BIOS 3600 / BIOL 6600 : Evolutionary Biology Last revised 17 November 2020

Fall Semester 2020, 3 credits Time: TR 9:30 – 10:45 am Location: BlueJeans land

Instructors

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TA: Sophia Eiesenfeld
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Recitation time: Wednesday afternoons (time TBD)
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Overview

Introduction to Evolutionary Biology is an active-learning class where students will gain a comprehensive overview of evolutionary biology, including processes (e.g., natural selection, genetic drift) and resulting patterns (e.g., genome organization, phylogeny, and the fossil record), based on lecture, in-class activities, and readings from the textbook and recent primary literature. By the end of this course, you will develop skills and knowledge that should allow you to:

1) Explain how evolution is the organizing principle for Biology, using specific cases and examples
2) Deconstruct and respond to evolutionary misconceptions
3) Form hypotheses about how phenotypes and traits evolve
4) Interpret data to address evolutionary questions
5) Apply mathematical equations from basic evolutionary theory to solve evolutionary questions or address hypotheses
6) View the world through a new lens. We hope walks in the woods will never be the same.

Prerequisites: Ecology (BIOL 2335 or 2337 or equivalent) or Genetics (BIOL 2345 or 2355 or equivalent) are required background for this course.

Evaluation

Problem Sets (4 total)	20%
Project	10%
Exams (1 quiz for 5%, 2 exams for 20%)	45%
Final Exam	25%

Final grades will be assigned using a 90-80-70-60 scale.

Class delivery mode: Our class will be delivered remotely, in the "Remote Synchronous" option. Meaning that lectures will be delivered live at the normal class time via BlueJeans. All lectures will be recorded and uploaded to the course page on Canvas. Attendance is not explicitly being graded, but we strongly suggest that you attend and participate in the class (asking questions, doing in-class assignments, etc), as we have seen a strong correlation in prior years between attendance and overall course grades.

Recitations: Weekly recitations will be held by TA Sophia Wiesenfeld and will review course material presented during lecture and assessed in the problem sets. Recitations are not mandatory.

Learning Catalytics: A learning catalytics account is required and will be used for interactive lecture sessions. To access a learning catalytics course, a student must create a student account and join a session. Students using learning catalytics, Mastering, or MyLab products in other courses this semester should already have access. If not, students can create account at https://learningcatalytics.com/users/sign_up. Student account pricing: $12 for 6 months of access. With a student account, you can:

* Participate in class on-line sessions using your laptop, smartphone, or tablet
* Complete homework and review content after class
* Use learning catalytics in an unlimited number of classes

Please create a login name that your instructors can recognize—i.e., use your GT username, your GT email, your actual name, or a nickname you have made known to your instructor. We prefer that you use your @gatech.edu email address. After you have created your account, you can use it in any number of courses during the subscription period (semester, quarter, or year). Help is available at http://help.pearsoncmg.com/learning_catalytics/student/en/index.htm.

Problem Sets: Problem sets are assigned throughout the semester to help synthesize and review course content from lecture and readings that may appear on exams. While you may work with peers to understand and solve the problems, the assignment turned in is non-collaborative; each student must submit an independently written, non-collaborative assignment. Problem sets must be typed, not handwritten and will be uploaded in Canvas. The due date will be listed on both the schedule, below, as well as in the Canvas assignment. Late submissions will lose 10% per 24 hour period.

Project: Each student will write a 1-2 page public service announcement directed at a professional community (doctors, farmers, etc.) to assist their constituency regarding an issue with evolutionary implications. Select a topic, such as a specific infectious disease, and explain how evolution could affect decision-making or patient treatment about the issue. Include an overview of the issue, how evolution could impact the issue, explanations of any relevant evolutionary misconceptions, and address questions that clients, patients or practitioners might have. Strong topics will be include infectious disease, parasite virulence, forensics, pest / weed evolution, and evolutionary medicine; please avoid the topic of evolution of antibiotic resistance. This would be a great time to dive into COVID-19 related research if you were interested! Topics must be approved by an instructor by the deadline for project topic approval in the schedule below. Format in the style of CDC Recommendations (example on breastfeeding with Ebola). Include Who this is for, What this is for, Key Points, and a minimum of 3 primary literature citations. Upload assignment to Canvas.

Exams and Quizzes: There will be two 75 minute exams and a 30 minute quiz during the semester. These will consist of short answer and/or essay questions. The exams will be delivered during class time. We prefer that the exam questions be typed (we will provide the exam in a MS Word document to make it easy to fill out), though if you feel you are unable to type quickly enough, you may hand write it. At the end of the period, the exams will be uploaded to Canvas. Questions will be drawn from topics covered in class, in-class activities, and assigned readings. The final exam will be cumulative. There will be no make-up exams or quizzes. Excused absences for these must be Institute-approved or excused by the Dean of Students. Excused missed assessments will be replaced by the weighted average of your other assessments.

BIOL 6600. In addition to the above material, students in the graduate section will write a paper on a topic, mutually-agreed upon by the student and professors, due on the final day of instruction (November 24th). This will count for 20% of your final grade (all other assessments will be

proportionally weighted to make up the remaining 80%). Please come see Drs. Paaby and Ratcliff early on to discuss the paper topic and format.

Regrade Policy: Students have 14 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.

Resources

- The Princeton Guide to Evolution (PGE), 2013. Ebook available for free from the library.
- Computer capable of writing a text file, running a Excel spread sheet, browsing the web, and logging into BlueJeans, Learning Catalytics and Canvas.
- Short papers and book excerpts will be posted to Canvas, as assigned throughout the semester.
- Students can ask and answer questions on Piazza. We instructors will check the site frequently and will answer / endorse peer answers. This is especially effective when studying for exams.

Honor Code: Any violations of the GT Honor Code will result in referral to the Office of Student Integrity with a penalty ranging from no credit for the assignment in question, to a grade of "F" for the class. We don't want to see you fail, and we will be glad to answer questions about class activities, problem sets, projects, or exams and the Honor Code.

Academic Integrity: Students are reminded of the obligations and expectations associated with the Georgia Tech Academic Honor Code and Student Code of Conduct, available online at:
http://www.deanofstudents.gatech.edu/integrity/policies/honor_code.php
http://www.deanofstudents.gatech.edu/codeofconduct.

Learning Accommodations: If needed, I will make classroom accommodations for students with learning disabilities. These accommodations must be arranged in advance and in accordance with the office for Disability Services (http://disabilityservices.gatech.edu/).

Schedule of Topics and Assignments

Note: The schedule is subject to modification. Readings from the primary literature and from other books will be posted on Canvas.

Class	Date	Topic	Readings & Assignments	Instructor
1	18-Aug	Intro, course mechanics		AP&WR
2	20-Aug	History of Evolutionary Thinking and Evidence for Darwin's Theory	PGE I.2&I.3	WR
3	25-Aug	How Geology and Paleontology Reveal the History of Life	PGE II.9	WR
4	27-Aug	Phylogenetic Inference: The History in Our Genes	PGE II.1	AP
5	1-Sep	Inferring Phylogeny	PGE II.2 ***Problem Set 1 due beginning of class***	AP
6	3-Sep	Natural Selection 1	PGE III.1	AP
7	8-Sep	Natural Selection 2 ***Quiz 1***	PGE III.2-3	AP
8	10-Sep	The Ways of Change: Drift and Selection 1	PGE IV.1-3	AP
9	15-Sep	The Ways of Change: Drift and Selection 2	PGE IV.1-3	AP
10	17-Sep	Evolution at Multiple Loci	PGE III.5	AP

Class	Date	Topic	Readings & Assignments	Instructor
11	22-Sep	Exam 1 review- We will answer your questions	Put questions on Piazza before review session ***Problem Set 2 due at the beginning of class***	WR&AP
12	24-Sep	***EXAM 1***	-	
20	29-Sep	Complex Trait Evolution	PGE V.13	AP
13	1-Oct	Speciation 1	PGE VI.1-2	AP
14	6-Oct	Speciation 2	PGE VI.1-2	AP
15	8-Oct	Sex: Causes and Consequences	PGE IV.5&6	WR
16	13-Oct	Sexual Selection 1	PGE VII.4-6 ***Problem Set 3 due at the beginning of class***	WR
17	15-Oct	Sexual Selection 2	PGE VII.4-6	WR
18	20-Oct	Cooperation, Conflict and the Evol. of Social Interactions 1	Wilson and Sober, Unto Others, Ch. 1-2 (on Canvas)	WR
19	22-Oct	Cooperation, Conflict and the Evol. of Social Interactions 2	Fletcher and Doebeli, 2009 (on Canvas).	WR
21	27-Oct	Exam 2 review- we will answer your questions	Put questions on Piazza before review session ***Problem Set 4 due at the beginning of class***	WR&AP
22	29-Oct	***EXAM 2***	-	
23	3-Nov	The Evolution Life Histories & Aging	PGE III.11 & VII.16	WR
24	5-Nov	Disease Evolution	PGE VIII.2 ***Deadline for project topic approval***	WR
25	10-Nov	~~Genomic Evolution~~	PGE V.2	AP
26	12-Nov	Searching for Adaptation in the Genome	PGE V.14	AP
27	17-Nov	Origin of Complex Life	PGE II.12-15	WR
28	19-Nov	Evolutionary Game Theory	***Project due at the beginning of class***	SW and CZ
29	24-Nov	Final exam review- we will answer your questions (optional attendance)		WR&AP
	7-Dec	***FINAL EXAM*** (cumulative) Take Home (see below for details)	Put questions on Piazza before review session	WR&AP

FINAL EXAM policy. Our final will be cumulative and open book. It was originally scheduled for Monday, December 7th, at 8am. Rather than require you to sit for the final during this time, we are going to give you two days to complete the exam. We will hand it out on Sunday, December 6th, and will be online and available for questions during the normal timeslot for the exam, Monday December 7th from 8am-10am. The exam will be due in Canvas no on Wednesday at 10am. Important points: 1) *Late submissions will not be accepted. 2) The assignment must be typed, not hand written. We will run it through a plagiarism detecting program, so please don't plagiarize. 3) You must complete the exam entirely on your own- you are not allowed to confer or collaborate with other students from the class.*