

Instructors

Dr. Grace John
gracejohn@ufl.edu
Bartram Hall 310A
Office hours: immediately
following class and by
appointment

BOT4935/BOT6935 The Ecology of Plant Stress

Fall, 2021

Lecture/Discussion: M period 7-8 and W period 7 (1:55 –3:50/2:45 pm)

Turlington Hall 2318

Why is studying plant stress important? Plants play a vital role in the function of our biosphere. As sessile organisms, they are subject to a wide variety of suboptimal conditions. These stressors have produced an

enormous array of diverse plant phenotypes and continue to define niches and drive spatial population dynamics. Understanding how plants have adapted to tolerate stresses and how they respond to disturbance provides insights into broader evolutionary and ecological patterns. Due to the dynamic nature of biotic and abiotic conditions, comprehension of ecosystem scale stress allows us to identify systems at risk and make predictions of plant performance under future climate scenarios.

This course aims to help students understand

- 1) Dynamic responses of plants to abiotic, biotic, and anthropogenic stress
- 2) Plant adaptive specialization to stressful environments;
- 3) Ecosystem scale processes and patterns driven by stress response, avoidance, and tolerance;

Further, this course will help you develop skills in

- 1) Reading comprehension of peer-reviewed scientific literature;
- 2) Critical thinking;
- 3) Science communication via oral and written presentation of your own research.

Specific learning outcomes

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

- 1) Discuss current theory on the dynamic relationship between plants and their environment;
- 2) Describe in detail modern scientific understanding of plant responses to a specific stressor;
- 3) Lead productive discussions of key manuscripts relevant to your scientific field;
- 4) Compile, assess, and synthesize articles to answer novel research questions using the published literature;

Recommended preparatory courses

Although this course has no explicit prerequisites, it is intended for upper-level undergraduate and graduate students in botany and plant science. It will be assumed that students have a basic understanding of plant ecology, diversity, phylogeny, morphology, and physiology.

Texts

This course has no specific required text. Weekly readings will be made available on the course Canvas page. If you would like supplemental reading, please see:

Plant Physiological Ecology (3rd Edition) by Lambers and Oliveira 2019

Physiological Plant Ecology (3rd Edition) by Walter Larcher 1995

Plant Physiology and Development (6th Edition) by Taiz et al., 2014

Physicochemical and Environmental Plant Physiology by Park S Nobel 2020

Course grades will be determined as follows:

| | | | |
|---|-----------|-------|---|
| Written literature review | = 100 pts | ~50% | <u>Grading scale:</u> 90 – 100% = A |
| Presentation and discussion leading | = 70 pts | ~35% | 80 – <90% = B |
| Peer review | = 15 pts | ~7.5% | 70 – <80% = C |
| Participation (15 discussion questions @ 1 pt each) | = 15 pts | ~7.5% | 60 – <70% = D |
| Total course points | = 200 | | below 60% = E |

Course structure

This course is designed around discussions that are largely student led. We will cover a variety of plant stressors beginning with abiotic/natural stressors, followed by biotic stressors, and finally anthropogenic stressors. Each student will be responsible for leading the discussion of a topic of their choice. A tentative calendar of topics is provided below, though topics are negotiable provided alternative topics are approved by me before the second week of the semester. Each Wednesday, I will provide a general overview of the stressor and its physiological and ecological implications. The following Monday, the student responsible for that stressor, having thoroughly reviewed the literature and worked with me to select two manuscripts on the topic, will lead a discussion. I will provide a detailed rubric used to assess discussion leading.

*Graduate students will be responsible for one discussion on their own and be assigned a topic on which they provide guidance to an undergraduate on reviewing the literature.

Literature Review

In reviewing the literature to lead the discussion, you will have become an expert in your selected stressor (Congratulations!!). You will use this knowledge to synthesize the literature in a written review structured as a manuscript submission to a scientific journal. Drafts of all reviews will be due on **Nov 17**. Each student will then be randomly assigned another students' paper for peer review. Students will use the feedback from their peers to revise and submit their final papers no later than **Dec 15**. While these reviews can focus on a general topic, I encourage student to explore more specific, novel questions with the aim of submitting the manuscript for publication. I will provide detailed graduate and undergraduate rubrics in advance of the first deadline.

Participation

Each week, an assigned discussion leader will provide two readings from the primary literature. It is essential for productive discussion that all students complete the readings before class. All students will be required to suggest a discussion question for each paper, submitted on Canvas prior to class and actively participate.

Course attendance, curves, and make up policy

Attendance is required and essential for success in this course. I understand that absences happen, but if you make this a habit, you are guaranteed to perform poorly. There will be NO curve applied to grades. If you have a valid documented excuse and notify me as soon as possible, you may be able to make up missed assignments or attend virtually. I will determine this on an as-needed basis. **DO NOT COME TO CLASS IF YOU ARE ILL.**

Policy on electronic devices

While in the classroom, use them if you want, but if they become distracting to your classmates, you will be asked to leave. Also, please note that the use of devices for socializing during class is very obvious to your classmates and your instructors. We'll make a mental note of it as disrespectful, and it leaves a negative impression.

UF counseling services

Resources are available on campus for students having personal problems or lacking clear career and academic goals. The resources include:

U Matter We Care, <https://umatter.ufl.edu/>, P: 352.294.CARE(2273) | E: UMatter@ufl.edu, resources and programs focused on health, safety, and holistic well-being.

UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.

Career Resource Center, Reitz Union, 392-1601, career and job search services.

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 Honesty Policy

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). For additional information on Academic Honesty, please refer to the University of Florida Academic Honesty Guidelines at:

<https://catalog.ufl.edu/ugrad/current/advising/info/student-honor-code.aspx#honesty>.

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>

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. Once notification is complete, the Dean of Students Office of Disability Resources will work with the instructor to accommodate the student.

Special COVID-19 Related practices

In response to COVID-19, the following practices are in place to maintain your learning environment, to enhance the safety of our in-classroom interactions, and to further the health and safety of ourselves, our neighbors, and our loved ones.

- If you are not vaccinated, get vaccinated. Vaccines are readily available at no cost and have been demonstrated to be safe and effective against the COVID-19 virus. Visit this link for details on where to get your shot, including options that do not require an appointment: <https://coronavirus.uflhealth.org/vaccinations/vaccine-availability/>. Students who receive the first dose of the vaccine somewhere off-campus and/or outside of Gainesville can still receive their second dose on campus.
- You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated. Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

Sanitizing supplies are available in the classroom if you wish to wipe down your desks prior to sitting down and at the end of the class.

Hand sanitizing stations will be located in every classroom.

- If you sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email covid@shcc.ufl.edu) to be evaluated for testing and to receive further instructions about returning to campus. UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the UF Health Screen, Test & Protect website for more information.

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.

If you are withheld from campus by the Department of Health through Screen, Test & Protect you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.

- Continue to regularly visit coronavirus.UFHealth.org and coronavirus.ufl.edu for up-to-date information about COVID-19 and vaccination.

Virtual material and privacy-related issues

Our class sessions may be audio-visually recorded for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate verbally are agreeing to have their voices recorded.

If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared.

As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

Tentative course schedule - subject to change

| | | Lecture topic | Reading topic | Discussion Leaders |
|-----------------------------|--------|-------------------------------------|---|---------------------------|
| Mon | 23-Aug | What is stress? | Course syllabus | NA |
| Abiotic stress | | | | |
| Wed | 25-Aug | Light | NA | NA |
| Mon | 30-Aug | NA | Shade, excess solar energy | 1. |
| Wed | 1-Sep | UV-B Radiation | Radiation stress | NA |
| Mon | 6-Sep | NO CLASS – Labor day | | |
| Wed | 8-Sep | Temperature | NA | NA |
| Mon | 13-Sep | NA | High temperature, chilling, freezing | 2. |
| Wed | 15-Sep | Water | NA | NA |
| Mon | 20-Sep | NA | Drought, flooding | 3. |
| Wed | 22-Sep | Salt | NA | NA |
| Mon | 27-Sep | NA | Salt avoidance, halophytes | 4. |
| Wed | 29-Sep | Nutrients | NA | NA |
| Mon | 4-Oct | NA | Macronutrient deficiency, nutrient excess | 5. |
| Wed | 6-Oct | Heavy metals | NA | NA |
| Mon | 11-Oct | NA | Micronutrient deficiency, metal toxicity and tolerance | 6. |
| Wed | 13-Oct | Wind | NA | NA |
| Mon | 18-Oct | NA | Acute wind stress (e.g., hurricanes), chronic wind stress | 7. |
| Wed | 20-Oct | Gravity | NA | NA |
| Mon | 25-Oct | NA | Limits on plant height, plants in space! | 8. |
| Biotic stress | | | | |
| Wed | 27-Oct | Herbivores | NA | NA |
| Mon | 1-Nov | NA | Herbivore defenses, community dynamics and dispersers | 9. |
| Wed | 3-Nov | Intra and interspecific competition | NA | NA |
| Mon | 8-Nov | NA | Competitive strategies (growth, allelopathy), parasitism | 10. |
| Wed | 10-Nov | Pollinator competition | NA | NA |
| Mon | 15-Nov | NA | Phenological mismatch, floral divergence | 11. |
| Wed | 17-Nov | Pathogens and pests | NA | NA |
| Mon | 22-Nov | NA | Fungal and viral infections, pest damage | 12. |
| Wed | 24-Nov | NO CLASS - Thanksgiving | Videos: <i>Fire Swamp</i> 😊 (youtube) and <i>Inside the Megafire</i> (NOVA) 😞 | |
| Anthropogenic stress | | | | |
| Mon | 29-Nov | NA | Fire resistance, wildfire mortality | 13. |
| Wed | 1-Dec | Atmospheric change | NA | NA |
| Mon | 6-Dec | NA | Air pollutants, plant climatic niche and range projections | 14. |
| Wed | 8-Dec | Final wrap up discussion | NA | NA |