BZ 441: Plant Physiology Laboratory and Recitation
CRN: 10846-L01 (Laboratory)
CRN: 10847-R01(Recitation)
Spring 2023
Canvas Page: https://colostate.instructure.com/courses/156882

Instructor

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Please **do not** use CANVAS to message me. Use my direct email (supplied above) with "BZ 441-SP23" in the subject line.

Meeting Time

We meet once a week from **2 – 4:50 pm** on **Wednesdays in BIO 128.** In addition to the 3 contact hours, students will do at least one hour of homework each week (writing, reading, and online searches). The laboratory, recitation components, and even the order of the experiments do not always follow a fixed schedule but will be mixed up as needed for optimal use of time and according to the flow of the experiments.

Office Hours:

Tuesday 2-3 pm or by appointment, BIO 408

Course Objectives

BZ441 is an upper-level botany lab course focusing on plant physiology. BZ441 is complementary to the BZ440 lecture course that I teach too. Everyone is welcome to attend the lecture. I teach on MWF from 10-10:50 in BIO136. BZ440 and BZ441 target groups are junior/senior students majoring in biology/botany, horticulture, soil and crop science, forestry, rangeland ecology, and related areas. Graduate students are also welcome.

BZ441 students will:
1. Gain experience in approaches and techniques commonly used in plant physiology.
2. Design and implement experiments to answer questions about plant physiology
3. Apply knowledge of plant physiology by leading and participating in discussions
4. Exercise scientific thinking through online research, analytical reading, experimental design, data analysis, and science communication.

Student objectives will be met by both the lab and recitation portion of this course. The lab portion involves hands-on experiments, some designed by the instructor, and some by students. The recitation portion will integrate and apply the students' knowledge, via discussions and exercises. Students will be trained not only in hands-on skills but also to apply their knowledge to problem-solving and to link their area of study to broader areas of intellectual endeavor and to society.

Text and Website

There is no text for this course, but the students will need to print out **each** lab which makes up the manual for the class (lab journal/notebook). A lab/recitation manual is available on the BZ441 Canvas site (login with your CSU eID and password).

Lab journal/Notebook

A 1" binder with some loose-leaf paper and your printed-out lab manual, works best for a lab journal. Students will maintain a lab journal for each lab's work and there will be journal checks during the semester for lab completion including the post-lab write-ups. Lab journal will be graded twice and could be checked anytime. Please make your lab journal up to date all the time.

Quizzes

There will be **8** quizzes, five points each. Students are expected to read each lab's manual **before** coming to class. There will be an online quiz most weeks over the previous lab results and the next lab's instructions**.** This will verify that the student is prepared for the current week's lab.

Exams

Students will have **4** exams. Exams will be taken on Canvas. Exams will be short answers and will be timed. They will be worth 15 pts each and you will have 20 minutes to complete the exam. You will have a week to take the exam, but once opened, it will close in 20 minutes.

Recitations

There are 5 recitations, some have multiple parts. These are written assignments in addition to the labs. Recitations will be completed and submitted. The recitations will be discussed in the next class after they are due.

Lab Work

Students are expected to do work before the lab, during the lab, and after the lab:

Before lab:

- Print out and read through the lab manual (found under the Modules tab on Canvas).
- Insert the printout in your lab journal in the right place and mark it in the appendix
- Take the lab quiz (found under the assignments tab on Canvas). Quizzes are just a few questions and will cover the previous lab results and this week's lab instructions.

During lab:

- Complete the lab in class, recording everything in the lab journal. Make sure to write the date of the experiment, objectives, and any modifications in the protocol.
- Answer all questions, most are **bolded.**
- Ask any question related to the experiment. Here is the best time to ask, do mistakes and learn from mistakes.
- Please be on time for each week's class. We will start the labs immediately, as you have already read through the lab instructions.

After lab:

- Analyze any lab data and add the appropriate graphs or tables to your lab journal.
- Complete the post-lab write-up in the journal.

Remember, in research never depend on your memory. Record everything. The negative result is a result too. We will discuss it too.

Grading

Lab portion grade	
8 weekly quizzes (5 points each)	40 pts
4 Exams (15 pts each)	60pts
Student Project	100 pts
Student Proposal	100 pts
Lab notebook/journal (will be checked twice at least)	50 pts
Lab participation, activities, and responsibilities	50 pts
Recitation portion grade	
Recitation assignments (10 assignments x 25)	250 pts
Recitation participation	50 pts
Total	**= 700 pts**

In the 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 grades will be calculated according to the following scale:

<95	A+
90-95	A
85-89	A-
80-84	B+
75-79	B
70-74	B-
65-69	C+

60-64	C
55- 59	D
>55	F

If the class average is less than 75% (B), final grades will be curved to bring the class average to 75%.

Late Work Policy

- All work is due to Canvas on Tuesday nights at 11:59 pm each week. (See the schedule).
- For the lab portion, any work turned in after the assigned due date will have a 10% penalty each day that it is late.
- The labs cannot be made up because they will be taken down after the end of class each week.
- For the recitation portion, all late recitation work will have a 10% penalty each day that it is late.
- If you miss a lab, you are still responsible for uploading your homework to Canvas by the day that it is due.

Regrading of Quizzes and Assignments

If students have concerns about grading, they must present the quiz/assignment for regarding within one week of when it was returned. We are happy to discuss how a quiz or assignment was 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 we find that credit was mistakenly given for incorrect answers.

Academic Integrity

Although you will work in groups during lab, **ALL lab and recitation assignments are individual work**, unless explicitly stated otherwise. Any academic dishonesty will not be tolerated and if caught will result in a zero for the assignment and will be reported to the Office of Conflict Resolution and Student Conduct Services. 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

Students with Special Needs

Students requesting exams or classroom accommodations should contact the student disability center located in room 121 TILT building (https://disabilitycenter.colostate.edu). The phone number is (970) 491-6385. They will approve the request and communicate with us.

Semester Schedule

Week 1	Introduction to lab and recitation
1/18/2023	Time scheduling
	Recitation 1A: Scientific Paper Components due by next Tuesday at 11:59 pm
	Quiz 1: over the syllabus and due by next Tuesday at 11:59 pm
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Week 2	Protein lab (Part 1)
1/25/2022	(Extraction, quantification, and samples preparation for SDS PAGE
	Recitation 1B: Scientific Paper Order due by next Tuesday at 11:59 pm
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Week 3	Protein lab (Part 2): SDS PAGE, continue
2/1/2022	Mineral Nutrition (Part 1): Hydroponics set up (lab project starts)
	Recitation 1C: Finding Scientific Papers due by next Tuesday at 11:59 pm
	Quiz 2: Due before class this Tuesday at 11:59 pm
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Week 4	Plant Water Relations
2/8/2022	Part 1: Water Potential
	Part 2: Plant Water Relations: Guttation and Xylem tension
	Student proposal project assignment
	Quiz 3: Due before class this Tuesday at 11:59 pm
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Week 5	Mineral Nutrition (Part 2): Data Collection
2/15/2022	**Lab**: Data collection
	Recitation 1D: Scientific Paper Data Analysis due by next Tuesday at 11:59 pm
	Exam 1
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Week 6	Mineral Nutrition (Part 3):
2/22/2022	Sample preparation for ICP
	Recitation 2: Popular Science Writing due by next Tuesday at 11:59 pm
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Week 7	Plant Biotechnology (Part I)
3/1/2022	Tobacco transformation using agrobacterium (tissue culture)
	Visiting Soil and Plant Testing Laboratory
	Quiz 4: Due before class this Tuesday at 11:59 pm
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Week 8	Plants Biotechnology (Part 2)
3/8/2023	Tobacco transformation using particle bombardment/gene gun
	Quiz 5: Due before class this Tuesday at 11:59 pm
	Notebook/Lab journal check #1
	Recitation 3
3/15/2023	**Spring Break** **No classes**
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Week 9	Plant Biotechnology (Part 3)
3/22/2023	Arabidopsis transformation using agrobacterium (flower dipping)
	Exam 2
	Proposal Abstract due
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Week 10	Measuring Photosynthesis
3/29/2023	**Lab:** Gas exchange
	LAB REPORT DUE
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Week 11	Measuring Respiration
4/5/2023	**Lab:** Gas exchange
	Recitation 4
	Quiz 6: (due before class this Tuesday at 11:59 pm)
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Week 12 4/12/2023	Plant Response to the Environment **Lab:** Plant Hormone Responses **Recitation 5A** **Exam 3**
Week 13 4/19/2023	Plants and Society (Part 2) **Recitation 5B** **proposal slides** **Quiz 7:** Due before class this Tuesday at 11:59 pm
Week 14 4/26/2023	Plant Response to Environment and Plant Biotechnology (Part II) **Lab:** Tropisms; Select your GMO ***STUDENT PROPOSAL PRESENTATION*** **Quiz 8:** Due before class this Tuesday at 11:59 pm **Recitation 5C**
Week 15 5/3/2023	Plant Biotechnology (Part III) **Lab:** Gus staining **Notebook/Lab journal check #2** **Exam 4**
Final week: 5/10/2023	There is no final exam.