IB 420 (CPSC 484) - PLANT PHYSIOLOGY - SPRING 2025 - 3 CREDIT HOURS

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Meetings: Class time is scheduled on Tuesdays and Thursdays from 9:30 to 10:50.

COURSE DESCRIPTION AND OBJECTIVES

This course is designed to guide you toward an understanding and appreciation of plant physiology. Physiology refers to the physical, mechanical, and biochemical functions of living organisms. It is a sub-discipline of biology that investigates the way organisms work from the molecular and cellular to the organ to the whole-organism levels. The focus of this course is on vascular land plants, although references to other autotrophic organisms may be made to understand underlying principles. As much as possible the concepts will be presented in the context of how plants interact with their environment.

COURSE POLICIES, EXPECTATIONS, AND REQUIREMENTS

Prerequisites:

IB 103 or IB 150 and MCB 150; CHEM 232; IB 202 recommended; or consent of instructor.

Student Commitment:

IB 420/CPSC 484 is a 16-week, 3-credit hour course. The student is expected to devote at least 3 hours per week learning the topics of the course through lectures and activities, and at least 2-4 additional hours per week on reading, quizzes, and working on presentations. The instructors will be available for consultation by appointment.

Required Text:

Lincoln, T., Eduardo, Z., Ian, M.M. and Angus, M. (2014). *Plant Physiology and Development, 6th Edition*. Sinauer Associates, Sunderland, MA Available from the university bookstore or other online booksellers. You will need either the physical book *or* e-book, but not both.

Evaluation and Feedback:

Constructive feedback during the course is essential for effective learning. If at any time you are concerned about your performance in the class, please contact the instructors. Evaluation will be based on the criteria shown on the next page:

Grading:	Quizzes	100 pts	20 %
	In-class Activities	100 pts	20 %
	Lightning Presentation	50 pts	10 %
	Presentation	100 pts	20 %
	Midterm Exam	75 pts	15 %
	Final exam	<u>75 pts</u>	<u>15 %</u>
	Total	500 pts	100 %

Your final grade will be assigned based on the following grading scale:

94-100 %	А	83-86.9 %	В	70-76.9 %	С
90-93.9 %	A-	80-82.9 %	B-	60-69.9 %	D
87-89.9 %	B+	77-79.9 %	C+	Below 60 %	F

A few notes about...

... online etiquette

Some components of this course will take place using the course Web site on Canvas (canvas.illinois.edu) and, if necessary, on Zoom. It is expected that you will treat everyone just as you would in a physical classroom. In addition, you should ensure that nothing that could be perceived as offensive is visible if you turn on your video (which can happen by mistake), that your microphone is muted unless you are speaking, and that background noise is kept to a minimum. Violations will result in appropriate disciplinary action.

...attendance

Attendance is expected at each class. If you must miss class for a scheduled event, please notify one of us as early as possible before class. Failure to do so will result in a failing grade (0%) for any activity which cannot be made up.

... participation

Participation in class discussions and activities is essential. This does *not* mean that you will be graded based on the number of times you speak. Rather, successful discussions result when participants are <u>prepared</u> and <u>engaged</u>. Remember to listen to your classmates, ask questions, think about what you want to say before you speak, yield the spotlight to others, and be respectful.

...late work

Late work will not be accepted except under extreme circumstances. If an assignment is due at the beginning of class and you are late for class, your assignment will be considered late.

... group work and academic integrity

Science is a collaborative endeavor. Each of you brings a unique set of interests and experiences to this course. We can all learn from each other and I encourage you to discuss the readings with your classmates and seek their feedback.

According to the Student Code, "It is the responsibility of each student to refrain from infractions of academic integrity, from conduct that may lead to suspicion of such infractions, and from conduct that aids others in such infractions." Please know that it is my responsibility as an instructor to uphold the academic integrity policy of the University, which can be found here: <u>https://studentcode.illinois.edu/article1/part4/1-401/</u>

...accommodations

Disability Accommodations: To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES you may visit 1207 S. Oak St., Champaign, call 333-4603 (V/TTY), or e-mail a message to disability@illinois.edu.

Student Learning Outcomes:

At the end of this semester, students will be able to do the following:

- Understand physiology functioning of plant responses to their environment, including variable environmental conditions, water transport, and solute uptake and partitioning.
- Critically understand the basic metabolic pathways involved in primary plant function, including, but not limited to, photosynthesis, photorespiration, respiration, sugar/starch/lipid synthesis and breakdown.
- Understand the determinants and mechanisms of plant growth, development and movements.
- Demonstrate competencies in understanding plant physiological response to and interactions with biotic and abiotic stresses.

Class Format:

The format of class will include the following:

Announcements and questions on lecture material (about 10 minutes) *This is time allocated to announcements of upcoming class activities, follow-up questions from previous lectures, and clarification of information previously presented. Questions can also be posted to the discussion board for that week.*

Quiz on lecture and reading (about 10 to 15 minutes, once a week)

These will be short quizzes on the lecture and reading material from the previous week. The primary goal is to ensure that students have done the work for that week.

Lecture (about 40-50 minutes)

In-class activities^{*} (about 30 minutes)

This time will be dedicated to students working together or individually to answer questions or work on activities related to the lecture material. The activities may include, but are not limited to, hands-on activities, worksheets, data and figure analysis, and discussion of literature. *Note that multiple in-class activities may be nested within the lecture.

Student presentations

Students will be randomly assigned a partner and together prepare a 2 minute "lightning presentation" in week 7 and a longer 10 minute presentation at the end of the semester on a selected paper. The group will select a topic from a list and can either choose a suggested paper or pick their own. Additional details will be available in class and on the course website.

All materials and lecture slides will be available on the class Web site at https://canvas.illinois.edu

Course meeting schedule

Date	Chapter (6 th edition) / Topic		
21 Jan	Course introduction		
23 Jan	Ch. 1: Plant and Cell Architecture		
28 Jan	Ch. 2: Genome Structure and Gene Expression		
30 Jan	Ch. 15: Signals and Signal Transduction		
4 Feb	Ch. 3: Water and Plant Cells		
6 Feb	Ch. 4: Water Balance of Plants		
11 Feb	Ch 10: Stomatal Biology		
13 Feb	Ch. 6: Solute Transport		
18 Feb	Ch 7: Photosynthesis: The Light Reactions		
20 Feb	Ch 7: Photosynthesis: The Light Reactions		
25 Feb	Ch. 8: Photosynthesis: The Carbon Reactions		
27 Feb	Ch. 8: Photosynthesis: The Carbon Reactions		
4 Mar	Ch. 9: Photosynthesis: Physiological and Ecological Considerations		
o Mar	Lightning Presentations		
11 Mar	Midterm Exam Review		
13 Mar	Midterm Exam		
18 Mar	Spring Break		
20 Mar	Spring Break		
25 Mar	Ch. 11: Translocation in the Phloem		
27 Mar	Ch. 11: Translocation in the Phloem		
1 Apr	Ch. 5: Mineral Nutrition		
3 Apr	Ch. 12: Respiration and Lipid Metabolism		
8 Apr	Ch. 12: Respiration and Lipid Metabolism		
10 Apr	Ch. 13: Assimilation of Inorganic Nutrients		
15 Apr	Ch. 14: Cell Walls: Structure, Formation, and Expansion		
17 Apr	Ch. 16: Signals from Sunlight		
22 Apr	Ch. 23: Biotic Interactions		
24 Apr	Ch 24: Abiotic Stress		
29 Apr	Group Presentations		
1 May	Group Presentations		
6 May	Final exam review		
9-15 May	Final exam		