Plant Biochemistry and Stress Physiology
PLSC 426/PLSC 526

COURSE INFORMATION *[Example]*
Lecture and Discussion periods: Tuesday and Thursday from 12.55 to 2.10 pm
Location: Room 129 Agriculture and Natural Resources Building (ANRB)
Course Credit: 3.0 Hours

FACULTY CONTACT INFORMATION
Dr. Tabibul Islam
346 Plant Biotech Building
Email: islamt@utk.edu
Phone: 865-974-4596
Lecture teaching assistant: Mahadi Hasan Redoy (mredoy@utk.edu)

COURSE DESCRIPTION:
This course will offer fundamental aspects of plant biochemistry and stress physiology. It will provide an overview of primary and specialized metabolism, phytohormone biosynthesis, and signal transduction pathways, as well as insight into the biochemical reactions triggered by the diverse stresses encountered by plants throughout their life cycles and their association with stress tolerance mechanisms.

STUDENT LEARNING OUTCOMES:

- Describe the biochemical pathways involved in photosynthesis, carbon fixation and assimilation, nitrogen metabolism, amino acid biosynthesis, and protein synthesis and degradation.
- Explain the biosynthesis and signal transduction mechanisms of major plant hormones (phytohormones).
- Analyze the pathways of plant-specialized (secondary) metabolism and their functional significance.
- Evaluate biochemical responses of plants to abiotic and biotic stresses.
- Demonstrate understanding of the molecular and biochemical mechanisms underlying plant stress responses and tolerance.
- Communicate scientific knowledge and experimental findings effectively through technical presentations and a written research proposal.

LEARNING ENVIRONMENT
This is an in-person class during which, upper-level undergraduate students (PLSC 426) learn with and are engaged via lectures and discussion alongside graduate students (PLSC 526) to enrich learning perspectives. Participation in each class is crucial to fulfilling class purposes. Students are expected to attend each class. If you need any equipment to complete the online components of this course, you can borrow equipment from Pendergrass Library.

HOW TO BE SUCCESSFUL IN THIS COURSE

Students are expected to attend each class and are encouraged to prepare by reading the sections of the textbook outlined in the semester calendar. Follow along with the semester calendar to be aware of upcoming assignments and assessments. Reach out to the instructor as soon as possible with any questions, ideas, or concerns about the class.

Learner Expectations

Be prepared for all classes; Be respectful of others; Actively contribute to the class; Commit to setting and meeting high expectations for yourself; Stay up-to-date on materials posted to the course Canvas site; Read and (if necessary) respond to communications from the instructor; Completely read and follow all instructions given for assignments and assessments; Ask the instructor for clarification when needed; Abide by the UT Student Code of Conduct.

Instructor Expectations

Start and end class on time; be prepared for all classes; evaluate all fairly and equitably; be respectful of all students; create and facilitate meaningful learning activities; clearly and effectively communicate course expectations and content; be open to constructive input from students in the course; abide by the University codes of conduct.

COURSE REQUIREMENTS

Texts, Resources, and Materials (Optional)

- *Plant Biochemistry*, 5th ed. Authors: Hans-Walter Heldt, Birgit Piechulla Hardback ISBN: 9780128186312, Heldt, and Piechulla.
- *Plant Physiology and Development*, 6th ed. ISBN-13: 978-1605352558, Taiz, Zeiger, Moller, and Murphy
- *Biochemistry & molecular biology of plants, 2nd ed. ISBN: 978-0-470-71421-8 Buchanan, Gruissem, Jones*
- *Phytohormones: A Window to Metabolism, Signaling and Biotechnological Applications*, ISBN 978-1-4939-0490-7, Tran and Pal.

Required Equipment: Students must have a working computer to complete assignments. If you need any equipment to complete this course online, you can borrow it from Pendergrass Library. Students may also be able to participate in class by using resources available in an on-campus computer lab.

Course Resources: This course will use Canvas via Online@UT. As a student registered for this course, you are automatically loaded into the course Canvas site, and it should appear on your homepage.

Technical Support: For technical issues, contact the OIT HelpDesk at (865) 974-9900 or the Walk-in HelpDesk. For IT and Computing issues, use the online Contact Form. Again, if you need any equipment to complete the online portion of this course, you can borrow equipment from Pendergrass Library.

COURSE COMMUNICATIONS POLICY

Classroom Etiquette: All online and offline communication should adhere to UT's Principles of Civility and Community.

Announcements: Announcements will be used to communicate with you about course logistics. All students are responsible for logging into Canvas on a daily basis to check for course updates. The three

most recent announcements are posted at the top of the course home page. Students should check their Canvas notification settings to ensure they receive instructor announcements.

Email: All students are provided with a working university email address. The instructor will use the university email to communicate course information. Students are responsible for staying up to date on email communications. For assistance with email, please visit help.utk.edu. Thank you for your attention to detail and professional courtesy in all communications regarding the class, including email.

COURSE ATTENDANCE AND PARTICIPATION POLICY

Participation in each class is crucial to fulfilling class purposes. Students are expected to attend all classes and may not be distracted during class.

Technology: Cell phones, tablets, and laptops should be used for notetaking purposes only but may not be used for recording audio or visuals. Sharing audio or visual files may violate University policy, copyright laws, or other restrictions. Smartphones and other technology will be turned off and remain in backpacks or purses during quizzes and exams. Use calculators and not smartphones during exams.

Readings: Any recommended reading assignments must be completed prior to the lecture period. You will get much more out of the lectures if you prepare yourself ahead of time and come prepared to ask any questions you may have regarding the material.

Campus Closures: If the university closes campus for any reason, including inclement weather, students who are unable to attend, submit assignments, or otherwise participate in a class session will not be penalized.

ASSIGNMENTS, ASSESSMENTS, AND EVALUATIONS

Points possible

Assignment	**Points Possible**
Exams *(2)*	300 pts (150 pts each)
Quizzes	100 pts
Presentation	70 pts
Attendance and involvement	30 pts
Total Points Available	**500 pts**

Grading Scale

Final grades will be assigned in accordance with the UT grading scale. For further explanation about student UT Grades and GPA or other policies related to academic standing, please reach out to OneStop. Two exams will cover the material presented after the previous exam. For undergraduate students enrolled in ***PLSC 426***, final grading will be based solely on the total points, as mentioned in the table above.

Graduate students enrolled in ***PLSC 526*** will be required to submit a research proposal on a research topic in plant biochemistry and stress physiology. Final grading for graduate students will be determined based on the research proposal (20% of the final grade) and the total points of the three exams (80%).

On a scale of a possible total of 500 points, final course grades will be determined as follows:

Letter Grade	Percentage	Projected Points
A	More than 93 %	465 to 500 pts
A-	90 to less than 93 %	450 to 464 pts
B+	87 to less than 90 %	435 to 449 pts
B	83 to less than 87 %	415 to 434 pts
B-	80 to less than 83 %	400 to 414 pts
C+	77 to less than 80 %	385 to 399 pts
C	73 to less than 77 %	365 to 384 pts
C-	70 to less than 73 %	350 to 364 pts
D	60 to less than 70 %	300 to 349 pts
F	Less than 60 %	299 pts and below

LECTURE SCHEDULE *(Subject to Change)*

In addition to the schedule provided below, the Canvas Calendar is a great way to view everything you have to do for all your courses in one place.

Week		Date	Topics to be Covered	Suggested Reading Assignments Due
1	Tu	8/20	First day of class: Syllabus, Introduction, and overview of plant cells and their chemical compositions.	
	Th	8/22	Photosynthesis, carbon fixation, and assimilation	
2	Tu	8/27	Biosynthesis and metabolism of disaccharides and polysaccharides.	
	Th	8/29	Lipids: Biosynthesis, membrane constituents, and as a storage carbon source	
3	Tu	9/03	Nitrogen fixation, assimilation, and metabolism.	**Quiz 1**
	Th	9/05	Amino acids: Overview, biosynthesis, and metabolism	
4	Tu	9/10	Biosynthesis of proteins and RNAi	
	Th	9/12	Degradation of proteins	
5	Tu	9/17	Transportation of Photoassimilates and Source-Sink Interactions	
	Th	9/19	Implications of the primary metabolism in plant growth and development: case study	**Quiz 2**
6	Tu	2/24	Specialized metabolism: Phenylpropanoids (Flavonoids)	
	Th	9/26	Specialized metabolism: Phenylpropanoids (Phenolic acids and cell wall components)	
7	Tu	10/01	Implications of specialized metabolism in plant growth and development: Case study & exam one outlines	**Quiz 3**
	Th	10/03	***Exam 1***	

8	Tu	**10/08**	***No Class – Fall Break***	
	Th	10/10	Signal transduction	**Research Proposal** **Initial submission (only for graduate students).**
9	Tu	10/15	Biosynthesis, signaling, and hormone functions: Auxins	
	Th	10/17	Biosynthesis, signaling, and hormone functions: Gibberellins, ABA	
10	Tu	10/22	Biosynthesis, signaling, and hormone functions: Ethylene, SA, JA	
	Th	10/24	Plant Defense and Immunity System	
11	Tu	10/29	Plant biotic stress I	**Quiz 4**
	Th	10/31	Plant biotic stress II	
12	Tu	11/05	***No Class – Election Day***	
	Th	11/07	Plant biotic stress III	
13	Tu	11/12	*Global climatic changes: Plant stress physiology.* (Exam 2 discussion)	**Presentation submission**
	Th	11/14	Plant abiotic stress I (Drought, case study)	
14	Tu	11/19	**Presentation I**	
	Th	11/21	**Presentation II**	
15	Tu	11/26	Plant abiotic stress II (exam two discussion)	
	Th	11/28	***No Class – Thanksgiving Recess***	
16	Tu	12/03	Plant abiotic stress III	**Research Proposal** **Final submissio (only for graduat students).**
	Th	**12/05**	**Exam 2**	

This document is subject to change at any time at the discretion of the instructor.

CAMPUS SYLLABUS

Dear Student,

The purpose of this **Campus Syllabus** is to provide you with important information that applies to all UTK courses. Please observe the following policies and familiarize yourself with the university resources listed below. At UT, we are committed to providing you with a high-quality learning experience. I want to wish you the best for a successful and productive semester.

- Dr. John Zomchick, Provost and Senior Vice Chancellor

Academic Integrity

Each student is responsible for their personal integrity in academic life and for adhering to UT's Honor Statement. The Honor Statement reads: "An essential feature of the University of Tennessee, Knoxville is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the university, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity."

Your Role in Improving the Course Through Assessment

At UT, it is our collective responsibility to improve the state of teaching and learning. During the semester you may be requested to assess aspects of this course, either during class or at the completion of the class, and through the TNVoice course evaluation. Please take the few moments needed to respond to these requests as they are used by instructors, department heads, deans and others to improve the quality of your UT learning experience.

Students with Disabilities – http://sds.utk.edu

The University of Tennessee, Knoxville, is committed to providing an inclusive learning environment for all students. If you anticipate or experience a barrier in this course due to a chronic health condition, a learning, hearing, neurological, mental health, vision, physical, or other kind of disability, or a temporary injury, you are encouraged to contact Student Disability Services (SDS) at 865-974-6087 or sds@utk.edu. An SDS Coordinator will meet with you to develop a plan to ensure you have equitable access to this course. If you are already registered with SDS, please contact your instructor to discuss implementing accommodations included in your course access letter.

Accessibility Policy and Training – http://accessibility.utk.edu

The University of Tennessee, Knoxville, provides reasonable accommodations for individual students with disabilities through its office of Student Disability Services. The university is also committed to making information and materials accessible, when possible. Resources and assistance to support these efforts can be found at http://accessibility.utk.edu/.

Wellness – http://wellness.utk.edu/ and http://counselingcenter.utk.edu/

The Center for Health Education and Wellness empowers all Volunteers to thrive by cultivating personal and community well-being. The Center can answer questions about general wellness, substance use, sexual health, healthy relationships, and sexual assault prevention. The Student Counseling Center is the university's primary facility for personal counseling, psychotherapy, and psychological outreach and consultation services.

Any student who has difficulty affording hygiene products, groceries, or accessing sufficient food to eat every day is urged to contact the Big Orange Pantry for support. The Big Orange Pantry, located in Greve Hall, is a free resource for all students, faculty, and staff, no matter how great or small their need is. Students who need emergency financial assistance can also request funding from the Student Emergency Fund.

Students who are experiencing non-academic difficulty or distress and need assistance should call 974-HELP or submit an online referral. The 974-HELP team specializes in aligning resources and support to students experiencing mental health distress.

Emergency Alert System – http://safety.utk.edu/

The University of Tennessee is committed to providing a safe environment to learn and work. When you are alerted to an emergency, please take appropriate action. Learn more about what to do in an emergency

and sign up for UT Alerts. Check the emergency posters near exits and elevators for building specific information. In the event of an emergency, the course schedule and assignments may be subject to change. If changes to graded activities are required, reasonable adjustments will be made, and you will be responsible for meeting revised deadlines.

COVID-19 Guidelines

CDC guidance recognizes the changing dynamics of living in a world with COVID-19. It rates COVID-19 community levels as low, medium, and high, with recommendations at each level about the use of masks and other precautions. At all levels of community spread, staying up-to-date with vaccination is the best way to protect yourself from serious illness and to limit the spread of COVID-19. Wearing a mask is always an option for any individual who chooses to do so, and the CDC recommends that those with high risk of severe illness talk with their health care providers. If you are sick, please stay in, avoid being around others as much as possible, and contact your health care provider for any symptoms that are worsening, moderate to severe, or concerning to you. For more information about vaccination or to self-report an illness and receive support, visit http://studenthealth.utk.edu/CommunityHealth. For more information about COVID-19, visit http://studenthealth.utk.edu/covid-19.

KEY CAMPUS RESOURCES FOR STUDENTS

- 974-HELP (developed to help distressed or distressing students reach their academic goals and to help maintain a safe community and learning environment for all students)
- Center for Career Development (Career counseling and resources, HIRE-A-VOL job search system)
- Computer Labs
- Course Catalogs (Listing of academic programs, courses, and policies)
- COVID-19 Information and Support (Visit the site for a list of resources)
- Herbert Virtual Learning Commons (Academic support, tools for individual study, wellness resources, and study groups)
- Hilltopics (Campus and academic policies, procedures and standards of conduct)
- Judith Anderson Writing Help Center (Writing support, navigating the writing process, and writing guides)
- OIT HelpDesk **(865)** 974-9900
- Schedule of Classes/Timetable
- Student Counseling Center (Visit the site for a list of services)
- Student Health Center (Visit the site for a list of services)
- Student Success Center (Academic support resources)
- Study Spaces (Check out this Map of Quiet Indoor and Outdoor Study Spaces on Campus to learn where you can find a distraction-free spot to attend online classes.)
- Undergraduate Academic Advising (Advising resources, course requirements, and major guides)
- University Libraries (Access to library resources, databases, course reserves, and services)