

Processes of Evolution
Biology 3200 A
Fall 2014

Lecture Time: Monday and Wednesday 11:30-1:00

Lecture Theatre: LAS B

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Office hours: Wed 2:00-4:30 by appointment.

Evolution is the central organizing concept in biology integral to our understanding of all aspects of biology including natural history, developmental biology and genetics, cell and molecular biology, ecology and microbiology. As Theodosius Dobzhansky asserted four decades ago “Nothing in biology makes sense except in the light of evolution.”

This course introduces students to the development of evolutionary thought from the nineteenth century to the present. What is evolution? What is an organism? What is a gene? We explore these questions and the controversies that have surrounded them. In so doing we study the formation of classical neo-Darwinian theory of the last century, the subsequent development of molecular phylogenetic methods, and the paradigm shift afoot today in our understanding of evolutionary processes.

The historical approach taken in this course is designed to enhance students’ understanding of the fundamental biological concepts that shape evolutionary theory. The lectures and readings are divided into three parts: 1) the emergence of evolutionary thinking in the 19th century, and debates over the mode and tempo of evolutionary change; 2) the rise of experimental biology, the development of Mendelian genetics, populations genetics, and the emergence of neo-Darwinian theory in the 1930s and 40s; 3) concepts in molecular biology, the development of molecular phylogenetics, modes of evolutionary change beyond neo-Darwinian theory including epigenetic inheritance, and the fundamental importance of lateral gene transfer and hereditary symbiosis in evolution.

Required Texts: Jan Sapp, *Genesis. The Evolution of Biology*, New York: Oxford University Press, 2003. Charles Darwin, *On the Origin of Species*, Murray, 1859. First edition.

<http://www.literature.org/authors/darwin-charles/the-origin-of-species/> Additional information and readings may be presented in class lectures. *See also the course website on Moodle for notices, lecture ppt presentations, and any other course readings.*

Evaluation: Three Tests, multiple choice and/or short answer. Value-100%

Students may see their tests by **appointment within one week** after notification of test results at a time specified by the course TA.

Course Moodle: Some of my lectures ppt slides will be made available to the class through the course Moodle site. The ppts are not a substitute for attending class or reading the book. You are responsible for information you may have missed.

Class participation: Some lecture material *may not be* included on ppt point slides on moodle. You will know what that information is by having read the required reading for the lecture before attending class.

Last day to drop course without receiving a grade: Nov. 7.

Missed Test: You must contact (email) me, or the course TA within two days (48 hours) of missing a midterm test. If you miss a test with a legitimate documented reason, permission may be granted to take a **makeup test**. All documentation supporting your excuse for missing a test must be received within one week of the missed test -or as soon as you are able to return to the university if you are ill for more than a week.

Only a “York Attending Physician’s Statement Form” (downloaded as part of the Petitions Package) or a similarly detailed doctor’s note (i.e., not a form stating only that the student visited the clinic) will be accepted for medical excuses. Documentation must cover the date of the missed test. Death of an immediate family member requires a death certificate or letter from the funeral director. If appropriate documentation is not provided within one week, a zero will be earned on the missed midterm.

Makeup tests will generally be held within 10 days of the regular test. They typically differ in format from the original test (i.e., include more short/long answer questions).

Missed Final Exam

Students who miss a final exam must download and fill out a “**Deferred Standing Agreement**” form and submit it to the UG office within a week of the missed exam. Supporting documentation (e.g. Attending Physician’s Statement) must be provided with the form. Deferred standing may not be granted, in which case a student may petition. Do not try to use “deferred standing” to “manage” your exam schedule.

Lectures

Part I

Sept. 8 Introduction: *Genesis* Preface
 Sept.10 Evolution and Revolution, *Genesis* chapter 1; The *Origin* chapter 2
 Sept.15 The Origin of Species, *Genesis* chapter 2; The *Origin* chapter 3
 Sept. 17 Darwin's Champions, *Genesis* chapter 3; The *Origin* chapter 4
 Sept. 22 Darwinism and Socio-politics, *Genesis* chapter 4
 Sept. 24 Mutualism, *Genesis*, chapter 5
 Sept. 29 Dissent from Darwin, *Genesis*, chapter 6; The *Origin* chapter 6

October 1 **Test 1**

Part II

Oct. 6 The Myth of the Cell Theory, *Genesis* chapter 7
 Oct. 8 The Body Politic, *Genesis* chapter 8
 Oct 13 Thanksgiving
 Oct. 15 Evolving Embryology, *Genesis* chapters 9 and 10
 Oct. 20 Mendel Redux, *Genesis* chapter 11
 Oct. 22 Emerging Genetics, *Genesis* chapter 12
 Oct. 27 Darwinian Renaissance, *Genesis* chapter 13
 Nov. 3 **review** +evolutionary ecology

Nov. 5 **Test 2**

Part III

Nov. 10 Genes, Germs and Enzymes, *Genesis* chapter 14
 Nov. 12 Genetic Heresy and the Cold War, *Genesis* chapter 15
 Nov. 17 Conceiving a Master Molecule, *Genesis* chapter 16
 Nov. 19 Beyond the Genome, *Genesis* chapter 17
 Nov. 24 Molecular Evolution and Microbial Phylogeny, *Genesis* chapter 18
 Nov. 26 Lateral Gene Transfer and Symbiomics, *Genesis* chapter 19
 Dec. 1 The Evolution of Relationships, *Genesis* chapter 20
 Dec. 3 Synthesis and Epilogue

Fall exams begin Dec 9