

**BIOLOGY 205-H02: FOUNDATIONS OF BIOLOGY:
ECOLOGY AND EVOLUTION – HONORS**

INSTRUCTOR:	Dr. Phillip Barden	EMAIL:	barden@njit.edu
OFFICE:	428B Central King Bldg.	OFFICE HOURS:	T & R: 4:00PM- 5:00PM
COURSE MEETINGS:	T & R: 2:30PM–3:50PM	PHONE:	973-596-5863
COURSE LOCATION:	CKB 317	COURSE WEBSITE:	https://canvas.njit.edu/

COURSE DESCRIPTION: There are approximately 1.2 million described species living on Earth – a small proportion of the estimated 5-10 million total species that exist today – each a unique assemblage of genes, morphology, ecology, and behavior. Incredibly, all species alive today as well as the billions that are now extinct arose from the same fundamental mechanism: evolution. At the same time, these organisms 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, as 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 energy cycles operate 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.

PREREQUISITE: Concepts in Biology (BIOL 200).

CO-REQUISITE: BIOL 206.

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REQUIRED MATERIALS:

- Textbook: In the Light of Evolution: Essays from the Laboratory and Field. ISBN: 978-0981519494.

GRADING POLICY & SCALE: Grades will be determined by performance on exams, assignments, participation, and final project. There will be two in-class exams, worth a total 30% of your final grade as well as a cumulative final exam worth 20% of your final grade. Assignments and participation will comprise 30% 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

Assignments	Percentage
In-Class Exams	30%
Assignments & Participation	30%
Group & Final Project	20%
Final Exam	20%
Total	100%

GROUP & FINAL PROJECT: Over the course of the semester, you will work toward completing a group & final project, which will culminate in a final presentation. In the lead up to the final presentation, the project will include work that will be turned in as a group, as well as individual assignments. A description and timeframe for the project can be found on Canvas.

ASSIGNMENTS & PARTICIPATION: Because we will spend a lot of time discussing and contemplating sometimes complex topics, this course will work best when everyone comes curious and prepared. Each week you will be assigned a reading from the textbook and/or a short reading from another source. These readings are **NOT** optional and usually directly relate to assignments listed in the syllabus. Assignments listed in the syllabus schedule are due on the date listed by 1:00pm.

MAKE UP EXAMS: Make up exams will be possible only with a doctor's or a dean's letter or with prior approval. If you have a serious reason for missing an exam, 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: The University's academic integrity policy can be found [here](#). This code will be enforced in this course. If you have any questions about this policy, please come and talk to me about it.

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

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COURSE OUTLINE: *NOTE: The final exam WILL be held during the final exam period listed below. Do not schedule travel.*

TENTATIVE SCHEDULE OF TOPICS

WEEK	TOPIC COVERED	READING / ASSIGNMENTS DUE
21-Jan	Course Overview	<u>Reading:</u> Syllabus
23-Jan	Focal Organism	<u>Assignment:</u> Identify your focal organism (on Canvas)
28- Jan	Biodiversity & You; Perceptions of Evolution & the History of Life	
30-Jan	Perceptions of Evolution & the History of Life	<u>Reading:</u> Short text: Gould, S. J. The Evolution of Life on the Earth. Scientific American, March 2004: 93-100. <u>Assignment:</u> Depicting evolution (on Canvas)
4-Feb	Mechanisms of Evolution: Selection	<u>Reading:</u> Textbook: Darwin in the Pumpkin Patch or Bay Area Travels with Charlie (pg. 27) <u>Assignment:</u> Reading assignment 1 (on Canvas)
6-Feb	Mechanisms of Evolution: Genes, Variation, and Drift	<u>Reading:</u> Short text: Loewe, L. (2008). Genetic mutation. Nature Education, 1:113. <u>Assignment:</u> Short definition assignment (on Canvas)
11-Feb	Adaptation, Life History, & Environment	<u>Reading:</u> Textbook: Guppies and the Empirical Study of Adaptation (pg. 205) <u>Assignment:</u> Reading assignment 2 (on Canvas)
13-Feb	Adaptation, Life History, & Environment	
18-Feb	Homology & Phylogenetics	<u>Reading:</u> Short text: Baum, D. (2008). Reading a phylogenetic tree: The meaning of monophyletic groups. Nature Education 1: 190.
20-Feb	Homology, Phylogenetics, & Fossils	
25-Feb	Sexual Selection	<u>Reading:</u> Textbook: Diversity in the Weapons of Sexual Selection: Horn Evolution in Dung Beetles (pg. 149) <u>Assignment:</u> Reading assignment 3 (on Canvas)
27-Feb	EXAM 1	
3-Mar	Ecosystems & Niches	<u>Reading:</u> Textbook: The Herbivore's Dilemma: Never Enough Nitrogen (pg. 121) <u>Assignment:</u> Reading assignment 4 (on Canvas)
5-Mar	Ecosystems, Niches, & Cycles	
10-Mar	Coevolution	<u>Reading:</u> Textbook: Patterns, Process, and the Parable of the Coffeepot Incident: Arms Races Between Newts and Snakes from Landscapes to Molecules (pg. 93) <u>Assignment:</u> Reading assignment 5 (on Canvas)

12-Mar	Coevolution & Evolutionary Medicine	
SPRING BREAK 3/15-3/22, 2020		
24-Mar	Speciation	<u>Reading:</u> King Midas and His Many Extremely Young Species: Studies on Speciation in Cichlid Fishes in Nicaraguan Crater Lakes (pg. 257) <u>Assignment:</u> Reading assignment 6 (on Canvas)
26-Mar	Speciation II	
31-Mar	Biogeography	<u>Reading:</u> Textbook: My Island Life (pg. 135) <u>Assignment:</u> Reading assignment 7 (on Canvas)
2-Apr	Extinction	
7-Apr	EXAM 2	
9-Apr	Student Presentation Group Work	10- Apr - GOOD FRIDAY
14-Apr	Evodevo	<u>Reading:</u> Textbook: From Darwin to DNA: The Genetic Basis of Color Adaptations (pg. 277) <u>Assignment:</u> Reading assignment 8 (on Canvas)
16-Apr	Conservation & the Future of Life on Earth I	
21-Apr	Human Evolution & Ecology	<u>Reading:</u> Textbook: Four Legs Good, Two Legs Fortuitous: Brains, Brawn, and the Evolution of Human Bipedalism (pg. 55) <u>Assignment:</u> Reading assignment 9 (on Canvas)
23-Apr	Conservation & the Future of Life on Earth II	
28-Apr	Student Presentations	
30-Apr	Student Presentations	
5-May	Tuesday is a Friday Schedule – No Class	NOTE: The Final Exam will be during the final exam week.
FINALS	FINAL EXAM WEEK: MAY 08-14, 2020	

