BIOL205 Foundations of Biology: Ecology and Evolution – Honors

Instructor: Dr. Phillip Barden
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Office: Online and CKB 428B
Office Hours: Tues, Fri: 1:30pm-2:30pm; by appointment

Course Website: http://canvas.njit.edu
Course Schedule: Tues, Fri: 2:30pm – 3:50pm
Course Location: Tiernan 111

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

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 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

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

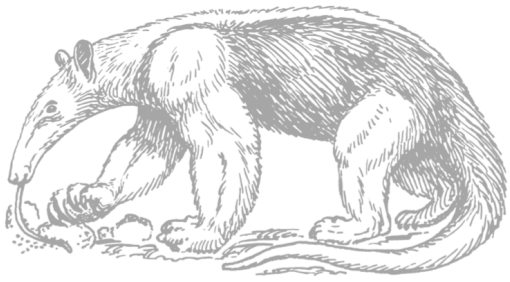
Group & Final Project: Over the course of the semester you will work toward completing a group & final project which will culminate in a final presentation. In the lead up to the final presentation, the project will include work that will be turned in as a group, as well as individual assignments. A description and timeframe for the project will be posted to 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 through Canvas on the date listed by 12:00pm, two and a half hours before class begins.

Make up exams: Make up exams will be possible with approval from the Dean of Students. If you have a serious reason 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: The university academic integrity policy can be found here: https://www.njit.edu/dos/academic-integrity. 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 (http://canvas.njit.edu).



Date	Topic	Assignment	Location
Tues, Jan 17	Course Overview	Reading: Syllabus	TIER 111
Fri, Jan 20	Focal Organism	Assignment: Identify your focal organism (on Canvas)	TIER 111
Tues, Jan 24	Biodiversity & You; Perceptions of Evolution & the History of Life		TIER 111
Fri, Jan 27	Perceptions of Evolution & the History of Life	Reading: Short text: Gould, S. J. The Evolution of Life on the Earth. Scientific American, March 2004: 93-100.	TIER 111
		Assignment: Depicting evolution (on Canvas)	TIER 111
Tues, Jan 31	Mechanisms of Evolution: Selection	Reading: Textbook: Darwin in the Pumpkin Patch or Bay Area Travels with Charlie (pg. 27)	TIER 111
		Assignment: Reading assignment 1 (on Canvas)	TIER 111
Fri, Feb 3	Mechanisms of Evolution: Genes, Variation, and Drift	Reading: Short text: Loewe, L. (2008). Genetic mutation. Nature Education, 1:113.	TIER 111
		Assignment: Short definition assignment (on Canvas)	TIER 111
Tues, Feb 7	Adaptation, Life History, & Environment	Reading: Textbook: Guppies and the Empirical Study of Adaptation (pg. 205)	TIER 111
		Assignment: Reading assignment 2 (on Canvas)	TIER 111
Fri, Feb 10	Adaptation, Life History, & Environment		TIER 111
Tues, Feb 14	Homology & Phylogenetics	Reading: Short text: Baum, D. (2008). Reading a phylogenetic tree: The meaning of monophyletic groups. Nature Education 1: 190.	TIER 111
Fri, Feb 17	Homology & Phylogenetics		TIER 111
Tues, Feb 21	Sexual Selection	Reading: Textbook: Diversity in the Weapons of Sexual Selection: Horn Evolution in Dung Beetles (pg. 149)	TIER 111
		Assignment: Reading assignment 3 (on Canvas)	TIER 111
Fri, Feb 24	**Exam 1**		TIER 111

Date	Topic	Assignment	Location
Tues, Feb 28	Ecosystems & Niches	Reading: Textbook: The Herbivore's Dilemma: Never Enough Nitrogen (pg. 121) Assignment: Reading assignment 4 (on Canvas)	TIER 111 TIER 111
Fri, Mar 3	Ecosystems, Niches, & Cycles		TIER 111
Tues, Mar 7	Coevolution	Reading: Textbook: Patterns, Process, and the Parable of the Coffeepot Incident: Arms Races Between Newts and Snakes from Landscapes to Molecules (pg. 93) Assignment: Reading assignment 5 (on Canvas)	TIER 111 TIER 111
Fri, Mar 10	Coevolution, Evolutionary Medicine		TIER 111
Tues, Mar 14 Fri, Mar 17	**Spring Break**		NA
Tues, Mar 21	Speciation	Reading: King Midas and His Many Extremely Young Species: Studies on Speciation in Cichlid Fishes in Nicaraguan Crater Lakes (pg. 257) Assignment: Reading assignment 6 (on Canvas)	TIER 111
Fri, Mar 24	Speciation II		TIER 111
Tues, Mar 28	Biogeography	Reading: Textbook: My Island Life (pg. 135) Assignment: Reading assignment 7 (on Canvas)	TIER 111
Fri, Mar 31	Extinction		TIER 111
Tues, Apr 4	**Exam 2**		TIER 111
Fri, Apr 7	**No Class – Good Friday**		TIER 111
Tues, Apr 11	Evodevo	Reading: Textbook: From Darwin to DNA: The Genetic Basis of Color Adaptations (pg. 277) Assignment: Reading assignment 8 (on Canvas)	TIER 111
Fri, Apr 14	Evodevo II		TIER 111

Date	Topic	Assignment	Location
Tues, Apr 18	Student Presentation Group Work		TIER 111
Fri, Apr 21	Human Evolution & Ecology	Reading: Textbook: Four Legs Good, Two Legs Fortuitous: Brains, Brawn, and the Evolution of Human Bipedalism (pg. 55) Assignment: Reading assignment 9 (on Canvas)	TIER 111
Tues, Apr 25	Conservation & the Future of Life on Earth		TIER 111
Fri, Apr 28	Student Presentations		TIER 111
Tues, May 2	Student Presentations		TIER 111
Final	**The final exam will be during final exam week.**		TBD

*Course schedule is tentative and subject to change.
*The final exam schedule will be posted here: http://www.njit.edu/registrar/exams/