

BIOL 246 - GENETICS - FALL 2005

Instructor:	Dr. Michael Temkin, 124 Bewkes Hall, Biology Department Office Telephone: 229-5871 Home Telephone: 386-3025 Web Page: it.stlawu.edu/~mtem
Class Meetings:	Lecture: Monday, Wednesday, and Friday 8:30-9:30 AM Valentine 103 Laboratory: Wednesday 1:15-4:15 PM Bewkes 108
Textbook:	Brooker, R. J. (2005) Genetics: Analysis & Principles, 2th Edition. McGraw-Hill, New York, 842 pp.
Course Content:	ANGEL – angel.stlawu.edu
Brooker Website:	http://highered.mcgrawhill.com/sites/0072835125/student_view0/chapter1

OBJECTIVES:

- 1) To develop your critical thinking skills and your ability to integrate information from many different areas of biology, chemistry, and physics
- 2) To facilitate your learning of the fundamental aspects of genetics at the subcellular, cellular, organismal, and evolutionary levels
- 3) To provide you with experience using modern molecular biology techniques
- 4) To allow you to conduct original research in genetics
- 5) To facilitate your learning of how to obtain information from molecular databases
- 6) To develop your abilities to utilize computers to analyze molecular data

REQUIRED ASSIGNMENTS AND THEIR POINTS VALUES:

Exam I	100 pts	Oct. 3 at 8:00 AM
Exam II	100 pts	Nov. 7 at 8:00 AM
Final Exam	150 pts	Monday Dec. 12th 8:30-11:30
Quizzes 4 @ 20 pts.	80 pts	Sept. 9, 23, Oct. 28, and Dec. 2
Problem Sets	30 pts	TBA
Laboratory Notebook	70 pts	Graded at the time of Exam I and II
Completed Labs	60 pts	
Paper	70 pts	TBA
Case It! Presentation	40 pts	Dec. 7 – 1:15 Madill 211
TOTAL POINTS	700 pts	60% Lecture/40% Lab

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 and QUIZZES:

Lecture exams will include the following: multiple choice, definitions, compare and contrast, diagram and label, diagram and describe, and potentially other types of short answer questions. Some questions may require you to apply the information to an unknown problem situation.

Quizzes will be given at the beginning of the class period, **so be on time!** You will have 30 minutes to complete each quiz. Quizzes will be 50% lecture material and 50% laboratory material. Quizzes will emphasize material studied during the interval between quizzes, **but may include any material that we have studied.**

Exam I, Exam II, and 100 pts of the lecture Final Exam will cover the material presented in the first, second and third portions of the course, respectively. Fifty points of the Lecture Final Exam will be cumulative and require information that you learned throughout the course.

LECTURE AND LABORATORY ATTENDANCE:

You are expected to be in lecture on Mondays, Wednesdays, and Fridays from 8:30 AM until 9:30 AM and in laboratory on Wednesdays 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 (remember 60 pts. come from you completing your lab assignments).

LABORATORY NOTEBOOK:

Your laboratory notebook should be an accurate and complete record of your work in lab. The type of notebook you use is your decision but must be either composition, spiral bound, or ring binder - **no folders!!!!** **Your notebooks will be graded on organization, completeness, and readability.** For each lab you should include the following in your notebook:

- 1) a complete step by step lab procedure based on either manufacturer's instruction sheets, class handouts, or your experiences
- 2) notes explaining the purpose of each step or set of steps of the procedure (e.g., liquid nitrogen was used to prevent the degradation of RNA while the tissue was being ground with a motor and pestle).
- 3) notes on any special preparation for the lab (recipes for reagents, special handling requirements, etc..)
- 4) notes concerning your progress through the procedure (**this may be as little as check marks as you add reagents to tubes**)
- 5) description of results - using words, pictures, sequences, etc..
- 6) comments - your thoughts and analysis of the results - what do the results mean - are they what you expected? How do you know what to expect? Try to explain negative results - sometimes the reason for a failed procedure is obvious - **OOPS we forgot to add the DNA!!** Other times reasons for failure are less obvious - please do not hesitate to consult with me if you are having a problem or unsure about what to do.

LECTURE TOPICS:

Introduction
Molecular Structure of DNA and RNA
Chromosome Organization and Molecular Structure
DNA Replication
Gene Transcription and RNA Modification
Translation of mRNA
Gene Regulation in Bacteria and Bacteriophages
Gene Regulation in Eukaryotes
Gene Mutation and DNA Repair
Mendelian Inheritance
Extensions of Mendelian Inheritance
Linkage and Crossing Over
Recombination and Transposition at the Molecular Level
Non-Mendelian Inheritance
Population Genetics
Genetic Technologies

LABORATORY SCHEDULE:

Aug. 31	Introduction to Lab and Project, Problem Set, View Nuclei with DNA Specific Fluorochrome
Sept. 7	Collect Freshwater Mussels from Little River and take tissue samples
Sept. 14	Isolate DNA from Mussel Tissue
Sept. 21	PCR - First round of nested PCR Amplification of Mitochondrial Genes - CO I Subunit and 16s rRNA
Sept. 28	PCR - Second round of nested PCR Amplification of Mitochondrial Genes - CO I Subunit and 16s rRNA
Oct. 5	Determine sizes of PCR products using agarose gel electrophoresis
Oct. 12	Clean PCR products and prepare them for sequencing
Oct. 19	Sequence Analysis - Whitman 169
Oct. 26	Sequence Analysis - Whitman 169
Nov. 2	Sequence Analysis - Whitman 169
Nov. 9	Case It! Studies on Genetic Diseases: Inheritance and Screening - Whitman 169
Nov. 16	Mendelian Genetics Problems
Nov. 30	Population Genetics Problems
Dec. 7	Case It! Presentations - Brown 122 - Bloomer Auditorium

PAPER FOR LABORATORY PROJECT:

You should write this paper as a formal research paper. 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! **You should use at least 15 to 20 references!**

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!!