BIO SCI 4320/7320 – Molecular Plant Physiology – Fall Semester 2012

Where: Tucker Hall, Room 8
When: MWF 8:00-8:50 AM

Instructors

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••• If you need accommodations because of a disability, if you have emergency medical information to share with me, or if you need special arrangements in case the building must be evacuated, please inform me immediately. Please see us privately after class, or make an appointment to see us.

To request academic accommodations (for example, a note-taker), students must also register with Disability Services, AO38 Brady Commons, 882-4696. It is the campus office responsible for reviewing documentation provided by students requesting academic accommodations, and for accommodations planning in cooperation with students and instructors, as needed and consistent with course requirements. For other MU resources for students with disabilities, click on "Disability Resources" on the MU homepage.

••• Academic honesty is fundamental to the activities and principles of a university. All members of the academic community must be confident that each person's work has been responsibly and honorably acquired, developed, and presented. Any effort to gain an advantage not given to all students is dishonest whether or not the effort is successful. Any student behaving dishonestly, such as cheating, will be given ZERO CREDIT for that particular exam. Cheating includes (but is not limited to) receiving any form of information during an exam (other than that provided by the instructor), or looking at the work of any other student. In addition to receiving a zero, any student caught cheating will be immediately reported to our Department chair and to the University Provost. This type of academic infraction can result in expulsion from MU! When in doubt about plagiarism, paraphrasing, quoting, or collaboration, consult the course instructor.

Text: *Plant Physiology (4th Ed)*, Taiz & Zeiger (2006). In addition to materials coming from the Taiz & Zeiger text, some figures and tables will come from additional sources that are not required. Such additional handouts will be posted on course website (access to these documents will require login and password information that will be given out in class or is available from instructors). Material not covered directly by the text has come from one of a number of sources, including: *Introduction to Plant Physiology (3rd Ed)*, Hopkins & Hüner (2004), *Biochemistry & Molecular Biology of Plants*, Buchannan, Gruissem & Jones (2000), as well as primary literature sources.

There is an on-line resource for the Taiz & Zeiger text that students may find helpful:
http://www.plantphys.net/

Class assignments: It is now clear that students retain more information as the result of hands-on learning, as opposed to simply taking notes in from lectures. Hence, periodically, we will make assignments for projects that are meant to be completed through independent work outside of class. Your performance on these assignments will be considered in the course grade.

Exams: There will be four exams (THERE IS NO FINAL EXAM). Alternate/Make-up exams will only be given to students providing proof of a valid conflict. (A work related conflict is NOT a valid excuse! An interview with a prospective post-graduation employer, graduate or medical school is valid.) Furthermore, Alternate/Make-up exams will be given PRIOR to the actual exam. Thus, if a conflict arises please inform the instructor at least two weeks in advance of the conflict. In cases of valid emergencies, alternate/make-up exams may be given after the actual exam. However, such cases are under the instructor's discretion.

ALL exams will be preceded by an in-class review session. Practice exam question (accessible from links within the course schedule at website) will be posted before review sessions.

Exams will consist of short and long answer questions. You will be tested on both facts discussed in class and conceptual ideas and applications of those concepts to hypothetical situations. There will be NO multiple-choice questions.

Exam questions will come entirely from lecture, nothing in the book that wasn't discussed in class will show up in an exam! As many questions will be conceptual in nature you may not have seen the specifics of some questions, however in such cases sufficient information will be given to allow you to answer appropriately by integrating material that WAS discussed in lectures. It is therefore CRITICAL that you attend class – simply reading the book will not cut it.

Grant Proposal (**for graduate credit ONLY**): As this course is cross-listed as an upper level undergraduate course and an introductory graduate level course, additional requirements exist for graduate credit. In addition to exams, students taking this course for graduate credit will be required to write ***and*** orally defend a grant proposal. The topic of the proposal can be on any topic in modern molecular plant biology. The instructors see this as a unique and valuable opportunity for graduate students to focus their own thesis/dissertation research and to prepare for comprehensive exams. Proposals must conform to current NSF guidelines for preparation of Project Description and References (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg), *except* that the Project Description section must be limited to 10 pages total.

The written portion of the proposal will be due no later than 5 pm, Mon 28 November 2011! No exceptions.

Written proposals will be evaluated by a panel of senior graduate students and postdoctoral fellows, and given a rank score based on a 0-4 scale, where 4 is the highest score (each point in ranking corresponds to 30 pts towards the final grade; thus the written portion of the proposal is worth 120 pts). Assigned rank scores will represent the mean score for each of three criteria from 3 independent reviewers. The three ranking criteria are: 1) intellectual merit; 2) clarity of the expressed ideas; and 3) feasibility of the proposed research. So, let's say you receive the following sets of scores from your three reviewers: reviewer #1 = 4, 2, 3 (for intellectual merit, clarity, feasibility); reviewer #2 = 2, 4, 2; and reviewer #3 = 4, 3, 4, your final rank score would be = 27 (total of scores)/9 (number of ranks)= 3.1. You would thus receive 93 pts out of 120 for the written portion of the proposal.

During finals week each student will be required to sit for a "grant panel" and orally defend his/her proposal. The panel for each student proposal will be composed of the same people who served as reviewers of the written proposal in order to provide continuity, plus both of the instructors. Students will be given back their proposal ranking, accompanied by written critiques from each reviewer addressing the three criteria, at least a week before their scheduled oral defense time (which will be determined in consultation with the instructors) in order to see where reviewers felt problems existed. This will give the student a chance to prepare for the defense portion. The overall purpose of the oral portion of the proposal process is to get feedback from the reviewers (remember if you do the proposal based on your thesis/dissertation research this is a chance to get extra critical feedback!) and to make up ground potentially lost in the written portion by 'convincing' panelists that you have given your proposal serious thought and reflection. The oral portion of the proposal process is worth a total of 30 pts; 6 pts being possible from each of the five panelists.

Grading: The grade received in this course for students registered in 4320 will be based on the combined score of the last exam and the two highest of the first three exams (thus total number of course points available is 300).

Grades for students taking the course for graduate credit (7320) will be determined from ALL four exams and the seminar report portion of the course (400 pts for exams + 150 pts for the grant proposal = 550 possible pts). Thus, the grant proposal portion of the graduate credit is not trivial (it's worth ~27% of the total grade!)

* This class will be graded straight up, no plus/minus.

Class Schedule. Although the text is NOT required, chapters/pages from the Taiz & Zeiger text associated with particular lectures are listed below. Often only parts of listed chapters will be discussed in class, and as such readings will only cover those topics. Reading prior to lecture will provide an introduction to the class discussion. Where multiple lectures are given on the same topic text will be cited with the first lecture only. Because some lectures are derived from other sources not all lectures will have an associated reading.

Aug 20	Course Introduction / Basic Principles of Plant Physiology / Plant Cells (Chapt 1 & 15) (Stacey)
22	Plant Cells (Stacey)
24	Genome Organization (Stacey)
27	Membrane Transport (Gassmann)
29	Membrane Transport (Gassmann)
31	Membrane Transport (Gassmann)
Sept 3	**Labor Day – NO CLASS**
5	Mineral Nutrition: Soil chemistry and nutrient availability, Chapter 5 & 12 (Mendoza))
7	Mineral Nutrition: Micronutrients (Mendoza)
10	Mineral Nutrition: Macronutrients (Mendoza)
12	Mineral Nutrition: Plant transporter families and their substrates (Mendoza)
14	Mineral Nutrition: Homeostasis of nutrients and detoxification of non-essential elements (Mendoza)
17	Mineral Nutrition: Long-distance transport of nutrients, Parts of Chapter 10 (Mendoza)
19	Mineral Nutrition: Transcriptional and post-transcriptional regulation of transport processes (Mendoza)
21	**Exam #1** (Stacey, Gassmann, Mendoza)
24	Genetics and Epigenetics (Stacey)
26	Genetics and Epigenetics (Stacey)
28	The Basics of Plant Signal Transduction and Systems Biology (Stacey)
Oct 1	The Basics of Plant Signal Transduction and Systems Biology (Stacey)
3	Basic Gene Regulation (Chapt 1 & 14 – online, also see transcription) (Stacey)
5	Basic Gene Regulation (Stacey)
8	Plant water relations (Chapters 3, 4) (Sharp)
10	Water stress and plant growth (some parts of Chapters 15, 26) (Sharp)
12	Abscisic acid (ABA) (Chapter 23) (Sharp)
15	**Exam #2** (Stacey, Sharp)
17	Hormone Biology: Auxin, part 1 synthesis and polar transport. Chapt 19 & Essay 19.2 online) (Mendoza)
19	Hormone Biology: Auxin, part 2 sensing and developmental effects. Chapt 19 & Essay 19.2 online) (Mendoza)
22	Hormone Biology, Gibberellins, physiological effects and crosstalk with auxin. Chapter 20 (Mendoza)
24	Hormone Biology, Brassinosteroids, effects on cell expansion and development. Chapter 24 (Mendoza)

26	Hormone Biology, Cytokinins, synthesis, sensing and developmental effects. Chapter 20 (Mendoza)
29	Hormone Biology, Ethylene and jasmonic acid, parts of Chapt. 22 and 14 (Mendoza)
31	Photosynthesis (Chapts 2 – online & 7) (Liscum)
Nov 2	Photosynthesis (Liscum)
5	Photosynthesis (Liscum)
7	Photosynthesis (Liscum)
9	Photosynthesis (Chapt. 8) (Liscum)
12	Photosynthesis (Liscum)
14	**Exam #3** (Mendoza, Liscum)
16	Photomorphogenesis (Chapt 17 & 18) (Liscum lab)
17-25	**Thanksgiving Recess**
26	Photomorphogenesis (Liscum lab)
	Graduate Student Grant Proposals DUE @ 5 pm
28	Surprise topc
30	Surprise topic
Dec 3	Review for Exam #4
5	**Exam #4**
7	**Reading Day – NO CLASS MEETING**
10-14	**Finals Week – Oral Defense of Grant Proposals (Graduate Students ONLY)**