

## **Bio 28/EARS 35: Macroevolution**

Instructor: Prof. Kevin J. Peterson

Meeting time: 12 (MWF 12:50-1:55 LSC 105; X hour Tuesday 1:20-2:10)

Office Hours: By appointment, Room 321 LSC

Readings: Journal articles (both background and discussion readings) are uploaded here on Canvas.

Bio 28 concerns itself with thinking about the evolutionary process in a different way, from the perspective of the species and through the lens of deep time. We do not really concern ourselves with the mechanisms of population genetics, which operate at a different scale both spatially and temporally. Instead, what we are ultimately concerned with in this course is whether life is organized hierarchically, and if so, can selection occur at any/all of these other levels, in addition to the level of the organism. This course is especially well suited for discussion and question, as even the definition of macroevolution, and its very existence, is under intense discussion by both microevolutionists and macroevolutionists alike. So - **Ask Lots of Questions!** Most of the fun of this class is the discussions we have as a group, not the lecture material *per se*.

Generally, each week we will explore a different subject in Macroevolution, with lectures or discussions during normal class time. Background reading(s) for each lecture are posted on Canvas. X hours will be used for either background information on specific phylogenetic techniques.

### **Schedule**

Lecture 1 (1/05-1/07): “Introduction & Hierarchy Theory”

Background Reading: [Myers & Saupe \(2013\)](#); [Valentine & May \(1996\)](#)

X-hour (1/11): [Cladistics & Classification](#)

X-hour Reading: [Omland et al. \(2008\)](#)

Homework: [Cladistics](#)

Homework [Key](#)

Lecture 2 (1/10-1/19): “Punctuated Equilibrium”

Background Reading: [Eldredge & Gould \(1972\)](#); [Gould & Eldredge \(1993\)](#)

NO CLASS 1/17: MLK Day

X-hour (1/18): Cladistics & Classification Continued

X-hour Reading: [Patterson \(1993\)](#)

Homework: [Classification](#)

Homework [Key](#)

Discussion 1 (1/21): [Casane & Laurenti \(2013\)](#)

Lecture 3 (1/24-1/26): “Species Sorting and Selection”

Background Reading: [Grantham \(1995\)](#); [Lieberman & Vrba \(2005\)](#)

X-hour (1/25): **Quiz 1 (Lectures 1 & 2)**

Fossil Friday! (1/28): Anatomy of a death assemblage

Lecture 4 (1/31-2/09): “The Origins of Macroevolution 1. Meiosis”

Background Reading: [Doolittle & Zhaxybayeva \(2009\)](#); [Henikoff et al. \(2001\)](#)

X-hour (2/01): [Gene trees](#)

Homework: [Gene trees](#)

Homework [Key](#)

Discussion 2 (2/04): [Fontaneto et al. \(2007\)](#)

X-hour (2/08): HGT

X-hour reading: [Crisp et al. \(2015\)](#)

Discussion 3 (2/11): [Wilkinson et al. \(1998\)](#)

**MIDTERM EXAMINATION (TAKE HOME) 2/11. DUE 2/18 AT THE BEGINNING OF CLASS**

Lecture 5 (2/14-2/23): “The Origins of Macroevolution 2. Macrophyagy and the Cambrian Explosion”

Background Reading: [Peterson \(2005\)](#); [Butterfield \(2011\)](#); [Erwin et al. \(2011\)](#)

X-hour (2/15): Molecular Clock

X-hour Reading: [Smith & Peterson \(2001\)](#)

Fossil Friday! (2/18): Ediacaran and Cambrian fossils

X-hour (2/22): Open (tour of the displays in the building?)

Discussion 4 (2/25): [Bush et al. \(2016\)](#)

Lecture 6 (2/28-3/02): “Extinction”

Background Reading: [Raup & Sepkoski \(1982\)](#); [Raup \(1994\)](#)

X-hour (3/01): Lecture continued

Discussion 5 (3/04): [Crampton et al. \(2016\)](#)

**Class Time (3/07): Quiz 2 (Lectures 5 & 6)**

Discussion 6 (3/08): [Hautmann \(2002\)](#)

**FINAL EXAMINATION (TAKE HOME) 3/09. Due by email March 15th by 12:00 PM**

## **COURSE INFORMATION**

### **Text Book**

There is no required textbook. Instead, readings for each week are posted on Canvas, as are the weekly PowerPoint presentations.

### **Grading**

There is one take-home midterm and one take-home final that are each worth 35% of your final grade. Rules/restrictions/guidelines will be discussed in class. There are 2 in-class quizzes that will cover all of the material (including X-hours and readings) given during each specified week. Each quiz is worth 15% of your final grade. If you are ill (for example) and cannot take a quiz you must make arrangements with me before hand, otherwise you will not earn any credit for the missed quiz.

If you wish to take part in religious observance(s) that occur during this academic term that conflict with your participation in the course, please meet with me before the end of the second week of the term to discuss appropriate accommodations.

### **Student Needs**

Students with disabilities enrolled in this course and who may need disability-related classroom accommodations are encouraged to make an appointment to see me before the end of the second week of the term. All discussions will remain confidential, although the Student Accessibility Services office may be consulted to discuss appropriate implementation of any accommodation requested.

I recognize that the academic environment at Dartmouth is challenging, that our terms are intensive, and that classes are not the only demanding part of your life. There are a number of resources available to you on campus to support your wellness, including: your undergraduate dean, Counseling and Human Development, and the Student Wellness Center. Please do not hesitate to utilize these resources, and if there is anything I can do as well, come speak with me at your convenience.

If you wish to take part in religious observance(s) that occur during this academic term that conflict with your participation in the course, please meet with me before the end of the second week of the term to discuss appropriate accommodations.

The only financial commitment to this course is access to a personal computer, and if you ever are having computer problems, or the means to acquire a computer, please let me know right away.

### **Honor Principle**

Please review Dartmouth's Honor Principle (<http://www.dartmouth.edu/judicialaffairs/honor/index.html>). I take this principle seriously and have full faith that you do and will as well. I have strict instructions about what is versus what is not allowed with the quizzes and examinations. I will discuss these rules, and their rationale, in class. If you ever have any questions about the Honor Principle and my expectations please email me or stop by so we can discuss in person.

### **COVID protocols (text from the College)**

Attendance:

You are expected to attend class in person unless you have made alternative arrangements due to illness, medical reasons, or the need to isolate due to COVID-19. For the health and safety of our class community, please: do not attend class when you are sick, nor when you have been instructed by Student Health Services to stay home. All lectures are recorded so you will not miss any information by staying home and watching the posted video.

#### Safety:

In accordance with current College policy, all members of the Dartmouth community are required to wear a suitable face covering when indoors, regardless of vaccination status. This includes our classroom and other course-related locations, such as labs, studios, and office hours. If you need to take a quick drink during class, please dip your mask briefly for each sip. Eating is never permitted in the classroom. (The only exception to the mask requirement is for students with an approved disability-related accommodation; see below.) If you do not have an accommodation and refuse to comply with masking or other safety protocols, I am obligated to assure that the Covid health and safety standards are followed, and you will be asked to leave the classroom. You remain subject to course attendance policies, and dismissal from class will result in an unexcused absence. If you refuse to comply with masking or other safety protocols, and to ensure the health and safety of our community, I am obligated to report you to the Dean's office for disciplinary action under Dartmouth's Standards of Conduct. Additional COVID-19 protocols may emerge. Pay attention to emails from the senior administrators at the College.