



BZ 440-801: PLANT PHYSIOLOGY

Fall 2023

Canvas Page: <https://colostate.instructure.com/courses/170386>

Zoom link for course-related sessions: (<https://zoom.us/j/7197091189>)

INSTRUCTOR

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LECTURES

Delivered online asynchronously via Canvas (<https://canvas.colostate.edu/>). Lectures will be recorded via Ech360 personal capture and links will be posted under modules. Each module will have the presentation file and links for the recorded lectures.

Each lecture will be about 40-50 minutes and you will have three lectures each week. I will plan lectures to be on Monday, Wednesday, and Friday, even the course is asynchronous.

Presentation files will be posted one week ahead of time while recordings will be posted the day before the proposed lecture day.

OPPORTUNITIES FOR SYNCHRONOUS INTERACTIONS

I recognize the importance of interactions in the learning process. Therefore, I strongly encourage students to participate in the following opportunities to discuss course content and ask questions while chatting over Zoom.

- Office hours: will be via zoom.
 - Wednesday, 4-5 pm Mountain time
 - Friday, 4-5 pm Mountain time
- Review Sessions: when there is exam, I will hold an online review session to address questions and work through relevant exam preparation materials. I will schedule these review sessions and send announcement the week before the exam.
- Special appointment: To make an appointment outside of these times, send me an e-mail with few options for when you can meet on Zoom.

TEXTBOOK

"Fundamentals of Plant Physiology" by Lincoln Taiz et al, Oxford Press. (2018), Student Edition. The same (and more) information can be found in the more comprehensive textbook "Plant Physiology and Development" by the same authors. Either book could be used for the course. Additional reviews and/or research articles will be posted and announced on Canvas on time.

COURSE DESCRIPTION

BZ440 is an upper-level botany class focusing on plant physiology (functions, activities, and mechanisms of biological processes at the cellular, organellar and whole plant levels). The objectives are for students to develop integrative comprehension of how plants function (e.g., acquire and transport water and nutrients from soil and inside, how plants photosynthesize, respire, transpire, distribute assimilates from sources to sinks, respond to abiotic and biotic stresses in their environment and how are environmental signals and plant hormones affect plant growth, development, and crop production). Also, students will learn how plant physiology is studied at the molecular level (Plant Biotechnology). The main target groups are upper division undergraduate students with backgrounds/career interests in Biology, Horticulture, Soil and Crop Science, Forestry, Rangeland Ecology, and related areas.

SPOECIFIC LEARNING OBJECTIVES

After taking this course, students should be able to demonstrate understanding of

- the organization of plants from the level of cells through tissues, tissue systems, and organs.
- the plant water potential, its components, and its effect on cellular function.
- the physiological mechanisms involved in the uptake and transport of water and prepared food by plants.
- the mechanisms of the establishment of membrane potential and its role in solute transport.
- the mechanisms for procurement of mineral ions by plants, mineral nutrition, and the role these minerals play in organic molecule synthesis and use.
- the nutrients deficiency and toxicity symptoms.
- the interrelationships among plants and micro-organisms symbiosis in nitrogen fixation, and assimilation of minerals ions by plants particularly nitrogen.
- the relationship of complementary metabolic pathways such as photosynthesis and respiration in energy acquisition and use during plant development.

- the environmental influences (drought, light intensity, and global warming) upon carbon metabolism in plants (e.g., with respect to alternative fixation pathways, photoinhibition, and photorespiration) and plant responses.
- the plant natural products with respect to their role in plant defense mechanisms.
- the major effects and physiological mechanisms of growth regulators (hormones) in plant growth, development, and crop production.
- the transformation and propagation of plants in tissue culture (Agricultural Biotechnology).

ASSESSMENT

I will use the following tools to assess if you achieve the course learning objectives:

1. Midterms and Final Exam (450 points)

There will be THREE non-comprehensive midterms (100 point each) and a comprehensive final exam (150 points). All exams will be delivered online via Canvas. Midterms will be on Mondays (see dates below). They are scheduled to be accessible for 24 hours BUT you should submit within the assigned exam time once you start. The final exam will be comprehensive on Thursday, December 14, 2023. Final exam worth 150 pts, with 100 pts specifically cover material discussed after midterm 3 and the remaining 50 pts spread evenly over the entire course.

Quiz/exam	Date	Covered Material	Points
Midterm 1	September 18	Weeks 1 → 4	100
Midterm 2	October 16	Weeks 5 → 8	100
Midterm 3	November 13	Weeks 9 → 12	100
Final	December 14	Weeks 1 → 16	150

- Students are required to use the [Respondus Lockdown Browser](#) during all exams. You can access and download the Lockdown Browser on the lecture Canvas page. I will send a mock exam for testing the setting before the actual exam.
- Exams must be taken on the scheduled date.
- Makeup exams will only be given to students with a university-approved proof of excuse.
- If you belong to any university sponsored group, you must inform me of known conflicts with exams at least one week before the exam day. In addition, I encourage you to follow up with a reminder email one day before the exam day.

2. Weekly assignments (90 points)

One weekly assignment (10 pts) will be assigned each week (except weeks when there will be exams or discussions). Assignment will be posted on Canvas no later than the Sunday night preceding the week and will be due on Canvas by Sunday 11:59 pm following week (i.e., seven days later). There will be a total of 10 weekly assignments, and students may drop the lowest score. The reason for dropping the lowest score is to accommodate for unforeseen events, including those that prevent a one-time submission. Therefore, late submissions might not be accepted and will have to count towards the one drop.

1. Assignment 1: Sunday, 8/27
2. Assignment 2: Sunday, 9/3
3. Assignment 3: Sunday, 9/10
4. Assignment 4: Sunday, 9/17
5. Assignment 5: Sunday, 10/8
6. Assignment 6: Sunday, 10/15
7. Assignment 7: Sunday 10/29
8. Assignment 8: Sunday, 11/12
9. Assignment 9: Sunday, 12/03
10. Assignment 10: Sunday, 12/10

3. Discussion:

Two discussions (30 points each) will be assigned. A relevant article will be posted on Canvas, and you will be asked to read it and respond as explained in the rubric. Grading will be based on your reading and response to your classmates.

Discussion 1: Sunday, 10/01
 Discussion 2: Sunday, 11/05

GRADING SCALE

Grades will be calculated according to the following breakdown:

Midterms	300
Final Exam	150
Weekly assignments	90
Discussions	60

Total	= 600 points

The grades of individual assignment, discussions and exams will not be curved. At end, the individual student's fractional grades will be rounded to the nearest whole number (e.g., 69.6 = 70 and 69.4 = 69). Then letter grades will be assigned on the following scale:

>95	A+	76 - 80	B	56 - 60	D
91 - 95	A	71 - 75	B-	< 55	F
85 - 90	A-	66 - 70	C+		
81 - 84	B+	61 - 65	C		

If the class average is less than 76% (B), final grades will be curved to bring the class average to 76%.

REGRADING OF EXAMS AND ASSIGNMENTS

If students have concerns about grading, they must present their request for regrading within one week of when it was returned. I am happy to discuss how an exam, assignment or discussion is graded at any point, but formal regrade requests will only be accepted within the one-week time window. For any regrade requests, the entire assignment (not just individual questions) will be regraded. Therefore, it is possible to lose points on a regrade if I find that a credit was mistakenly given for incorrect answers.

ACADEMIC INTEGRITY

This course will adhere to the CSU Academic Integrity Policy as found on the student responsibilities page of the CSU General catalog. <http://catalog.colostate.edu/general-catalog/policies/students-responsibilities/#academic-integrity>.

While you will not be required to affirm the honor pledge, you will be asked to affirm the following statement at the start of your exams: "I have not given, received, or used any unauthorized assistance." Violations will result in a grading penalty and a report to the Office of Student Conduct Services.

STUDENTS WITH SPECIAL NEED

Students requesting exams accommodations should contact the student disability center located in room 121 TILT building. The phone number is (970)491-6385. They will approve the request and communicate with me.

TENTATIVE LECTURE SCHEDULE AND TOPICS

Week	Start Date	Modules	Chapter (*)	Exams/assignments
1	21-Aug	Organization of plants and plant cells, Genome organization, protein production and regulation	1 (1) 1 (2)	Assignment 1, Sunday 08/27
2	28-Aug	Water movement across membranes: Osmosis and water potential	2 (3)	Assignment 2, Sunday 09/03
3	04-Sep	Whole-plant water relations	3 (4)	Assignment 3, Sunday 09/10
4	11-Sep	Mineral nutrition	4 (5)	Assignment 4, Sunday 09/17
5	18-Sep	Solute transport	6 (6)	Midterm 1, Monday, 09/18
6	25-Sep	Photosynthesis I: the light reactions	7 (7)	Discussion 1, Sunday 10/01
7	02-Oct	Photosynthesis II: carbon fixation	8 (8)	Assignment 5, Sunday 10/08
8	9-Oct	Ecophysiology	9 (9, 10)	Assignment 6, Sunday 10/15
9	16-Oct	Translocation of assimilates	10 (11)	Midterm 2, Monday, October 16
10	23-Oct	Respiration	11 (12)	Assignment 7, Sunday 10/29
11	30-Oct	Other important metabolic pathways.	5 (13)	Discussion 2, Sunday, 11/5
12	06-Nov	Plant hormones and their functions & applications	12 (15)	Assignment 8, Sunday 11/12
13	13-Nov		12 (15)	Midterm 3, Monday, November 13
0	20-Nov	Thanksgiving Break		
		No class		
14	27-Nov	Plant responses to light, gravity, touch, temperature	13 (16,18.20)	Assignment 9, Sunday 12/03
15	04-Dec	Plant stress physiology and biotechnology	18, 19 (23,24)	Assignment 10, Sunday 12/10
16	11-Dec	Final week	Review	Final exam, Wednesday 12/13

(*) chapter number in the alternative textbook Plant Physiology and Development.