

# BIOS 3600/BIOL 6600 - Evolutionary Biology

Spring 2022, 3 credits  
Tuesday and Thursday, 12:30-1:45pm  
Location: Instructional Center 211

## Instructors

### Dr. **Joseph Lachance**

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## Teaching assistants

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Office hours: Monday 5:30-6:30pm via BlueJeans, or by appointment

## Prerequisites

Genetics/honors genetics or ecology/honors ecology. If none of these classes have previously been taken, permission to take BIOS 3600/BIOL 6600 must be obtained from the course instructors.

## Overview

The goal of this course is to gain a comprehensive knowledge of evolutionary biology. It is geared towards intermediate undergraduate students and beginning graduate students. Emphasis will be placed on conceptual understanding of the subject with examples taken from the recent primary literature. Each week students will be introduced to:

- **fundamental concepts** of evolutionary biology
- **cutting edge-research** from journal articles and scientific conferences
- **real world examples** of different evolutionary phenomena

## Learning objectives

As a result of taking this course, you will be able to:

- Understand how evolutionary forces have shaped the diversity of life on Earth.
- Generate alternative explanations for historical patterns.
- Be able to adopt population, as opposed to typological, thinking.
- Interpret figures and tables from the primary literature.

## Course policies and assignments

*Covid guidance and course mode:* As per USG policies, instruction for this course will be face-to-face. All exams will require in-person attendance. This is an unprecedented time. If we are required to move to an online format because of a covid outbreak, we will work to help you learn the course content remotely. To accommodate your needs and the health of our community, all lectures will also be broadcast live via BlueJeans (accessible via a tab in Canvas). Our expectation is that everyone who is eligible will be vaccinated. This is because vaccination significantly reduces the likelihood of severe disease, including the Omicron variant. Booster shots are also encouraged. Because the Omicron variant can be spread by vaccinated individuals, we also expect that everyone who is able to should wear a mask, correctly covering mouth and nose, when indoors. Both of these expectations are based on current CDC guidance. As guidance is updated, we will communicate any new expectations. Weekly asymptomatic surveillance testing should be part of everyone's regular routine, regardless of vaccination status (including individuals who have received booster shots). Details can be found here: <https://health.gatech.edu/coronavirus/testing>.

*Participation:* Performance in this class correlates strongly with attendance in lecture. If you are unable to attend class due to illness or another type of excused absence, please email the course instructor beforehand. After each class, lecture materials will be made available on Canvas. BlueJeans recordings of each class will also be made available via Canvas, but they shouldn't be viewed as a substitute for actually attending class (students who only review recorded material tend to do worse on exams than students who are present during actual lectures).

*Restrictions on redistribution of class materials:* Class recordings, lectures, presentations, and other materials posted on Canvas are for the sole purpose of educating the students currently enrolled in the course.

*Mobile devices:* In class use of cell phones or computers for purposes unrelated to course activities is not allowed (it is distracting to your neighbors and there is evidence that multitasking has a negative effect on the amount of learning). Expect to be called-on if it looks like you aren't paying attention!

*Exams:* There will be three non-cumulative in-person exams. Each exam is worth the same amount of points. If you are sick and unable to take an exam, Digest articles will potentially be used as alternative form of assessment (seek permission from the course instructors beforehand in any case).

*Regrade Policy:* Students have 7 days from when an assignment was returned to submit a regrade request. Any requests after this time will not be considered. To reduce statistical bias, we will not regrade single problems, but instead will regrade entire assignments (i.e., regrading can result in a loss of points).

*Canvas Quizzes:* Six quizzes will be assigned throughout the semester to help synthesize and review course material. These quizzes are non-collaborative; each student must submit their own independently written answers. Quizzes are due at 5pm on the dates listed in the syllabus, and late submissions will lose 20% per 24-hour period.

*Group project:* Over the course of the semester, you will work on a group project. This will involve making a short (3 minute) film about an evolutionary topic of your own choosing. Group sizes of four to six students are anticipated, and assessment will be on both an individual and group level. Examples of award-winning short evolutionary films can be found at: <https://evolutionfilmfestival.org/>. At the culmination of the semester, we will hold an evolutionary-themed film festival where each group's work will be shared with the rest of the class. Video projects will be due April 26<sup>th</sup>. Additional details regarding group projects (including scoring rubrics) will be made available on Canvas.

*Digest articles:* Graduate students taking BIOL 6600 are required to write a Digest article. See below for more details. If any student is unable to take an exam (e.g., due to illness), Digest articles may be assigned as an alternative form of assessment.

### **Additional expectations for BIOL 6600 students**

In addition to the above material, students in the graduate section of Introduction to Evolutionary Biology (BIOL 6600) will write a two-page summary of a recent paper from the primary literature. Digest articles can be found in the journal *Evolution*, and they are similar to News and Views articles in the journals *Science* and *Nature*). Digest articles are individual assignments, and they must focus on a research article that covers a topic in evolutionary biology (as opposed to a review paper). Please reach out to the course instructors if you have any questions about whether your choice of paper is appropriate. You are welcome to get peer feedback prior to uploading your article to Canvas, but make sure that the writing is your own and that you avoid any plagiarism. Digest articles are due on April 5<sup>th</sup>, but feel free to submit them beforehand if you are ahead of the game (think of it as a rolling deadline). Additional guidelines of what goes into a Digest can be found via the following link: <https://sites.duke.edu/evodigests/writing-instructions/>.

<b>Evaluation</b>	<b>BIOS 3600</b>	<b>BIOL 6600</b>
Online quizzes (six in total)	18%	12%
Exam #1	22%	20%
Exam #2	22%	20%
Exam #3	22%	20%
Group project (short evolution film)	16%	14%
Digest article	0%	14%

If you obtain >90% of all available points you will be assured of receiving an A, and if you obtain >80% you will be assured of receiving a B or higher. Grades will be curved upwards at the discretion of the course instructor.

### **How do you get an "A" in Evolution?**

Read all the materials, come to the lectures and recitations. Ask questions and discuss topics in class. Understand concepts and how they are applied rather than memorizing names or formulas. Take careful notes and review them regularly, perhaps in small study groups. This class may be different from other classes you have taken: you will not get good grades if you just memorize the material without understanding conceptual aspects of this field. Exams will primarily focus on lecture material, as opposed to the readings, though technically everything is fair game. Good Luck! In previous (non-pandemic) years the top ~40% of students in this class received an A.

## **Optional textbook**

*Evolution: Making Sense of Life (3<sup>rd</sup> edition)* by Douglas Emlen and Carl Zimmer (2020).

Although this textbook is technically optional, you are highly encouraged to purchase it and use it as a resource for this class. Reading the assigned chapters before or after class will increase how much evolutionary biology you learn. Additional online resources will be posted via *Canvas*.

## **Academic integrity**

There is a zero-tolerance regarding cheating and plagiarism. If you have any questions about what constitutes plagiarism, please email the course instructors. Students are reminded of the obligations and expectations associated with the Georgia Tech Academic Honor Code, available online at: <http://policylibrary.gatech.edu/student-affairs/academic-honor-code>

## **Student-Faculty Expectations Agreement**

At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See <http://www.catalog.gatech.edu/rules/22/> for an articulation of some basic expectation that you can have of us and that we have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, we encourage you to remain committed to the ideals of Georgia Tech while in this class.

## **Additional campus resources**

- Center for academic success: <http://success.gatech.edu>
- Communication center: <http://www.communicationcenter.gatech.edu>
- Counseling Center: <http://counseling.gatech.edu>; 404-894-2575

## **Learning accommodations**

If needed, we will make classroom accommodations for students with disabilities. These accommodations must be arranged in advance and in accordance with the ADAPTS office (<http://www.adapts.gatech.edu>).

## **Statement of intent for inclusivity**

As members of the Georgia Tech community, we are committed to creating a learning environment in which all of our students feel safe and included. Because we are individuals with varying needs, we are reliant on your feedback to achieve this goal. To that end, we invite you to enter into a dialogue with us about the things we can stop, start, and continue doing to make our classroom an environment in which every student feels valued and can engage actively in our learning community.

## Syllabus for **Evolutionary Biology** (Spring 2022)

<b>Fall 2021</b>	<b>Topic &amp; Instructor</b>	<b>Readings &amp; Activities</b>
Jan 11 (Tues)	Introduction - <b>Lachance &amp; Brockett</b>	
Jan 13 (Thurs)	The whale and the virus: how scientists study evolution - <b>Brockett</b>	Chapter 1
Jan 18 (Tues)	From natural philosophy to Darwin - <b>Brockett</b>	Chapter 2
Jan 20 (Thurs)	What the rocks say: geology and paleontology - <b>Brockett (Quiz)</b>	Chapter 3
Jan 25 (Tues)	The tree of life: phylogeny - <b>Brockett</b>	Chapter 4
Jan 27 (Thurs)	Macroevolution: the long run - <b>Brockett</b>	Chapter 14
Feb 1 (Tues)	Natural selection: empirical studies in the wild - <b>Brockett</b>	Chapter 10
Feb 3 (Thurs)	Sex: causes and consequences - <b>Brockett (Quiz)</b>	Chapter 11
Feb 8 (Tues)	After conception: life history evolution and parental care - <b>Brockett</b>	Chapter 12
Feb 10 (Thurs)	<b>EXAM #1 - Brockett</b>	
Feb 15 (Tues)	<b>Darwin Day film festival - Lachance &amp; Brockett</b>	<b>(Pick video groups)</b>
Feb 17 (Thurs)	Intimate partnerships: how species adapt to each other - <b>Brockett</b>	Chapter 15
Feb 22 (Tues)	Brains and Behavior - <b>Brockett</b>	Chapter 16
Feb 24 (Thurs)	Cultural evolution - <b>Brockett (Quiz)</b>	Additional readings TBA
Mar 1 (Tues)	<b>Work on group video projects - Lachance &amp; Brockett</b>	<b>(Pick video topics)</b>
Mar 3 (Thurs)	Raw material: heritable variation among individuals - <b>Lachance</b>	Chapter 5
Mar 8 (Tues)	The ways of change: genetic drift - <b>Lachance (Quiz)</b>	Chapter 6
Mar 10 (Thurs)	The ways of change: natural selection - <b>Lachance</b>	Chapter 6
Mar 15 (Tues)	Quantitative genetics and phenotypic evolution - <b>Lachance</b>	Chapter 7
Mar 17 (Thurs)	<b>Exam #2 - Lachance &amp; Brockett</b>	
Mar 22 (Tues)	<b>Spring Break (No Class)</b>	
Mar 24 (Thurs)	<b>Spring Break (No Class)</b>	
Mar 29 (Tues)	The history in our genes - <b>Lachance</b>	Chapter 8
Mar 31 (Thurs)	From genes to traits - evolution and development <b>Lachance (Quiz)</b>	Chapter 9
Apr 5 (Tues)	<b>Work on group video projects - Lachance &amp; Brockett</b>	<b>(Digest articles due)</b>
Apr 7 (Thurs)	Geography of Evolution - <b>Lachance</b>	Crisp et al. 2011
Apr 12 (Tues)	The origin of species - <b>Lachance</b>	Chapter 13
Apr 14 (Thurs)	Human evolution: a new kind of ape - <b>Lachance (Quiz)</b>	Chapter 17
Apr 19 (Tues)	Evolutionary medicine - <b>Lachance</b>	Chapter 18
Apr 21 (Thurs)	Cancer evolution - <b>Lachance (Evolution films due)</b>	Lipinski et al. 2016
Apr 26 (Tues)	<b>Evolution Film Festival - Lachance &amp; Brockett</b>	
May 5 (Thurs)	<b>EXAM #3 - Lachance</b>	Time: 11:20am-2:10pm

Note that this syllabus is subject to change. If any changes are made an updated syllabus will be uploaded to *Canvas*.