

Cedar Crest College
Biology 300

Fall 2008
Lecture 3 credits
Lab 1 credit

EVOLUTION

Lecture: MWF 10-10:50 AM, SC106

Lab: Thurs. 1-4:00 PM, SC 106

Instructor: Dr. Amy Faivre
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Office: SC 119A
Office Hours:
Thursdays 4-5pm,
or by appointment

Prerequisites: BIO 121 & 122; BIO 231 Genetics recommended

Required Text: Freeman, S. and J.C. Herron. 2007. *Evolutionary Analysis*. 4th Edition. Pearson Prentice Hall: Upper Saddle River, NJ. 834pp.

Other Highly Recommended Materials: A 3-ringed binder to store handouts such as discussion questions from lecture, lab handouts and notes/results taken in lab. I will provide you with additional reading materials throughout the semester.

Course Description:

For part of the semester we will focus on evolutionary processes in populations and species. These include an in-depth look at natural selection, mutations, genetic drift, founder effect, immigration and emigration to and from populations, and speciation. We will look at the relationship between evolution and development, evolution and changes at the chromosome and nucleotide levels, and evolution and behavior. In this course we will also spend part of the semester looking at patterns of evolutionary history. We will discuss systematics and the terminology and tools of phylogenetics.

Course Objectives and Outcomes:

In *Principles of Biology I* and *II* and if you have taken *Ecology* and *Genetics* you have been introduced to a number of evolutionary concepts, including population-level variation, Hardy-Weinberg equilibrium, mutations, and the diversity of species on earth, to name a few. This course will review some of these concepts to ensure that you are familiar with them and then expand to include more advanced topics such as phylogenetic theory, modes of evolution, and speciation. With these experiences, by the end of the course, you will achieve the following outcomes assessed in the following manner:

Outcome (1.) Be conversant in evolutionary terms and be able to assess the current evidence for evolution, as well as, explain this evidence to others.

Assessment of Outcome (1.) Assigned reading in the textbook and from outside sources will expand on ideas presented in lecture. Course exams will test your grasp of new vocabulary and synthesis of these ideas.

Outcome (2.) Participate in and critically assess research in evolutionary biology.
Assessment of Outcome (2.) Laboratory exercises are structured to provide you with hands-on experience in designing and completing several experiments testing evolutionary theories such as selection, existence of population-level variation, and homology. Lab write-ups will indicate how well you have developed your inquiry-based skills, and provide for feedback several times during the course. In lab, you will also choose a paper from the primary literature and critique it for the class. Your ability to comprehend, present, and assess the paper will be graded. In the lecture portion of the course you will choose several papers from the primary literature that address a specific topic, explain the topic to the class, and assess how well the previous research supports the conclusions, this exercise will also be graded.

Outcome (3.) Use the tools of assessing evolutionary processes through the study of morphology, phylogenetic theory, molecular biology, fieldwork, and statistics.
Assessment of Outcome (3.) Ideas presented in lecture as well as exercises in lab are designed to introduce you to these techniques, and familiarize you with ways to use them to ask and answer sound questions. Lab exercises will be graded.

Outcome (4.) To be aware of current studies and events in evolutionary biology. Evolutionary events surround us; they do not only exist in the fossil record!
Assessment of Outcome (4.) Graded presentations of primary literature papers in lecture and lab will indicate your comprehension of current studies/ideas in evolutionary biology.

Student Assessment (Assignments and Grading):

Final Course Grade: Final grades will be calculated as follows:

93.0-100% A		90.0-92.9% A-	87.0-89.9% B+	83.0-86.9% B	80.0-82.9% B-
77.0-79.9% C+	73.0-76.9% C	70.0-72.9% C-	67.0-69.9% D+	60.0-66.9% D	<60.0% F

3 credits – Lecture (620 points)

Due Date	Assignment	Points
9/15	Exam 1	100
10/8	Exam 2	100
11/7	Exam 3	100
10/20-10/27, 12/1-12/5	Class Presentation	120
All Semester	Participation (Especially Discussion Questions – these will be assigned)	100
Finals Week	Final Exam	100

1 credit – Lab (205 points)

Due Date	Assignment	Points
9/11	Homology Worksheet	20
10/2	Plant-Animal Interactions Lab	50
10/23	Population Variation Lab – Short Report	35
10/30, 11/6	Paper Presentations	50
11/20	Selection Lab	50

Laboratory – The lab section of the course is worth 1 credit, and must be taken by students wishing *Evolution* to count towards a major in Biodiversity and Conservation Biology and/or a minor in Bioinformatics. There will be a separate grade for lab and lecture. Labs will be held every Thursday in Science Center Room 106 (or for some labs, in Miller 22, and for a few labs we will be in the field) from 1-4:00 pm. Information regarding each lab will be handed out in class on Mondays. You should read this information before attending lab. You are expected to keep a lab notebook for recording your data and procedures, I suggest a 3-ringed binder for storing lab handouts and notes/results recorded in lab.

Date*	Lab
August 28	Homology
September 4	Plant-Animal Interactions
September 11	Plant-Animal Interactions– Homology Worksheet Due
September 18	Plant-Animal Interactions
September 25	Collection for Population Variation Lab and DNA Extraction/ Pollinations for Sexual Selection Lab
October 2	Population Variation Lab Using ISSRs – Plant-Animal Interactions Lab Due
October 9	Selection Lab – Dogs!
October 16	Selection Lab II – Dogs!
October 23	Discussion of Selection Data/Staining for Sexual Selection Lab – Population Variation Lab Due
October 30	Paper Presentations
November 6	Paper Presentations
November 13	Sexual Selection
November 20	Identifying Characters and Building a Phylogenetic Tree – Selection Lab Due
November 27	No Lab - Thanksgiving
December 4	Phylogenetic Methods

* Dates may change to take into account lecture schedule, weather conditions, or status of supplies. I will make every effort to announce any changes on Monday or Wednesday before lab on Thursday.

Lecture – We will be discussing many important and complex theories and terms in lecture. Participation and questions are **strongly encouraged**. For most readings there will be take home discussion questions. Questions will be assigned on a rotating basis to

everyone in the class. A majority of your participation grade for lecture will come from your preparedness to answer these questions; I will be marking each student on this.

Date*	Topic	Reading to be done after class**
8-25	Introduction to Study of Evolution	Chap. 1
8-27	Introduction/Discussion	Chap. 1
8-29	Evidence for Evolution	Chap. 2
9-1	Labor Day – No Class	
9-3	Homology and the Genetic Code	Chap. 2
9-5	Evolution Under Attack Today	Outside Reading – Intelligent Design
9-8	Darwin and Natural Selection	Chap. 3
9-10	Darwin and Natural Selection	Chap. 3/Outside Reading
9-12	Natural Selection	
9-15	Exam 1	
9-17	Mutation and Genetic Variation	Chap. 5
9-19	Mutation and Genetic Variation	Chap. 5
9-22	Selection and Mutation	Chap. 6
9-24	Selection and Mutation	Chap. 6
9-26	Selection and Mutation	Chap. 6
9-29	Migration, Genetic Drift, Nonrandom Mating	Chap. 7
10-1	Migration, Genetic Drift, Nonrandom Mating	Chap. 7
10-3	Inbreeding and Outbreeding Depression	Outside Reading
10-6	Applying Genetic Variation to Issues in Conservation	
10-8	Exam 2	Chap. 19
10-10	Evo/Devo	Outside Reading
10-13	Fall Break – No Class	
10-15	Evo/Devo	Outside Reading
10-17	Evo/Devo	Outside Readings
10-20	Class Presentations	Outside Readings
10-22	Class Presentations	Outside Readings
10-24	Class Presentations	Outside Readings
10-27	Class Presentations - Discussion	Chap. 8
10-29	Linkage and Sex	Chap. 9
10-31	Modes of Selection	Chap. 10
11-3	Adaptations	Chap. 10
11-5	Adaptations	
11-7	Exam 3	Chap. 11
11-10	Sexual Selection	Chap. 11
11-12	Sexual Selection/Reconstructing Phylogenies	Chap. 4
11-14	Reconstructing Phylogenies	Chap. 4
11-17	Speciation	Chap. 16

11-19	Speciation	Outside Reading
11-21	Biogeography	Outside Readings
11-24	Biogeography	Outside Readings
11-26 thru 11-30	Thanksgiving Break – No Classes	
12-1	Class Presentations	Outside Readings
12-3	Class Presentations	Outside Readings
12-5	Class Presentations	
12-8	Review and Discussion	
Finals Week	Final Exam	

* Dates for reading assignments are subject to change if we find that we want to spend more or less time on certain topics. I will clearly announce and write on the board any changes to the reading assignments.

** Reading assignments refer to your textbook unless stated otherwise. A more detailed description of specific pages associated with each reading assignment will be given in class.

Course Policies and Student Responsibilities:

Attendance and Makeup:

Regular attendance is expected, as is the completion of all assignments. You are responsible for the materials covered in this course and are invited to ask questions to clarify any confusion with the subject matter. **Lab attendance, for those enrolled in the lab, is mandatory. Your final grade will be reduced 5% for each lab missed, unless a valid, documented excuse is provided.**

*****If you miss an exam, it can only be made up if you notify me prior to the exam time or on the day of the exam and have a valid, documented excuse. Otherwise you will receive a “0” for this exam. For excused absences, you have 1 week (i.e., if the exam is on a Friday, you have until the following Friday to make up the exam). Lab reports, projects, and presentations are also to be completed on time. **For every day an assignment is late, the total possible points for that assignment will be reduced by 5% (i.e., if an assignment is 2 days late and was originally worth 100pts., the grade for that assignment will be 10pts. less than the grade it would have earned if it had been handed in on the original due date).** Assignments cannot be handed in after they have been returned to the class, with the exception of extenuating circumstances.

Extra-credit Policy: No extra credit assignments will be given. If you are having difficulty in the course, please see me for extra help.

Honor Code

We will follow the rules of the Cedar Crest College Honor Code and the Classroom Protocol code as stated in the Student’s Guide Book (Section A.I).

Plagiarism

We will follow the College's policy on plagiarism. Please see the Student's Guide (Section A.I) for a definition of plagiarism and the College's policy on plagiarism. "...penalties for academic dishonesty may range from a request to redo the assignment before the grade is assigned, to the grade of an 'F' for that assignment, to the grade of an 'F' for the course, to suspension or expulsion.".. "All cases of plagiarism must be reported to the Provost."

College Accommodations Policy

Anyone with documented disabilities who may need academic accommodations should discuss these needs with me during the first two weeks of class. Anyone with disabilities who wishes to request accommodations should contact Academic Services (x3484).

Final Exam

Professors were asked by the Provost's office to include the following statement on our syllabi regarding attendance at the final exam. "Your obligations for this course include attendance at the final exam, on the day and time scheduled by the Registrar's Office. You should not make travel arrangements until the final exam schedule is published; if you must make plans early, you should schedule your travel after the last final exam day." I will inform you as soon as I know the date of our final exam.

Assignments in Greater Detail

Lab Reports: Details of how these formal lab reports are to be written will be presented in class, but will include Abstract, Introduction, Materials and Methods, Results, Discussion, and Literature Cited sections as well as citations from relevant, primary literature.

Lab Paper Presentations: Each of you will choose a paper from the primary literature and provide copies for the rest of us in the lab. You will provide an overview of the paper and explain the results. All others in lab that week will prepare 3 questions relating to the paper.

Class Presentations in Lecture: Each of you will choose a topic (such as "Effects of the Ice Age on Plant Distribution in the Northeastern United States" or a series of papers about a particular evolutionary topic (such as understanding the development of animals using a variety of tools from morphological to molecular). From these papers, you will choose a paper from the primary literature for the rest of us to read. Then you will present the topic and critique the paper, with input from the rest of us.