# Evolution

Bi 426 CRN 10399

fall 2007

**Instructor**: Dr. Susan Masta; email smasta@pdx.edu; office 725-8505
**Office hours:** Tuesday 8:30-9 pm, in the classroom; Wed 1-2 Room 606 SB1
**When and Where:** 6:40 - 8:30 pm Tuesday, Thursday; Room 107 SB1
**Required Textbook:** *Evolutionary Analysis* by Scott Freeman and Jon Herron, 4th edition, 2007 Prentice Hall.
**Textbook Web site:** http://wps.prenhall.com/esm_freeman_evol_4
**WebCT** will be used to post some material, and for group discussions, so make sure your ODIN account is active.
**Computer lab 139A Science Building 2** is available for you to do your course assignments. The room is available whenever SB2 is open, unless a class is scheduled at that time (which should be posted on the door). You can enter the computer lab by swiping your PSU magnetic-strip student ID on the pad next to the door. If you do not have this type of ID, you can obtain one at the PSU ID office in Neuberger Hall. There is no printer in the room, so you will need to print out your reports elsewhere (the library has a printer).

**Course Description:** This course provides a broad overview of evolutionary theory. You will become familiar with the ways in which genes and phenotypic traits change over generations, such that you will be able to make inferences about how populations evolve. Evolutionary concepts will be illustrated with both classic examples and recent research. We will also examine the many applications of evolution that impact our daily lives. You will learn how dogs evolved, why HIV continues to be a public health concern, what genes make us human, why elaborate sexual traits are common, and why we age.

**Grading:** Your grade will be based on 2 exams (35% each), 1 computer simulation exercise (5%), 2 group discussions/exercises (10%), and 1 project report (15%). There will be no make up exams without prior approval. All late assignments will have points deducted for each day they are late. At the end of the term, after the final exam has been graded, the class scores will be scaled such that the student with the highest percentage of points receives 100%. Regardless of your rank in the class, you will receive at least the following grades if your cumulative scores are: 95-100% = A; 90-94% =A-; 87-89% = B+; 82-86% = B; 80-81% = B-; 77-79% = C+; 72-76% = C; 70-71% = C-; 67-69% = D+; 62-66% = D; 60-61% = D-; ≤ 59% = F.

**Exams:** The exams will primarily be multiple choice and short answer. The second (final) exam is not cumulative, but you will be expected to be familiar with evolutionary concepts that we will build upon throughout the term. The exams will be based on the material covered in lecture. This will include the material in the textbook, other assigned readings, and current research in evolutionary biology that is discussed in lecture. If an assigned textbook chapter has a topic in it that was not covered in lecture, you will not be responsible for it on the exam.

**Computer exercise:** The goal of this assignment is to familiarize you with the processes of selection and genetic drift over the course of many generations. There will be one exercise using computer simulations from the textbook website. The instructions will be handed out in class, and you will need to turn that sheet in.

**Discussion group exercises:** The goal of the group discussions is to have you work with your classmates to develop evolutionarily sound arguments for how traits or organisms may have evolved, or could evolve in the future. You will work in groups of 5, and each group will have its own online discussion site on webCT. The results of the first discussion will be a short written report, while the second project will also involve a short class presentation.

**Project report:** The goal of this project is to have you think critically and form an evolutionarily sound argument to support your ideas. You will first need to research your topic using the scientific literature. Then you must use the knowledge gained in this course to develop a hypothesis that predicts when and why we may expect to see the evolution of the specific trait you have studied. A discussion of which evolutionary concepts you are incorporating into your logic is necessary.
A choice of topics will be posted on WebCT for you to choose among for your term project. The report must not exceed two single-spaced pages, not including the references. All references must be from scientific journal articles or books (non-peer-reviewed web-based sources are not allowed).

**Syllabus**

| Date | Topic | Reading | Assignment |
|---|---|---|---|
| **25 September** | Introduction to Evolutionary Questions; HIV case study | Chapter 1 | |
| **27 September** | Patterns of Evolution | Chapter 2 | |
| **3 October** | Evolutionary Trees | pp 111-131 of Chapter 4 | Discussion exercise 1 assigned |
| **4 October** | Natural Selection | Chapter 3 | |
| **9 October** | Mendelian Genetics in Populations; H-W equilibrium | Chapter 6 | **Discussion exercise 1 due** |
| **11 October** | Evolutionary Medicine | Chapter 14; Chapters 1 and 3 of *Why We Get Sick* (WebCT) | Simulation exercise 2 assigned |
| **16 October** | Mendelian Genetics in Populations; Genetic Drift | Chapter 7 | Discussion exercise 3 assigned |
| **18 October** | Molecular Evolution and the Neutral Theory | Chapter 7 | **Simulation exercise 2 due** |
| **23 October** | Molecular Clocks | pp 132-137 of Chapter 4 | |
| **25 October** | Evolution at Multiple Loci; Quantitative Genetics | Chapter 9 | |
| **30 October** | Heritability | Chapter 9 | **Exam 1 (through 23 Oct)** |
| **1 November** | Linkage and Sexual Selection | pp 281-295 of Chapter 8, Chapter 11 | |
| **6 November** | Sexual Selection | Chapter 11 | **Discussion exercise 3 presentations** |
| **8 November** | Senescence and Life History Evolution | Chapter 13 | |
| **13 November** | Human Evolution | Chapter 20 | |
| **15 November** | Species Concepts; Genetics of Speciation | Chapter 16 | |
| **20 November** | Biodiversity and Extinctions | Chapter 18 | **Project Report due** |
| **22 November** | **PSU closed: Thanksgiving** | | |
| **27 November** | Evolution of Sex; Development | pp 302-313; 725-735 | |
| **29 November** | Evolution of Genes and Genomes | Chapter 15 | |

****Final Exam (exam #2) is Tuesday 4 December from 7:30-9:20 pm****