Course Syllabus

EBIO 6300: Phylogenetic Comparative Methods - Fall 2013

Day/Time/Room:	Wednesday 3:30-4:30 PM, Gold A150
Instructor:	Dr. Stacey D. Smith, Department of Ecology and Evolutionary Biology Stacey.D.Smith@colorado.edu (email); 303-492-1374 (phone); 402-370-6749 (voicemail); C340 Ramaley (office)
Office hours:	Fri. 1:15-3:15 in C340 Ramaley

Course Description

This course explores the interpretation of phylogenetic trees and the application of comparative methods in different fields of biology including ecology, biogeography, conservation biology, molecular evolution, epidemiology, and behavior.

Supplemental texts [not required]

Harvey, P. H., & M. D. Pagel. 1991. *The comparative method in evolutionary biology.* Oxford University Press, Oxford. [a classic textbook in comparative methods; does not cover the most recent methods, but does cover all fundamentals]

Baum, D. A., & S. D. Smith. 2013. *Tree-Thinking: An Introduction to Phylogenetic Biology*. Roberts & Co., Greenwood Village, CO. [introductory phylogenetics textbook covering how trees are inferred, interpreted and applied]

Course Objectives

Students will read both classic and new papers in the area of comparative methods. By the end of the course, students should be able to:

1. Read and interpret phylogenetic trees
2. Understand the range of methods used for studying patterns of trait evolution (ancestral state reconstruction, rates of evolution)
3. Create testable hypotheses in a phylogenetic framework (e.g. trait correlations, order of trait evolution, directional trends)
4. Be able to identify the appropriate phylogenetic methods for addressing a particular applied research questions (if the method exists!)
5. Be comfortable navigating primary literature in statistical comparative methods

Class Format

Each week we will read one or two papers, which will be emailed to the class at least a week in advance. Students will take turns leading the discussion. Each student must meet with me during office hours (or arrange a different time) in order to prepare to present the paper. The instructor will select the papers although requests are welcome. During the class period, the presenter(s) will spend the first ~10 giving an overview of the paper and then we will break into smaller groups for discussion. We will reconvene as a whole for the last 20 minutes to discuss the paper as a group. Students will be encouraged to ask for clarification of unfamiliar concepts before starting the discussion.

Assessment:.

Attendance:	60 points	60%
Participation:	20 points	20%
Presentation of a topic:	20 points	20%
Total	100 points	100%

Attendance: I will take attendance at every class period. I will excuse one absence without dropping your grade. After that, each absence will drop your score by 5 points. If you miss class for a valid excuse (illness, death in the family), you must email me before the class period and complete the discussion questions on your own to receive credit for that period. Make-ups must be received within one week of the missed class.

Participation: Participation will be scored by (1) involvement during discussions and (2) completion of discussion sheets. These can be turned in at the end of the class period or in my mailbox by the Friday following class if you'd like more time.

Presentation of a topic: Each student will be assigned a week to lead the discussion. The student will work with the instructor to develop discussion questions, which will be shared via email with the class by the Monday before class. The student will briefly present the paper and guide the discussion.

Grade scale:

A= 93.34-100%	A-= 90-93.33%	
B+= 86.67-89.99%	B= 83.34-86.66%	B-= 80-83.33%
C+= 76.67-79.99%	C= 73.34-76.66%	C-= 70-73.33%
D+= 66.67-69.9%	D= 63.34-66.66%	D-= 60-63.3%
F= less than 60%		

Date	Topic	Reading	Presenter(s)
8/28	Orientation		
9/4	Overview of phylogenetic inference	Optional: Lewis 2001	SDS
9/11	Introduction to tree thinking	O'Hara, 1998; Baum et al. 2005	SDS
9/18	History of discrete trait evolution	Maddison 1994; Schluter et al. 1997	SDS
9/25	Tests of adaptation with discrete traits	Baum and Larson 1991; Pagel 1994	SDS
10/2	Analysis of continuous traits with PICs	Felsenstein 1985; Podos 2001	SDS
10/9	Estimating diversification rates	Ricklefs 2007; Bininda-Edmonds et al. 2007	Melinda, Julia
10/16	Key Innovations and evolutionary dead-ends	Mitter et al. 1998; Goldberg et al. 2010; [Background: Maddison et al. 2007]	Toby, Rob
10/23	Molecular clocks / divergence time estimation [Diggle moderating]	Sanderson 1997; Drummond et al. 2006	Jack, Emily
10/30	Ancestral area reconstruction / biogeography	Ronquist 1997; Ree et al. 2008 [Background: Ree et al. 2005]	Julie
11/6	Phylogenetic signal	Blomberg et al. 2003; Revell et al. 2008	Josh, Frank
11/13	Community phylogenetics	Cavendar-Bares et al. 2004	Evelyn, Lara
11/20	Niche evolution [Ng moderating]	Ackerly et al. 2006	Kevin, Amanda
11/27	Thanksgiving – no class	-	-
12/4	Species tree estimation	Maddison 1997; Maddison & Knowles 2006	Sierra
12/11	Species delimitation	Pons et al. 2006	Andie, Abby