Course Syllabus for Biology 207L-Molecular Biology I – Genes & Genetics Lab
FALL 2013
Chaminade University of Honolulu

Meeting time & place:	R 2:30-5:20 PM Henry Hall Lab 02
Textbook:	Chaminade Lab Manual ($7 from me or office) & supplemental materials
Instructor:	Dr. Joan Kuh
Office & Contact Info:	WESS 102, 739-4642 (phone), joan.kuh@chaminade.edu (e-mail) Office Hours: MW 1:00-3:00 or by appointment

Course Description:

This is the laboratory that accompanies, but is distinct from, the Genetic Biology lecture course BI 207 and is intended to reinforce through practical applications the concepts presented in the lecture. Analysis of progeny resulting from genetic crosses completed in the pomace fly, *Drosophila melanogaster* and *Zea mays* will demonstrate both Mendelian and non-Mendelian patterns of inheritance for a number of traits. Experience with molecular biological techniques such as PCR, DNA isolation and restriction enzyme analysis will also be gained. Novel techniques involving differential gene expression will also be done. Additionally, there will be laboratories on writing and reading scientific articles and in population genetics.

Course Objectives: The student should be able to *do* the following:

1. Determine the mode of inheritance (Mendelian and non-Mendelian) of a genetic trait(s) in flies, corn and humans.
2. Determine the distances between genes on a *Drosophila* chromosome using recombination analysis.
3. List and describe the various steps and components of cloning using plasmid vectors in a bacterial host.
4. Describe the chemistry of DNA isolation methods and describe methods used in its analysis including PCR, restriction enzyme mapping and gel electrophoresis.
5. Determine a genotype via PCR and carry out subsequent population genetics analysis (e.g., determination of allele and genotype frequencies and Hardy-Weinberg Equilibrium) which involves a rudimentary knowledge of probability and statistical testing for significance.
6. Characterize a DNA sequence using *in-silico* approaches (e.g. bioinformatics).
7. Define the terms PCR-RFLP, SNPs, linkage, chi-square, and others.

Grades: Your grade in this course will be derived from the following:

Formal Laboratory reports [2 each at 50 points]	100 points
Homework assignments [3 @ 20 points each]	60 points
Lab Notebooks [2 checks @ 30 points each]	60 points
Exit Exercises [8 @ 5 points each]	40 points
Lab Exams [2 @ 70 points each]	140 points

The two laboratory reports will be I) Drosophila Genetics and Genetic Mapping and II) Cloning and Analysis of *Drosophila* DNA in Plasmid Vectors. The contents of these reports as well as the three assignments will be described at the appropriate times during the semester. You will be required to keep a lab notebook, which will be collected at the time of each. More specifics on the organization of this lab notebook will be provided at the first lab meeting.

Attendance to Lab: Mandatory. Please be aware that you have agreed to attend a course that is held from 2:30 to 5:20 PM on Thursday afternoons. Let me know ahead of time that you will NEED (stress need) to miss lab. However, be advised that there are not makeup labs and you will lose points for that lab and activity.
Athletes cannot miss more than two lab meetings.

Tentative Laboratory Schedule:
Stress tentative since flies are living organisms and don't always follow our schedules (DARN!)

Week	Date	Lab	Exit Exercise	Assignments
1	Aug 29	1-Introduction to course; getting to know flies	Sorting male and female flies	
2	Sep 05	2-Mendelian Genetics-One Gene in flies and humans Score F1	Punnett Squares completed	
3	Sep 12	3-Mendelian Genetics-Two Genes in flies and corn; Probability & Statistics	Corn cross testing results	
4	Sep 19	4-Recombination & Linkage Score F2	Preliminary F2 results	**Assignment I due**
5	Sep 26	5- Scientific Writing WS Score more F2		**Outline of Lab Report I**
6	Oct 03	6-DNA Isolation & PCR Review for Lab Exam I	Submit DNA samples	**Lab Report I due today**
7	Oct 10	Lab Exam I on Labs 1-5	Clean up PCR product	**Submit Lab Notebook**
8	Oct 17	7- BlueWhite Cloning; PCR of human DNA	Describe difference between blue and white bacterial colonies	
9	Oct 24	8- DNA Analysis & gel electrophoresis; PCR of positive clones; Set up restriction digests for PTC-PCR products	Proper gel loading technique	
10	Oct 31	9- Population Genetics of PV92 locus		**Assignment II due**
11	Nov 07	10-RFLPs & SNPs in the PTC locus; Clean up clone PCR for sequencing		
12	Nov 14	11- DNA Sequencing		**Assignment III due (Population Gen)**
13	Nov 21	12- Bioinformatics	Outline/draft of lab report 2	**Lab Report 2 due Monday 11/25**
	Nov 28	THANKSGIVING HOLIDAY		
14	Dec 05	Lab Exam II on Labs 6-12		**Submit Lab Notebook**

Safety RULES for Chaminade Teaching Labs

1. Clothing --- closed toe shoes and a lab coat must be worn at all times. You will NOT be allowed to work in the laboratory without these. Sandals, crocs and open-toed shoes are prohibited. Unless your lab coat covers most of your legs, long pants are recommended as lab wear.
2. Long hair should be tied back securely. Loose apparel such as ties, scarves and jewelry should be secured so as to not contaminate the work area or introduce a possible safety hazard.
3. Latex* gloves should be worn when performing most work in this course. Goggles or safety glasses should be worn during DNA extractions. *If you have an allergy to latex, we can provide gloves made from other materials.
4. No food or drinks are allowed in the lab *at any time*.
5. Wash hands when you first enter the lab, wash hands before you leave for the day. Wash hands/ change gloves as needed during the lab session.
6. Follow instructions from me on how to dispose of used lab supplies or reagents. In general, very LITTLE will go into the regular trash including gloves. Pipet tips must be treated as "sharps" and hence, need to go into hard-sided containers for disposal. Some materials may be regarded as "biohazardous" (including your tissue samples) and will need to be placed into special containers to be autoclaved before disposal. Do not put anything down the sink drain unless approved by the instructor. Specific disposal instructions will be provided at each lab session.
7. Do not use a piece of equipment until you have been shown how to operate it properly. We will be using centrifuges frequently---make sure that the rotor is balanced prior to turning on the machine. The micropipettors are also expensive and you will be shown how to operate them properly. PLEASE ASK QUESTIONS IF ANY DOUBTS ON USING EQUIPMENT—I don't expect you to become experts in a short time with such a short exposure to lab equipment.
8. Clean up spills immediately. In the unlikely event it involves a toxic or caustic compound, walk away from the spill and notify other members of the lab. The instructor will arrange proper clean up of the material.
9. Clean your work area before you leave and wash the bench area. It is recommended that you wipe down the bench area before starting work.

*****The BEST way to avoid accidents is to be familiar with the procedures and equipment for the experiment being conducted. The BEST way to succeed in the laboratory is to be familiar with the procedures and equipment AND to work neatly with accurate record keeping.

*******There are FINES for not adhering to these safety rules. More information will be provided at our first meeting.

CHAMINADE POLICY now states that the use of cell phones and other electronic devices in laboratories is PROHIBITED. If you must answer your cell phone, please leave the lab to do so.