

BIOL205 Foundations of Biology: Ecology and Evolution – Honors

Instructor: Phil Barden
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Office: CKB 428B
Office Hours: Tue/Fri 2:30-3:30pm; by appointment

Course Website: <http://canvas.njit.edu>
Course Schedule: Tue/Fri 1:00-2:20pm
Course Location: CKB G-08

Course description: There are about 1.2 million described species living on Earth – a small proportion of the estimated 5-10 million total species that exist today. Each of species is a unique assemblage of genes, morphology, ecology, and behavior. All organisms alive today as well as the billions that are now extinct arose from the same fundamental mechanism: evolution. At the same time, these species and their interactions with each other and the environment have irreversibly shaped our planet and ourselves. Ecology and evolution are fundamental in our understanding of biology; they underlie mechanisms responsible for all life. The material we cover will build upon concepts you likely are somewhat familiar with and expand your expertise in ecology and evolution, topics include: the history of life; selection, genetic mechanisms of evolution and variation; adaptation; community ecology; ecosystems; coevolution; phylogenetics; speciation; biogeography; paleontology.

Course objectives

After completing this course, students will be able to:

1. Recall key moments in the history of life on Earth.
2. Describe different processes of selection and how they ultimately shape genotypes and phenotypes.
3. Describe the genetic basis for variation, inheritance, and development as these mechanisms relate to evolution.
4. Interpret and evaluate information presented in the form of phylogenetic trees while recalling the theory behind their construction.
5. Describe how new species arise and diversify.
6. Explain how organisms impact each other in a community setting.
7. Understand how nutrients cycle and energy flows at an ecosystem level.
8. Describe the relationship between distributional patterns of organisms and their evolutionary histories.
9. Describe how fossils contribute to modern understanding of evolutionary biology.
10. Apply concepts learned throughout the course to other fields of biology.
11. Relate the topics we cover in class to humans, medicine, and society.

Prerequisites: Concepts in Biology (BIOL 200)

Required Materials: We may occasionally consult a free textbook called Open Stax Biology 2e: <https://openstax.org/details/biology-2e>.

Grading Policy: Grades will be determined by performance on exams, assignments, participation, and final project. There will be two in-class exams, worth a total 34% of your final grade as well as a cumulative final exam worth 21% of your final grade. Weekly assignments will comprise 25% of your grade while a group & final project will make up 20%.

Grading Scale	
A	90 – 100
B+	85 – 90
B	80 – 85
C+	75 – 80
C	65 – 75
D	50 – 65
F	0 – 50

Assignment	Percentage
In-Class Exams (2)	34%
Final Exam	21%
Group & Final Project	20%
Weekly Assignments	25%

Group & Final Project: Over the course of the semester, you will work toward completing a group final project that will culminate in a final presentation. In the lead up to the final presentation, the project will include assignments that will be turned in as a group, as well as individual assignments. A description and timeframe for the project will be posted to Canvas after spring break.

Weekly Assignments: This course works best when everyone comes curious and prepared. Each week you will be assigned a reading from primary literature, book chapters, or websites. Readings are the foundation of our course and directly relate to assignments listed in the syllabus. Weekly assignments are an opportunity to routinely develop your thinking and receive routine feedback on your understanding – you will receive individual feedback on each assignment from myself or the course grader before each exam. There are no practice exams or study guides, however, participation in the weekly assignments is designed to directly prepare you for the exam material. I also use these weekly assignments to assess understanding of concepts as the course progresses.

Weekly assignments are graded as full (100%) or zero (0%) credit. For the nine reading assignments listed in the schedule, any submission of text drafted by you will result in full credit. That’s right. You can simply type your name, the date, or “points please” and receive full credit. I hope you take the opportunity to participate earnestly in the assignments to make use of the opportunity to learn the course material and receive feedback on your thinking. Still, there is absolutely no penalty for not engaging in weekly assignments beyond submitting placeholder text, even if you do so for all nine assignments. The only exception is the usage of any generative AI text – please see the policy below.

Assignments listed in the syllabus schedule are due through Canvas on the date listed by 12:00pm, one hour before class begins. Any assignments turned in after 12:00pm will be eligible for 50% credit up to one week after the due date. After a week, no assignment credit will be possible without permission from the Dean of Students office.

Generative AI: The use of generative AI to draft any assignment text or images is prohibited. This applies to group assignments, final projects, and weekly assignments. As described above, you are free to submit any text for full credit on weekly reading assignments so long as you write the submission yourself (even a single word) – there is simply no reason to waste the time of myself and the grader by submitting work that has not been drafted by you. The purpose of these weekly assignments is to provide you with an opportunity to receive feedback on your comprehension of course material. Students who attempt to submit work drafted by large language models or other generative models will be referred to the Dean of Students office with my recommendation that they receive an XF for the course.

Make up exams will be possible with approval from the Dean of Students. If you have a qualifying reason (assessed through the Dean of Students) for missing an exam that you are aware of head of time, you must talk to me before the scheduled exam period to notify me that you cannot take the exam. You are then responsible for arranging with me to make up the test within two days.

Academic integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy [here](#).

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu

Canvas: We will be using Canvas for our class website (<http://canvas.njit.edu>).

BIOL 205H Course Syllabus – Spring 2025

Date	Topic	Assignment
Tue, Jan 21	<i>Course Overview</i>	<u>Reading</u> : Syllabus
Fri, Jan 24	<i>Biodiversity & You</i>	<u>Assignment</u> : Identify your focal organism
Tue, Jan 28	<i>Perceptions of Evolution & the History of Life</i>	<u>Reading</u> : Gould, S.J., 1994. The evolution of life on the earth. Scientific American, 271(4), pp.84-91. <u>Assignment</u> : Depicting evolution
Fri, Jan 31	<i>Mechanisms of Evolution: Selection</i>	<u>Reading</u> : Darwin in the Pumpkin Patch or Bay Area Travels with Charlie PDF <u>Assignment</u> : Reading assignment 1
Tue, Feb 4	<i>Mechanisms of Evolution: Genes, Variation, and Drift</i>	<u>Optional Reading</u> : OpenStax Biology 2e: Chapter15.1 The Genetic Code: 369-373.
Fri, Feb 7	<i>Adaptation, Life History, & Environment</i>	
Tue, Feb 11	<i>Adaptation, Life History, & Environment</i>	<u>Reading</u> : Guppy time: Reznick et al. 1990 <u>Assignment</u> : Reading assignment 2
Fri, Feb 14	<i>Homology & Phylogenetics</i>	<u>Reading</u> : Phylogeny paper: McLennan 2010
Tue, Feb 18	<i>Homology & Phylogenetics</i>	
Fri, Feb 21	<i>Sexual Selection</i>	<u>Reading</u> : Diversity in the Weapons of Sexual Selection: Horn Evolution in Dung Beetles PDF <u>Assignment</u> : Reading assignment 3
Tue, Feb 25	Exam 1	
Fri, Feb 28	<i>Ecosystems & Niches</i>	
Tue, Mar 4	<i>Ecosystems, Niches, & Cycles</i>	<u>Reading</u> : Lycaenid butterfly paper: Pierce 1985 <u>Assignment</u> : Reading assignment 4
Fri, Mar 7	<i>Coevolution, Evolutionary Medicine</i>	
Tue, Mar 11	<i>Coevolution, Evolutionary Medicine</i>	<u>Reading</u> : Snake stuff: Brodie & Brodie 1991 <u>Assignment</u> : Reading assignment 5
Fri, Mar 14	<i>Speciation</i>	
Tue, Mar 18 Fri, Mar 21	Spring Break	
Tue, Mar 25	<i>Speciation II</i>	<u>Reading</u> : Island radiations: Losos & Ricklefs 2009 <u>Assignment</u> : Reading assignment 6
Fri, Mar 28	<i>Biogeography</i>	<u>Reading</u> : TBD <u>Assignment</u> : Reading assignment 7
Tue, Apr 1	<i>Extinction</i>	

BIOL 205H Course Syllabus – Spring 2025

Date	Topic	Assignment
Fri, Apr 4		Exam 2
Tue, Apr 8		<i>Student Presentation Group Work</i>
Fri, Apr 11	<i>Evodevo</i>	<u>Reading</u> : Eye stuff limb stuff: Shubin et al. 2009 <u>Assignment</u> : Reading assignment 8
Tue, Apr 15	<i>Evodevo II</i>	
Tue, Apr 22	<i>Human Evolution & Ecology</i>	<u>Reading</u> : Four Legs Good, Two Legs Fortuitous: Brains, Brawn, and the Evolution of Human Bipedalism PDF <u>Assignment</u> : Reading assignment 9
Fri, Apr 25	<i>Human Evolution & Ecology</i>	
Tue, Apr 29	<i>Conservation & the Future of Life on Earth</i>	
Fri, May 2		Student Presentations
Wed, May 7		Student Presentations
Final	The final exam will be during final exam week.	

*Course schedule is tentative and subject to change.

*The final exam schedule will be posted here: <http://www.njit.edu/registrar/exams/>

