

# BISC 301 Evolution

## Syllabus

**Instructor:** Dr. Susan Balenger

**Office:** My office is now in my house, so pop-in meetings won't be possible.

**Email:** balenger@olemiss.edu

**Zoom Office Hours:** By appointment

### **Class Meeting Structure:**

- Asynchronous: 6-10 mini-lectures will be uploaded to Box every Sunday. This lecture material will not exceed 100 minutes per week (equivalent to 2 50-minute class meetings)
- Synchronous: Students have been randomly assigned to a live weekly meeting day during one regular class meeting time. Therefore, you have already been randomly assigned to attend live Zoom class discussions on either Wednesdays (12-12:50pm) or Fridays (12-12:50pm). You may not change meeting days simply for your convenience. It is important that you attend the day assigned (more on that below).

### **Lectures:**

- Shared through Box (<https://olemiss.account.box.com/login>)
- You should receive an email invitation and link to join the folder

### **Wed/Fri Discussion:**

- <https://olemiss.zoom.us/j/94854674215?pwd=M2FyU1U0Qk0wZGxUQIR0UUk2MytJdz09>
- Classroom Meeting ID: 948 5467 4215  
Passcode: bisc301

**Required Textbook:** Evolution (Futuyma & Kirkpatrick, 4th ed.)

The evolution of life arises from a complex set of *processes* that often involve *abstract concepts* (esp. time). **Many people think they understand evolution, but in fact they have misconceptions and/or a fuzzy understanding of the topic.** Throughout the semester, I will work to clarify these misconceptions, help you to learn the language of evolutionary biology, and support your ability to think scientifically.

## Course Goals/Learning Objectives:

The following is a non-exhaustive list of the learning objectives of this course:

- Students will learn about the central concepts and definitions used in the study of biological evolution.
- Students will improve the logic and precision of their descriptions of scientific topics.
- Students will improve their quantitative thinking by working with several quantitative evolutionary topics.
- Students will practice their writing skills through weekly journal entries.
- Students will learn about doing hypothesis-driven science and demonstrate this by designing effective experiments to test evolutionary hypotheses.
- Students will gain experience interpreting and critiquing experimental data used by others to make claims about specific hypotheses.
- Students will gain skills allowing them to synthesize and think critically about primary and secondary scientific literature.

## Course Description:

Evolutionary biology is first and foremost a historical science, but it is also a living, experimental field of study. We utilize our conception of how past occurrences can and have influenced the patterns that we see across life today. We design experiments to test which process(es) have produced such patterns. In doing so, we can utilize our understanding of natural systems and processes to develop predictive models that inform possible future outcomes. As the course progresses, I hope that you will constantly be thinking about time scales (especially as it pertains to numbers of generations) and how process + time can lead/has led to the biological world in which we live.

This course focuses on the *processes* of evolution and the *patterns* generated by these processes. The aim is to develop a scientific way of thinking about biological diversity rather than attempting to memorize the history of living things. If you can acquire an “evolutionary way of thinking” about the tremendous diversity of life, you will probably remember more, and be equipped to discuss things more intelligently, than if forced to memorize dry facts about, say, gene frequencies or the fossil record. How can we account for the diversity of finch species on the remote Galapagos Islands and the existence of male crickets that don’t chirp? How on earth did some insects come to look so much like sticks and some spiders become such incredible dancers? We will seek explanations for such patterns of diversity and for the apparent “good fit” of organisms to their environment.

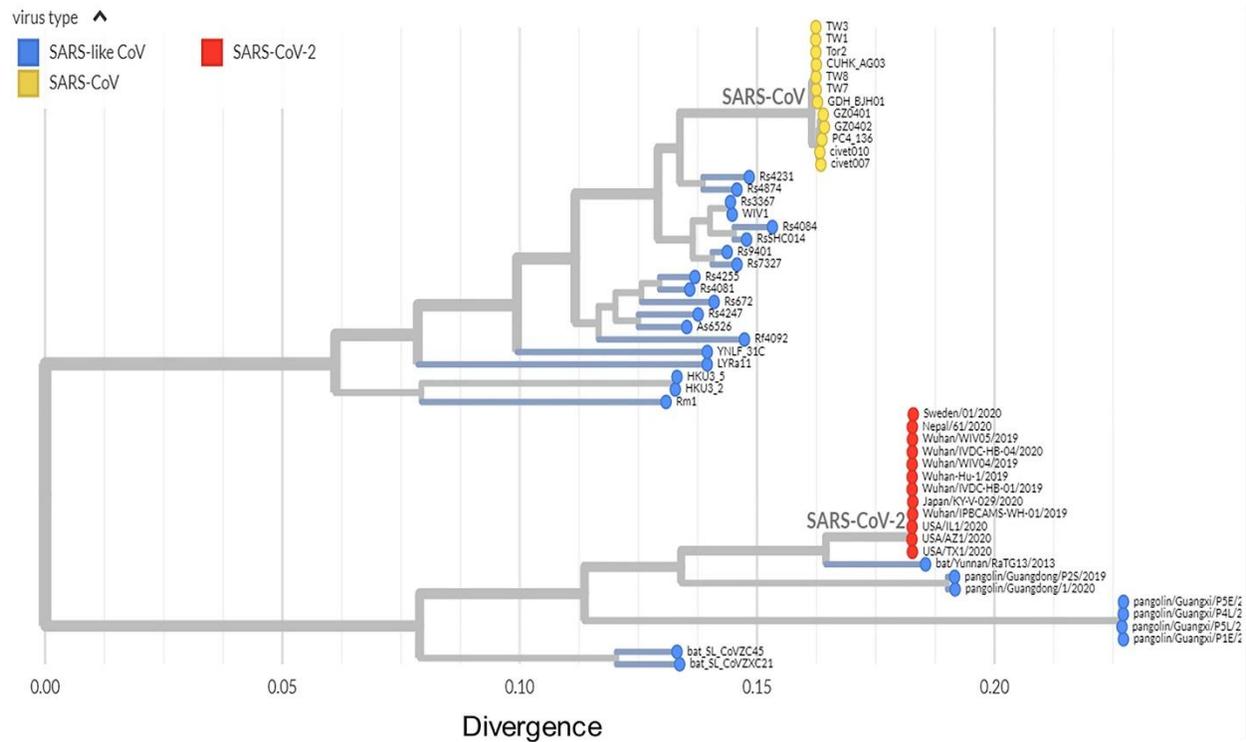
Topics covered include the history of evolutionary thought, elementary population genetics, the theory of evolution by natural selection, concepts of fitness and adaptation, genetic bases of evolutionary change, the importance of randomness in evolutionary outcomes (i.e., genetic drift), how movement of individuals generates evolutionary change, the evolution of sex, and how species-species interactions influence evolution. As this list indicates, you will be introduced to the major topics within evolutionary biology. I hope that exposure to the tremendous diversity

within this discipline will illustrate why evolution is viewed as the central theme unifying all of biology.

An understanding of evolution is not just the philosophical base upon which we build our understanding of life, but it is also a field that intersects all aspects of biology. For example, evolutionary concepts are at the forefront of many of the most important and cutting-edge advances in ecology, medicine, molecular biology, and epidemiology.

*Among biologists, evolution is considered to be a central unifying discipline because it is within an evolutionary framework that the rest of biology is understood, and it is therefore evolution that connects all other biological subfields.* Evolution provides the key to understanding the origin and maintenance of the diversity of life on earth.

**Example: When and where did SARS-CoV2 originate?**



**Phylogeny of SARS-like betacoronaviruses including novel coronavirus SARS-CoV-2.** Phylogenetic tree including 52 genomes. Red dots, SARS-CoV-2 coronaviruses from the COVID-19 epidemic; yellow dots, SARS-CoV coronaviruses from the 2002-03 SARS outbreak; and blue dots, SARS-like coronaviruses. (Adapted from “github.com/blab/sars-like-cov”; “Built with blab/sars-like-cov and maintained by Trevor Bedford and Emma Hodcroft”)

## Required Readings:

**Textbook** - Listed on the lecture outline are pages from the text (Evolution by Douglas Futuyma and Mark Kirkpatrick) associated with the lectures for a given week. The textbook is the 4<sup>th</sup> edition of Evolution by Futuyma & Kirkpatrick and the assigned readings are absolutely essential to success in this course. Each week you will be responsible for the material covered in the chapter of the text assigned in this syllabus. Most of this material will be covered in lecture as well, but you are responsible for any material covered in class that is not in the text as well as any material in the text that is not directly mentioned in class. **I strongly encourage you to read the textbook and use the associated website (evolution4e.sinauer.com) to review material.**

**Assigned readings for discussion** - In addition to the textbook, we will read primary & secondary literature to facilitate learning and discussion in this course. Therefore, **readings for weekly in-person Zoom discussions must be completed prior to classtime.** Putting the time in to not only read the assigned papers, but to think about them as you do so is absolutely essential to the success of the course and for your ability to participate in informed analysis and debate during discussions. Assigned readings are listed in this syllabus, and pdfs of each will be posted on Blackboard at least one full week before they are due.

### Grades:

Journals (60 pts.); Quizzes (20 pts.); Discussion attendance, participation & assignments (70 pts.); Exams (exam 1 = 100pts, exam 2 = 100pts, exam 3 = 150pts). **Total = 500 pts.**

### Grading scheme:

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	<60%

**Journals:** You are required to write about your thoughts and reflections of the week's major ideas, activities, discussion, and/or remaining questions or controversies that came up either in or outside of class. These journals are mainly for you to review and reinforce what you learned each week. They have the added benefit of allowing you to provide feedback to your professor about the effectiveness of the classroom activities and readings. Do you feel that you are learning the desired concepts and skills? What material really resonated with you, what is still unclear, and do you see connections with material you are learning/have learned in other classes or parts of your life?

- I have compiled a few examples of excellent journal entries from a different class. These are posted on Blackboard. I hope you will use them to guide you in writing your own journal.
- Entries are to be submitted online through the course Blackboard page before 5 pm each Friday (including exam weeks).
- You are required to write a minimum of five complete sentences to get full points, but a longer discussion is welcome as well.

- Journal entries are time stamped.
- You will be penalized if you submit your journal during class time or after the deadline (lose 1pt for 1 day late, 2pts for 2 days late).
- Journals will not receive credit if they are submitted more than 48 hours late.
- There will be total 12 entries – each is worth 5pts

**Quizzes:** A short quiz (1-3 T/F or multiple choice questions) will be posted on Blackboard each Sunday (except during exam weeks). Quizzes are open note, open book. You should see them as an opportunity to get some insight into what topics your professor thinks are particularly important. They should also be easy points!

- There will be 10 total quizzes
- Quizzes 1-4 must be completed prior to Exam 1 (Noon on 9/21)
- Quizzes 5-7 must be completed prior to Exam 2 (Noon on 10/19)
- Quizzes 8-10 must be completed prior to the last day of the regular semester (11/17)

**Discussion Attendance, Participation & Related Assignments:** Attendance is expected and will be taken for meetings where papers are discussed. Your grade will reflect poor attendance and lack of participation in these discussions.

- You will receive points for submitting your answers to the questions before the beginning of class (**2 pts**). (Points are awarded based on your attempt to answer the questions, not whether or not they are correct.)
- You will receive points for Zoom attendance and in class participation (**3 pts**)
- You will receive points for submitting your answers to the questions at the end of class (**2 pts**). These points will be awarded based on your answer to one randomly selected question.

**Exams:** Exam questions will include 1) true/false, 2) multiple choice, and 3) problem-solving and discussion style responses. They will cover material presented in lectures, discussions and readings and will encourage the integration of information from these sources. All exams will be administered through Blackboard. There will be 3 total exams, with the 3<sup>rd</sup> exam being cumulative.

**FYI:** Dr. Balenger typically holds a review session outside of class time (pending availability) 1-2 days before each exam.

### **Make up work:**

- Make up quizzes are NOT given.
- If you have a documented school function (marching band, game) or research-related function (conference, workshop), you will need to provide documentation in advance. It may be possible for you to switch discussion groups on such occasions, or to have your discussion points excused.

**Students with disabilities:**

- University policy provides for reasonable accommodations to be made for students with verified disabilities on an individualized and flexible basis as specified under Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 (ADA).
- SDS provides classroom accommodations to all students on campus who disclose a disability, request accommodations, and who meet eligibility criteria. We do not have specialized programs for specific types of disabilities.
- It is the responsibility of any student with a disability who requests a reasonable accommodation to contact the Office of Student Disability Services (915-7128). SDS will then contact the instructor through the student by means of an Instructor Notification of Classroom Accommodations form.

**Cheating:**

- Is, of course, unacceptable. This absolutely includes plagiarism. Any assignment including plagiarized material will automatically be given 0 points, and extreme cases of cheating and/or plagiarizing will result in failure of the course.

**University COVID19 Policy Statements:**

- Students attending the virtual component of hybrid, remote, or online courses are subject to the same attendance policy and procedures as traditional students. However, participation is defined in a different manner. The University's "Attendance Policy for Online Education" states: "Student attendance in online courses is defined as active participation in the course as described in the individual course syllabus." If students fail to meet online attendance requirements as stated in the syllabus, they will be given an absence.
- Students are encouraged to visit the [University's Keep Learning site](https://olemiss.edu/keeplearning/) (https://olemiss.edu/keeplearning/) to access information and resources related to COVID-19 support. The site provides links to University student services to facilitate and support learning. • Students with diagnosed health concerns that may affect their compliance with COVID-19 health requirements should contact [UM's Student Disability Services \(SDS\) Office](https://sds.olemiss.edu) (https://sds.olemiss.edu) to see if they are eligible for an SDS accommodation as soon as possible.

**Disclaimer:**

**The instructor retains the right to modify this syllabus during the semester. Students will be notified of modifications through Blackboard.**