

Syllabus
Biol 218: Evolution
Fall 2011

Lecture/discussions: Tues & Thur, 9:35 - 10:50, Science Center A155

Keith Tarvin, Instructor

Department of Biology
 Oberlin Science Center A130
 440-775-8306
 email: keith.tarvin@oberlin.edu

Office Hours:

Mon 1:30-2:30; Tue 11:00-12:00; Fri 3:30-4:30
 - *PLEASE SIGN UP ON MY OFFICE DOOR* -
 Or by appointment (contact me via email or
 phone to set up a time).
If my office door is closed, just knock!

Course description: Biol 218 Evolution. 3 NS credits.

Principles of microevolution (selection, gene flow, mutation, genetic drift, and factors that influence population genetic structure), evolutionary ecology (life history strategies, gene-environment interactions), and macroevolution (changes above the species level) will be studied, with emphasis on both the process and pattern of organic evolution. Pre-requisites: Two introductory biology courses (Bio 100 or Bio 118, plus Bio 102 or Bio 120), or an AP score of 5. Consent of instructor required. Enrollment Limit: 24.

Course Objectives: The study of evolution is extremely broad – it essentially covers all of biology! Although we can't exhaustively cover all of it in this course, we can develop a strong understanding of fundamental principles and processes. To that end, my goals are to help you:

1. Understand the major causes of evolutionary change – natural selection and drift coupled with mutation and recombination.
2. Become familiar with tools for understanding how and when evolution occurs – population and quantitative genetic models and corresponding empirical approaches.
3. Understand factors affecting the efficacy of selection and the likelihood of drift – the relationship between genotype and phenotype and factors that affect that relationship.
4. Become familiar with some of the major problems in evolution – the evolution of sex, life history evolution, genomic conflict, multilevel selection, speciation.
5. Become familiar with some of the major modes of evolutionary inquiry – evolutionary models, trait analysis, experimental microevolution, paleontological methods, phylogenetic methods, genomics.
6. Develop the ability to synthesize and integrate information from disparate topics to understand the connections among various components of evolutionary theory and evolutionary processes.
7. Become adept at interpreting graphical representations of data and hypotheses.

Required Text:

Stearns, S. C. and R. F. Hoekstra. 2005. *Evolution: An Introduction*. 2nd Edition. Oxford University Press.

Other required readings:

Several journal articles plus a chapter from a different textbook also constitute required reading. I will provide the references for these papers and chapters and post copies of them on Blackboard.

Supplemental Texts:

The following evolution texts are on reserve in the library. You may find them helpful when our primary text lacks sufficient detail for a given topic. Both are by the same author; *Evolutionary Biology* contains more detail than *Evolution*.

Futuyma, D. J. 1998. *Evolutionary Biology*, 3rd ed. Sinauer Associates.

Futuyma, D. J. 2005. *Evolution*. Sinauer Associates.

Other course materials:

I will post most everything you need on Blackboard. This will include the syllabus, updated copies of the calendar (I'll tell you in class if any changes to the calendar are made), problem sets (and later their solutions), papers for discussion sessions (or instructions for how to find them), exam keys, handouts, and PowerPoint lectures.

Additional study tools: Our textbook has practice questions at the end of each chapter, plus a companion website (<http://www.oup.com/uk/orc/bin/9780199255634/>) with a different set of online study questions for each chapter of the book. As many of the questions are True/False or Multiple Choice, I encourage you to flesh out your answers in prose before looking at the online answers. My exams are primarily short answer or short essay, so you will need to practice generating your own explanations and answers, rather than simply recognizing correct ones that are presented to you.

Format of the Course:

During **interactive lecture/discussions** I will present material introducing each of the major topics of the course. I will lead us through a topic based on the textbook and other material, but I expect you to bring up issues that you find interesting or confusing. **Questions, comments, and discussion during lecture are strongly encouraged!** Periodically, we will hold a “**discussion session**,” during which we will discuss one or more journal articles chosen to supplement, expand upon, or bridge treatment of topics presented in the text or in class.

Discussion Sessions and Papers. Discussion sessions will comprise two phases. During the first part of the class period, small groups of 4 to 6 students each will discuss the papers. During the latter part of the class period, the small groups will merge, and we will continue the discussion as a large group (i.e., the entire class). During this phase, groups will share ideas and concerns about the papers discussed in the small groups.

One student in each group (designated ahead of time) will be responsible for leading discussion of the articles within the small groups. During these small-group discussions, *all* group members should discuss the material, identifying the important results of the papers, their implications, and their relationship to the course topic. They also should discuss any particularly difficult or confusing aspects of the paper, and be prepared to bring these up when the small groups join together for the large-group discussion. The role of the Discussion Leader is to direct the discussion, make sure it stays on track, and provide topics for the rest of the small group to discuss. S/he also is the person primarily responsible for communicating the findings/questions of the small group to the class as a whole during the latter part of the class period. **The Discussion Leader also will turn in a short exegesis of the paper under discussion within 3 days of the Discussion Session.** I will post guidelines for leading discussions and preparing written reports on Blackboard and will be happy to meet with upcoming Discussion Leaders to discuss strategies for leading effective discussions.

Although discussion leaders are responsible for generating discussion, **everyone in the class is expected to participate in every discussion session**, both in small and large groups.

Exams. We will have two regular exams and a comprehensive final exam. All exams will be short answer / short essay, with occasional problems to solve. Exams will cover material discussed in class and assigned readings (i.e., both the text book and discussion articles). You are responsible for the material in the text book even if we don't explicitly deal with that material in class, so read the book!

Problem sets. You will be required to work and turn in a set of evolutionary genetics problems during the first portion of the course, and a set of phylogenetic problems in the last portion of the course. These problem sets will be worth 50 points each.

Other aspects of the course:

Class starts promptly at 9:35 am!! Please be on time so that you don't disrupt class when you enter the room.

Attendance Policy. Because this course involves class discussion and lectures on material that may not appear in your text book or other readings, you should make every effort to attend all class meetings. Exam material may be drawn from class discussions (i.e., from information that is not in the book or primary papers or in PowerPoint slides). If you expect to be absent for a class period, consult with me as soon as possible beforehand.

Along those lines, please don't assume that you will be able to glean everything you need from the PowerPoint slides posted on Blackboard. They will provide a general outline of the lecture topics along with supporting figures and other graphics, but they will not include the text of the lecture material. Hence, you won't be able to interpret the PowerPoint presentations unless you go to class.

Special Needs. Please contact me early in the semester if you have special needs so we can make any necessary accommodations. Alternatively, you may contact Jane Boomer, Coordinator for Students with Disabilities, Room G27, Peters Hall (ext. 55588; jane.boomer@oberlin.edu). All discussions between you and Ms. Boomer remain confidential, and I will only receive information that describes the type of accommodation needed.

Honor Code. As members of the Oberlin College Community, each of us is expected to adhere to the Honor Code. Please familiarize yourself with this code. You can view it online in your Blackboard site: Log on to Blackboard, scroll to the bottom of the page and click on "Honor System".

The following text was taken from The Honor Code and The Honor System Charter:

At the end of each academic exercise students shall write in full and sign the Honor Pledge: "I affirm that I have adhered to the Honor Code in this assignment."

If a student does not follow the appropriate procedure, faculty members have the option of withholding the grade until the student writes the Honor Pledge correctly, although they may not penalize students for an oversight.

You will need to pledge the honor code on every assignment that you turn in (exams, problem sets, written reports of discussion papers).

Grading: You will be evaluated as follows:

| Assignment | Points | Approximate Percentage of final grade |
|---------------------------------|--------|---------------------------------------|
| Exam 1 | 100 | 21% |
| Exam 2 | 100 | 21% |
| Exam 3 (comprehensive final) | 125 | 26% |
| Problem sets (2 at 50 pts each) | 100 | 21% |
| Discussion paper report | 50 | 11% |
| Total | 475 | 100% |

Calendar for Biol 218 Evolution -- Fall 2010

| Wk | Dates | Days | Topic | Readings (chapters refer to Stearns and Hoekstra) |
|----|------------------|------|---|---|
| 1 | Sep 6, 8 | T | Part I - Microevolutionary processes Introduction and Background | Preface; Chap 1 |
| | | R | Adaptation and selection | Chap 2 |
| 2 | Sep 13, 15 | T | Neutral evolution | Chap 3 |
| | | R | Population genetics <i>Assign Problem Set</i> | Chap 4 |
| 3 | Sep 20, 22 | T | Quantitative genetics | Grant & Grant 1995 |
| | | R | Origin and maintenance of genetic variation | Chap 5 |
| 4 | Sep 27, 29 | T | Finish up this section + DISCUSSION | Levinton et al. 2003 |
| | | R | Evo-Devo: Evolution and development (<i>PROBLEM SET DUE</i>) | Chap 6 |
| 5 | Oct 4, 6 | T | <i>EXAM I</i> | |
| | | R | The expression of genetic variation | Chap 7 |
| 6 | Oct 11, 13 | T | Part II - Design by selection for reproductive success Finish expression of genetic variation, Begin the evolution of sex | Chap 8 |
| | | R | Finish sex, begin genomic conflict | |
| 7 | Oct 18, 20 | T | Genomic conflict and multilevel selection | Chap 9 |
| | | R | DISCUSSION | Traulsen & Nowak 2006 |
| 8 | Oct 25, 27 | -- | Fall Break | |
| 9 | Nov 1, 3 | T | Life history evolution | Chap 10 |
| | | R | Life history evolution | |
| 10 | Nov 8, 10 | T | Sexual selection | Chap 11 |
| | | R | Part III - Macroevolution <i>EXAM II</i> | |
| 11 | Nov 15, 17 | T | Speciation <i>Assign Systematics Problems</i> | Chap 12 |
| | | R | Species concepts and systematics | Chap 13 |
| 12 | Nov 22, 24 | T | Cladistics; Begin paleontology | Pp 430-436 |
| | | R | (no class – Thanksgiving) | |
| 13 | Nov 29, Dec 1 | T | Extinction | Pp 390-396 |
| | | R | DISCUSSION (<i>SYSTEMATICS PROBLEMS DUE</i>) | Liow et al. 2008 |
| 14 | Dec 6, 8 | T | Part V - Specific problems in evolution The origin of humans | Freeman and Herron chap 20, Pp 753-785 |
| | | R | Insights into contemporary human evolution | |
| 15 | Dec 13 | T | DISCUSSION | Cant and Johnstone 2008 |
| | Dec 19 | M | <i>COMPREHENSIVE FINAL EXAM, 9:00-11:00 am</i> | |