests managed as working forest by the School of the Environment. They are also available by arrangement for research and instruction. Largest and closest is the 7,800-acre Yale-Meyers Forest in northeastern Connecticut. It has some lakes and a diversity of fauna, flora, and natural habitats. [forests.yale.edu](http://forests.yale.edu)

## E&EB Courses 2023-2024

### Required Introductory Courses

**BIOL 101, Biochemistry and Biophysics.** Lilian Kabeche, Michael Koelle & Richard Harrington.  
MW 11:35 – 12:50, 1/2 course credit

Introduction to the study of life at the molecular level. Topics include the three-dimensional structures and function of large biological molecules, the human genome, and the design of antiviral drugs to treat HIV/AIDS. Prerequisite: The first of four modules in a yearlong introductory biology sequence; meets for the first half of the term.

**BIOL 102, Principles of Cell Biology and Membrane Physiology.** Richard Harrington & Amaleah Hartman MW 11:35 – 12:50, 1/2 course credit

Introduction to the study of cell biology and membrane physiology. Topics include the organization and functional properties of biological membranes, membrane physiology and signaling, rough endoplasmic reticulum and synthesis of membrane/secretory membrane proteins, endocytosis, the cytoskeleton, and cell division. Prerequisite: The second of four modules in a yearlong introductory biology sequence; meets for the second half of the term.

**BIOL 103, Genes and Development.** Thomas Loreng & Weimin Zhong.  
MW 11:35 – 12:50, 1/2 course credit

Introduction to genes, genetics, and developmental biology. How genes control development and disease; Mendel's rules; examples of organ physiology. Prerequisite: The third of four modules in a year-long introductory biology sequence; meets for the first half of the term.

**BIOL 104, Principles of Ecology and Evolutionary Biology.** Erika Edwards, Thomas Loreng, & Thomas Near. MW 11:35 – 12:50, 1/2 course credit

Introduction to ecology, evolutionary biology, animal behavior, and the history of life. Evolutionary transitions and natural selection. Adaptation at genic, chromosomal, cellular, organismal, and supra-organismal levels. Distributional and social consequences of suites of organismal adaptations. Prerequisite: The fourth of four modules in a year-long introductory biology sequence; meets for the second half of the term.

## Courses and Laboratories with No Prerequisites

**[E&EB 035, The Ecology of Food.]**

**[E&EB 075, Virus Discovery & Evolution.]**

**E&EB 106/MCDB 106/HLTH 155, Biology of Malaria, Lyme and Other Vector Borne Diseases.** Alexia Belperron. MW 1pm-2:15pm

This introduction to the biology of pathogen transmission from one organism to another by insects focuses on malaria and Lyme disease. Biology of the pathogens including modes of transmission, establishment of infection, host immune responses, and the associated challenges to prevention and treatments.

**[E&EB 115, Conservation Biology.]**

**[E&EB 125/EPS 125, History of Life.]**

**[E&EB 145, Plants & People.]**

**E&EB 210/SD&S 101, Introduction to Statistics: Life Sciences.** Jonathan Reuning-Scherer. TTh 1pm-2:15pm

Statistical and probabilistic analysis of biological issues presented with a unified foundation in basic statistical theory. Problems are drawn from genetics, ecology, epidemiology, and bioinformatics.

**E&EB 223L, Laboratory for Principles of Ecology, Evolutionary Biology, and the Tree of Life.** Marta Wells. T, W, or Th 1:30pm-4:30pm

Study of evolutionary novelties, their functional morphology, and their role in the diversity of life. Introduction to techniques used for studying the diversity of animal body plans. Evolutionary innovations that have allowed groups of organisms to increase their diversity.

**E&EB 225, Evolutionary Biology.** TBA. W 1pm-2:50pm.

An overview of evolutionary biology as the discipline uniting all of the life sciences. Reading and discussion of scientific papers to explore the dynamic aspects of evolutionary biology. Principles of population genetics, paleontology, and systematics; application of evolutionary thinking in disciplines such as developmental biology, ecology, microbiology, molecular biology, and human medicine.

**[E&EB 242, Behavioral Ecology.]**

**[E&EB 246, Plant Diversity & Evolution.]**

**E&EB 250, Biology of Terrestrial Arthropods.** Marta Wells. TTh 11:35am-12:50pm

Evolutionary history and diversity of terrestrial arthropods (body plan, phylogenetic relationships, fossil record); physiology and functional morphology (water relations, thermoregulation, energetics of flying and singing); reproduction (biology of reproduction, life cycles, metamorphosis, parental care); behavior (migration, communication, mating systems, evolution of sociality); ecology (parasitism, mutualism, predator-prey interactions, competition, plant-insect interactions).

**E&EB 255, Invertebrates.** Casey Dunn. TTh 11:35am-12:50pm.

An overview of animal diversity that explores themes including animal phylogenetics (evolutionary

relationships), comparative studies of evolutionary patterns across species, organism structure and function, and the interaction of organisms with their environments. Most animal lineages are marine invertebrates, so marine invertebrates are the focus of most of the course.

**[E&EB 262, Biology of Sharks and Their Relatives.]**

**[E&EB 264, Ichthyology.]**

**[E&EB 272, Ornithology.]**

**[E&EB 275 / EVST 400, Biological Oceanography.]**

**[E&EB 280 / ANTH 310, Mammalogy.]**

**E&EB 290, Comparative Developmental Anatomy of Vertebrates.** Joshua Moyer. MWF 11:35am-12:25pm.

A comparative study of vertebrates that focuses on anatomical diversification over evolutionary time. Topics include major transformations in vertebrate evolution as well as introductions to functional anatomy, vertebrate sensory structures, and evolutionary developmental biology.

**E&EB 291L. Laboratory for Comparative Developmental Anatomy of Vertebrates.** Joshua Moyer. Th or F 1:30 – 4:30

Microscopic examination of histological and embryological preparations. Dissection of selected vertebrate species including shark, bony fish, frog, lizard, and rat. Must be taken concurrently with EEB 290. ½ credit

## Intermediate Courses

Note: Prerequisites for many E&EB courses numbered 200 and above are BIOL 101, 102, 103 and 104, or permission of the instructor.

**E&EB 210/SD&S 101, Introduction to Statistics: Life Sciences.** Jonathan Reuning-Scherer. TTh 1pm-2:15pm

Statistical and probabilistic analysis of biological issues presented with a unified foundation in basic statistical theory. Problems are drawn from genetics, ecology, epidemiology, and bioinformatics

**E&EB 220/E&EB 520/EVST 223. General Ecology.** Carla Staver. MW 11:35am – 12:50pm.

The theory and practice of ecology, including the ecology of individuals, population dynamics and regulation, community structure, ecosystem function, and ecological interactions at broad spatial and temporal scales. Topics such as climate change, fisheries management, and infectious disease are placed in an ecological context. *Prerequisite: MATH 112 or equivalent.*

**E&EB 225/E&EB 525. Evolutionary Biology.** TBA. TTh 10:30am – 11:20am.

An overview of evolutionary biology as the discipline uniting all the life sciences. Reading and discussion of scientific papers to explore the dynamic aspects of evolutionary biology. Principles of population genetics, paleontology, and systematics; application of evolutionary thinking in disciplines such as developmental biology, ecology, microbiology, molecular biology, and human medicine.

**E&EB 228, Ecology and Evolution of Infectious Diseases.** Vanessa Ezenwa & Paul Turner. TTh 10:30am - 11:20am.

Overview of the ecology & evolution of pathogens (bacteria, viruses, protozoa) and their impact on host populations. Topics include theoretical concepts, ecological and evolutionary dynamics, molecular biology, and epidemiology of ancient and emerging diseases.

**[E&EB 230/E&EB 530/EVST 221/F&ES 221. Field Ecology].**

**[E&EB 242/E&EB 542, Behavioral Ecology.]**

**[E&EB 246/E&EB 546. Plant Diversity and Evolution].**

**E&EB 250/E&EB 550. Biology of Terrestrial Arthropods.** Marta M. Wells. TTh 11:35am – 12:50pm.

Evolutionary history and diversity of terrestrial arthropods (body plan, phylogenetic relationships, fossil record); physiology and functional morphology (water relations, thermoregulation, energetics of flying and singing); reproduction (biology of reproduction, life cycles, metamorphosis, parental care); behavior (migration, communication, mating systems, evolution of sociality); ecology (parasitism, mutualism, predator-prey interactions, competition, plant-insect interactions).

**E&EB 255/E&EB 555. Invertebrates.** Casey Dunn. TTh 11:35am-12:50pm.

An overview of animal diversity that explores themes including animal phylogenetics (evolutionary relationships), comparative studies of evolutionary patterns across species, organism structure and function, and the interaction of organisms with their environments. Most animal lineages are marine invertebrates, so marine invertebrates are the focus of most of the course.

[E&EB 264/E&EB 564. Ichthyology].

[E&EB 272/E&EB 572, Ornithology.]

[E&EB 275/EVST 400. Biological Oceanography.]

[E&EB 280/ANTH 310. Mammalogy].

**E&EB 290. Comparative Anatomy of Vertebrates.** Joshua Moyer. MWF 11:35am – 12:25am.

A comparative study of vertebrates that focuses on anatomical diversification over evolutionary time. Topics include major transformations in vertebrate evolution as well as introductions to functional anatomy, vertebrate sensory structures, and evolutionary developmental biology.

**E&EB 295. Life in Motion: Ecological and Evolutionary Physiology.** Joshua Moyer. MW 9:00am - 10:15am.

Physiology studies the functions that organisms perform and how they use those functions to interact with the environment. To survive, grow, and reproduce, all organisms must acquire energy and avoid conditions that exceed their physiological limits. These interactions all involve motion—ions travel across membranes, muscle fibers twitch, organisms breathe and move. In this course, we view physiological processes from both “bottom up” and “top down” approaches, with integration among these dimensions, to extract general physiological rules of life. Then, we link our discoveries to the broader context of ongoing global change, and consider whether and how organisms can physiologically respond to contemporary selective pressures. While the course focuses heavily on animal physiology, plants, fungi, and microbes are also featured. *Prerequisites: BIOL 101-104 and CHEM 161, or instructor permission.*



## Laboratories

**[E&EB 075L. Laboratory for Virus Discovery and Evolution.]**

**E&EB 223L/E&EB 523L, Laboratory for Principles of Ecology, Evolutionary Biology, and the Tree of Life.** Marta Wells. W 1:30pm-4:30pm

Study of evolutionary novelties, their functional morphology, and their role in the diversity of life. Introduction to techniques used for studying the diversity of animal body plans. Evolutionary innovations that have allowed groups of organisms to increase their diversity. ½ credit.

**[E&EB 247L/E&EB 547L. Laboratory for Plant Diversity and Evolution].**

**E&EB 251L/E&EB 551L. Laboratory for Biology of Terrestrial Arthropods.** Marta Wells. W 1:30pm – 4:30pm

Comparative anatomy, dissections, identification, and classification of terrestrial arthropods; specimen collection; field trips. May be taken concurrently with or after E&EB 250. ½ credit

**E&EB 256L/E&EB 556L. Laboratory for Invertebrates.** Casey Dunn. Th 1:30pm-4:30pm.

The study of invertebrate anatomy and diversity in a laboratory and field setting. Activities will include examination of live animals and museum specimens, as well as local field trips. Some field trips will fall on weekends. Must be taken concurrently with E&EB 255; instructor permission required. ½ credit.

**[E&EB 263L Laboratory for the Biology of Sharks and Their Relatives.]**

**[E&EB 265L/E&EB 565L. Laboratory for Ichthyology.]**

**[E&EB 273L/E&EB 673L. Laboratory for Ornithology.]**

**E&EB 291L. Laboratory for Comparative Developmental Anatomy of Vertebrates.** Joshua Moyer. Th or F 1:30 – 4:30

Microscopic examination of histological and embryological preparations. Dissection of selected vertebrate species including shark, bony fish, frog, lizard, and rat. Must be taken concurrently with EEB 290. ½ credit

**[E&EB 327L/E&EB 627L. Laboratory for Plant Structure and Function.]**

## Advanced Courses

**[E&EB 305/E&EB 705, Plant Ecology].**

**E&EB 320/E&EB 620, Community Ecology.** David Vasseur. TTh 1:00pm-2:15pm.

This course covers core questions in community ecology related to species interactions, species coexistence theory, species-environment interactions, the consequences of biological diversity, spatial ecology, food webs, and eco-evolutionary interactions. Lectures emphasize the theoretical and conceptual foundations of these topics and incorporate the empirical and experimental evidence supporting and confronting contemporary views. *Prerequisites: E&EB 220 or EVST 223, or with instructor permission.*

**[E&EB 321/E&EB 621, Philosophy of Biology].**

**E&EB 322/E&EB 622, Evolutionary Genetics.** Jennifer Coughlan. MW 1:00pm-2:15pm.

Genetic variation is the currency by which natural selection is translated into evolutionary change. In this course we dissect patterns of genetic variation using an evolutionary mindset to ultimately understand what shapes genetic variation in nature and the potential for species to adapt to new and changing environments. This class unites two foundational fields of evolutionary genetics; quantitative genetics (the study of the genetic basis of complex traits) and population genetics (the study of gene variant frequencies across time and space), with an ultimate goal of understanding evolutionary change in nature. Although this course is lecture based, there is much opportunity for hands-on learning. Students use real-life and simulated genetic data to map the genetic basis of traits and investigate the evolutionary forces responsible for shaping genetic variation in nature. We also discuss how quantitative and population genetics theory are applied to the modern genomic era, particularly in the context of detecting genomic signatures of adaptation. Lastly, we discuss the application of evolutionary genetics to human populations, including the usefulness and missteps of these applications for science and society. *Prerequisite: E&EB 225.*

**[E&EB 325/E&EB 625, Limnology].**

**[E&EB 326/E&EB 626, Plant Structure and Function].**

**E&EB 330/E&EB 620/EVST 330, Ecosystem Ecology.** Michelle Wong. MW 11:35-12:50.

Ecosystem ecology asks how abiotic and biotic processes come together to shape the diversity in form and function across Earth's ecosystems, from the flow of energy and materials through the environment, to how communities of organisms interact with their environment. This course examines the factors that influence ecosystem structure and function: the processes that shape how energy, water, carbon, and nutrients cycle through ecosystems, the role of disturbance on these processes, and feedbacks from human-induced global change. *Prerequisite: E&EB 220 or instructor permission.*

**E&EB 335/E&EB 635/HLTH 250, Evolution and Medicine.** Brandon Ogbunu. TTh 1:00pm-2:15pm.

Introduction to the ways in which evolutionary science informs medical research and clinical practice. Diseases of civilization and their relation to humans' evolutionary past; the evolution of human defense mechanisms; antibiotic resistance and virulence in pathogens; cancer as an evolutionary process. Students view course lectures online; class time focuses on discussion of lecture topics and research papers. *Prerequisites: BIOL 101-104.*

**[E&EB 336/HUMS 336/HSHM 453, Culture and Human Evolution.]**

**[E&EB 342/E&EB 842/ANTH 335/ANTH 835, Primate Diversity and Evolution.]**

**[E&EB 354/E&EB 654, Phylogenetic Biology.]**

**[E&EB 362, Tropical Field Biology.]**

**E&EB 375, Topics in Vertebrate Ecomorphology.** Joshua Moyer. MW 1:00pm-2:15pm.

Ecomorphology is a field that bridges ecology and evolutionary neology. Researchers studying organisms' ecomorphology ask questions like, "What does the morphology of an organism tell us about its relationship with its environment" and "How are correlations between morphology and ecology influenced by behavior?" The answers to questions like these inform evolutionary hypotheses based on natural selection and help to explain the amazing diversity of life forms that surround us. In this course, we explore the links between organismal form, function, ecology, and evolution using a series of readings and guided discussions. Students also learn many of the fundamentals associated with crafting and revising publishable scientific writing – a must for those seeking research-based graduate education in the sciences. By the end of the semester, students refine their critical thinking and scientific writing skills, and they have a newfound awareness of one of the most integrative and fascinating branches of vertebrate biology. *Prerequisites: BIOL 101-104.*

**[E&EB 380/E&EB 680, Life History Evolution,]**

**[E&EB 428/AMTH 428/G&G 428/PHYS 428/G&G 528, Science of Complex Systems.]**

**[E&EB 460/E&EB 960, Studies in Evolutionary Medicine I.]**

**[E&EB 461 E&EB 961, Studies in Evolutionary Medicine II.]**

**E&EB 464/ANTH 464/ANTH 864/ARCG 464/ARCG 864, Human Osteology.** Eric Sargis TTh 2:30pm-3:45pm

A lecture and laboratory course focusing on the characteristics of the human skeleton and its use in studies of functional morphology, paleo demography, and paleopathology. Laboratories familiarize students with skeletal parts; lectures focus on the nature of bone tissue, its biomechanical modification, sexing, aging, and interpretation of lesions.

## **E&EB Research and Tutorials**

### **E&EB 469. Tutorial.** Marta Wells

Individual or small-group study for qualified underclass students who wish to investigate an area of ecology or evolutionary biology not presently covered by regular courses. A student must be sponsored by a faculty member who sets requirements and meets with the student. A term paper is required at the end of the semester. To register, the student must submit a written plan of study (proposal) approved by the faculty instructor, as well as Assistant DUS Marta Wells. Students are encouraged to apply during the term preceding the tutorial by registering and submitting a pre-proposal. Students' final proposals must be submitted no later than the first 10 days of the term in which the student begins the tutorial. The final paper is due in the hands of the faculty instructor and the Assistant DUS by the last day of the reading period in the term of enrollment. In special cases, with approval of the director of undergraduate studies, this course may be elected for more than one term. Normally, faculty sponsors must be members of the E&EB department. Underclassmen will receive one credit and a grade of P/F.

### **E&EB 470. Senior Tutorial.** Marta Wells

Tutorial for seniors in the B.A. degree program who elect a term of independent study to complete the senior requirement. Individual or small-group study for qualified students who wish to investigate an area of ecology or evolutionary biology not presently covered by regular courses. A student must be sponsored by a faculty member who sets requirements and meets weekly with the student. A term paper is required at the end of the semester. To register, the student must submit a written plan of study approved by the faculty instructor, as well as Assistant DUS Marta Wells. Students are encouraged to apply during the term preceding the tutorial by registering and submitting a pre-proposal. Students' final proposals must be submitted no later than the first 10 days of the term in which the student begins the tutorial. The final paper is due in the hands of the faculty instructor and the Assistant DUS by the last day of reading period in term of enrollment. Normally, faculty sponsors must be members of EEB department. Enrollment limited to seniors. Fulfills the senior requirement for B.A. degree.

### **E&EB 474. Research.** Marta Wells

One term of original research in an area relevant to ecology or evolutionary biology. This may involve, for example, laboratory work, fieldwork, or mathematical or computer modeling. Students may also work in areas related to environmental biology such as policy, economics, or ethics. The research project may not be a review of relevant literature but must be original. In all cases students must have a faculty sponsor who oversees the research and is responsible for the rigor of the project. *An average of 10 hours per week is required.* To register, students are encouraged to apply during the term preceding the research by registering and submitting a *preproposal*. A student's *final proposal* must be submitted no later than the first 10 days of the term in which the student begins the research, with the faculty mentor's signature of approval. The final research paper is due to both the faculty mentor and Assistant DUS Marta Wells by the last day of the reading period in the term of enrollment. With the approval of the Director of Undergraduate Studies, this course may be elected for more than one term. Underclassmen will receive one credit and a grade of P/F.

**E&EB 475/476. Senior Research.** Marta Wells

Two terms of original research in an area relevant to ecology or evolutionary biology. This may involve, for example, laboratory work, fieldwork, or mathematical or computer modeling. Students may also work in areas related to environmental biology such as policy, economics, or ethics. The research project may not be a review of relevant literature but must be original. In all cases students must have a faculty sponsor who oversees the research and is responsible for the rigor of the project. *An average of 10 hours per week is required.* To register, students are encouraged to apply during the term preceding the research by registering and submitting a *preproposal*. A student's *final proposal* must be submitted no later than the first 10 days of the term in which the student begins the research, with approved signature by the faculty mentor. The final research paper is due to both the faculty mentor and Assistant DUS Marta Wells by the last day of the reading period in the term of enrollment. Enrollment is limited to seniors. A letter grade with two credits (1 credit per semester) will be awarded. Fulfills the senior requirement for the B.S. degree.

**E&EB 495/496. Intensive Senior Research.** Marta Wells

Two terms of intensive original research in an area relevant to ecology or evolutionary biology. This may involve, for example, laboratory work, fieldwork, or mathematical or computer modeling. Students may also work in areas related to environmental biology such as policy, economics, or ethics. The research project may not be a review of relevant literature but must be original. In all cases students must have a faculty sponsor who oversees the research and is responsible for the rigor of the project. *An average of 20 hours per week is required.* To register, students are encouraged to apply during the term preceding the research by registering and submitting a *preproposal*. A student's *final proposal* must be submitted no later than the first 10 days of the term in which the student begins the research, with the faculty mentor's signature of approval. The final research paper is due to both the faculty mentor and Assistant DUS Marta Wells by the last day of the reading period in the term of enrollment. Enrollment is limited to seniors. A letter grade with four credits (2 credits per semester) will be awarded. Fulfills the senior requirement for the B.S. degree.

## Graduate Courses and Labs

With permission of the instructor, advanced undergraduates may take graduate courses for credit. If you are interested in one of these, first consult the instructor and then request permission through Yale Course Search registration. For current course descriptions and other information, please use <https://courses.yale.edu/>.

**E&EB 500 & 501, Advanced Topics in Ecology & Evolutionary Biology.** DGS.

[E&EB 530, Field Ecology.]

**E&EB 545, Responsible Conduct of Research.** DGS.

[E&EB 621, Philosophy of Biology.]

**E&EB 622, Evolutionary Genetics.** Jennifer Coughlan.

[E&EB 636, Biosocial Science.]

[E&EB 652, Evolutionary Theory.]

**E&EB 712, Foundations of Ecology.** David Vasseur.

[E&EB 713, From Biodiversity Science to Conservation Impact.]

[E&EB 717, Structuralism and Macroevolution.]

**E&EB 721, Foundations of Terrestrial Ecology.** Michelle Wong.

[E&EB 725, Scientific Writing for Ecology & Evolutionary Biology.]

[E&EB 729, Microbial Ecology & Evolution.]

[E&EB 800, Seminar in Molecular Evolution.]

[E&EB 821, Advanced Topics in Philosophy of Biology.]

**E&EB 830, The Ecology of the Great Pandemics.** Brandon Ogbunu.

[E&EB 842, Primate Diversity and Evolution.]

[E&EB 854, The Behavioral Immune System.]

**E&EB 856, Special Topics in the Ecology and Evolution of Infectious Diseases.** Vanessa Ezenwa.

[E&EB 865, Evolutionary Architects: Organisms as Targets and Agents of Natural Selection.]

[E&EB 872, Speciation and Adaptation Genomics.]

[E&EB 875, Phenotypic Plasticity and Evolution]

**E&EB 930, Seminar in Systematics.** Jacques Gauthier

## 2023 Senior Projects

### Presenter and Title

### Faculty Advisor

#### Selu Adams

Characterizing Riparian Vegetation Associated with Simulated Beaver Dams in South-central Colorado

William Lauenroth

#### Ivana Barnes

Molecular Phylogenetic Analysis of Crayfishes in the Southeastern United States

Tom Near

#### Daviana Berkowitz Sklar

A Socio-Ecological Study of a Costa Rica Fishery through Fisher Local Ecological Knowledge (LEK) and Satellite Tracking

Oswald Schmidt

#### Chase Brownstein

Drivers of Evolutionary Stasis and Speciation in a Depauperate Clade of Vertebrates

Tom Near

#### Virginia Davis

Intertwining Life History and Reproductive CAM in *Cistanthe longiscapa*

Erika Edwards

#### Julia de los Reyes

Early Bloomers in a Changing Climate: An Exploration of Plant Reproductive Phenology in 100 New England Species

Patrick Sweeney

#### Camilla Emsbo

The Microbiome in Relation to Blood Lead Concentrations in Mottled Ducks

Brandon Ogbunu

#### Derek Fucich

Engineering Fire: The Drivers of Low Fire Intensity over the Mounds of the Gopher Tortoise

Carla Staver

#### Leah Genth

The Effects of Sex and Conspecific Density on Herbivory in a Dioecious Tropical Tree Species

Simon Queenborough

#### Miles Goldenberg

Profiling Antibiotic Resistance in *Vibrio cholerae* Isolated from Mallard Ducks

Brandon Ogbunu

#### ShiJi Guan

A Review of Vertebrate Mechanosensory Structures through the Lateral Line System

Josh Moyer

#### Marsh Hlavka

Breeding Bird Diversity Across a 30-Year Chronosequence in Oak-Hickory Shelterwoods

Marlyse Duguid

#### Laurel Humphreys

Characterizing Fungal Communities across Height and Epiphytic Bryophyte Substrates in Temperate Rainforest Canopies

Tom Near

#### Emmy James

Salamander Fight Club: Heat-Induced Behavioral Plasticity in Plethodon Hybrids

Martha Muñoz

<b>Daniel Ma</b> Characterizing Factors Affecting the Courses of Cholera Epidemics across History	Brandon Ogbunu
<b>Maxine Mackie</b> Investigating Double-stranded RNA (dsRNA) Stimulation in Anti-tumor Immunity through the Expression of Immune Cell Surface Markers	Jeffrey Ishizuka
<b>Emme Magliato</b> Developing an ELISA-based Diagnostic Test for Leptospirosis Using Highly Conserved <i>Leptospira</i> Protein Epitopes	Elsio Wunder
<b>Kiran Masroor</b> Evolutionary Drivers of Thermal Tolerance in Phrynosomatid Lizards	Martha Muñoz
<b>Madeline Meade</b> Using New Behavioral Metrics to Assess Rhesus macaque ( <i>Macaca mulatta</i> ) Theory of Mind	Laurie Santos
<b>Erika Mendez</b> The Regenerative Capacities of Axolotls	Martha Muñoz
<b>Vanessa Nunez</b> Constantly Moving Targets: A Systematic Review of Evolutionary Considerations and Impacts of Vaccination on Infectious Diseases	Vanessa Ezenwa
<b>Odera Nweke</b> Contribution of Life History Tradeoffs to Viral Coexistence	Paul Turner
<b>Jack Parker</b> Evolutionary Differences in Human and Mouse Fibroblast Populated Collagen Lattices	Henry Hsia
<b>Sam Pletcher</b> A Study of Oyster Aquaculture as Fish Habitat in Southwestern Connecticut	Mary Beth Decker
<b>David Rubin</b> The Impact of Forest Management on Native Bee Populations in Southern New England	Marlyse Duguid
<b>Noora Said</b> Evaluating the Impact of Border Walls: Implications for Biodiversity and Large Species	Marta Wells
<b>Tina Wu</b> Photoperiodic Diapause in <i>Aedes albopictus</i> in Japan and the United States	Luciano Cosme
<b>Gemma Yoo</b> Conservation of Genetic Determinants of Thorn Meristem Identity in Citrus	Vivian Irish
<b>Sophia Zhuang</b> Immigration and Environmental Mismatch: How Changing Dietary Habits Affect Immigrant Health and Clinical Practice in the United States	Brandon Ogbunu



## **Appendix I – Worksheets for E&EB**

The following pages are worksheets that aid the potential major in planning a course of study.

Bachelor of Arts    Biodiversity & the Environment

Bachelor of Arts    Organismal Biology

Bachelor of Science    Biodiversity & the Environment

Bachelor of Science    Organismal Biology



## E&EB Major Worksheet B.A. Degree B&E Track

Name: \_\_\_\_\_  
 Date: \_\_\_\_\_  
 Class: \_\_\_\_\_  
 College: \_\_\_\_\_  
 Advisor: \_\_\_\_\_  
 Email: \_\_\_\_\_

### Prerequisites

#### Biology Introductory Courses

BIOL 101	Biochemistry & Biophysics
BIOL 102	Principles of Cell Biology & Membrane Physiology
BIOL 103	Genes & Development
BIOL 104	Principles of Ecology & Evolutionary Biology

Course	Semester	Grade	Place Out

#### 2 terms of General Chemistry

CHEM 161 & 165
CHEM 163 & 167

Course	Semester	Grade	Place Out

#### 2 terms of General Chemistry Labs

CHEM 134L
CHEM 136L

Course	Semester	Grade	Place Out

#### 1 term of Math or Statistics & Data Science

MATH 115	S&DS 100
MATH 116	S&DS 230

Course	Semester	Grade	Place Out

#### 4 total credits, no more than two term lecture courses per department

CHEM 174 or 220	MATH 115 or 116	S&DS 100-106
CHEM 175 or 221	MATH 118 or 120	S&DS 220
CHEM 222L	MATH 222 or 225	S&DS 230
CHEM 223L	MATH 230 or 231	S&DS 238
EPS 110	MATH 235	S&DS 240
EPS 212	MATH 241	PHYS 170 or 180
EPS 220	MATH 242	PHYS 171 or 181
EPS 222	MATH 244	CPSC 100
EPS 232	MATH 246	CPSC 112
EPS 240	MATH 247	CPSC 123
EPS 255	MATH 250	CPSC 201
	MATH 255	

Course	Semester	Grade	# Credit

#### Required Core Courses: B&E Track

E&EB 220	General Ecology
E&EB 225	Evolutionary Biology
E&EB 2xx or 3xx	Organismal Diversity Lecture
E&EB 2xxL or 3xxL	Organismal Diversity Lab

Course	Semester	Grade

#### Independent Research for Underclassmen (P/F) (optional, but recommended)

E&EB 469	Tutorial
E&EB 474	Research

Course	Semester	Grade	Advisor

#### B.A. Senior Requirement - choose one. Must be taken in senior year.

E&EB 470	Senior Tutorial (1 credit)
xxx	Senior Essay (0 credit)

Course	Semester	Grade	Advisor



## E&EB Major Worksheet B.A. Degree O.B. Track

Name: \_\_\_\_\_  
 Date: \_\_\_\_\_  
 Class: \_\_\_\_\_  
 College: \_\_\_\_\_  
 Advisor: \_\_\_\_\_  
 Email: \_\_\_\_\_

### Prerequisites

#### *Biology Introductory Courses*

BIOL 101	Biochemistry & Biophysics
BIOL 102	Principles of Cell Biology & Membrane Physiology
BIOL 103	Genes & Development
BIOL 104	Principles of Ecology & Evolutionary Biology

Course	Semester	Grade	Place Out

#### *2 terms of General Chemistry*

CHEM 161 & 165
CHEM 163 & 167

Course	Semester	Grade	Place Out

#### *2 terms of General Chemistry Labs*

CHEM 134L
CHEM 136L

Course	Semester	Grade	Place Out

#### *1 term of Math or Statistics & Data Science*

MATH 115	S&DS 100
MATH 116	S&DS 230

Course	Semester	Grade	Place Out

#### *4 total credits, no more than two term lecture courses per department*

CHEM 174 or 220	MATH 115 or 116	S&DS 100-106
CHEM 175 or 221	MATH 118 or 120	S&DS 220
CHEM 222L	MATH 222 or 225	S&DS 230
CHEM 223L	MATH 230 or 231	S&DS 238
EPS 110	MATH 235	S&DS 240
EPS 212	MATH 241	PHYS 170 or 180
EPS 220	MATH 242	PHYS 171 or 181
EPS 222	MATH 244	CPSC 100
EPS 232	MATH 246	CPSC 112
EPS 240	MATH 247	CPSC 123
EPS 255	MATH 250	CPSC 201
	MATH 255	

Course	Semester	Grade	# Credit

#### Required Core Courses: O.B. Track

MCDB/MB&B 300	Biochemistry
E&EB 295 or BENG 350	Comparative Physiology or Physiological Systems
E&EB 290	Comparative Anatomy
E&EB 291L	Comparative Anatomy Lab

Course	Semester	Grade

#### Independent Research for Underclassmen (P/F) (optional, but recommended)

E&EB 469	Tutorial
E&EB 474	Research

Course	Semester	Grade	Advisor

#### B.A. Senior Requirement - choose one. Must be taken in senior year.

E&EB 470	Senior Tutorial (1 credit)
xxx	Senior Essay (0 credit)

Course	Semester	Grade	Advisor



## E&EB Major Worksheet B.S. Degree B&E Track

Name: \_\_\_\_\_  
 Date: \_\_\_\_\_  
 Class: \_\_\_\_\_  
 College: \_\_\_\_\_  
 Advisor: \_\_\_\_\_  
 Email: \_\_\_\_\_

### Prerequisites

#### *Biology Introductory Courses*

- BIOL 101            Biochemistry & Biophysics  
 BIOL 102            Principles of Cell Biology & Membrane Physiology  
 BIOL 103            Genes & Development  
 BIOL 104            Principles of Ecology & Evolutionary Biology

#### *2 terms of General Chemistry*

- CHEM 161 & 165  
 CHEM 163 & 167

#### *2 terms of General Chemistry Labs*

- CHEM 134L  
 CHEM 136L

#### *1 term of Math or Statistics & Data Science*

- MATH 115            S&DS 100  
 MATH 116            S&DS 230

#### *4 total credits, no more than two term lecture courses per department*

- CHEM 174 or 220    MATH 115 or 116            S&DS 100-106  
 CHEM 175 or 221    MATH 118 or 120            S&DS 220  
 CHEM 222L            MATH 222 or 225            S&DS 230  
 CHEM 223L            MATH 230 or 231            S&DS 238  
 EPS 110                MATH 235                    S&DS 240  
 EPS 212                MATH 241                    PHYS 170 or 180  
 EPS 220                MATH 242                    PHYS 171 or 181  
 EPS 222                MATH 244                    CPSC 100  
 EPS 232                MATH 246                    CPSC 112  
 EPS 240                MATH 247                    CPSC 123  
 EPS 255                MATH 250                    CPSC 201  
                               MATH 255

Course	Semester	Grade	Place Out

Course	Semester	Grade	Place Out

Course	Semester	Grade	Place Out

Course	Semester	Grade	Place Out

Course	Semester	Grade	# Credit

#### Required Core Courses: B&E Track

- E&EB 220            General Ecology  
 E&EB 225            Evolutionary Biology  
 E&EB 2xx or 3xx    Organismal Diversity Lecture  
 E&EB 2xxL or 3xxL Organismal Diversity Lab

Course	Semester	Grade

#### Required Electives: B&E Track

2 terms of science electives: choose from 200+ level lecture courses in E&EB, MCDB, or MB&B; 200+ level science labs, or other dept. with DUS approval

Course	Semester	Grade

#### Independent Research for Underclassmen (P/F) (optional, but recommended)

- E&EB 469            Tutorial  
 E&EB 474            Research

Course	Semester	Grade	Advisor

#### B.S. Senior Requirement - 2 terms required in senior year

- E&EB 475 & 476    Senior Research (1 credit each)  
 E&EB 495 & 496    Intensive Senior Research (2 credits each)

Course	Semester	Grade	Advisor



## E&EB Major Worksheet B.S. Degree O.B. Track

Name: \_\_\_\_\_  
 Date: \_\_\_\_\_  
 Class: \_\_\_\_\_  
 College: \_\_\_\_\_  
 Advisor: \_\_\_\_\_  
 Email: \_\_\_\_\_

### Prerequisites

#### *Biology Introductory Courses*

BIOL 101	Biochemistry & Biophysics
BIOL 102	Principles of Cell Biology & Membrane Physiology
BIOL 103	Genes & Development
BIOL 104	Principles of Ecology & Evolutionary Biology

Course	Semester	Grade	Place Out

#### *2 terms of General Chemistry*

CHEM 161 & 165
CHEM 163 & 167

Course	Semester	Grade	Place Out

#### *2 terms of General Chemistry Labs*

CHEM 134L
CHEM 136L

Course	Semester	Grade	Place Out

#### *1 term of Math or Statistics & Data Science*

MATH 115	S&DS 100
MATH 116	S&DS 230

Course	Semester	Grade	Place Out

#### *4 total credits, no more than two term lecture courses per department*

CHEM 174 or 220	MATH 115 or 116	S&DS 100-106
CHEM 175 or 221	MATH 118 or 120	S&DS 220
CHEM 222L	MATH 222 or 225	S&DS 230
CHEM 223L	MATH 230 or 231	S&DS 238
EPS 110	MATH 235	S&DS 240
EPS 212	MATH 241	PHYS 170 or 180
EPS 220	MATH 242	PHYS 171 or 181
EPS 222	MATH 244	CPSC 100
EPS 232	MATH 246	CPSC 112
EPS 240	MATH 247	CPSC 123
EPS 255	MATH 250	CPSC 201
	MATH 255	

Course	Semester	Grade	# Credit

#### Required Core Courses: O.B. Track

MCDB/MB&B 300	Biochemistry
E&EB 295 or BENG 350	Comparative Physiology or Physiological Systems
E&EB 290	Comparative Anatomy
E&EB 291L	Comparative Anatomy Lab

Course	Semester	Grade

#### Required Electives: O.B. Track

2 terms of science electives: choose from 200+ level lecture courses in E&EB, MCDB, or MB&B; 200+ level science labs, or other dept. with DUS approval

Course	Semester	Grade

#### Independent Research for Underclassmen (P/F) (optional but recommended)

E&EB 469	Tutorial
E&EB 474	Research

Course	Semester	Grade	Advisor

#### B.S. Senior Requirement - 2 terms required in senior year

E&EB 475 & 476	Senior Research (1 credit each)
E&EB 495 & 496	Intensive Senior Research (2 credits each)

Course	Semester	Grade	Advisor

## **Appendix II – Forms for Tutorial & Research Courses**

E&EB 469	Underclass Tutorial
E&EB 470	Senior Tutorial
E&EB 474	Research
E&EB 475 & 476	Senior Research
E&EB 495 & 496	Senior Intensive Research
	Senior Essay

**EEB 469: Underclass Tutorial**  
**Department of Ecology and Evolutionary Biology**

Submission Date:	Semester:	
<b>STUDENT INFORMATION</b>		
Student's Last Name:	First:	Middle:
Email Address:		
Class:	Student ID:	Cell Phone:
Title for Tutorial:		
Are you an EEB major?		
Student's Signature:		
Date:		
<b>DESCRIPTION OF UNDERCLASS TUTORIAL REQUIREMENTS</b>		
<p>Individual or small-group of underclass students who wish to investigate an area of ecology or evolutionary biology not presently covered by regular courses. A student must be sponsored by a faculty member who sets requirements and meets with the student. A term paper is required. To register, the student must submit a written plan of study (proposal) approved by the faculty instructor, as well as EEB faculty in charge Marta Wells. Students are encouraged to apply during the term preceding the tutorial by registering and submitting a <b>preproposal</b>. A student's <b>final proposal</b> must be submitted no later than the first 10 days of the term in which the student begins the tutorial. The final paper is due in the hands of the faculty mentor and the EEB faculty in charge by the last day of reading period in the term of enrollment. In special cases, with the approval of the director of undergraduate studies, this course may be elected for more than one term. Please attach this form to your proposal and return to the faculty in charge (see below). Underclass students will receive one credit and a grade of P/F.</p>		
<b>TO THE TUTORIAL MENTOR</b>		
<p>By signing this form, you agree to supervise the student's project. You also agree to grade the final paper and report a grade to the EEB Assistant DUS based on exam(s) or term paper. This should be reported no later than the last day of the final examination period. Notification by email is acceptable and preferred to the EEB faculty in charge: <a href="mailto:marta.wells@yale.edu">marta.wells@yale.edu</a> (or the EEB Registrar: <a href="mailto:kelly.pyers@yale.edu">kelly.pyers@yale.edu</a>).</p>		
<b>MENTOR'S INFORMATION</b>		
Mentor's Name:		
Mentor's Email:		
Mentor's Phone:		
Mentor's Signature:		
Date:		
<b>FACULTY APPROVAL</b>		
EEB Faculty in Charge Signature:		
Date:		

**EEB 470: Senior Tutorial**  
**Department of Ecology and Evolutionary Biology**

Submission Date:	Semester:	
<b>STUDENT INFORMATION</b>		
Student's Last Name:	First:	Middle:
Email Address:		
Class:	Student ID:	Cell Phone:
Title for Tutorial:		
B.A. Senior Requirement:	YES	NO
Student's Signature:		
Date:		
<b>DESCRIPTION OF SENIOR TUTORIAL REQUIREMENTS</b>		
<p>Individual or small-group study for qualified students who wish to investigate an area of ecology or evolutionary biology not presently covered by regular courses. A student must be sponsored by a faculty member who sets requirements and meets weekly with the student. A term paper is required at the end of the semester. To register, a student must submit a written plan of study approved by the faculty instructor to the EEB faculty in charge. Students are encouraged to apply during the term preceding the tutorial by registering and submitting a <b>preproposal</b>. A student's <b>final proposal</b> must be submitted no later than the first 10 days of the term in which the student begins the tutorial. The final paper is due in the hands of the EEB faculty in charge by the last day of reading period in the term of enrollment. Proposals must be submitted no later than the first day of the second week of the term in which the student enrolls in the tutorial. The final paper is due in the hands of the faculty instructor and the EEB faculty in charge (Marta Wells) by the last day of reading period in the term of enrollment. Normally, faculty sponsors must be members of the EEB department. Please attach this form to your proposal and return to the faculty in charge (see below). Enrollment limited to seniors. Fulfills the senior requirement for the B.A. degree.</p>		
<b>TO THE TUTORIAL MENTOR</b>		
<p>By signing this form, you agree to supervise the student's project. You also agree to grade the final paper and report a grade to the EEB Assistant DUS based on exam(s) or term paper. This should be reported no later than the last day of the final examination period. Notification by email is acceptable and preferred to the EEB faculty in charge: <a href="mailto:marta.wells@yale.edu">marta.wells@yale.edu</a> (or the EEB Registrar: <a href="mailto:kelly.pyers@yale.edu">kelly.pyers@yale.edu</a>).</p>		
<b>MENTOR'S INFORMATION</b>		
Mentor's Name:		
Mentor's Email:		
Mentor's Phone:		
Mentor's Signature:		
Date:		
<b>FACULTY APPROVAL</b>		
EEB Faculty in Charge Signature:		
Date:		

Rev. 6/1/22



**EEB 474: Underclass Research**  
**Department of Ecology and Evolutionary Biology**

Submission Date:	Semester:	
<b>STUDENT INFORMATION</b>		
Student's Last Name:	First:	Middle:
Email Address:		
Class:	Student ID:	Cell Phone:
Project Title:		
Are you an EEB major?		
Student's Signature:		
Date:		
<b>DESCRIPTION OF UNDERCLASS RESEARCH REQUIREMENTS</b>		
<p>One term of original research in an area relevant to ecology or evolutionary biology. This may involve, for example, laboratory work, fieldwork, or mathematical or computer modeling. Students may also work in areas related to environmental biology such as policy, economics, or ethics. The research project may not be a review of relevant literature but must be original. In all cases students must have a faculty sponsor who oversees the research and is responsible for the rigor of the project. An average of <b>10 hours per week</b> is required. Students are encouraged to apply during the term preceding the research by registering and submitting a <b>preproposal</b>. A student's <b>final proposal</b> must be submitted no later than the first 10 days of the term in which the student begins the research, with the faculty mentor's signature of approval. The final research paper is due in the hands of the faculty instructor and EEB faculty in charge (Marta Wells) by the last day of reading period in the term of enrollment. Please attach this form to your proposal and return to the faculty in charge (see below). Underclass students will receive one credit and a grade of P/F.</p>		
<b>TO THE TUTORIAL MENTOR</b>		
<p>By signing this form, you agree to supervise the student's project. You also agree to grade the final paper and report a grade to the EEB Assistant DUS based on exam(s) or term paper. This should be reported no later than the last day of the final examination period. Notification by email is acceptable and preferred to the EEB faculty in charge: <a href="mailto:marta.wells@yale.edu">marta.wells@yale.edu</a> (or the EEB Registrar: <a href="mailto:kelly.pyers@yale.edu">kelly.pyers@yale.edu</a>).</p>		
<b>MENTOR'S INFORMATION</b>		
Mentor's Name:		
Mentor's Email:		
Mentor's Phone:		
Mentor's Signature:		
Date:		
<b>FACULTY APPROVAL</b>		
EEB Faculty in Charge Signature:		
Date:		

Rev. 6/1/22

**EEB 475 and 476: Senior Research  
Department of Ecology and Evolutionary Biology**

Submission Date:	Semester:	
<b>STUDENT INFORMATION</b>		
Student's Last Name:	First:	Middle:
Email Address:		
Class:	Student ID:	Cell Phone:
Title for Research:		
B.S. Senior Requirement:	YES	NO
Student's Signature:		
Date:		
<b>DESCRIPTION OF SENIOR RESEARCH REQUIREMENTS</b>		
<p>Two terms of original research in an area relevant to ecology or evolutionary biology. This may involve, for example, laboratory work, fieldwork, or mathematical or computer modeling. Students may also work in areas related to environmental biology such as policy, economics, or ethics. The research project may not be a review of relevant literature but must be original. In all cases students must have a faculty sponsor who oversees the research and is responsible for the rigor of the project. An average of <b>10 hours per week</b> is required. To register, students are encouraged to apply during the term preceding the research by registering and submitting a <b>preproposal</b>. A student's <b>final proposal</b> must be submitted no later than the first 10 days of the term in which the student begins the tutorial, with the faculty mentor's signature of approval. The final research paper is due in the hands of the faculty mentor and the EEB faculty in charge by the last day of reading period in the term of enrollment. Please attach this form to your proposal and return to the faculty in charge (see below). Enrollment limited to seniors. A letter grade with two credits (1 credit per semester) will be awarded. Fulfills the senior requirement for the B.S. degree.</p>		
<b>TO THE TUTORIAL MENTOR</b>		
<p>By signing this form, you agree to supervise the student's project. You also agree to grade the final paper and report a grade to the EEB Assistant DUS based on exam(s) or term paper. This should be reported no later than the last day of the final examination period. Notification by email is acceptable and preferred to the EEB faculty in charge: <a href="mailto:marta.wells@yale.edu">marta.wells@yale.edu</a> (or the EEB Registrar: <a href="mailto:kelly.pyers@yale.edu">kelly.pyers@yale.edu</a>).</p>		
<b>MENTOR'S INFORMATION</b>		
Mentor's Name:		
Mentor's Email:		
Mentor's Phone:		
Mentor's Signature:		
Date:		
<b>FACULTY APPROVAL</b>		
EEB Faculty in Charge Signature:		
Date:		

Rev. 6/1/22

**EEB 495 and 496: Intensive Senior Research**  
**Department of Ecology and Evolutionary Biology**

Submission Date:	Semester:	
<b>STUDENT INFORMATION</b>		
Student's Last Name:	First:	Middle:
Email Address:		
Class:	Student ID:	Cell Phone:
Title for Research:		
B.S. Senior Requirement:	YES	NO
Student's Signature:		
Date:		
<b>DESCRIPTION OF INTENSIVE SENIOR RESEARCH REQUIREMENTS</b>		
<p>Two terms of intensive original research in an area relevant to ecology or evolutionary biology. This may involve, for example, laboratory work, fieldwork, or mathematical or computer modeling. Students may also work in areas related to environmental biology such as policy, economics, or ethics. The research project may not be a review of relevant literature but must be original. In all cases students must have a faculty sponsor who oversees the research and is responsible for the rigor of the project. An average of <b>20 hours per week</b> is required. Student are encouraged to apply during the term preceding the research by registering and submitting a <b>preproposal</b>. A student's <b>final proposal</b> must be submitted no later than the first 10 days of the term in which the student begins the tutorial, with the faculty mentor's signature of approval. Please attach this form to your proposal and return to the faculty in charge (see below). The final research paper is due in the hands of both the faculty mentor and the EEB faculty in charge by the last day of reading period in the term of enrollment. Enrollment limited to seniors. A letter grade with four credits (2 credits per semester) will be awarded. Fulfills the senior requirement for the B.S. degree.</p>		
<b>TO THE RESEARCH MENTOR</b>		
<p>By signing this form, you agree to supervise the student's project. You also agree to grade the final paper and report a grade to the EEB Assistant DUS based on exam(s) or term paper. This should be reported no later than the last day of the final examination period. Notification by email is acceptable and preferred to the EEB faculty in charge: <a href="mailto:marta.wells@yale.edu">marta.wells@yale.edu</a> (or the EEB Registrar: <a href="mailto:kelly.pyers@yale.edu">kelly.pyers@yale.edu</a>).</p>		
<b>MENTOR'S INFORMATION</b>		
Mentor's Name:		
Mentor's Email:		
Mentor's Phone:		
Mentor's Signature:		
Date:		
<b>FACULTY APPROVAL</b>		
EEB Faculty in Charge Signature:		
Date:		

Rev. 6/1/22

**Senior Essay**  
**Department of Ecology and Evolutionary Biology**

Submission Date:		Semester:	
<b>STUDENT INFORMATION</b>			
Student's Last Name:		First:	Middle:
Email Address:			
Class:	Student ID:	Cell Phone:	
Topic for Senior Paper:			
B.A. Senior Requirement:	YES	NO	
Student's Signature:			
Date:			
<b>DESCRIPTION OF SENIOR ESSAY REQUIREMENTS</b>			
<p>The senior essay is graded, but it carries no course credit. The senior essay should be a critical evaluation of some portion of the current, primary biological literature. The topic may be anything within the realm of biology or it may explore the relationships of biology to other fields. Each student must obtain approval of the paper topic from a member of the EEB department to assure that the subject is a promising one. The paper must be a minimum of 20 double-spaced pages, not including bibliography. The faculty in charge of senior projects will ask a faculty advisor to read and grade each paper. Students may suggest readers if they wish. Papers are to be submitted to the student's senior essay advisor and a copy to the faculty in charge of the senior projects. Normally, a letter grade is reported to the registrar by the faculty in charge. If the essay is "Unsatisfactory," the student may make arrangements with the DUS to submit another paper. Papers received late may not be processed before Commencement.</p> <p><i>Hints for finding a faculty member to advise on senior essay:</i>            First decide on the general area you would like to explore in your senior essay. Then try to find which faculty member might have an interest or expertise in that area. The best sources are the faculty member's own website and the EEB department booklet, available from the E&amp;EB office. Second, if a faculty member discussed the topic in a course, he/she would be a good choice. Otherwise, look through the Yale College Program of Study to see which faculty member teaches a course that includes your prospective topic. Approach the faculty member identified above. If he/she is not the best person to advise you on your topic, the faculty member should know who would be more knowledgeable in that area. Your senior essay advisor will often not be the same advisor that signs your course listings. In discussion with the essay advisor, narrow your area of interest to a focused topic on which you can write in depth; a superficial review of a broad field is not appropriate. The advisor may also suggest a few references to start off your reading in the field.</p>			
<b>TO THE SENIOR ESSAY MENTOR</b>			
<p>By signing this form, you agree to supervise the student's senior essay project and provide the necessary support. You also agree to grade the final paper and report a grade to the EEB faculty in charge. This should be reported no later than the last day of the final examination period. Notification by email is acceptable and preferred to the EEB faculty in charge: <a href="mailto:marta.wells@yale.edu">marta.wells@yale.edu</a> (or the EEB Registrar: <a href="mailto:kelly.pyers@yale.edu">kelly.pyers@yale.edu</a>).</p>			
<b>MENTOR'S INFORMATION</b>			
Mentor's Name:			
Mentor's Email:			
Mentor's Phone:			
Mentor's Signature:			
Date:			
<b>FACULTY APPROVAL</b>			
EEB Faculty in Charge Signature:			
Date:			