

**Instructor**

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am or by appointment

**BOT3503/5505C Physiology and Molecular Biology of Plants**

Spring, 2021

Lecture: M,W,F | Period 3 (9:35 AM - 10:25 AM)

Larsen Hall LAR 0310

***Why is learning plant physiology important?*** Plant

physiology is the study of plant function and behavior. To

understand plant processes, a student must integrate concepts from molecular and cell biology, chemistry, and physics. Through the study of plant physiology, you will uncover links between plant structure and function and further your understanding of plant responses to their biotic and abiotic environment. Such knowledge provides a conceptual basis for the improvement of crops and the maintenance of other plant ecosystem services.

***This course aims to help students understand plant processes in agronomic and environmental contexts including***

- 1) Cell wall and membrane structures and functions;
- 2) Water and nutrient transport;
- 3) Gene expression and signal transduction;
- 4) Energetics, enzymes, and biochemical reactions;
- 5) Photosynthesis and respiration;
- 6) Growth, morphogenesis, and flowering;
- 7) Hormones and light responses;
- 8) Stress responses

***Further, our course will help you develop skills in***

- 1) Reading comprehension;
- 2) Critical thinking;
- 3) Oral and written communication

***Specific learning outcomes***

After you have completed this class, you will be able to:

- 1) Define characteristics that differentiate plants from animals;
- 2) Describe the structure and biochemistry of plant cell walls and membranes;
- 3) Discuss the physical properties that enable plant water transport;
- 4) List and describe the function of plant macro and micronutrients;
- 5) Explain signal transduction and the importance of gene expression in plant performance;
- 5) Outline and describe the biochemical pathways for photosynthesis and respiration;
- 6) Outline and describe the fundamental processes involved in the complete plant life cycle;
- 7) List and describe the function of key plant hormones;
- 8) Describe photochemical signals involved in plant growth and phenology;
- 9) Make predictions of plant behavior under water, light, nutrient, and herbivore stress

***Texts***

The primary text for this class is *Fundamentals of Plant Physiology* (1st edition) by Taiz et al., 2018. This is an introductory text that is succinct and easy to read with excellent artwork.

(For a more comprehensive text, you may instead use *Plant Physiology and Development* (6<sup>th</sup> edition) by Taiz et al., 2014. This original text is more advanced, but follows the same structure as the fundamentals text above. I strongly recommend the advanced text for graduate students and those interested in pursuing a career in plant science.)

***Course grades will be determined as follows:***

The course grade is determined from three exams, in-class questions, and homework assignments.

**Grading scale:**

90 – 100% = A

80 – <90% = B

70 – <80% = C

60 – <70% = D

below 60% = E

***Exams:*** Examinations are primarily based on the material covered during class, but the text provides additional information for those that want or need background information. Memorization and regurgitation of facts is not a good strategy for success in the course. The three exams consist of short answer questions relating to the lecture and reading assignments and will require problem solving and synthesis of concepts. They will be taken during the regular class periods. Each exam is worth 100 points. A grade rubric will be provided when exams are returned.

***In-class questions:*** Students will answer questions during class, as well as homework assignments on eLearning. This work will total 100 points.

**Course Policies:**

The course meets from 9:35 a.m. to 10:25 a.m. (period 3) on Monday, Wednesday and Friday in 310 LAR and synchronously online via Zoom. Students are expected to complete the reading before class, attend lectures and interact during class (questions during lecture are encouraged).

***Attendance and make-ups***

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

If you are experiencing COVID-19 symptoms ([click here for guidance from the CDC on symptoms of coronavirus](#)), please use the UF Health screening system and follow the instructions on whether you are able to attend class. [Click here for UF Health guidance on what to do if you have been exposed to or are experiencing Covid-19 symptoms](#). Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work. Refer to the above link for more information on the university's attendance policy.

***Accommodations***

Students who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester. 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. Once notification is complete, the Dean of Students Office of Disability Resources will work with the instructor to accommodate the student.

***Course Evaluations***

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at [gatorevals.aa.ufl.edu/students/](http://gatorevals.aa.ufl.edu/students/). Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via [ufl.bluer.com/ufl/](http://ufl.bluer.com/ufl/). Summaries of course evaluation results are available to students at [gatorevals.aa.ufl.edu/public-results/](http://gatorevals.aa.ufl.edu/public-results/).

### ***Academic Integrity***

“UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honorcode/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

### ***Important – Plagiarism***

Plagiarism is a serious violation of the Student Honor Code. It includes:

- Submitting all or part of someone else's work as if it is your own
- "Borrowing" without crediting the source
- Submitting duplicate assignments
- Collaborating or receiving substantive help in writing your assignment unless we require such collaboration as part of the work
- Failing to cite sources, or citing them improperly

Consequences of plagiarism:

- Failing grade on assignment AND
- Course grade penalty of one letter grade AND • Report to the Office of the Dean of Students.

Please review plagiarism and how to avoid it: <http://web.uflib.ufl.edu/msl/07b/studentplagiarism.html>

### ***Resources Available to Students***

#### ***Health and Wellness***

- *U Matter, We Care*: [umatter@ufl.edu](mailto:umatter@ufl.edu); 392-1575
- *Counseling and Wellness Center*: <http://www.counseling.ufl.edu/cwc/Default.aspx>; 392-1575
- *Sexual Assault Recovery Services (SARS)*: Student Health Care Center; 392-1161
- *Career Resource Center*, Reitz Union, 392-1601, career and job search services.
- *University Police Department*: <http://www.police.ufl.edu/>; 392-1111 (911 for emergencies)
- Many students experience test anxiety and other stress – related problems. “A Self Help Guide for Students” is available through the Counseling Center (301 Peabody Hall; 392-1575) and at their web site: <http://www.counsel.ufl.edu/>.

#### ***Academic Resources***

- *E-learning technical support*: [Learningsupport@ufl.edu](mailto:Learningsupport@ufl.edu); <https://lss.at.ufl.edu/help.shtml>; 352-392-4357 (opt. 2)
- *Career Resource Center*: Reitz Union; <http://www.crc.ufl.edu/>; 392-1601
- *Library Support*: <http://cms.uflib.ufl.edu/ask>
- *Teaching Center*: Broward Hall; 392-2010 or 392-6420
- *Writing Studio*: 302 Tigert Hall; <http://writing.ufl.edu/writing-studio/>; 846-1138

### ***Procedure for Conflict Resolution***

Any classroom issues, disagreements or grade disputes should be discussed first between the instructor and the student. If the problem cannot be resolved, please contact the Undergraduate/Graduate Coordinator or the Department Chair. Be prepared to provide documentation of the problem, as well as all graded materials for the semester. Issues that cannot be resolved departmentally will be referred to the

University Ombuds Office (<http://www.ombuds.ufl.edu>; 392-1308) or the Dean of Students Office (<http://www.dso.ufl.edu>; 392-1261). For further information refer to [https://www.dso.ufl.edu/documents/UF\\_Complaints\\_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf) (for residential classes) or <http://www.distance.ufl.edu/student-complaintprocess> (for online classes).

### **A NOTE ON OUR HYFLEX CLASS THIS SEMESTER**

This course consists of two sections, an online and a face-to-face, which are *simultaneous*, i.e., they occur at the same meeting days and times. This means that some students in our class, and the instructor, will be participating from the assigned classroom, while others will be participating remotely (e.g., via Zoom) from their preferred location.

As this is a new format for us, we want to ensure that you are aware of the following:

- This course has been assigned a physical classroom with enough capacity to maintain physical distancing (6 feet between individuals) requirements. Please utilize designated seats and maintain appropriate spacing between students. Please do not move desks or stations. Since our rooms hold significantly fewer students than normal, the number of students *in* the classroom will be quite small – in this section, there will be 8 students in person, with the remaining 17 participating online.
- Students who have signed up for the *in-person* section are expected to attend class on every scheduled meeting day and time, as indicated in the course syllabus. Likewise, students who signed up for the *online* section are expected to attend class virtually on every scheduled meeting day and time, as indicated in the course syllabus.
- In-person students (and faculty) are required to wear approved face coverings at all times during class and within buildings, and to maintain physical distancing of at least six feet at all times. Following and enforcing these policies and requirements are all of our responsibility. Failure to do so will lead to a report to the Office of Student Conduct and Conflict Resolution.
- Face-to-face students and instructors are expected to clean their spaces (desks, chairs, podium) at the end of every class period. Sanitizing supplies are available in the classroom.
- Technology in the classrooms has been updated, but is still insufficient to allow communication between face-to-face and virtual students. The instructor will be the only one able to communicate with both populations, but will have to do so while remaining behind the podium (due to microphone placement). The instructor will have to repeat any questions or comments from face-to-face students for the benefit of the virtual students.
- If face-to-face students wish to join the Zoom call from the classroom, they will have to provide their own computers and, crucially, headsets, in order to avoid interference from the various microphones.
- Instructors will make every effort to incorporate both cohorts of students simultaneously, although this will require a lot of trial and error and a great deal of patience on all our parts.

This will be a different experience for all of us, but we are doing our best to comply with university mandates while still fulfilling the goals and objectives of our courses and providing you with the best possible educational experience. We appreciate your understanding.

## Physiology and Molecular Biology of Plants

Discussion Topics	Chapter
Water Potential and Water Relations	2
Water Balance in Plants and Soils	3
Mineral Nutrition	4
Nitrogen, Phosphate, and Iron Assimilation	5
Solute Transport	6
<b>Exam 1 (Feb. 15)</b>	2-6
Photosynthesis: light reactions	7
Photosynthesis: carbon reactions	8
Ecology and Photosynthesis	9
Phloem Transport	10
Respiration and Lipid Metabolism	11
<b>Exam 2 (March 22)</b>	7-11
Plant signaling and hormones	12
Plant responses to light	13
Embryogenesis	14
Seed dormancy, germination and seedling establishment	15
Vegetative growth and senescence	16
Flowering and fruit development	17
<b>Exam 3 (April 21)</b>	12-17