

# EVOLUTIONARY BIOLOGY (BIOL 5250) SPRING 2017

Class meetings:	BNR 278, 12:00–1:15 p.m., Tu & Th	
Website:	Log-in to Canvas	
	Instructor	Teaching Assistant
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	Dr. Zach Gompert	Michael Orr
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Office:	BNR 355	by appointment
Office Hours:	Tu & Th 1:15–2:30 p.m.	by appointment

## 1 DESCRIPTION OF THE COURSE AND LEARNING OBJECTIVES

In this course we will get an overview of modern evolutionary biology. A good understanding of the processes and mechanisms of evolution will be our primary goal. By the end of the course you should be able to (1) make predictions and generate testable hypotheses based your understanding of the evolutionary process, (2) apply evolutionary thinking to real-world problems, and (3) respond to major misconceptions regarding evolution. Along these lines, this course is designed to address the following IDEA learning objective:

- learning fundamental principles, generalizations, or theories
- learning to apply course material in problem solving, and decision making
- learning to analyze and critically evaluate ideas, arguments, and hypotheses

Although this is an introductory course in evolutionary biology, it is not purely a lecture-based course. I will offer lectures, explanations and examples to introduce and clarify material, but we will also discuss material and perform hands-on activities in small groups and as a class. This format may be unfamiliar at first and will require that all of us come prepared to each class. Part of my job will be to make clear what the preparation for each class entails. It should be clear from the outset that this course is built around your regular, active preparation for class meetings.

## 2 COURSE MATERIALS

1. J. C. Herron and S. Freeman. 2014. *Evolutionary Analysis*. Fifth Edition. Pearson Prentice Hall, NJ.
2. Articles from scientific journals (available via Canvas)

### 3 ATTENDANCE AND PARTICIPATION

Learning in class is a communal endeavor as well as an individual undertaking. You are expected to be present and prepared at the designated time for every class and to remain engaged in class activities throughout the time allotted for class. Coming to class prepared includes reading book chapters and selections from the primary literature and completing all assignments.

### 4 ASSESSMENT

Your performance will be evaluated based on two exams, four analytical exercises, five reading assignments (think pieces), a series of reading quizzes and class participation (discussion questions). These assignments are introduced below, but additional information regarding the exams and analytical exercises will be provided in due course. Due dates for all assignments can be found on Canvas.

Discussion questions	5%
Reading quizzes	10%
Think pieces	20%
Analytical exercises	20%
Mid-term exam	20%
Final exam	25%

Letter grades will be calculated on the standard USU scale:

A = 93 – 100, A<sup>-</sup> = 90 – 92, B<sup>+</sup> = 87 – 89, B = 83 – 86, B<sup>-</sup> = 80 – 82, C<sup>+</sup> = 77 – 79, C = 73 – 76, C<sup>-</sup> = 70 – 72, D<sup>+</sup> = 67 – 69, D = 60 – 66, and F < 60. Your final score will be **rounded downward** to the nearest integer value when assigning letter grades. In other words, a 79.9 is a C<sup>+</sup> not a B<sup>-</sup>.

#### 4.1 DISCUSSION QUESTIONS (5%)

You will be asked to respond to discussion questions each class period. I will use these questions to assess learning during lectures and summarize in-class group discussions and problem-solving exercises. You will be required to log your responses with the REEF polling software. Your score for the discussion questions will be calculated based on the percentage of questions that you log an answer for. If you answer at least 80% of the questions you will receive full credit for the discussion questions. Answering at least half of the questions will result in half credit. You will receive no points for discussion questions if you do not answer at least half of them. Because you can miss 20% of the questions and still receive full credit, no make-up questions will be provided for missed classes or personal technical issues.

#### 4.2 READING QUIZZES (10%)

Reading the text book will give you an introduction to each topic that we cover in this course. By keeping up with the reading outside of class, we will be able to focus on more difficult concepts and applications of the material in class. There will be a short (2-6 questions) reading quiz for each assigned chapter (it may cover all or part of the chapter, see Canvas

for details). You can take the reading quizzes on-line via Canvas. These reading quizzes are meant to provide you with immediate feedback on your grasp of the material, and to help me identify and target topics that many students struggle with.

### 4.3 THINK PIECES (20%)

As biologists you will need to read and analyze scientific papers. Thus, as part of this course you will read, analyze (in writing), and discuss five recently published scientific papers. The written component that is associated with and responds to each assigned reading is called a think-piece. Think-pieces should contain discussion, critical analysis, and reasoned opinion, as opposed to a simple factual summary. Think-pieces should address the key concepts associated with the topic, as well as highlight the most important findings or other aspects of the reading, and make connections between the journal article and the material we have discussed in class. An additional purpose of the think-pieces is to give you an opportunity to summarize your thoughts, responses, and questions after reading the materials and in preparation for in-class discussion. Think-pieces should be word processed and approximately one page long. Each think piece is worth 10 points (see the rubric on Canvas for details). During class you will be given questions or prompts associated with the scientific papers to discuss in small groups.

### 4.4 ANALYTICAL EXERCISES (20%)

Scientists develop hypotheses, design and conduct experiments, and analyze and interpret data. As part of this course, you will complete four analytical exercises that will help you develop these skills and delve deeper into important topics in evolutionary biology. In these exercises you will work in groups to conduct computer-based experiments and analyze and interpret scientific data. You will then be asked to respond to a series of questions or write a short report. I will provide detailed instructions and expectations for each analytical exercise in due course. A substantial portion of this work will be done in class, but you will likely need out of class time to complete these assignments.

### 4.5 MIDTERM (20%) AND FINAL EXAM (25%)

There will be a midterm and final exam. Each exam has two parts or sections. The first part will be administered via Canvas, timed, and will include 20-40 multiple choice or fill in the blank questions. You are not permitted to use notes or your book for this part, but you can use a calculator. The second part is a take-home exam that will contain a mixture of short and long-answer questions that will require critical thinking, quantitative and qualitative analyses, application of knowledge to problems, and synthesis. You will have approximately 48 hours to complete the take-home portion of each exam, and you may use your book and class notes.

## 5 SCHEDULE OF TOPICS

The course is organized into seven ~two week modules, each focused on a major topic in evolutionary biology. In these modules, we will learn about the key questions, approaches, and major findings associated with a specific topic through lectures and in-class discussions, by

reading the text book (and taking the associated reading quizzes), by engaging in analytical exercises, and by reading, summarizing and discussing an article from the primary literature (not all activities apply to all modules). Below you will find a schedule with the module topics and associated book chapters. Due dates for individual assignments are available on Canvas.

Date	Module	Book Chapters
10–12 Jan.	Evolutionary Thinking	
17–26 Jan.	Natural Selection and Adaptation	FH 3, 10
31 Jan.– 9 Feb.	Mechanisms of Evolutionary Change 1	FH 5, 6
14–23 Feb.	Mechanisms of Evolutionary Change 2	FH 7
28 Feb.–21 Mar.	Mechanisms of Evolutionary Change 3	FH 8, 9, 15
23 Mar.–4 Apr.	Speciation	FH 16
6–18 Apr.	History of Life and Macroevolution	FH 17, 18, 19
20–27 Apr.	Human Evolution	FH 20

## 6 ADDITIONAL ITEMS

- The schedule of topics, assignments, and all other details in this syllabus are subject to change with fair warning.
- I should be informed of an absence from a scheduled exam in advance and I will accommodate absences for legitimate reasons and administer an exam at another time. If an emergency causes an absence from an exam, please contact me at your earliest convenience.
- ADA compliance: Students with physical, sensory, emotional or medical impairments may be eligible for reasonable accommodations in accordance with the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973. All accommodations are coordinated through the Disability Resource Center in Room 101 of the University Inn, 797-2444 voice, 797-0740 TTY, or toll free at 1-800-259-2966. Please contact the DRC as early in the semester as possible. Alternate format materials (Braille, large print or digital) are available with advance notice.
- Sexual harassment is defined by the Affirmative Action/Equal Employment Opportunity Commission as any “unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature.” If you feel you are a victim of sexual harassment, you may talk to or file a complaint with the Affirmative Action/Equal Employment Opportunity Office located in Old Main, Room 161, or call the AA/EEO Office at 797-1266.
- Students whose religious activities conflict with the class schedule should contact me at the beginning of the semester to make alternative arrangements.
- Cheating and other forms of academic dishonesty are listed in The Code of Policies and Procedures for Students at Utah State University (revised September 2009), Article

VI, Section 1. If you are found to be engaged in academic misconduct, at a minimum you will receive no credit for that exam or assignment. Repeat or serious offenders can expect more serious consequences.

- Many electronic devices are distracting in the classroom, to the user, other students and the instructor. This includes laptops, which clearly can be useful for taking notes but their web access often is a distraction. I ask that students are conscientious about their electronic devices and do their best to keep distractions outside the classroom. The simple guideline is that laptops, tablets, and mobile phones should be used for note-taking and classroom exercises only and not for browsing the internet.