

Instructor:

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Office hours: Wednesday,
9-11:30 am or by appointment.

**BOT 3503L. Plant Physiology and Molecular
Biology Laboratory****Spring, 2023****Laboratory:** R periods 7-9 (1:55 PM - 4:55 PM). Car 109

Why the practical component is important in plant physiology? A “hands-on” approach, along with demonstrations, is used to illustrate some of the principles and phenomena, which are covered in Physiology and Molecular Biology of Plants (BOT 3503). The main objective is to provide plant science students with practical experience in plant physiological and biochemical processes while studying their relationship with plant structure and anatomy, and their responses to biotic and abiotic environmental factors.

Course content:

During this course, you will have practical experience in three units which are covered in BOT 3503. The combination of the lecture and the “hands-on” learning will provide you with the necessary tools to make predictions on plant responses to their environment, at the end of the course.

Unit 1. Plant water balance and mineral nutrition

- Lab. 2. Pressure-volume curve
- Lab 3. Water potential and cell collapse in leaves
- Lab. 4. Pigment analysis

Unit 2. Photosynthesis

- Lab. 5. C3 and C4 photosynthesis
- Lab 6. Transpiration and stomata conductance
- Lab. 7. PS proteins

Unit 3. Whole plant growth and development

- Lab. 8. Auxin signaling
- Lab. 9. Tropism
- Lab. 10. Seed germination

Additionally, the “fast-plants” experiment and mineral nutrition projects will be carried out throughout the semester. A final report and oral presentation for the experiment will be presented in the research symposium at the end of the semester.

Texts:

To allow a better understanding of the results that you find during your laboratory, I highly recommend following *Plant Physiology and Development (6th Edition)* by Taiz et al., 2014. Their diagrams and explanations will be used during a short lecture at the beginning of every class.

Course evaluation:

The total points for the course are 500, and the grade is determined from:

10 lab quizzes @ 5 points each	=	50 points (~ 10%)
10 lab reports @ 20 points each	=	200 points (~40%)
12 performance evaluation @ 5 points each	=	60 points (~12%)
“Fast-plants” experiment	=	90 points (~18%)
- Research proposal (14 pts)		
- Final report (46 pts)		
- Oral presentation (30 pts)		
Final exam	=	100 points (~20%)
Total course points	=	500 points

Grading Scale: 90 - 100% = A 80 - <90% = B 70 - <90% = C 60 - <70% = D Below 60% = E

Each lab exercise has data analysis questions that need to be turned in one week after the data was collected. A penalty of 20% per day will be assessed on all assignments that are late. **Turn your work in on time.**

Students are expected to attend each lab. Students generally work in groups, **but the write-ups must be an individual’s own original work.**

It is important to study and be familiar with each week’s experiments **before** entering the laboratory. To provide an incentive to study the experiments ahead of time, you will be expected to complete a **short online quiz** based on the experiments before the lab begins (5 points each).

The lab instructor’s evaluation of your **weekly performance** affects your grade (see item 3)—this is determined by attendance, the performance of the experiments, and tidying up at the end of each lab. It is important that the collected data be shared before departing the lab. **Each group is responsible for sharing its data in every class.**

Course attendance and make-up policy

Attendance will be required for success in this course, as the lab quizzes and performance evaluations will be made during the class period. Three unexcused absences will result in a failing grade. If you have a documented excuse, please notify me in advance to determine how to make-up the assignments.

Curves and time commitment

There will be NO curve applied to grades. If you have questions regarding your grades, please contact the instructor. Even though the lab will usually finish early, sometimes additional time will be required later in the week to complete data collection.

One research project (“fast-plants” experiment) **will be carried out throughout the semester**, and the final reports represent ~18% of your final grade. You will be **working in groups of four**, so please organize your time appropriately to keep the plants alive and take measurements.

You will need to add a table at the end of your report, with the date, time, and name of the student in charge of taking care of the plants and taking measurements every week.

The “Fast-plants” experiment will enable students to become scientists, leading in research design, setup, execution, analysis, and presentation of new results. This setup begins in early February and continues until the end of the semester. Each group will grow *Brassica rapa* (“fast plant”) seedlings and divide them into two treatments, to test the effect of one abiotic factor, using a control and a treatment group (light, nutrients, salt, competition). Integration of anatomical characterizations of your plants is encouraged, but not a requirement. The results, at the end of the semester, will be presented in groups as a written paper and an oral presentation. As the deadline for the report approaches, you will be provided with additional information concerning the necessary format.

Students need to have available: a calculator with *log* function; a marker for writing on the glass; a pair of safety goggles or eyeglasses with safety lenses. Reminder: smoking, eating, and drinking are prohibited in the laboratory. To generate lab reports, it is essential that you have access to a computer with Microsoft word, and data analysis and graphing software.

Laboratory safety regulations: every student will be required to use closed-toed shoes for every class. In some cases, safety goggles, and lab coats will be required, but this will be notified in the laboratory guidelines for every week.

Academic Honesty

All students registered at the University of Florida have agreed to comply with the following statement:

“I understand that the University of Florida expects its students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University.”

In addition, on all work submitted for credit the following pledge is either required or implied:

“On my honor, I have neither given nor received unauthorized aid in doing this assignment.”

If you witness any instances of academic dishonesty in this class, please notify the instructor or contact the Student Honor Court (392-1631) or Cheating Hotline (392-6999).

Accommodations for students with disabilities

Students who will require a classroom accommodation for a disability must contact the Dean of Students Office of Disability Resources, in Peabody 202 (phone: 352-392-1261). Please see the University of Florida Disability Resources website for more information at:

<http://www.dso.ufl.edu/drc/>. Note that the student should provide documentation of a requirement for accommodation by the second week of classes. No accommodations are available to students who lack this documentation. It is the policy of the University of Florida that the student, not the instructor, is responsible for arranging accommodations when needed.

Tentative course schedule – Subject to change

Date	Lab topic	Evaluation	Additional activities (DURING class time)	Additional activities (OUTSIDE class time)
19 – Jan	Lab 1. Statistics	Quiz Pre-Lab 1 (5pts)		Measure dry weight (20-Jan)
26 – Jan	Lab 2. Pressure-Volume curve	Quiz Pre-Lab 2 (5pts) Report Lab 1. (20 pts)		
2 – Feb	Lab 3. Water potential and cell collapse in leaves	Quiz Pre-Lab 3 (5 pts) Report Lab 2. (20 pts)		
9 – Feb	Lab 4. Pigment analysis	Quiz Pre-Lab 4 (5 pts) Report Lab 3. (20 pts)	“Fast-plant” experiment discussion	
16 – Feb	“Fast-plant” experiment setup	Report Lab 4. (20 pts) Research proposal “fast-plant” experiment (14 pts)		
23 – Feb	Lab 5. C3 & C4 photosynthesis	Quiz Pre-Lab 5 (5 pts)		Keep plants alive!
2 - Mar	Lab 6. Transpiration and stomata conductance	Quiz Pre-Lab 6 (5 pts) Report Lab 5. (20 pts)	“Fast-plant” experiment – Harvest # 1, begin experimental treatment	
9 – Mar	“Fast-plant” experiment – Finish measurements Harvest #1	Report Lab 6. (20 pts)		Keep plants alive!
16 – Mar	Spring Break			Keep plants alive! (Erin and Claudia will help)
23 – Mar	Lab 7. Proteins	Quiz Pre-Lab 7 (5 pts)	“Fast-plant” experiment – Harvest # 2	
30 – Mar	Lab 8. Auxin signaling	Quiz Pre-Lab 8 (5 pts) Report Lab 7. (20 pts)	“Fast-plant” experiment – Finish measurements, Harvest #2	
6 – Apr	Lab 9. Tropism	Quiz Pre-Lab 9 (5 pts) Report Lab 8. (20 pts)		“Fast-plant” experiment – Begin data analysis
13 – Apr	Lab 10. Seed Germination	Quiz Pre-Lab 10 (5 pts) Report Lab 9. (20 pts)		“Fast-plant” experiment – Work on the final report and presentation Measure germination rate on the next day (14 Apr)
20 – Apr	Research Symposium	Report Lab 10. (20 pts) Written report “Fast-plant” experiment (46 pts) Oral presentation (30 pts)		
4 – May		Final exam (100 pts)		