FD '02

Course Syllabus for Biology 431L-Genetics Lab
Fall 2002
Chaminade University of Honolulu

Meeting time & place: Th 2-4:50 PM Henry Hall 13

Textbook: Handouts will be given for each laboratory exercise.

Instructor: Dr. Joan Kuh

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Office Hours: WF 12-2, T 1-2 or by appointment

Course Description:

This is the laboratory that accompanies, but is distinct from, the Genetics Biology lecture course BI 431 and is intended to reinforce through practical applications the concepts presented in the lecture. Actual genetic crosses completed with the pomace fly, *Drosophila melanogaster,* and pedigree analysis will demonstrate both Mendelian and non-Mendelian patterns of inheritance for a number of traits. Experience with *karyotyping* and molecular biological techniques such as PCR, DNA extraction and restriction enzyme analysis will also be gained. Profiles of gene expression will be studied indirectly by examining the expression of an important developmental gene in the background of several mutations in *Drosophila*. Additionally, there will be laboratory exercises pertaining to population genetics and the genetics of behavior.

Course Objectives: The student should be able to demonstrate the following:

1. The determination of the mode of inheritance (Mendelian and non-Mendelian) of a genetic trait(s) by tracking the trait(s) through at least two (fly) generations or, in the case of human genes, from pedigree analysis.
2. The isolation and characterization of chromosomes from both plant and animal sources.
3. The basic components of a human karyotype and the various methods of analyzing both normal and abnormal karyotypes.
4. To understand the various steps and components of "blue-white" cloning and the importance of this technique to the analysis of a gene or genomes.
5. Determination of a genotype via PCR and subsequent population genetics analysis (e.g., determination of allele and genotype frequencies based on the data). Also, the principle of PCR, the components and what each does in the reaction.
6. Ability to describe how DNA is isolated, quantitated and characterized via restriction enzyme mapping and gel electrophoresis.
7. Describe how striped embryos and ectopic expression in *Drosophila* demonstrate the concept of differential gene expression.
8. Describe how/what genes play a role in courtship behavior in *Drosophila.*

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

2 (formal) laboratory reports (2 each at 50 points)	100 points
3 assignments (2 @ 15 points and 1 @ 20 points)	50 points
2 semester exams (2 @ 100 points)	200 points

The two laboratory reports will be I) Drosophila Genetics and Gene Mapping and II) Cloning and Characterization of a DNA Fragment via Blue-White Cloning. The contents of these reports as well as the three assignments will be described at the appropriate times during the semester.

Tentative Laboratory Schedule:

Date	Laboratory
8/29	Introduction, Looking at Flies
9/05	Mendelian Genetics – Monohybrid & Dihybrid Crosses
9/12	Probability & Chi Square [**Assignment I due 9/19**]
9/19	Sex Linkage, Pedigree Analysis
9/26	Recombination and Linkage Analysis **[Lab Report I due 10/03]**
10/03	Cytology **[Assignment II due 10/10]**
10/10	Genes & Behavior
10/17	**Lab Exam I**
10/24	Blue-White Cloning
10/31	Plasmid and Genomic DNA extractions
11/07	DNA manipulation—restriction enzyme mapping, quantitation and electrophoresis **[Laboratory Report II due 11/14]**
11/14	Genotyping with PCR and Population Genetics **[Assignment III due 11/21]**
11/21	Differential Gene Expression
11/28	**Thanksgiving Recess**
12/05	**Lab Exam II**