

Dr. Jeff Young jeff.young@wwu.edu

Office Hours: BI 412 M&Tr 11 - 12 am or by appointment

Lecture: M 2 – 2:50 am in BH111

Lab: T&Tr 2 – 4:50 pm in BI454

Course Content: In this course, we will examine various topics in genetics using five different organisms: (i) the small, free-living nematode *Caenorhabditis elegans*, (ii) the mustard plant *Arabidopsis thaliana*, (iii) the parasitic wasp *Nasonia vitipennis*, (iv) the bacterium *Escherichia coli*, and (v) *Homo sapiens*. These topics include independent assortment, developmental genetics, molecular genotyping, forward genetic screens, mitochondrial DNA and inheritance, and Bioinformatics. We will use *Escherichia coli* to explore basic concepts in prokaryotic genetics and mutagenesis.

Course Objectives:

Content goals: i. You should understand and be able to apply classical genetic and molecular genetic principles in a laboratory setting. Specifically, you should obtain a reasonably sophisticated understanding of several major aspects of genetics, including Mendelian Genetics, prokaryotic genetics, and molecular genetics. ii. You should acquire skills in handling model organisms, keeping detailed research records, analyzing data and writing scientific reports.

Process goals: i. You should improve your critical thinking skills through the analysis of experimental data. ii. You should improve your quantitative reasoning skills. iii. You should improve your written communication skills.

Lab notebook: You should purchase a bound laboratory notebook with numbered pages. These are available in the bookstore. This notebook will be used to record your activities and observations during each laboratory period. At the beginning of the notebook, you should have a table of contents which clearly indicates on what pages each exercise is recorded. Because most of the experiments will span two or three laboratory periods, you should organize your notebook by experiment and not by class period.

Prior to each new lab project, you are required to write, in your own words, an abstract of the experiment with an outline of the proposed work. A photocopy of this page will be collected and marked at the beginning of the class period. Leave plenty of room in your notebook for data collection and analysis and for notes relating to the progress of your experiments. I encourage you to keep your notebook as if it were a journal of your laboratory activities. In other words, you should record what you did in lab before you leave the lab. If you are working with a lab partner, you should record what your partner did in lab as well as what you did.

Work up and analyze your data as soon as you've completed the experiment and while it is still fresh in your mind. Your notebook should be neat, well organized and detailed enough such that another person can determine exactly what you did and what your results were for any given experiment.

For some of the lab exercises you will also be required to complete and/or write a formal lab report (formal lab reports must be generated on a word processor). The format of these reports will be discussed in class.

Lab manual: In lieu of a laboratory manual, each week you will be provided with handouts describing the laboratory exercises or experiments to be performed.

Lab periods: Most of the work involved in the assignments will be performed during the scheduled lab periods. Occasionally you may be required to come to the lab at other times to maintain lines, set up crosses, score progeny, etc. At the beginning of each lab period we will have a short discussion over what will be done that day and whether any work outside the scheduled lab period will be necessary.

Attendance is mandatory. Unexcused absences are unacceptable.

Evaluation: Your grade for the course will be determined as follows:

Notebooks 40 points total

You must submit, via an online form, an outline of the work to be performed before the start of class to demonstrate that you are prepared for the day's lab. 1 points per lab. All or nothing. You must keep a notebook. An example of a good lab notebook will be available.

Lab Behavior 30 points

These are points that you will need to earn and will be based on how good of a lab citizen you have been. Simple attendance in the lab will not be sufficient to earn points. Allocation of points will be influenced by your punctuality (are you always on time?), engagement (are you focused upon the lab or more interested in socializing?), organization, safe behavior, and consideration of other students.

Lab Book, Work Sheets and Formal Lab Write-ups 50 pts.

Mid Term and Final 50 pts. (each)

Pop quizzes and other assignments 30 pts.

Approximate Grading Scale

225-250 points A

200-224 points B

175-199 points C

150-174 points D

Below 150 points F

Biology 322 Course Tentative Timetable, Spring 2013

Week 1 4/2 -	M: No class T: Intro to Course Discussion of Model Systems, <i>C. elegans</i> Tr: Start <i>C. elegans</i> experiment: <i>Review of Mendel</i>
Week 2 4/8 -	M: Chi Square analysis T: <i>Review of Mendel continued</i> : pick F1's. TR: <i>C. elegans</i> phenotypic diversity
Week 3 4/15 -	M: Introduction to <i>Nasonia</i> T: <i>C. elegans Review of Mendel</i> : Score F2's TR: Begin <i>Nasonia</i> complementation
Week 4 4/22 -	M: Midterm review T: <i>C. elegans Review of Mendel</i> : Score F3's TR: Midterm I (1 hour exam)
Week 5 4/29 -	M: Introduction to <i>Arabidopsis</i> T: Start <i>Arabidopsis</i> genotyping and mutagenesis exercises TR: Wasp/ <i>Arabidopsis</i> Handling, Review
Week 6 5/6 -	M: Introduction to PCR T: PCR Genotyping Experiment TR: <i>Arabidopsis</i> Data Analysis, Collect Mt DNA, PCR
Week 7 5/13 -	M: Bacterial Genetics T: Bacterial genetics: <i>E. coli</i> F' X F- TR: Collect/interpret data from <i>E. coli</i> F' X F-
Week 8 5/20 -	M: Introduction to Mitochondrial Genotyping T: Set up <i>E. coli</i> Hfr X F- cross TR: Set up <i>E. coli</i> : spontaneous and induced mutation Work with Hfr cross.
Week 9 5/27 -	M: Introduction to RNAi T: Collect/interpret data from Hfr X F- cross TR: Set up <i>E. coli</i> : RNAi (subject to change) Collect and analyze <i>E. coli</i> mutagenesis data
Week 10 6/3 -	M: Final Review T: Analyze Mt Data, Collect RNAi Data (subject to change) TR: Clean-up, Midterm II (1 hour exam)

Note: Schedules involving living organisms are subject to change.