

PCB 4683 Evolutionary Biology, Fall 2021

Evolution is the unifying theory of biology, applicable to all biological organisms including humans. As such, understanding evolutionary biology is critical for biologists and anyone who seeks an understanding of the natural world. To quote a notable evolutionary theorist, "Nothing in biology makes sense except in the light of evolution" (*Theodosius Dobzhansky, 1973*). In this class we take an analytical approach to explore the pattern and process of evolution in all life forms, from viruses to single-celled organisms to plants 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 is vitally important to your success in this class.

TIME AND PLACE:

Lecture: 11:30 am – 1:20 pm Tuesday/Thursday in HPA1 Rm 119.

CREDIT:

Lecture (PCB 4683): 4 semester hrs.

LECTURE INSTRUCTOR
Dr. Michelle R. Gaither
Department of Biology
Office BMS132
Web Site: https://webcourses.ucf.edu/

OFFICE HOURS:

I will generally be available from Mon 9:30-10:30 am; Wed 11:30am -12:30pm. Email me to [schedule an appointment](#).

Laboratory Teaching Assistants:

Katie Martin; katie.martin@knights.ucf.edu

Office hours: Mondays 1:30-3PM & Fridays 8:30-10AM via zoom (in-person via appointment)

<https://ucf.zoom.us/j/99847881642?pwd=STINbWN2TTFWdnBma1VEQkl0Rmp0Zz09>

Meeting ID: 998 4788 1642

Passcode: officehour

*Vero Urgiles Penafiel; vurgiles@knights.ucf.edu

Office hours:

Mondays 3:30 - 5:00 pm (in-person via appointment)

<https://ucf.zoom.us/j/94760642222?pwd=L00zT2IyZHhQWFpwVER5emtpSHhadz09>

Passcode: evobio

Tuesdays 9:00 - 10:30 am (in-person via appointment)

<https://ucf.zoom.us/j/92477745945?pwd=d0lhMFpFTjdWNEpOeEp4eVVjd0FoUT09>

Passcode: evobio

*Vero is also the Lecture TA. These hours can be used to review for upcoming exams or to see old exams. However, old exams will only be available for review before the next exam.

Note: all reviewing of graded exams is administered by the Lecture TA during weekly office hours. Instructor office hours are for lecture content-related questions, follow-up questions about exams after reviews with the Lecture TA, and other inquiries.

WEBCOURSES SITE:

Course materials are posted on Webcourses (<https://webcourses.ucf.edu>), including the syllabus, PowerPoints, quizzes, and grades. If you need to contact me, please do so using the Inbox Conversations function in Webcourses. If you don't get a response within 24 hours send me an email.

REQUIRED MATERIALS:

Evolutionary Analysis, 5th edition 2014. By Herron and Freeman. Prentice Hall, Inc., Upper Saddle River, NJ ISBN: 0-321-61667-7

Companion Website: www.pearsonhighered.com/herron

If you come to class and follow the lectures the 4th edition will do fine!

COVID:

UCF expects that all members of our campus community who are able to do so get vaccinated, and we expect all members of our campus community to wear masks indoors, in line with the latest CDC guidelines. If I fall ill during the semester, there may be temporary changes to this course, including having a backup instructor take over the course or going remote for a short time. Please look for announcements or mail in Webcourses@UCF or Knights email for any temporary alterations to this course. **Students who believe they may have been exposed to COVID-19** or who test positive must 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 or have tested positive for COVID-19.

CLASS POLICIES:

1. 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 cannot be made up.
2. Assigned readings should be completed before attending class. Quizzes will assess your reading knowledge sometimes prior to covering the material in class.
3. You are encouraged to discuss any and all portions of the class with me. Please feel free to make an appointment to discuss the class during my office hours, especially if you are having trouble.
4. 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. Hateful or offensive speech or writing will not be tolerated.
5. Smart phones should be turned off and put away before class starts. If a phone disrupts class the owner will be asked to leave and will not be allowed to participate in discussion assignments.
6. Academic dishonesty (cheating and plagiarism) is strictly prohibited and will be taken very seriously and will result in at least 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 SDES (Ferrell Commons 185; 407-823-2371; sas@ucf.edu) to talk about academic accommodations.

Grading:

Grades will be assigned according to the following scale, no exceptions:

Percentage	Letter Grade
90.0 – 100	A
80.0 – 89.9	B
70.0 – 79.9	C
60.0 – 69.9	D
< 60.0	F

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

(1) **Four semester exams** will be given on the dates indicated on the schedule. They will consist of multiple choice including math problems. Each will consist of 50 questions worth 2 pts each for a total of 100 points (20% of total grade each).

(2) **One cumulative final exam** will have the same format as the semester exams and will be worth 20% of your total grade. Together exams (including final exam) make up 80% of your grade. The lowest of the five grades will be dropped. This includes the final (so $20\% \times 4 = 80\%$). Therefore, together the exams are worth 400 pts.

If you have taken all four semester exams and are satisfied with your grade after exam four you do not need to take the final.

(3) **Quizzes** will be administered online through Webcourses approximately once per week for a total of ten quizzes. These quizzes are matched to the pace of assigned readings, and you will be expected to read each chapter and take a short quiz to assess your knowledge of the chapter *prior to (or thereabouts)* going over that chapter during lecture. **Quizzes are due before midnight on the due date.** This will ensure you will be ready to cover the material during lecture and anything you didn't understand in the reading can be addressed in detail during class. You may take each quiz twice and the *highest* of the two scores will be your grade for that quiz. Pay careful attention to due dates on Webcourses as these will be strictly enforced. The quizzes will be worth a total of 100 pts or 20% of your total grade (2% each, 20% total). No quiz scores are dropped.

(4) A **pre-test** and **post-test** for the course will be given via Webcourses to gauge course efficacy. These are not actually graded but instead full credit is given for completed tests and is considered **extra credit**. Each is worth 5 pts or 1% of total grade (together they are worth 2% of total grade if completed).

In-class discussions will take place during class throughout the semester. Students can form groups or work alone to answer broad questions based on textbook material and primary literature. This material will be covered on exams and quizzes. So while not graded participation in discussions will improve comprehension and possibly improve exam/quiz grades.

The following schedule is approximate and dates may be changed at any time. **Quizzes are due before midnight the day they are listed** as these go hand in hand with the required pre-class reading. Quizzes will typically be available for several days in advance of the due date. Lecture topics will overlap and possibly run over multiple days so topics listed are not exact!

Date	Topic	Pre-class Read:	Assignments
Aug 24 (T)	Class intro ~ A Case for Evolutionary Thinking	Chapter 1	
Aug 26 (TH)	COVID 19 The Pattern of Evolution	Acter et al. 2020	Pre-test Due by Friday at midnight
Aug 31 (T)	The Pattern of Evolution	Chapter 2	
Sept 2 (TH)	Finish The Pattern of Evolution Evolution by Natural Selection	Chapter 3	Quiz 1: Ch 1-3; Acter et. al. 2020
Sept 7 (T)	Evolution by Natural Selection		
Sept 9 (TH)	Phylogenetics	Chapter 4; Zhang et al. 2020	Quiz 2: Ch 4 & 5
Sept 14 (T)	Genetic & Environmental Variation	Chapter 5	
Sept 16 (TH)	Finish up material for Exam 1		Quiz 3: Ch 1-5
Sept 21 (T)	*EXAM 1* (Ch 1-5)		
Sept 23 (TH)	Population Genetics: HWE & Selection	Chapter 6	Quiz 4: Ch 5 & 6
Sept 28 (T)	Population Genetics: Selection & Mutation		
Sept 30 (TH)	Population Genetics: Migration & Drift	Chapter 7	Quiz 5: Ch 7
Oct 5 (T)	Linkage and Sex	Chapter 8	
Oct 7 (TH)	Quantitative Genetics	Chapter 9	Quiz 6: Ch 8 & 9
Oct 12 (T)	Finish up material for Exam 2		
Oct 14 (TH)	*EXAM 2* (Ch 6-9)		
Oct 19 (T)	Methods for Studying Adaptation	Chapter 10	
Oct 21 (TH)	Sexual Selection	Chapter 11	Quiz 7: Ch 10 & 11
Oct 26 (T)	Kin Selection	Chapter 12	
Oct 28 (TH)	Life History Evolution	Chapter 13	Quiz 8: Ch 12 & 13
Nov 2 (T)	Finish up material for Exam 3		
Nov 4 (TH)	*EXAM 3* (Ch 10-13)		
Nov 9 (T)	Evolution and Human Health	Chapter 14; TBD reading	
Nov 11 (TH)	Mechanisms of Speciation I	Chapter 16	Quiz 9: Ch 14 & 16
Nov 16 (T)	Mechanisms of Speciation II		
Nov 18 (TH)	Human Evolution	Chapter 20	Quiz 10: Ch 20
Nov 23 (T)	Human Evolution	TBD reading	
Nov 25 (TH)	Thanksgiving (No class)		Post-test Open Today
Nov 30 (T)	*EXAM 4* (Ch 14, 16 & 20)		Post-test Due Today
Dec 2 (TH)	TBD		
Dec. 9 (TH)	*FINAL EXAM 10-11:30am HPA1 119		Cumulative