

PLANT PHYSIOLOGY HORT 4430/6430

Instructor: Anish Malladi

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Office hours: please email to make an appointment

COURSE DESCRIPTION

This course is designed to enhance students' knowledge of the basic principles of plant physiology including water relations, solute transport and phloem transport, photosynthesis and respiration, plant genomes, regulation of plant gene expression, and phytohormone biology.

RECOMMENDED COURSE MATERIAL

- *Plant Physiology* by Lincoln Taiz and Eduardo Zeiger. (Publisher: Sinauer)
- *Fundamentals of Plant Physiology* by Taiz, Zeiger, Moller and Murphy (1st edition)

ADDITIONAL REFERENCES

- *Plant Physiology* by Frank Salisbury and Cleon Ross
- *Molecular Life of Plants* by Jones, Ougham, Thomas and Waaland (Wiley Blackwell)
- Selected papers will be provided to graduate students

COURSE OBJECTIVES

1. To introduce students to fundamental concepts in plant physiology
2. To encourage students to develop perspectives on plant physiology at the molecular, cellular, and whole-plant levels
3. To introduce graduate students to the latest developments in fundamental plant physiology and encourage critical thinking in these areas

GRADING SYSTEM

There will be three mid-term exams and one comprehensive final exam in this course. Exams will primarily consist of short answer questions. Make-up exams will be offered only in case of conflict or illness (*documentation required*). Each of the mid-term exams will contribute 20% towards the final grade. The final exam will constitute 25% of the final grade. Homework assignments will constitute 15% of the final grade. Around 3-5 assignments will be provided during the course. Assignments will be given typically on Fridays and will be due on the following Friday. Late assignments will not be accepted.

Graduate students:

In addition to the above, graduate students will be required to read classic and/or recent literature in plant physiology assigned to them by the instructor. Graduate student assignments will be designed to encourage critical thinking. The above-described exams and assignments will constitute 80% of the final grade for graduate students. Graduate students will also be required to write a term paper on a current topic in plant physiology. The topic for the term paper will be chosen by the student in consultation with the instructor. Graduate students may be required to make a presentation to the class at the end of the semester on the above project (time permitting). The term project will constitute 20% of the final grade.

The traditional A-F (+/-) system of grading will be used in this course.

NOTE: Changes to course content and schedule may be required and will be made as necessary by the instructor.

MODE OF INSTRUCTION: All classes will be offered in person. Students are expected to be in attendance for in-person classes except in-case of health-related reasons. To accommodate students from Griffin and Tifton, classes will also be offered *via* zoom.

UNIVERSITY HONOR CODE AND ACADEMIC HONESTY POLICY

All academic work for the course must meet University standards described in ‘A Culture of Honesty.’ Students are expected to inform themselves of the requirements contained within the above reference. (See: <http://www.uga.edu/honesty/>). All submitted work should be the original work of students.

COURSE SCHEDULE

The Plant Cell

- Structure and function of organelles
- Cell wall structure; cell growth
- Model plants
- Genome size and sequencing
- Regulation of gene expression
- Enzymes and enzyme kinetics

Water Relations in Plants

- Terminology
- Water movement in plants
- Transpiration

Mineral Nutrition

- Essential nutrients; Generation of electro-chemical gradients
- Solute transport mechanisms
- Overview of nutrient functions in plants

Photosynthesis

- Light reactions
- Carbon reactions
- Carbon metabolism
- Phloem transport/translocation; Source-sink physiology

Respiration

- Overview of respiration
- Electron transport cycle and ATP synthesis

Phytohormones

- Overview of plant hormones;
- Hormone homeostasis
- Hormone perception
- Functions of phytohormones
- Auxin: A case study

EXAM SCHEDULE

EXAM I: September 16

EXAM II: October 14

EXAM III: November 11

FINAL: December 12 (8-11 am)