

EVOLUTION - BIOL 343

FALL 2001

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Class Meetings: Lecture Tuesday and Thursday 10:10-11:40 AM Valentine 207
Laboratory Tuesday 1:15 - 4:15 PM Bewkes 108

Textbook: Volpe, E. P. and P. A. Rosenbaum (2000) Understanding Evolution, 6th edition. McGraw Hill, New York, 259 pp.

Webpage: <http://it.stlawu.edu/~mtem/evolution/evolution.htm>

OBJECTIVES:

- 1) Help you to develop critical thinking skills
- 2) Present a historical perspective about life on Earth and examine the fundamental evolutionary processes that have produced the diversity of life we see today
- 3) Develop technical skills for the study of DNA sequences and molecular phylogenetic analysis
- 4) Conduct original research

REQUIRED ASSIGNMENTS AND THEIR POINTS VALUES:

Mid-term	100 pts	Oct. 11
Final Exam	100 pts	Dec. 21, 8:30 - 11:30 AM
Freshwater Mussel Evolution Research - Participation and Quality	25 pts	
Research Paper	75 pts	Dec. 6
Molecular Phylogeny Project - Participation and Quality	25 pts	
Molecular Phylogeny Project Paper	75 pts	Nov. 15
Problem Sets	50 pts	
Participation	25 pts	
TOTAL POINTS	475 pts	

GRADES:

Point Percentage

4	Excellent	≥ 90
3.5	Between Excellent and Good	85 - 89
3	Good	80-84
2.5	Between Good and Satisfactory	75-79
2	Satisfactory	70-74
1.5	Between Satisfactory and Lowest Passing Grade	65-69
1	Passing Grade	60-64
0	Failing Grade	< 60

EXAMS:

Exams will consist of short answer and essay questions. Some questions will require you to have not only memorized the material that we have studied, but understand it well enough so that you can apply the information to an unknown problem situation. The midterm exam will test you on material covered in the first half of the course while the final exam will cover the second half of the course.

LECTURE AND LABORATORY ATTENDANCE:

You are expected to be in lecture on Tuesdays and Thursdays from 10:10 AM until 11:40 AM and in laboratory on Tuesdays from 1:15 until 4:15 PM. There are valid reasons why you may miss lecture or laboratory, but these **do not** include the following: 1) finishing a paper for another course, 2) studying for a test for another course, 3) staying up too late, and 4) having made a plane, train, or boat reservation for a trip.

In the laboratory, lab partners must work together, sharing the work equally. Sharing the work equally does not mean that one partner does all of the fun lab work while the other does all the cleanup and prep work. It is important to make sure that you and your lab partner talk to one another about what you are going to do for each lab and that each of you understands the why, what, and how of each lab.

There will be 1 or 2 Tuesdays when we will have an extended class period - e.g. beginning at 10:10 AM and finishing after 4:15 PM. We will use these extended class periods for field trips or setting up experiments. On these days you need to remember to pack a lunch, bring extra clothes, and make any arrangements you need to, e.g., check with a coach or roommate, before class starts at 10:10 AM.

If you know you will miss a lecture or lab, make sure that you check with me ahead of time. This does not mean that you leave me a message on my voice mail the day you miss class.

FIELD TRIP ATTIRE:

When we go into the field you should expect to get **wet!** This means that you should not wear your best clothes and shoes. You may want to bring a towel and a change of clothes with you, just in case you fall into the water. **Footwear:** An old pair of tennis shoes is probably best.

LECTURE TOPICS:

Introduction

A History of Life on Earth - A Story From Fossil Data

Origin of Life

Species Concepts

Classification and Phylogeny

Mutation and Molecular Evolution

Genetic Equilibrium

Genetic Drift and Gene Flow

Natural Selection

Speciation

Cataclysmic Evolution

Microevolution, Macroevolution and Punctuated Equilibria

Natural Selection and Social Behavior

LABORATORY SCHEDULE:

Sept. 4	Field Trip to Fossil Site
Sept. 11	Collect <i>Pyganodon</i> spp.
Sept. 18	Prepare Genomic DNA
Sept. 25	PCR - First round of nested PCR Amplification of Mitochondrial Genes - CO I Subunit
Oct. 2	PCR - Second round of nested PCR Amplification of Mitochondrial Genes - CO I Subunit
Oct. 9	Determine sizes of PCR products using agarose gel electrophoresis
Oct. 16	Clean PCR products and prepare for sequencing
Oct. 23	PCR - First round of nested PCR Amplification of Mitochondrial Genes - 16s rRNA
Oct. 30	PCR - Second round of nested PCR Amplification of Mitochondrial Genes - 16s rRNA
Nov. 6	Determine sizes of inserts by agarose gel electrophoresis
Nov. 13	Clean PCR products and prepare for sequencing
Nov. 27	Sequence Analysis
Dec. 4	Sequence Analysis
Dec. 11	TBA

FORMAT FOR PROJECT PAPERS:

You should write these papers as formal research papers. You should include your objectives, how you conducted your research, the results and what the results mean. The paper should be formatted for submission to a scientific journal. The format you will use is the following:

- 1) **Title Page** - Informative title, your name, address, and date
- 2) **Introduction** - The introduction should provide background material so that someone reading your paper will understand what you did and why you did it, e.g., - history and importance of the subject you want to study - broad significance - **Objectives** - Statement of your specific aims - i.e., what data do you plan to collect - Statement of why achieving your objectives is important
- 3) **Materials and Methods** - How you conducted your research. This section must describe your research in enough detail that someone else may repeat what you did. This section should not read like a cookbook. If you are unsure how much detail to add when you are writing this section you should look at papers you are using as references, other journal articles in the library, and talk to Dr. Temkin.

- 4) **Results** - This section needs to contain a written description of your results. Your written description may refer to figures (pictures, graphs, etc.) and/or tables that contain your data. Tables need to have titles and figures require descriptive captions.
- 5) **Discussion** - The text of this section puts your results into context with the primary literature and should make connections to your introduction, e.g., objectives statement. It is in this section that you interpret your results. It is here in the discussion where you explain the why's, wherefore's, and because's of your work. Make sure that you finish the paper with a strong summary or conclusion statement!
- 6) **Literature Cited** - This section contains a list of all the works that you referenced in the body of the paper. Literature citations should follow an accepted style from a major scientific journal. Try to keep to the primary literature, which does not include textbooks, magazines, encyclopedias, and most personal web sites!

Citing references in your text - You may use any appropriate method of citing references in your text. Make sure that you pick a system and remain consistent. Do not mix the Harvard method (Jones et al., 1984) with a numbering system.

Also, please remember to check your spelling and grammar!! They do count toward your grade on this paper!!