BIOL205 Foundations of Biology: Ecology and Evolution – Honors

Instructor: Dr. Phillip Barden
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Office: Online and CKB 428B
Office Hours: Weds, Fri: 11:30am-12:30pm by appointment

Course Website: http://canvas.njit.edu
Course Schedule: Weds, Fri: 10:00am – 11:20am
Course Location: Online; then CKB 215

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%

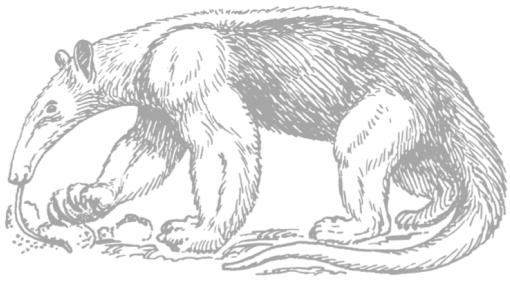
Group & Final Project: Over the course of the semester you will work toward completing a group & final project which will culminate in a final presentation. In the lead up to the final presentation, the project will include work that will be turned in as a group, as well as individual assignments. A 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 8:00am, two hours before class begins.

Make up exams: Make up exams will be possible with a doctor's or a dean of student'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 academic integrity policy can be found here: http://www.njit.edu/academics/pdf/academic-integrity-code.pdf. 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
Weds, Jan 19	Course Overview	Reading: Syllabus	Webex
Fri, Jan 21	Focal Organism	Assignment: Identify your focal organism (on Canvas)	Webex
Weds, Jan 26	Biodiversity & You; Perceptions of Evolution & the History of Life		Webex
Fri, Jan 28	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. Assignment: Depicting evolution (on Canvas)	Webex
Weds, Feb 2	Mechanisms of Evolution: Selection	Reading: Textbook: Darwin in the Pumpkin Patch or Bay Area Travels with Charlie (pg. 27) Assignment: Reading assignment 1 (on Canvas)	CKB 215
Fri, Feb 4	Mechanisms of Evolution: Genes, Variation, and Drift	Reading: Short text: Loewe, L. (2008). Genetic mutation. Nature Education, 1:113. Assignment: Short definition assignment (on Canvas)	CKB 215
Weds, Feb 9	Adaptation, Life History, & Environment	Reading: Textbook: Guppies and the Empirical Study of Adaptation (pg. 205) Assignment: Reading assignment 2 (on Canvas)	CKB 215
Fri, Feb 11	Adaptation, Life History, & Environment		CKB 215
Weds, Feb 16	Homology & Phylogenetics	Reading: Short text: Baum, D. (2008). Reading a phylogenetic tree: The meaning of monophyletic groups. Nature Education 1: 190.	CKB 215
Fri, Feb 18	Homology & Phylogenetics		CKB 215
Weds, Feb 23	Sexual Selection	Reading: Textbook: Diversity in the Weapons of Sexual Selection: Horn Evolution in Dung Beetles (pg. 149) Assignment: Reading assignment 3 (on Canvas)	CKB 215
Fri, Feb 25	**Exam 1**		CKB 215
Weds, Mar 2	Ecosystems & Niches	Reading: Textbook: The Herbivore's Dilemma: Never Enough Nitrogen (pg. 121) Assignment: Reading assignment 4 (on Canvas)	CKB 215
Fri, Mar 4	Ecosystems, Niches, & Cycles		CKB 215
Weds, Mar 9	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)	CKB 215
Fri, Mar 11	Coevolution, Evolutionary Medicine		CKB 215

Date	Topic	Assignment	Location
Weds, Mar 16	**Spring Break**		NA
Fri, Mar 18			
Weds, Mar 23	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)	CKB 214
Fri, Mar 25	Speciation II		CKB 215
Weds, Mar 30	Biogeography	Reading: Textbook: My Island Life (pg. 135) Assignment: Reading assignment 7 (on Canvas)	CKB 215
Fri, Apr 1	Extinction		CKB 215
Weds, Apr 6	**Exam 2**		CKB 215
Fri, Apr 8	Student Presentation Group Work		CKB 215
Weds, Apr 13	Evodevo	Reading: Textbook: From Darwin to DNA: The Genetic Basis of Color Adaptations (pg. 277) Assignment: Reading assignment 8 (on Canvas)	Evodevo
Fri, Apr 15	**No Class – Good Friday**		NA
Weds, Apr 20	Conservation & the Future of Life on Earth I		CKB 215
Fri, Apr 22	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)	CKB 215
Weds, Apr 27	Conservation & the Future of Life on Earth II		CKB 215
Fri, Apr 29	Student Presentations		CKB 215
Tues, May 3	Student Presentations		CKB 215
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/

Online Protocol – BIOL205 Honors
Foundations of Biology: Ecology and Evolution

Following a January 6 announcement by NJIT administration, Spring classes, studios, and labs will be transitioned from in-person to synchronous online format from January 18 through January 30. University-wide updates are here: https://www.njit.edu/pandemicrecovery/recent-messages. Whether this online transition will continue beyond January 30th is not yet clear. To facilitate a synchronous online format, this class will meet via Webex at this link: https://njit.webex.com/meet/barden. Please join the Webex room by the start of class time, which is 10am.

I know it's an uncertain time, so I've worked to structure the course in a way that is flexible and not punitive for unexpected events or unequal access to an environment that is conducive to online class participation. If you are concerned about the structure of the course or being able to join in on class discussions via Webex (for example if you have a patchy internet connection or are in a place where you can't use a camera), please get in touch! The course is heavily discussion-based but we can identify other options for class participation. The goal is for the course to operate as stress-free as possible.

Discussion board
To help make sure everyone has an opportunity to ask questions about the course format (deadlines, assignments, etc.) and course topics, I have made two discussion boards on Canvas. Please feel free to post any questions there, where other students can help weigh in and (equally important!) benefit from your questions. If you prefer to email your question privately, please do so (barden@njit.edu). If it is widely applicable, I may post an anonymized version of your question on the discussion board with an answer to ensure that everyone benefits from your question.

After Class Canvas Course Chat
Just after the end of class I will host a live chat in Canvas and stay on in Webex for a few extra minutes or until all questions are answered. The Canvas Course Chat is accessible on the course Canvas page on the left navigation bar – click "chat." This will be an opportunity to ask questions about course content and logistics. No one will be penalized for not attending after class chats or staying on Webex after scheduled time. If you are unable to attend this after class chat but have questions, please get in touch or post to our Course Q&A discussion board.

Staying in touch
My hope is that across our Webex classes, course chat, course Q&A discussion board, and office hours, there will be a lot of opportunities for communication and feedback. In addition, I will be providing you with feedback on your weekly assignments. If at any time you have questions or concerns, please get in touch via email.