

# Evolutionary Biology PCB 4683

## Spring 2015

**BY ENROLLING IN THIS CLASS YOU AGREE TO EVERY ITEM IN THIS SYLLABUS.**

### **PCB 4683 Evolutionary Biology, Spring Semester 2015 (4 credits)**

Understanding evolutionary biology is critical for biologists and important for all biological organisms, including humans. To quote two notable evolutionary theorists, "Nothing in biology makes sense except in the light of evolution" (*Theodosius Dobzhansky, 1973*) and "Man is descended from a hairy, tailed quadruped, probably arboreal in its habits" (*Charles Darwin, 1871*). In this class we take an analytical approach to explore the pattern and process of evolution in all life forms, from HIV to single celled organisms to *Homo sapiens*. Evolutionary genetics will be considered as the foundation underlying all aspects of evolutionary biology, and concepts in speciation, adaptation, classification, population genetics, and macroevolution will be covered in depth. The importance of evolutionary concepts to all facets of biology will be emphasized, particularly the interplay between evolution and ecology, genetics, development, and medicine.

### **Course Objectives**

- To understand evolutionary patterns and how evolutionary relationships are estimated.
- To become a skilled reader and critic of scientific literature.
- To understand the principles of population genetics, including selection, genetic drift, mutation, linkage, and gene flow.
- To understand the mechanisms of speciation and diversification.
- To understand the relevance of evolutionary biology to human society, particularly human health.

### **Prerequisites:**

A grade of C or better in undergraduate genetics and ecology courses or consent of the instructor. A good understanding of basic genetics and ecology are vitally important to success in this class.

### **Class Meetings:**

Lecture: 11:30 am –1:20 pm Tuesday and Thursday in BA1 119.

Labs (PCB 4683L, 1 credit): Mondays in BL 414

Lab 11: 8:30–10:20 am; Lab 12: 10:30 am–12:20 pm; Lab 13: 12:30–2:20 pm

### **Lecture Instructor:**

Dr. Anna E. Savage

Office: BL 435, 407-823-4504

E-mail: Anna.Savage@ucf.edu

Office Hours: Tuesday 2:30–4:00 pm, Wednesday 1:00–3:30 pm, online in Webcourses chat room Wednesday 7:00–8:00 pm. (I will do my best to be available during those times, but things occasionally come up requiring me to be away from my office or computer. Please e-mail me for specific meeting times.)

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### **Laboratory Teaching Assistants (office hours by e-mail appointment):**

Ms. Alexa Trujillo; BL 427; E-mail: altrujillo5@knights.ucf.edu

Mr. Matthew Lawrance; BL 425, E-mail: lawrancm@knights.ucf.edu

### **Webcourses Site:**

I have a course web site set up on Webcourses (<https://webcourses.ucf.edu>) that I will use to post materials for the course, including the syllabus, calendar dates, PowerPoints, quizzes, and your grades. If you need to contact me, please do so using the Inbox Conversations function in Webcourses.

### **Required Text:**

Herron, J. C., and S. Freeman. 2014. Evolutionary Analysis, 5th edition. Pearson Education, Boston, USA. ISBN 0-321-61667-7

Companion Website: [www.pearsonhighered.com/herron](http://www.pearsonhighered.com/herron)

### **Class Policies:**

1. Attendance is not strictly required but many studies have shown that students who do not attend class do poorly. In addition, discussion assignments will take place during class and anyone absent will receive a zero for the assignment.
2. Exam make ups will not be given without valid documentation that is presented prior to the absence or within 24 hours of the administration of the test. Quizzes and discussion assignments may not be made up.
3. Assigned readings should be completed before attending class. Quizzes will assess your reading knowledge prior to covering the material in class.
4. You are encouraged to discuss any and all portions of the class with me. Please feel free to come to my office hours or make an appointment to discuss the class, especially if you are having trouble in the class.
5. Respect should be given to fellow students and the instructor. Please do not arrive late to class, walk out in the middle of class, or leave early.
6. Hateful or offensive speech or writing will not be tolerated.
7. Cell phones, iPods, and other electronic devices should be turned off and put away before class starts. If one of these devices disrupts class the owner will be asked to leave and will not be allowed to participate in discussion assignments.
8. Academic dishonesty (cheating and plagiarism) is strictly prohibited and will be taken very seriously and will result at least in an "F" for that assignment (and may, depending on the severity of the case, lead to an "F" for the entire course) and may be subject to appropriate referral to the Office of Student Conduct for further action. See the UCF Golden Rule for further information.

### **Course Accessibility:**

It is my goal that this class be an accessible and welcoming experience for all students, including those with disabilities that may impact learning in this class. If anyone believes the design of this course poses barriers to effectively participating and/or demonstrating learning in this course, please meet with me to discuss reasonable options or adjustments. You may also contact SDS

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(Ferrell Commons 185; 407-823-2371; sds@ucf.edu) to talk about academic accommodations.

### **Grading:**

Grades will be assigned according to the following scale:

	92-100 = A	90-91 = A-
87-89 = B+	82-86 = B	80-81 = B-
77-79 = C+	72-76 = C	70-71 = C-
	60-69 = D	
	≤ 59 = F	

The grade for this course will be based on four aspects:

- (1) Three semester **exams** will be given on the dates indicated on the schedule. They will consist of multiple choice, math problems, and short answer questions (20% each)
- (2) One cumulative **final exam** will have the same format as the semester exams and will take place on Thursday April 30<sup>th</sup> at 10:00 am. (24%)
- (3) Pre-reading **quizzes** will be administered online through Webcourses approximately once a week. You will be expected to read each chapter and take a short quiz to assess your knowledge of the chapter *prior to* going over that chapter during lecture. This will ensure you will be ready to cover the material during lecture and anything you didn't understand in the reading can be covered in detail during class. You may take each quiz twice and the *most recent* of the two scores will be your grade for that quiz. The lowest quiz will be dropped. All quizzes are due by **11:59 pm** on their due dates. (8%)
- (4) **Discussion assignments** will take place during class throughout the semester. Dates will often not be announced in advance, so regular attendance is necessary to complete all of these assignments. Groups of students will discuss broad questions based on textbook material and primary literature and write a consensus answer that will be turned in for credit. The lowest discussion assignment will be dropped. (8%)

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### Schedule:

The following schedule is approximate and dates may be changed at any time.

<b>Date</b>	<b>Topic</b>	<b>Assignments</b>
13 January T	Class intro ~ Why study evolution? ~ Begin A Case for Evolutionary Thinking	Chapter 1
15 January TH	Finish A Case for Evolutionary Thinking ~ Begin The Pattern of Evolution	Chapter 2.1-2.2; <b>Quiz 1: Ch 1</b>
20 January T	Finish The Pattern of Evolution ~ Scientific Method	Chapter 2.2-2.5; <b>Directed reading 1</b>
22 January TH	Evolution by Natural Selection	Chapter 3
27 January T	Natural Selection continued	<b>Quiz 2: Ch 2 &amp; 3</b>
29 January TH	Intro to Phylogenetics	Chapter 4
3 February T	Intro to Phylogenetics ~ Genetic & Environmental Variation	Chapter 5.1-5.2
5 February TH	Mutation	Chapter 5.3-5.5; <b>Quiz 3: Ch 4 &amp; 5.1-5.2</b>
10 February T	<b>*EXAM 1*</b>	<b>Ch 1-5 exam</b>
12 February TH	Population Genetics: HWE & Selection	Chapter 6.1-6.2; <b>Directed reading 2</b>
17 February T	Population Genetics: Selection & Mutation	Chapter 6.3-6.5
19 February TH	Population Genetics: Migration & Drift	Chapter 7.1-7.2; <b>Quiz 4: Ch 6</b>
24 February T	Population Genetics: Molecular Evolution & Nonrandom Mating	Chapter 7.3-7.5
26 February TH	Linkage and Sex	Chapter 8; <b>Quiz 5: Ch. 7</b>
3 March T	Quantitative Genetics	Chapter 9
5 March TH	<b>*EXAM 2*</b>	<b>Ch 6-8 exam</b>
10 March T	<b>*SPRING BREAK*</b>	
12 March TH	<b>*SPRING BREAK*</b>	
17 March T	Methods for studying adaptation	Chapter 10
19 March TH	Sexual Selection I: Dimorphism and Males	Chapter 11.1-11.2; <b>Quiz 6: Ch 10</b>
24 March T	Sexual Selection II: Females, Plants and Humans	Chapter 11.3-11.6
26 March TH	Kin Selection	Chapter 12; <b>Quiz 7: Ch. 11 &amp; 12</b>
31 March T	Life History Evolution	Chapter 13
2 April TH	Evolution and Human Health	Chapter 14; <b>Directed reading 3</b>
7 April T	<b>*EXAM 3*</b>	<b>Ch. 9-13 exam</b>
9 April TH	Genome Evolution	Chapter 15
14 April T	Mechanisms of Speciation I: Species Concepts and Isolation	Chapter 16.1-16.2; <b>Quiz 8: Ch. 15</b>
16 April TH	Mechanisms of Speciation II: Drivers of Divergence	Chapter 16.3-16.5; <b>Directed reading 4</b>
21 April T	Human Evolution	Chapter 20
23 April TH	Finish Human Evolution ~ Discussion	<b>Quiz 9: Ch. 16 &amp; 20</b>
28 April T	Study Day	
30 April Tr	<b>*FINAL EXAM*</b>	<b>~50% Chapter 14, 15, 16 &amp; 20, ~50% cumulative</b>