

BIOL/PLHL 3060: INTRODUCTORY PLANT PHYSIOLOGY

Department of Biology, College of Sciences
Four credits, Fall 2023

Course Instructor

Dr. Jordan Dowell

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Office: LSA 210

Office Hours: 11:30-12:30 pm Monday & Wednesday

in person by default or via Zoom by appointment

Graduate Teaching Assistant

Alexis Strain, Ph.D. student

Contact via Moodle

Office Hours: via Zoom, scheduling announced on Moodle.

Course Description

Covers core concepts in plant physiology, explicitly focusing on photosynthesis, respiration, water relations, mineral nutrition, growth and allocation, hormones, secondary metabolites, reproduction, and stress physiology. Students will develop an understanding of the integration of plant physiological traits and their role in plant-environment interactions, as well as gain skills in assessing key plant physiological traits through hands-on practice. The course format will consist of lectures and an accompanying laboratory section where students will conduct a semester-long research project to assess plant traits and responses to critical stimuli. Your active engagement in the research and/or creative scholarship process will be the core of your learning experience in this course. A significant portion of your Biol/Plhl 3060 grade will be derived from your active participation in the research process and the tangible course-related project(s) that comes out of this project.

Course Goals and Learning Objectives

Upon completion of the course, students will be able to:

- Understand the role of plant traits in the environment.
- Identify and judge adaptation versus acclimation.
- Consider the integration of plant traits among organs.
- Design research questions and experiments in plant physiology.
- Select appropriate methods to assess plant traits and responses.
- Confidently collect data to inspect variations in plant physiology.
- Interpret graphs and figures related to plant physiology.
- Communicate research findings in oral and written formats.

Class Meetings

Time: Monday, Wednesday, & Friday 10:30-11:20 am (lecture)

Time: Friday 1:30-4:20 pm (laboratory)

Location: Williams 201

Location: Life Sciences 308A

Prerequisites

Course Materials and Resources – Texts and Moodle

Moodle will be used to post materials for the course, including the syllabus, lecture slides, reading materials, and grades for all assignments.

This course will optionally use the following text: “Plant Physiology and Development” by Taiz and Zeiger (6th edition) OR “Plant Physiology” by Taiz and Zeiger (4th or 5th edition). These texts are mainly equivalent; any edition can be used, though they are organized differently. Note that I have listed assigned chapters to read for each edition in the course schedule. The instructor will provide additional supplementary reading materials (e.g., journal articles) through Moodle.

Assessment and Grading Procedures

Grades will be assigned on the following scale without rounding:

A+: 98-100% A: 84-97.9% A-: 90-93.9% B+: 87-89.9% B: 84-86.9% B-: 80-83.9% C+: 77-79.9% C: 71-76.9% C-: 68-70.9% D+: 65-67.9% D: 62-64.9% D-: 58-61.9% F: <57.9%

The grade for this course will be based on the following components:

(1) Three regular **exams**, given in class on the dates indicated on the schedule, and one cumulative **final exam** (10% each, 40% total) provided during the assigned final exam period. The first three exams will be closed-book, closed-note, and open-class exams consisting of short answer and essay questions. Students are encouraged to collaborate and discuss test questions during the exam period. However, plagiarism is prohibited. **Please Note that the Final Exam will be closed-book, closed-note, and closed-class. The lowest exam grade independent of the Final Exam will be dropped**

(2) **Laboratory assignments** based on activities in the lab (30% total, ~4.5% each, 7 lab assignments). One lab assignment will be dropped. You will be expected to have read the laboratory assignment before lab begins.

(3) One **team research project (Meta-analysis)** addressing research questions in plant physiology (30% total; see Moodle assignment for breakdown). This project is graded using the group scores as a baseline, adjusted by research participation and individual contributions if needed.

Course Policies and Specific Expectations

1. This is a research-intensive course with major hands-on components; therefore, attendance is essential. A large portion of the course grade will be based on assignments resulting from group participation in laboratory sections and the group research project, and exams will cover material not available outside of class. **HOWEVER, no student will be penalized for**

being away from class. Absences are not directly penalized; late assignments will be accepted for excused absences. Excused absences include illness, serious family emergencies, special co-curricular activities and requirements, severe weather conditions, and religious holidays. Assignments from unexcused absences may be submitted late for a 10% per week reduction in the assignment's grade.

2. Make-up exams will be arranged with valid documentation of illness, mandatory religious observance, or required participation at an authorized university activity before the absence or within 48 hours of the missed exam. Make-ups for laboratories cannot be provided, and a dropped laboratory assignment is provided for unforeseen circumstances. An alternate assignment will be provided if a student must miss more than one laboratory section meeting due to approved reasons.
3. Assigned readings for a given day should be completed **before** class, and laboratory modules should be read in their entirety before attending the laboratory section.
4. Written communication with the instructor should be sent via Moodle or LSU email. Note that I cannot respond to course inquiries from third-party email addresses (e.g., Gmail) where student identity cannot be confirmed to comply with FERPA regulations. I strive to respond to all inquiries within two business days (M-F).
5. This course will involve a semester-long team research project (Meta-analysis). Students must communicate and work together to complete the project, like working scientists in academia and industry. The Graduate Teaching Assistant will establish a preferred method of communication for the research project, and groups should confirm successful communication shortly after being sorted into groups. Along with this, students have a responsibility to be professional and reasonably responsive to their group (e.g., responding to correspondence within 1-2 business days on project matters), though team members should also be courteous and mindful that people have diverse work/course schedules and may not be able to respond to last-minute inquiries and that pandemic-related absences are a possibility. Groups should set expectations about communication early.
6. The LSU student code of conduct governs academic dishonesty (e.g., plagiarism or cheating). Students found to have committed academic dishonesty will receive a minimum of an "F" for the assignment in question and, at the instructor's discretion, based on the severity of the violation, an "F" for the entire course with a referral to the Office of Student Conduct. See the university policy below.
7. Students are highly encouraged to discuss any and all portions of this course with me. If you are struggling, please do not wait until you fall behind to meet with me. I am available during my weekly office hours or by appointment and will always be happy to discuss the course.

Course Schedule

The course schedule is an approximation and subject to change at any time by the instructor. Readings should be completed before attendance at the lecture on the week specified. Lab assignments are typically due in lab the week after the laboratory occurs, but check the schedule.

Week	Meeting	Week	Description	Due (Friday)	Readings (6 th ed.)	(4 th or 5 th ed.)
1	Lecture	8/21	Structure/Function, Adaptation/Acclimation Plant Cells, Tissues, and Organs		Ch. 1 + 24	Ch. 1 + 26
	Lab	8/25	Research Project Group Formation + Planning of Research Questions and Data Collection for Meta-Analysis			
2	Lecture	8/28	Photosynthesis I		Ch. 7 + 8	Ch. 7 + 8
	Lab	9/1	#1: Introductory Skills: Pipetting, Standard Curves, & Colorimetric Approaches			
3	Lecture	9/6	<i>NO CLASS Monday - *Labor Day*</i> Photosynthesis II	Lab #1 + Research Questions Due	Ch. 9 + 10	Ch. 9 + 18
	Lab	9/8	#2: Photosynthesis – Hill Reaction & Respiration			
4	Lecture	9/11	Water Relations I	Lab #2 + Study search report and preliminary database	Ch. 3 + 4	Ch. 3 + 4
	Lab	9/15	#3: Photosynthesis – Survey Measurements and Light Response Curves			
5	Lecture	9/18	*EXAM I*(MONDAY) Water Relations II			

	Lab	9/22	#3: Water Relations Lab Meta-Analysis – Planning Time & Collective Progress Reports			
6	Lecture	9/25	Respiration	Lab #3 + Full Introduction Due	Ch. 12 + 18	Ch. 11
	Lab	9/29	#4a: Mineral Nutrition Lab – Part 1			
7	Lecture	10/2	Mineral Nutrition I	Lab #4	Ch. 5 + 13	Ch. 5 + 12
	Lab	10/6	#5a: Hormone Lab - Part 1			
8	Lecture	10/9	Mineral Nutrition II, Solute + Phloem Translocation	Complete Meta- analysis Dataset Due	Ch. 6 + 11	Ch. 6 + 10
	Lab	10/13	Meta-Analysis – Data Analysis Workshop #4a: Mineral Nutrition Lab – Part 2			
9	Lecture	10/16	Growth, Cell Walls, and Meristems		Ch. 14 + 17 + 18	Ch. 15 + 16
	Lab	10/20	#5b: Hormone Lab - Part 2			
10	Lecture	10/23	*EXAM II* (MONDAY)	Lab #5 + Methods Section	Ch. 15 + 19	Ch. 19 + 20 + 21
	Lab	10/27	#6a: Plant Pathology Lab - Part 1			
11	Lecture	10/30	Senescence and Life History		Ch. 22	Ch. 22 + 23
	Lab	11/3	#6b: Plant Pathology Lab - Part 2			
12	Lecture	11/6	Reproduction and Phenology	Results Due	Ch. 20 + 21	Ch. 25
	Lab	11/10	Meta-Analysis – Science Communication Workshop			

13	Lecture	11/13	Specialized Metabolism + Biotic Interactions	Lab #6 + Optional First Draft of Meta- Analysis	Ch. 23	Ch. 13
	Lab	11/17	#7: Specialized Metabolite Lab			
14	Lecture	11/20	*EXAM III* (MONDAY) <i>NO CLASS Wednesday & Friday – *Thanksgiving Break*</i>	Lab #7 (No late penalty pre- final exam time)	Ch. 24	Ch. 26
	Lab	11/24	<i>NO LAB – *Thanksgiving Break*</i>			
15	Lecture	11/27				
	Lab	12/1	Presentation of Projects, Final Exam Review			
Final Exam	Room:	12/5	**FINAL EXAM**(TUESDAY) 3:00-5:00 pm	Final Written Meta- analysis + Poster		

General University Policies

Course Accessibility and Disability Statement

Louisiana State University is committed to providing reasonable accommodations for all persons with disabilities. The syllabus is available in alternate formats upon request.

If you have a disability that may impact your work in this class and for which you may require accommodations, please see a **staff member in Disability Services** so that such accommodations can be considered. Students that receive accommodation letters, please meet with me to discuss the provisions of those accommodations as soon as possible.

LSU student code of conduct

The LSU student code of conduct explains student rights, excused absences, and behavior expectations. Students are expected to understand this code as described here. Any violations of the LSU student code will be duly reported to the Dean of Students.

Expectations

LSU's general policy states that for each credit hour, you (the student) should plan to spend at least two hours working on course-related activities outside of class. Since this course is for three credit hours, you should expect to spend a **minimum of six** hours outside of class each week working on assignments for this course. For more information see: <http://catalog.lsu.edu/content.php?catoid=12&navoid=822>.

Make-up Assignments for Authorized University Events or Co-curricular Activities

Students who represent the university in an authorized event or activity (for example, student-athletes) and who cannot meet a course deadline due to a conflict with that event must provide the instructor with documentation in advance to arrange a make-up. No penalty will be applied. For more information, see the LSU policy at < https://www.lsu.edu/policies/ps/ps_22.pdf >

Make-up Assignments for Religious Observances

Students must notify their instructor in advance if they intend to miss class for a religious observance. For more information, see the LSU policy at < https://www.lsu.edu/policies/ps/ps_22.pdf >.

In-Class Recording Statement

Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal educational use, for use in a complaint against the institution, or for use as evidence in a civil or criminal proceeding. Students may not record for any other purpose without the consent of the faculty member. A class lecture is defined as a formal or methodical oral presentation as part of a university course intended to present information or teach students about a particular subject. Recording classroom activities other than class lectures, including but not limited to lab sessions, student presentations (whether individually or part of a group), class discussion (except when incidental to and incorporated within a class lecture), clinical presentations such as patient history, academic exercises involving student participation, test or examination administrations, field trips, and private conversations is prohibited. Recordings may not be used as a substitute for class participation

and class attendance, and may not be published or shared without the written consent of the faculty member. Failure to adhere to these requirements may violate the University's Student Code of Conduct.

Academic Integrity

Students should familiarize themselves with LSU's Code of Student Conduct at <https://www.lsu.edu/saa/students/codeofconduct.php> According to Section 1, "Academic Misconduct," students are prohibited from engaging in

1. Unauthorized assistance: Using or attempting to use unauthorized materials, information, or study aids in any academic exercise unless authorized by the instructor of record. The unauthorized possession of examination or course-related material also constitutes cheating.
2. Communication to another through written, visual, electronic, or oral means: The presentation of material which has not been studied or learned, but instead was obtained through someone else's efforts and used as part of an examination, course assignment, or project.
3. Commercial Use of Academic Material: Selling course material to another person, student, and/or uploading course material to a third-party vendor without authorization or the university's and the instructor's express written permission. Course materials include but are not limited to class notes, Instructor's PowerPoints, course syllabi, tests, quizzes, labs, instruction sheets, homework, study guides, handouts, etc.
4. Falsifying or misrepresenting the student's own academic work.
5. Plagiarism: Using or appropriating another's work without any indication of the source, thereby attempting to convey the impression that such work is the student's own.
6. Multiple Submissions: Submitting the same academic work for credit more than once without the express written permission of the instructor.
7. Helping another violates academic behavior standards.
8. Soliciting assistance with academic coursework and/or degree requirements.

Responses to Academic Dishonesty, Plagiarism, or Cheating

Students should also familiarize themselves with the procedures for academic misconduct in LSU's student handbook. LSU faculty members are responsible for students' education and the value of an LSU degree, so they seek to prevent unethical behavior and respond to academic misconduct when necessary. Penalties for violating rules, policies, and instructions within this course can range from a zero on the exercise to an "F" letter grade in the course. In addition, an Academic Misconduct report could be filed with the Office of Student Conduct, which could lead to a disciplinary warning, disciplinary probation, or deferred suspension or separation from the University through suspension, dismissal, or expulsion with the addition of a "Z" designation on one's transcript.

Being found in violation of academic conduct standards could result in a student having to disclose such behavior on a graduate school application, being removed from a leadership position within a student organization, being the recipient of scholarships, and participating in University activities such as study abroad, internships, etc.

Let's avoid all of this by demonstrating values of honesty, trust, and integrity. No grade is worth compromising your integrity and moving your moral compass. Stay true to doing the right thing: take the zero, not a shortcut.

Academic Success

The primary ingredients of your academic success are attending class, managing time efficiently, taking good notes, and developing good critical thinking and communication abilities. LSU has several excellent resources that will assist you in developing these skills. The place to begin is the Center for Academic Success. The CAS offers guidance on what learning strategies best suit your talents, tutoring in the basic subjects, and workshops on various topics, from note-taking to time management. Communication Across the Curriculum assist students in developing the communication skills necessary for academic and professional success. Finally, concerning professional success, the LSU Olinde Career Center can assist you in choosing a major and a profession that best suits your talents and passions and help you develop a four-year career plan to ensure success when you graduate from LSU.

Diversity, Equity & Inclusion Statement

We believe diversity, equity, and inclusion enrich the educational experience of our students, faculty, and staff and are necessary to prepare all people to thrive personally and professionally in a global society. Therefore, LSU is firmly committed to an environment that affords respect to all members of our community. We will work to eliminate barriers that any members of our community experience.

To make LSU a place where that can happen, we must recognize and reflect on the inglorious aspects of our history. We now acknowledge the need to confront how racism, sexism, ableism, ageism, classism, LGBTQ+ phobia, intolerance based on religion or national origin, and all forms of bias and exploitation have shaped our everyday lives.

We accept personal and professional responsibility to eliminate bias and oppression wherever they are found. We understand our obligation to speak up when we see bias in our teaching, study, or daily work. Our community will educate themselves proactively and continuously about how to intervene and bring bias to the attention of others with commitment and compassion.

We will hold ourselves accountable for our actions and inactions and for maintaining intentional, measurable, and meaningful efforts to enhance diversity, equity, and inclusion, including through ongoing evaluation of our policies, practices, and procedures.

Nondiscrimination, Sexual Harassment, & Title IX

LSU provides equal opportunity for all qualified persons in admission to, participation in, or employment in the programs and activities which the university operates without regard to race, creed, color, marital status, sexual orientation, gender

identity, gender expression, religion, sex, national origin, age, mental or physical disability, or veteran's status. LSU has implemented a procedure to address complaints for those who believe they have been subjected to discrimination and/or harassment violating this policy. Please know that your instructors are here to support and listen to your experience. We also want you to know that we are mandatory reporters and must report what we know to the Office of Civil Rights and Title IX. All LSU employees, with few exceptions, are required to report instances of sex- or gender-based harassment and discrimination, including sexual misconduct and power-based violence (e.g., sexual assault, stalking, dating violence, domestic violence, sexual exploitation, retaliation, etc.) for which they may not be the victim, but of which they are aware. The Office of Civil Rights & Title IX is the LSU office investigating complaints regarding discrimination, sexual harassment, or power-based violence. The Office of Civil Rights & Title IX is at 118 Himes Hall, and the phone number is (225) 578-9000. Suppose you know of an individual who has been victimized. In that case, you are encouraged to contact the Office of Civil Rights & Title IX or file an online report by visiting **LSU's Domestic & Sexual Violence Support and Reporting** website and clicking the **Report an Incident** box. If you have been assaulted, harassed, or a victim of violence, we encourage you to contact the Office of Civil Rights & Title IX. Please reach out for help immediately.

Some excellent resources available to Baton Rouge residents include:

- STAR (Sexual Trauma Awareness and Response; 24/7 hotline: (855) 435-STAR (7827)
- IRIS Domestic Violence Center; 24/7 hotline: (800) 541-9706
- The Lighthouse Program; (225) 578-5718 VIA LINK; (800) 273-TALK (8255) [national line but answered from New Orleans]

National resources include:

- RAINN (Rape, Abuse & Incest National Network); 24/7 hotline: (800) 656-4673
- National Sexual Violence Resource Center

For additional information, visit www.lsu.edu/civil-rights, the **Office of Civil Rights & Title IX**, and review **PM-73** (Prohibiting Power-based Violence, including Sex- and Gender-based Harassment and Discrimination, and Sexual Misconduct).