

PBL/BMB/CSS 856: Plant Molecular Biology Syllabus - Spring 2007

Instructors:	Department/Academic Unit:	Office:	Phone:
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*Contact RL with general questions

Brief Description of Course: The intention of the course is to provide a survey of plant molecular biology, molecular genetics, and cell biology emphasizing recent advances in higher plants.

Prerequisite: college-level genetics course (equivalent to ZOL/PBL 341)

Recitation (recommended for all students): Each week, Jonathan Davis will provide a one-hour recitation, in which molecular techniques and experiments used in the articles covered in the previous two lectures will be discussed, and questions about methodological approaches can be raised.

Credits: 3-0

Class Session: 3:00-4:20 PM (includes 5 min. break)
Room 247 Plant Biology Building

Web Site: <http://angel.msu.edu>

Use your MSU userID and password (case-sensitive) to log in.

Format/Daily Preparation: Each session of the class will consist of lectures by the faculty combined with a discussion of assigned readings. For each week, two to four key papers will be posted as .pdf files at the Angel web site, by the previous Friday. The faculty will provide lecture notes by or soon after lecture time, by providing access to Power Point slides through Angel. These notes will provide copies of some of the figures and tables that may be mentioned from articles other than those which were among the assigned readings. All of the assigned papers should be read for learning about the lecture topic. However, at least one paper will be designated for thorough understanding and in-depth discussion in one of the lectures of the week (TBA). That article will also be the source of a brief in-class assignment. Students should prepare by making sure that they can answer the following:

1. What was the goal of the research, including the problem being addressed?
2. Which figure(s) presents the most critical data in the study? Why?
3. What were the strengths and weaknesses of the paper?
4. What would **you** do next?

Other Recommended Activities: Throughout the semester, several seminar series will be hosting scientists who will present lectures on pertinent topics. These may be mentioned in class, and posted on the Angel site.

Course Grade: The grade will be based on two exams (60% of grade total; split 1:2 between midterm and final) and a research proposal (30% total). The remaining 10% of the final grade will be based on the in-class assignments, involvement in discussion of the assigned articles and general class participation.

Exams: Copies of the midterm and final exam will be given to students in the class period indicated on the schedule (**8 February; covering up to the 6 February lecture, April 26; covering the remaining lectures**). The two exams will have an open-book, take-home format (notes, books, and articles may be consulted, but students are expected to complete their exams independently, without discussion with others until after the exams are turned in). The exams are due *by 5 pm* on the following day. The midterm exam should be given to Rob Last, and the final exam should be turned in to Sheng Yang He.

Written Assignment (Due to R. Last at noon on 29 March): Your assignment is to write an original research proposal on some aspect of plant molecular biology/molecular genetics. It does not have to be on a topic specifically covered in class, but should focus on the molecular biology/molecular genetic aspects of the problem you choose to address (as opposed to the biochemistry or physiology of the problem). It should also be a basic biology problem, though it could have translational possibilities. For instance, you could write a proposal relating to the regulation of gene expression; mechanisms of plant disease resistance; molecular genetics of plant development; molecular responses to the environment (e.g., light, temperature, water, UV); etc. The only limitation is that the proposal should NOT be directly related to the research project you are conducting for your graduate degree. If you would happen to be working on regulation of gene expression in response to low temperature, you should not write a proposal on this topic. You could, however, write a proposal on ABA-regulated gene expression/signal transduction or, of course, any of the other topics.

The general format of the proposal should be as follows (page numbers refer to single spaced pages using a standard 12 pt font):

A. Summary with Specific Aims (1 page max.). State the broad, long-term objectives of the proposed line of research and describe concisely and realistically what the specific research described in the proposal is intended to accomplish.

B. Background and Significance (2 pages max.). Summarize what is known about the chosen area of research critically evaluating the existing knowledge and specifically identifying the gaps the project is intended to fill. State concisely the importance of the research and relate the specific aims to the broad, long-term objectives of the project.

C. Experimental Design and Methods (3 pages max.). Outline the experimental design and the procedures to be used to accomplish the specific aims of the project. Include discussion on how you will interpret the data. Discuss the potential difficulties and limitation of the proposed procedures and present alternative approaches to achieve the aims where appropriate. Give a tentative sequence or timetable for the investigation.

D. References. List the literature cited in the text, including titles.

E. Graduate Research Project (1 paragraph). Because the proposal is not supposed to be directly related to your graduate research project, we ask you to very briefly summarize the research you are conducting for your graduate degree. A research proposal will be written on a topic pertinent to the course. The proposal is expected to be original and creative. Students may not use a paper written for another course, nor conceptualized by someone else.

Oral Presentations: Three class periods (3-10 April) are reserved for students to give 10 minute presentations describing their research proposals to the rest of the class. The order of the reports will be announced only one day prior to their commencement, so all students should be prepared to speak on April 3. Either Power Point slides or transparencies may be used to aid the presentations. The quality of both the oral presentation and the written report will be considered in assigning a grade to the research proposal.

**BMB/CSS/PLB 856 - Plant Molecular Biology
Lecture Schedule for Spring 2007**

Date	Instructor	Notes	Topic	Quizzes
1/9/2005	Last		Course Organization. Model Organisms.	
1/11/2005	Last		The Plant Cell: Structure and protein trafficking	Take home assignment due by class time
1/16/2005	Last		Forward and Reverse Genetic Approaches	In class Quiz 1 (model organisms and plant cell papers)
1/18/2005	Last		Chromosome structure - the Centromere	
1/23/2006	Last		Genes, Gene Families, and Genome Evolution	In class Quiz 2 (Genetics and chromosome structure papers)
1/25/2006	Last		ABC Model of Floral Development and EvoDevo Approaches	
1/30/2005	Last		Transcript and Protein Analysis	In class Quiz 3 (Genes and evo devo papers)
2/1/2005	Last		Examples - use of transcript profiling to study biological systems	
2/6/2005	Last		Molecular Regulation of Metabolism	In class Quiz 4 (transcript and protein analysis papers)
2/8/2005	Last	Midterm Distributed at 4 PM	Transcriptional Regulation of Gene Expression	
2/9/2006	Last	Midterm Due at 5 PM to R. Last		
2/13/2005	Thomashow		Transcriptional Gene Silencing	
2/15/2005	He		Post-transcriptional Regulation of Gene Expression	
2/20/2005	Thomashow		Hormone Regulatory Pathways: Ethylene and Cytokinin	In class Quiz 5 (transcriptional and post transcriptional regulation of gene expression papers)
2/22/2005	Thomashow		Hormone Regulatory Pathways: Auxin and ABA	
2/27/2005	Thomashow		Abiotic Stress Responses: Cold Acclimation and Drought	In class Quiz 6 (hormone regulation papers)
3/1/2006	Thomashow		Regulation of Flowering: Vernalization	
5-9 March		No Classes	Spring Break	
3/13/2005	Thomashow		Regulation of Flowering: Photoperiod	In class Quiz 7 (cold and vernalization papers)
3/15/2005	Thomashow		Circadian Rhythms	
3/20/2005	He		Molecular Basis of Self Incompatibility	In class Quiz 8 (photoperiod and circadian papers)
3/22/2005	He		Programmed Cell Death in Development and Defense	
3/27/2005	He		Molecular Biology of Plant-Virus Interactions: Gene Silencing	In class Quiz 9 (self incompatibility and PCD papers)
3/29/2005	He	Proposals Due at Noon to R. Last	Molecular Biology of Agrobacterium Infection	
4/3/2005	Last		Presentations	
4/5/2005	Last		Presentations	
4/10/2005	Last		Presentations	
4/12/2005	He		Plant Disease Resistance Genes	In class Quiz 10 (silencing and Agrobacterium papers)
4/17/2005	He		Molecular Biology of Rhizobium Infection	
4/19/2006	He		Salicylic Acid Signaling	In class Quiz 11 (resistance genes and Rhizobium papers)
4/24/2005	He		Jasmonic Acid Signaling	
4/26/2005	He	Finals distributed at 4 PM	Hot Topic (TBA)	In class Quiz 12 (SA and JA papers)
4/27/2006	He	Finals due at 5 PM to S.Y. He		