

Plant Physiology and Development

Instructor

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Office hours: 4th Period Monday, Tuesday, and Friday

Course information

Textbook: Plant Physiology and Development, 6th edition, 2014, Sinauer by Lincoln Taiz *et al.*

Lectures: SMC A210, MWF 6th period

Lab: SMC B207, Thursday, 9:20-12:10

Course description

As an independent evolution of multicellularity, the structure and physiology of plants is fundamentally different from other complex organisms. In this course, we will learn about the physiological, structural, and developmental traits of plants, all with the aim of better understanding how plants solve problems.

Course objectives

By the end of the course, you will be able to:

1. Identify plant tissues and structures, and connect their form to function.
2. Discuss how plants regulate growth and structure.
3. Know the plant life cycle, and compare the life cycles of major groups of plants.
4. Understand the basic biochemical and metabolic processes of plants.
5. Discuss how specific physiological and structural adaptations allow plants to overcome environmental challenges.

Course policies

Honor code: As always, in this course you will be expected to uphold Knox College's Honor Code. This is true not only for exams, but for written assignments. If you have any questions about how to properly attribute ideas or cite sources, please check with me about it.

Course materials: All course materials will be available on Moodle. Unless otherwise discussed before the assignment is due, all materials should be turned in in hard-copy in class the day they are due.

Attendance: The participation grade will be partially based on attendance. Attendance will not be tracked for lectures, but the benefit of the lab activities is dependent on you being there to participate in them; if you expect to miss a lab, please contact me in advance if possible. For

excused absences for illness or sports, there will be opportunities to make up the participation points. If other extraordinary circumstances cause you to miss a lab, please contact me.

Late work: Work that is turned in late without permission will have a penalty of 5% on that assignment for each day that it is late. If there are extraordinary circumstances that prevent you from turning in work on time, please talk to me—as far in advance as possible.

Accommodations: If you have documented accommodations, I'll be happy to work with you to support those. Please talk to me about it as soon as possible so that I can make sure we have a plan in place.

Laptops and devices in class: Using laptops in class is allowed; however, there is a significant body of research that shows that most students don't learn as well when they take notes on laptops, and so I discourage you from doing so. I do not want to see phones out in class or lab unless there is a specific reason you need to be using it for class activities at that point.

Assignments

Grades for the course will be based on the following:

First exam	12%
Second exam	12%
Final exam	16%
Lab practical	5%
Problem sets	10%
Participation	10%
Lab writing assignments	15%
Adaptation paper	10%
Paper responses and discussions	10%

Exams: There will be two mid-term exams and a cumulative final exam. The lab practical will involve identification of structures on living specimens and prepared slides. Exam material will be derived from lectures and laboratory activities, not directly from the textbook.

Problem Sets: Six problem sets throughout the term will give you an opportunity to practice solving problems and getting feedback.

Participation: Participation grades will be based on engagement in lab and class. If you are focused on the work and complete in-class and in-lab assignments, you'll do well.

Written lab assignments: In order to practice describing and analyzing experiments and data, many lab activities will include a written report. Details on formats will be given each week. Each assignment will be due at the beginning of the lab section the following week.

Adaptation paper: The physiological processes that we will be studying allow plants to survive and thrive in diverse challenging environments. For this paper you will choose a plant

physiological adaptation that you find interesting and discuss how it mitigates a specific environmental challenge. The paper will be 4-6 pages, double-spaced.

Paper responses and discussions: Plant physiology is an active field of research with implications for basic science, crop development, and environmental studies. In order to better understand how our course content relates to this research, we will have four discussions throughout the term on articles related to topics we're discussing in class. You will read the paper carefully, write a short (1-2 pages, double-spaced) response, and come to class prepared to participate in a discussion.

Schedule (subject to change)

	Topic	Reading	Lab activity
Wed, Mar 21	Intro to plants	p. 1-8	Intro to plants
Fri, Mar 23	<i>No class</i>		
Mon, Mar 26	Plant cells	Ch 1	Photosynthesis
Wed, Mar 28	Photosynthesis	Ch 7	
Fri, Mar 30	Photosynthesis	Ch 8	
Mon, April 2	Water potential	Ch 3	Water potential and transpiration
Wed, April 4	Transpiration	Ch 4, PS1 due	
Fri, April 6	Stomata	Ch 10, PS2 due	
Mon, April 9	Arid conditions	Ch 9	Cam photosynthesis <u>Monda et al. 2011</u>
Wed, April 11	Midterm 1		
Fri, April 13	Mineral nutrition	Ch 5	
Mon, April 16	Transport in the phloem	Ch 11	Mineral nutrition
Wed, April 18	Germination	Ch 18, PS3 due	
Fri, April 20	Growth	Ch 14, 18	
Mon, April 23	Growth	Ch 19	Plant hormones <u>Yang et al. 2016</u>
Wed, April 25	Regulation of growth	Ch 15, 19	
Fri, April 27	Regulation of growth	Ch 19, PS4 due	
Mon, April 30	Circadian clock	Ch 16	Plant defenses <u>Wei et al. 2011</u>
Wed, May 2	Biotic interactions	Ch 23	
Fri, May 4	Midterm 2		
Mon, May 7	Life cycle of seedless plants		Life cycle of non-flowering plants
Wed, May 9	Life cycle of conifers		
Fri, May 11	<i>No class</i>		
Mon, May 14	Life cycle of Angiosperms	Ch 21, 17 PS5 due	Life cycle of Angiosperms
Wed, May 16	Fruit and seed development	Ch 21	
	Adaptation Paper Due		
Fri, May 18	Seasonal cues	Ch 20, 22	
Mon, May 21	Floral development	Ch 20, PS6 due	<u>Burghardt et al. 2016</u>
Wed May 23	Biotic interactions	Ch 23	Lab Practical
TBA	Final exam		