

Honors Evolutionary Biology
PCB 4932H
Fall 2020

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

PCB 4932H: Honors Evolutionary Biology (4 credits)
Fall Semester 2020

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. We will read and discuss primary literature, and students will present recent research publications, to emphasize the active areas and approaches to research in evolutionary biology. 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 develop skills in interpreting and communicating evolutionary concepts from a variety of sources, including the primary literature
- To understand the relevance of evolutionary biology to human society, particularly human health.

Prerequisites:

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

Class Meetings:

Lecture: Mon & Wed 10:30 AM – 12:20 PM (held live over Zoom)

Lab course:

PCB 4683L, 1 credit.

The Evolutionary Biology lab is a separate 1 credit course and is not required. However, the

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laboratory content is coordinated with the lecture course, and concepts from lecture are reinforced with laboratory activities. When possible, you are encouraged to enroll in the lab during the same semester you take the lecture.

Mondays in BIO 211

Section 0011: Monday 8:30 – 10:20 am

Section 0012: Monday 10:30 am – 12:20 pm

Section 0013: Monday 3:30 – 5:20 pm

Lecture Instructor:

Dr. Anna E. Savage

Office: BL 424, phone: 407-823-4504

E-mail: Anna.Savage@ucf.edu

Office Hours: Mondays 2:00-4:30 PM, and by appointment.

I will do my best to be available during office hours, but things occasionally come up requiring me to be away. Please e-mail me to schedule a specific meeting time.

Monday office hours will be held in Zoom. You will be placed in the waiting room and I will let students in on a first-come, first-served basis. If this time does not work for you, please email me to schedule alternate Zoom meetings and I will work with you to accommodate your schedule. Office hours can be used to discuss specific course-related material, and also for general advisement regarding your education and personal or professional goals and concerns.

Laboratory Teaching Assistants:

Jacob LaFond (lab TA only, sections 011 and 013)

BL 425; E-mail: lafondj@knights.ucf.edu

Office hours: Tues 2-3:30 PM & Wed 3:30-5 PM

Katherine Martin (lecture TA and lab TA for section 012)

BL 425; E-mail: katie.martin@knights.ucf.edu

Office hours: Thurs 2-3:30 PM & Fri 2-3:30 PM

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, links to Zoom meetings for lectures and office hours, access to quizzes and exams (which will all occur within Webcourses), and your grades. If you wish to contact me, you can use the Inbox Conversations function in Webcourses or you can email me directly.

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

Class Policies:

1. Lectures will be held live (synchronously, not pre-recorded) over Zoom. Attendance is

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required during lectures, both because studies have shown that students who do not attend class do poorly, and because we are a small group so attendance is critical to facilitate discussion and interaction. Graded discussion assignments will occasionally take place during class and anyone absent will receive a zero for the assignment. **Missing more than 3 scheduled lectures without approved excuses (e.g., medical illness, conference, job interview) will result in your final grade being lowered by one letter grade.**

2. Make ups for missed exams, quizzes, presentations and discussion assignments will only be guaranteed if you present valid documentation (e.g., doctor note, education-related travel) prior to the absence or within 24 hours of the administration of the assignment.
3. Assigned readings should be completed before attending 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 difficulties with any of the material or with your education this semester overall.
5. Respect should be given to fellow students and the instructor. Please do not arrive late to class or leave early unless this has been pre-arranged with instructor approval. Please mute yourself when not speaking during Zoom lectures so as not to disrupt the rest of the class.
6. Hateful or offensive speech or writing will not be tolerated.
7. 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 SAS (Ferrell Commons 185; 407-823-2371; sds@ucf.edu) to talk about academic accommodations.

Respect for Diversity:

It is my intent that students from all diverse backgrounds and perspectives be well-served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. Specifically:

- If you have a name and/or set of pronouns that differ from those that appear in your UCF records, please let me know.

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- If any of our class meetings conflict with your religious events, please let me know so that we can make arrangements for you.
- If you feel like your performance in the class is being impacted by your experiences outside of class, please don't hesitate to come and talk with me. I want to be a resource for you. If you prefer to speak with someone outside of the course, you can contact UCF's Office of Diversity and Inclusion (diverse@ucf.edu or 407-823-6479) or the Biology Department Undergraduate Coordinator Dr. Josh King (Joshua.King@ucf.edu).
- I (like many people) am still in the process of learning about diverse perspectives and identities. If something was said in class (by anyone) that made you feel uncomfortable, please talk to me about it (or contact the resources listed above if you feel more comfortable).

Despite aiming to be objective, science has been historically built on and biased by a small subset of privileged voices. Many of the readings for this course, including the textbook, were authored by white men. Furthermore, the course often focuses on historically important evolution experiments which were mostly conducted by white men. I strive to include more diverse perspectives and studies in my lectures and in the reading assignments outside of the textbook. However, I acknowledge that there may be both overt and covert biases in the material due to the lens with which it was written, even though the material is primarily of a scientific nature. Integrating a diverse set of experiences is important for a more comprehensive understanding of science. Please contact me if you have any suggestions to improve the quality of the course materials.

COVID-19 course impacts:

Due to the COVID-19 pandemic, this course will be taught 100% remotely using Zoom for live lectures and webcourses for administering quizzes, exams, etc. I have made the choice to use Zoom rather than hold face-to-face meetings because I feel that discussion and lectures are better facilitated over Zoom compared to in a socially-distanced classroom with all of us wearing face masks.

COVID-19 Illness Notification:

Students who believe they may have a COVID-19 diagnosis should contact UCF Student Health Services (407-823-2509) so proper contact tracing procedures can take place.

Students should not come to campus if they are ill, are experiencing any symptoms of COVID-19, have tested positive for COVID, or if anyone living in their residence has tested positive or is sick with COVID-19 symptoms. CDC guidance for COVID-19 symptoms is located here:

(<https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>)

Students should contact their instructor(s) as soon as possible if they miss class for any illness reason to discuss reasonable adjustments that might need to be made. When possible, students should contact their instructor(s) before missing class.

In Case of Faculty Illness:

If the instructor falls ill during the semester, there may be changes to this course, including having a backup instructor take over the course. Please look for announcements or mail in Webcourses@UCF or Knights email for any alterations to this course.

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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. Exams:	66%
2. Online quizzes:	12%
3. Final presentations	10%
4. Paper discussion assignments:	9%
5. Pre- and post-test:	<u>3%</u>
Total:	100%

(1) Three **exams** will be given on the dates indicated on the schedule. They will consist of a mix of multiple choice, true/false, and/or math problems, as well as some short answer and/or essay questions, in varying proportions depending on the material covered. All three exams will be delivered in webcourses, will take place during regular class time during the semester, and will be open book and open notes. However, *communicating with any other people during the exam is strictly prohibited and is grounds for failing the exam and/or class*. Exams will not be cumulative, covering only those chapters assigned since the previous exam. (22% each; 66% total)

(2) Reading assignment **quizzes** will be administered online through Webcourses approximately every 2 weeks. Quizzes will always be due on Wednesdays (by 11:59pm) and will be available by the previous Monday. You will be expected to read each assigned chapter (or in some cases, chapter sections or other assigned material) and take a short quiz to assess your knowledge of the chapter material. All quizzes will be open book and you will have 15-30 minutes to complete each quiz depending on the format. The lowest quiz grade for each student will be dropped. All quizzes are due by **11:59 pm** on their due dates. (12% total)

(3) Four **paper discussion assignments** will take place during class throughout the semester. We will use breakout groups in Zoom to break into groups of 2-3 and discuss a series of questions based on previously assigned primary literature. We will then engage in final discussion where each group presents their answers and we debate and come to consensus on important takeaways from the primary literature. Your grade will be based on participating in these discussions: you will earn 100% as long as you are present and contribute to the conversation. Discussion assignment readings will be included as material covered on each of the three in-class exams. The lowest discussion assignment will be dropped. (3% each; 9% total)

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(4) **Pre- and post-tests** will assess your general knowledge of evolutionary biology and will be administered online through Webcourses during the first and last weeks of class, respectively. You will earn 100% on the pre-test and post-test for completing the online questions, regardless of your score. (1.5% each; 3% total)

(5) **Final paper presentations.** During the final exam period, each student will give a 5-minute oral presentation with PowerPoint slides covering a recent (within the last 2 years) primary literature paper in the field of evolutionary biology that relates to a topic we focused on during lecture. The presentation will be evaluated based on (1) oral presentation skills, (2) slide content and visuals, (3) ability to convey the key points of the study and how it relates to a concept from class, and (4) communication of why the student found this paper interesting/important. Students must select their paper and have it approved by the instructor in advance of the presentation (see detailed schedule below for deadlines). (10% total)

Schedule:

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

Date	Topic	Assignments
24 August M	Class intro ~ Why study evolution? ~ Begin A Case for Evolutionary Thinking	Chapter 1
26 August W	Finish A Case for Evolutionary Thinking ~ Begin The Pattern of Evolution	Chapter 2.1-2.2; Pre-test
31 August M	Finish The Pattern of Evolution ~ Scientific Method	Chapter 2.3-2.5
2 September W	Evolution by Natural Selection	Chapter 3; Quiz 1: Ch 1 & 2
7 September M	*LABOR DAY NO CLASS*	
9 September W	Finish Natural Selection ~ paper discussion 1	Directed reading 1
14 September M	Intro to Phylogenetics	Chapter 4
16 September W	Finish Phylogenetics ~ Genetic & Environmental Variation	Chapter 5.1-5.2; Quiz 3: Ch 3 & 4
21 September M	Mutation	Chapter 5.3-5.5
23 September W	*EXAM 1*	Ch 1-5 exam
28 September M	Population Genetics: HWE & Selection	Chapter 6.1-6.2
30 September W	Population Genetics: Selection & Mutation	Chapter 6.3-6.5; Quiz 4: Ch 6
5 October M	Population Genetics: Migration & Drift	Chapter 7.1-7.2
7 October W	Population Genetics: Molecular Evolution & Nonrandom Mating	Chapter 7.3-7.5; Quiz 5: Ch 7
12 October M	Linkage and Sex	Chapter 8
14 October W	Methods for studying adaptation	Chapter 10; Quiz 6: Ch 8 & 10
19 October M	Sexual Selection I: Dimorphism and Males	Chapter 11.1-11.2
21 October W	Sexual Selection II: Females, Plants and Humans	Chapter 11.3-11.6
26 October M	Paper discussion 2	Directed reading 2
28 October W	*EXAM 2*	Ch. 6-11 exam
2 November M	Kin Selection	Chapter 12
4 November W	Finish Kin Selection ~ Start Life History Evolution	Chapter 13.1-13.3; Quiz 7: Ch. 11 & 12
9 November M	Finish Life History Evolution ~ begin Evolution and Human	Chapter 13.4-end

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	Health	
11 November W	*VETERANS DAY NO CLASS*	
16 November M	Finish Evolution and Human Health ~ paper discussion 3	Chapter 14; Directed reading 3
18 November W	Mechanisms of Speciation I: Species Concepts and Isolation	Chapter 16.1-16.2; Quiz 8: Ch. 14 & 16
23 November M	Mechanisms of Speciation II: Drivers of Divergence	Chapter 16.3-16.5; turn in paper selection for final
25 November W	Human Evolution	Chapter 20; Quiz 9: Ch. 20
30 November M	Paper discussion 4 and final review	Directed reading 4
2 December W	*EXAM 3*	Ch 12-16 and 20 exam
7 December M	*FINAL PRESENTATIONS* 10:00 AM – 12:50 PM	5 minute oral presentation to class