

BIOLOGY 304- PLANT PHYSIOLOGY

SPRING 2016

COURSE OBJECTIVES- This is an introductory course in plant physiology. The objective is to get a feel for how plants function and to understand some of the ways physiology is influenced by biotic and abiotic components of the environment. Topics to be covered include plant anatomy and morphology, water relations, mineral nutrition, growth and development, metabolism, and stress physiology. By semesters end students should have sufficient knowledge to explore various areas of plant biology independently.

SPECIFIC LEARNING OUTCOMES-

1. Students will be able to identify the different cell types found in higher plants and will understand how those cell types are assembled into complex tissues.
2. Students will comprehend how vascular plants obtain water from the environment and they will demonstrate this understanding by measuring cellular and whole plant water potential in the laboratory.
3. Students will comprehend how plants acquire mineral nutrients from the soil and they will apply this understanding to predict plant growth patterns resulting from mineral nutrient deficiencies.
4. Students will demonstrate an understanding of cellular establishment and maintenance of plasma membrane potential and its role in facilitation nutrient uptake into roots.
5. Students will demonstrate understanding of how plants acquire nitrogen through their symbiosis with soil bacteria.
6. Students will demonstrate an understanding of plant defensive responses to insect herbivores and microbial pathogens and will demonstrate how cellular communication facilitates such responses.
7. Students will demonstrate the ability to formulate hypotheses, devise an experiment, analyzed data, and then present those data to others in a scientific manuscript.
8. Students will demonstrate an understanding of plant carbon assimilation at molecular, organelle, cellular, single leaf, and plant canopy levels of biological organization.
9. Students will demonstrate an understanding of plant secondary chemistry and the importance of secondary metabolites for ecology and medicine.

INSTRUCTOR-

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MEETING TIMES- Lecture is Tuesday and Thursdays from 9:55-11:10 AM in room 207 Harbor Walk West. Attendance at lecture is required; be advised that there is usually a negative linear relationship between final course grades and number of absences (i.e., the more absences you have, the lower your grade). Furthermore, there might be both announced and unannounced quizzes. If you miss class, you may miss one of these quizzes and/or an announcement concerning future assignments. Missed quizzes cannot be made up. Attendance and participation are also important in those rare cases where your final grade teeters between B and A, D and C etcetera.

Labs are Fridays from 2-6 PM and will be held at various locations including Harbor Walk East (room 302), the USDA Vegetable Laboratory, Dixie Plantation, or the CofC greenhouse behind the library. *Attendance at lab is mandatory.* There will be no opportunities to make up missed labs. *If you must miss lab, and if your absence is legitimate, and if you are able provide me with convincing documentation, you may be allowed to earn credit for that exercise by completing a research paper on a topic of my choice.* If something comes up and you must miss a lab, let me know as early as you can.

OFFICE HOURS- T/Th 3:30-5:00

PREREQUISITES- BIO111, 111L, 112, 112L and one year of chemistry.

REQUIRED TEXT- *Plant Physiology and Development*, 6th edition by Taiz et al. (2015). **You must buy and interact with the text to succeed in this class.** No books are required for the laboratory component.

GRADING-

LECTURE

EXAMS- There will be four exams spaced more or less evenly throughout the semester. They will carry equal weight (100 points each); the final exam will be comprehensive (and will be given during finals week) but will emphasize topics covered after exam III. Exams are typically in essay format.

MANUSCRIPT REVIEWS- There will be 5 manuscript reviews during the course of the semester. These will be worth 20 points each (total of 100 points)

SUMMARY: 4 exams: 4 x 100 = 400 points
 Manuscript reviews: 5 x 20 = 100 points
 Lecture total = 500 points (80% of course grade)

LABORATORY

LAB- I will provide a separate lab syllabus shortly that will outline the weekly schedule.

Participation/Lab Reports: 50 points
Project 1 paper: 100
Final project: 150 points
Lab total= 300 points (20% of course grade).

Final grades will be determined as the % of total points that you have earned throughout the semester as follows:

grades will be assigned as follows:

93-100	A	73-76	C
90-92	A-	70-72	C-
87-89	B+	67-69	D+
83-86	B	63-66	D
80-82	B-	60-62	D-
77-79	C+	0-59	F

Honor Code and Academic Integrity

Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code that, when identified, are investigated. Each instance is examined to determine the degree of deception involved.

Incidents where the professor believes the student's actions are clearly related more to ignorance, miscommunication, or uncertainty, can be addressed by consultation with the student. We will craft a written resolution designed to help prevent the student from repeating the error in the future. The resolution, submitted by form and signed by both the professor and the student, is forwarded to the Dean of Students and remains on file.

Cases of suspected academic dishonesty will be reported directly to the Dean of Students. A student found responsible for academic dishonesty will receive a XF in the course, indicating failure of the course due to academic dishonesty. This grade will appear on the student's transcript for two years after which the student may petition for the X to be expunged. The

student may also be placed on disciplinary probation, suspended (temporary removal) or expelled (permanent removal) from the College by the Honor Board.

It is important for students to remember that unauthorized collaboration--working together without permission-- is a form of cheating. Unless a professor specifies that students can work together on an assignment and/or test, no collaboration is permitted. Other forms of cheating include possessing or using an unauthorized study aid (such as a PDA), copying from another's exam, fabricating data, and giving unauthorized assistance.

Remember, research conducted and/or papers written for other classes cannot be used in whole or in part for any assignment in this class without obtaining prior permission from the professor.

Students can find a complete version of the Honor Code and all related processes in the Student Handbook at http://www.cofc.edu/studentaffairs/general_info/studenthandbook.html.

TENTATIVE LECTURE SCHEDULE*

Week/Day	Topic	Readings
Jan 7, 12	Introduction, plant cells	chp 1
Jan 14	Plant tissues	
Jan 19, 21	Growth and development	chp 21, 17, 19
Jan 26, 28	Cellular water relations	chp 3
Feb 2, 4	Water balance of plants	chp 4
Feb 9	EXAM I	
Feb 11, 16	Mineral nutrition	chp 5 (and 361-367)
Feb 18, 23	Solute transport	chp 6
Feb 25, March 1	Photosynthesis: Light reactions	chp 7
March 3	EXAM II	
March 15, 17	Photosynthesis: Carbon reactions	chp 8
March 22, 24	Photosynthesis: Ecophysiology	chp 9, 10
March 29, 31	Translocation in the phloem	chp 11
April 5	EXAM III	
April 7, 12	Biotic Interactions	chp 23
April 14, 19	Abiotic Stress	chp 24
May 8 (12-3 PM)	FINAL EXAM	

*This schedule is likely to change.

BIOLOGY 304- PLANT PHYSIOLOGY LABORATORY

SPRING 2016

LABORATORY OBJECTIVES- The laboratory component is intended to reinforce concepts covered in lecture. A research project will expose students to the scientific process from experimental design through experimentation, scientific writing, and publication.

LAB NOTEBOOKS- You will need a permanently bound notebook (no three ring binders) in which you keep records of all experimental work conducted in this class. You will be required to hand in your notebook at the end of lab for a grade. The lab notebook will be particularly useful as you go about completing the research projects.

LAB REPORTS- Most lab exercises will be completed in groups and data will often be pooled and shared. All lab write-ups, however, must be completed independently. **EVERYONE MUST TURN IN THEIR OWN** reports which they have written **BY THEMSELVES**.

TENTATIVE LABORATORY SCHEDULE – SPRING 2016

Week	Topic
Jan 15	LAB 1- Plant Anatomy and morphology
Jan 22	LAB 2- Cellular water relations and set-up for mineral nutrition lab (LAB 4)
Jan 29	LAB 3- xylem tension, transpiration, and stomata; begin grafting experiment (LAB 5)
Feb 5	Continue LAB 4 and LAB 5 measurements
Feb 12	Visit USDA-ARS Vegetable Laboratory/grafting lab
Feb 19	Meet at Dixie Plantation for orientation and to initiate projects
Feb 26	DIXIE RESEARCH PROJECT- Meet with research partner(s) to brainstorm and plan independent projects at Dixie. Acquire primary literature
March 4	DIXIE RESEARCH PROJECT- Set-up/plant experiments
March 18	DIXIE RESEARCH PROJECT- Measurements/Sample analysis
March 25	DIXIE RESEARCH PROJECT- Measurements/Sample analysis
April 1	DIXIE RESEARCH PROJECT- Measurements/Sample analysis
April 8	DIXIE RESEARCH PROJECT- Finish projects/data analysis
April 15	FINAL PRESENTATIONS and DIXIE PROJECT PAPERS DUE