Syllabus for BIOL 371 Advanced Genetics Laboratory

Instructor: Rebekah A. Rampey Ph.D.

Catalog course description: Classic papers are read and discussed to complement laboratory problem solving. Students are expected to pose problems, design experiments, analyze data, and communicate results to their peers. Prerequisites: BIOL 315 and CHEM 215 or 249.

Course requirements: Students will participate in independent research projects utilizing DNA cloning in *E. coli*, mutant screening with *Arabidopsis* seedlings, and detection of protein interaction with *S. cerevisiae*. In addition, students will be expected to understand the background of their projects and how their projects fit with the larger research topic involving auxin regulation in Arabidopsis.

Course support: Research in this course is provided by a Howard Hughes Medical Institute research grant awarded to Dr. Bonnie Bartel in the Biochemistry and Molecular Biology department at Rice University in Houston, Texas. The purpose of this grant is to allow undergraduate students to have an opportunity to experience modern molecular research. In addition to providing funding for equipment and supplies, this grant provides a stipend and housing for two Harding students to work in Dr. Bartel's laboratory during the summer after completion of this course. Dr. Rampey will choose two students excelling in this course for this honor.

Materials to be purchased by student: 2 boxes of gloves and black 1-inch/3-ring binder for use as a lab notebook

Dr. Rampey's expectations of each student:

1. You are expected to not only read each background or techniques paper given to you, but to master the material. You must understand WHAT you are doing or the lab work to follow will not be as meaningful.

2. You are expected to keep a notebook with sections including: background, experiments (this section can be divided into sub-sections if more than one project is undertaken), and protocols. <u>You will turn this notebook in for evaluation at the times listed below.</u> You CANNOT put too much detail in your notebook about your experiments – you can put too little (and this will come back to haunt you when any experiment needs repeating).

3. You are expected to keep track of your hours worked each week. Starting the week of August 27th and ending/including dead week, you are expected to work at least 5 hours in lab each week. Some weeks will have more work to do than others, and it is up to you on the "down" weeks to see me for more projects. Create an hours log and keep it in the front pocket of your binder.
4. Dates are set between October 16 and 23 for student paper presentations. These presentations are for YOUR benefit. Not only will they ensure that you have a

high comprehension of advanced genetics, but they also allow me to evaluate you as a speaker. (Presentations like these are great topics for future recommendation letters.)

5. You will be expected to produce a "mini-thesis" that will be due in portions throughout the semester. This paper is NOT one that is to be written the night before any of the due dates. I highly recommend exchanging chapters of your paper with class-mates for editing BEFORE I read them! The "mini-thesis" will include the following chapters:
    1. Project Background
    2. Materials and Methods
    3. Results and Discussion

Tentative Schedule

Date:	Due:	Value:
Aug 21	Introduction to class, group project discussions	
Aug 28	Quiz over reading assignment: Lab manual part 1 & Appendices 1-5. FOCUS: syllabus, lab etiquette, auxin, IAA-conjugates, and bHLH transcription factors	30
Sep 4	Quiz over reading assignment: Rampey et al., 2006 An Arabidopsis basic helix-loop-helix leucine zipper protein modulates metal homeostasis and auxin conjugate responsiveness FOCUS: bHLH-LZ transcription factor ILR3, microarray analysis, Q-PCR	30
Sep 11	Chapter 1 draft	90
Sep 18	Quiz over reading assignment: Tartaglia et al., 1995 Identification and Expression Cloning of a Leptin Receptor, OB-R FOCUS: Screening a cDNA library; Genetic mapping	30
Sep 25	Quiz over reading assignment: McGinnis et al., 2003 The Arabidopsis *SLEEPY1* Gene Encodes a Putative F-Box Subunit of an SCF E3 Ubiquitin Ligase FOCUS: Genetic mapping, double mutant analysis, Northern blot analysis	30
Oct 2	Quiz over reading assignment: Kuusk et al., 2006 Functionally redundant SHI family genes regulate Arabidopsis gynoecium development in a dose-dependent manner FOCUS: Genetic redundancy	30
Oct 9	First notebook evaluation	125
	Quiz over reading assignment: Inoue et al., 1995 The immunoglobulin superfamily protein Izumo is required for sperm to fuse with eggs FOCUS: Homologous recombination and knockouts; Southern blot analysis	30
Oct 16	Article presentation - Offenhauser et al., 2006 Increased Ethanol Resistance and Consumption in Eps8 Knockout Mice Correlates with Altered Actin Dynamics FOCUS: Homologous recombination and knockouts; Immunofluorescence	100
Oct 23	Article presentation: Couñago et al., 2006 In vivo molecular evolution reveals biophysical origins of organismal fitness FOCUS: Microevolution; Genetic variation and enzyme stability	
Oct 30	Work day	
Nov 6	Work day	
Nov 13	Chapter 2 draft	90
Nov 27	Chapter 3 draft	90
Dec 4	Wrap up projects, lab cleanup	
Dec 13	Final Mini-thesis	130
	Second notebook evaluation*	125
	Lab competency and participation	100
	Total points possible (one quiz dropped)**:**	**1000**

*Lab notebooks must be turned in to the instructor permanently at the end of the semester (see below).

The points breakdown in the following percentages:

Writing	40%
Lab notebook	25%
Quizzes	15%
Presentation	10%
Lab comp.	10%

Important notice: Since students are working on actual research projects via Dr. Rampey's collaboration with Dr. Bonnie Bartel at Rice University, lab notebooks must be turned in to the instructor permanently at the end of the semester. Future work and eventual publication of this research will require using these notebooks as references. (You are allowed to make copies of any of your material that you wish.) A final course grade will not be issued to any student who fails to complete this task.

Academic integrity statement: Honesty and integrity are characteristics that should describe each one of us as servants of Jesus Christ. As your instructor, I pledge that I will strive for honesty and integrity in how I handle the content of this course and in how I interact with each of you. I ask that you join me in pledging to do the same.

Academic dishonesty will result in penalties up to and including dismissal from the class with a failing grade and will be reported to the Assistant Vice President for Academic Affairs. All instances of dishonesty will be handled according to the procedures delineated in the Harding University catalog.

Students with disabilities: It is the policy for Harding University to accommodate students with disabilities, pursuant to federal and state law. Therefore, any student with a *documented disability* condition (e.g. physical, learning, psychological, vision, hearing, etc.) who needs to arrange reasonable accommodations, must contact the instructor and the Disabilities Office at the *beginning* of each semester. (If the diagnosis of the disability occurs during the academic year, the student must self-identify with the Disabilities Director *as soon as possible* in order to get academic accommodations in place for the remainder of the semester.) The Disabilities Office is located in Room 102 of the Lee Academic Center, telephone, (501) 279-4019.

Syllabus disclaimer: While I have attempted to cover the major aspects of the course and my expectations of you in this syllabus, please do not hesitate to bring to my attention any questions you have concerning this course.

Schedule disclaimer: While I plan to adhere to the schedule provided, the fluid nature of laboratory work, the depth of our discussions or breaking new information may force us to change the schedule slightly from time to time. Please do not panic when this happens.