**BIOS 3600 / BIOL 6600: Evolutionary Biology**

Last revised 12 November 2018

Fall Semester 2018, 3 credits Time: TR 9:30 – 10:45 AM Location: Klaus 2456

**Instructors**

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**Overview**

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. I hope walks in the woods will never be the same.

**Prerequisites:** Ecology (BIOS 2600 or 2610 or equivalent) or Genetics (BIOS 2800 or 2810 or equivalent) are required background for this course. In the event that none of these classes have previously been taken, permission to take BIOL 3600 must be obtained from the course instructors.

**Evaluation**

Participation 10%

Problem Sets (4 total) 20%

Project 10%

Exams (2 exams for 17.5%) 35%

Final Exam 25%

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

**Learning Catalytics:** A learning catalytics account is required and will be used for interactive lecture sessions, which will contribute to the "participation" portion of your course grade (participation also includes attendance), and problem sets. While you are welcome to use your laptop or cell phone to access learning catalytics during class, when we are not using the platform we ask that you close your laptops and put your cell phones away.

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 are due as a print out in class and also as a t2 upload under Assignments (the upload is for our records). Problem sets are due by the start of class on the dates listed in the syllabus; late submissions will lose 10% per 24 hour period.

**Project:** Each student will write a public service announcement directed at field-specific professionals (medical, agricultural, public policy, etc.) to assist in how to constituents (patients, farmers, staff and elected officials, etc.) regarding a targeted issue with evolutionary implications. We will include detailed information about how to prepare this assignment during the course.

**Exams**: There will be two 80-minute midterm exams during the semester. These may consist of multiple choice, short answer, and/or essay questions. 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. 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.

**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**

*Optional textbooks*

* *Evolution (4th edition)* by Douglas J. Futuyma and Mark Kirkpatrick (2017)
* The Princeton Guide to Evolution (PGE), 2013. Ebook available for free from the library.

*Other resources*

* Device capable of logging into Learning Catalytics.
* Short papers and book excerpts will be posted to t2, as assigned throughout the semester.
* T2 or T-square — <http://tsquare.gatech.edu>

**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, we will make classroom accommodations for students with

disabilities. These accommodations must be arranged in advance and in accordance with the Office of Disability Services (<http://disabilityservices.gatech.edu/>).

**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 (December 4th). 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. Brockett and Ratcliff early on to discuss the paper topic and format.

**Schedule of Topics and Assignments**

Note: The schedule is subject to modification. Readings from the primary literature and from other textbooks will be handed out in-class or posted on T-square.

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| **Class** | **Date** | **Topic** | **Readings & Assignments** | **Instructor** |
| 1 | 21-Aug | Introduction |  | MB |
| 2 | 23-Aug | What is Evolution? | PGE I.1-4 or Ch. 1 | MB |
| 3 | 28-Aug | Tree of Life | PGE I.1-4 or Ch. 2 | MB |
| 4 | 30-Aug | History of Life | PGE II.10-18 (skimming recommended) or Ch. 17 | MB |
| 5 | 4-Sep | Phylogenetic Inference: The History in Our Genes | PGE II.1 or Ch. 16  ***Problem Set 1 due at the beginning of class*** | MB |
| 6 | 6-Sep | Inferring Phylogeny | PGE II.2, II.7 or Ch.16 | MB |
| 7 | 11-Sep | Natural Selection 1 | PGE III.1 or Ch. 3 | MB |
| 8 | 13-Sep | Natural Selection 2 | PGE III.2-3 or Ch. 5 | MB |
| 9 | 18-Sep | How to Be Fit | Ch. 11 | MB |
| 10 | 20-Sep | Interactions Among Species | Ch. 13  ***Problem Set 2 due at the beginning of class*** | MB |
| 11 | 25-Sep | Exam 1 review- We will answer your questions | Put questions on Piazza before the review session | MB |
| 12 | 27-Sep | ***EXAM 1*** | - | MB |
| 13 | 2-Oct | The Ways of Change: Drift and Selection 1 | PGE IV.1-2 or Ch. 7 | MB |
| 14 | 4-Oct | The Ways of Change: Drift and Selection 2 | PGE III.3 or Ch. 7 | MB |
| 15 | 9-Oct | *Fall Recess* |  |  |
| 16 | 11-Oct | Evolution at Multiple Loci | PGE III.5 | WR |
| 17 | 16-Oct | Speciation 1 | PGE VI.1-2  ***Problem Set 3 due at the beginning of class*** | WR |
| 18 | 18-Oct | Speciation 2 | PGE VI.1-2 | WR |
| **Class** | **Date** | **Topic** | **Readings & Assignments** | **Instructor** |
| 19 | 23-Oct | Cooperation, Conflict and the Evol. of Social Interactions 1 | Wilson and Sober, Unto Others, Ch. 1-2 (on T2)  PGE III.2&4 | WR |
| 20 | 25-Oct | Cooperation, Conflict and the Evol. of Social Interactions 2 | Fletcher and Doebeli, 2009 (on T2).  ***Problem Set 4 due at the beginning of class*** | WR |
| 21 | 30-Oct | Sex: causes and consequences | PGE IV.5&6 | WR |
| 22 | 1-Nov | ***EXAM 2\**** | - | WR&MB |
| 23 | 6-Nov | Sexual Selection | PGE VII.4-6 | WR |
| 24 | 8-Nov | The Evolution Life Histories & Aging | PGE III.11 & VII.16  ***Deadline for project topic approval*** | WR |
| 25 | 13-Nov | Disease Evolution | PGE VIII.2 | WR |
| 26 | 20-Nov | *Thanksgiving Break* |  | WR |
| 27 | 22-Nov | Origin of Complex Life | PGE II.12-15 |  |
| 28 | 27-Nov | Human Evolution | PGE II.18  ***Project due at the beginning of class*** | WR |
| 29 | 29-Nov | 9: | PGE II.10 | WR |
| 30 | 4-Dec | Final exam review | Put questions on Piazza before the review session | WR&MB |
| - | 13-Dec | ***FINAL EXAM*** *(cumulative): 11:20-2:10* |  | WR |
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\*Note that we don’t have an in-class review session for the second exam due to faculty travel schedule conflicts. However, the TA will host a review session outside of class and we will join the Piazza discussion to help answer questions.