

PBIO 424/524: Advanced Plant Physiology - Spring 2006
Call #s 04927 and 04932; 6 credit hours

Contact information:

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Office hours: by appointment

Course schedule:

Lecture: M,W,F 9:10-10:00 am, Porter Hall 304
Lab: M,W 10:10am-1:00 pm, Porter Hall 304

Text books:

Required: Taiz, L and Zeiger, E *Plant Physiology*, THIRD EDITION, Sinauer Associates, Inc., Publishers, 2002
Optional: Buchanan. *Biochemistry & Molecular Biology of Plant*, Wiley Publishers, 2002

Course objectives:

This course satisfies the 500/400-levels course requirements. It is designed to provide you with comprehensive exposure to the subject of plant physiology. You will learn the physical and biochemical aspects of plant physiology. Basic knowledge in plant physiology is assumed, as is recall from PBIO 210 course. The laboratory exercises will be investigative and literature-based since you will have to design your own experiments. As a study of recent advances in specific topics, this course will examine the current work of internationally recognized scientists through their works and available information on their lab webpage.

Grading policy

Your final grade will be based on **1000** points:

Test on lectures		Laboratory Component		Discussion Component	
Exam I	150	One lab Report	250	Presentation	150
Exam II	150	Lab work	100	Participation	50
Final exam	150				
Total	450	Total	350	Total	200

Each exam is composed of short answer questions and 1 or 2 essay questions. **THERE WILL BE NO MAKE-UP EXAMS!** If you have a written excuse for missing one exam, your course grade will be calculated on the basis of the other two exam scores. The point from each component will be added and a letter grade will be assigned, using the following scale:

	424 level students	524 level students
A, A-	+85%	+90%
B+, B, B-	84-72	89-80
C+, C, C-	71-58	79-70
D+, D, D-	57-45	69-60

Attendance policy

Lecture attendance is strongly encouraged, but discussion/presentation and lab attendance are mandatory.

Academic dishonesty

The penalty of cheating on an examination or plagiarizing will be failure of the course.

Course organization: The course has three components:

- 1- Lecture component:** It consists of 2 x 1h lectures (M, F, 9:10 – 10am) per week in which the physical, structural and biochemical aspects of plant physiology will be highlighted. The textbook will likely be supplemented with handouts. The contents of the lectures are grouped in three parts:

Part-I: Metabolism:

Photosynthesis: *Chapter 7, 8, and 10*

Respiration and lipid metabolism: *Chapter 11*

Mineral and nitrogen metabolism: *Chapter 12*

Secondary metabolites and plant defense: *Chapter 13*

Exam 1 (Tentative date: Wednesday 26, April)

Part-II: Growth and Development:

Cell walls: Structure, biogenesis, and expansion: *Chapter 15*

Plant growth (hormones and regulation): *Parts of chapters 16-23*

Exam 2 (Tentative date: Wednesday 17, May)

Part-III: Environmental Factors

Stress physiology: *Chapter 25*

Light signaling: *Parts of chapters 17 and 18*

Final exam (Wednesday 7, 10:10am in 304)

- 2- Laboratory component:** It consists of 2 x 3h meeting per week (M, W, 10:10am-1pm). The laboratory is designed to develop the student's ability to extract detailed information from the literature and design experimental protocols (with the appropriate controls and plant models) in order to verify their working hypotheses.

The students are encouraged to choose projects related to their interests. For example, you may choose an **organelle** (i.e., cell wall, chloroplast, mitochondria, nucleus, Golgi, ER...), a **cell component** (sugar/polymers, specific enzyme activity, secondary metabolite, hormone...), or a **developmental process** (structural seed development/germination, mutants development...), and design experimental protocols to verify a **working hypothesis**.

Students will work in pairs. During the first and second week, with the instructor's help the students will elaborate the experimental procedures that will be used to perform the experiments in the following weeks. These experiments will be carried out in room 304 (Porter Hall), or in the instructor's laboratory. If a student is already working in a lab, she/he can perform some experiments in her/his lab. At the end of the quarter, each student is expected to write a report that must follow the standard publication guidelines (i.e., introduction and goals, material and methods, and discussion). The laboratory report is due on the last day of the week 9; late papers will receive a 10% deduction per day late. Failure to hand in this report before Wednesday 7 of June will result in a failing grade for the course. The students may work as group on the same project but your report must, however, be done ON YOUR OWN. Plagiarism will not be tolerated and severe penalties will be invoked.

- 3- Discussion component:** It consists of 1h meeting per week (W, 9:10-10am). The goal of this exercise is to attract student's attention on recent advances in plant physiology, and to develop their capacity to present and explain these scientific advances. Each student will make a presentation and lead a discussion on specific topics. During our first meeting, a list of topics will be provided to the students and the assignment of the topics will be done in the same time. Your participation and extensive contribution are critical for success of the class setting. Examples of topics:

- Protein translocation in chloroplasts
- Protein translocation in mitochondria
- Plastidic metabolite transport
 - NDP-sugar conversion and transport
 - Chloroplast division
 - Phytoremediation
 - Insect-plant interaction
 - Vascular tissue formation
 - Aquaporin