

Plant Ecology (PCB3601C) Spring 2019

Lead Instructor:

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Research Interests: Nature conservation; tropical forestry; fire ecology; forest & savanna ecology

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Laboratory Instructors:

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Course Website: Go to E-Learning (<http://lss.at.ufl.edu/>) & login to e-learning in Canvas with your Gator Link ID. Reading quizzes must be taken on Canvas BEFORE the class/lab meeting unless otherwise announced during the class. Updates to schedules & supplementary readings will be posted on this website along with copies of other course-related communications sent to you via e-mail. Be sure that you are receiving these messages (several sent even before classes commenced).

Course Description: This course introduces ecology as a scientific discipline with emphasis on Floridian plants & ecosystems. By the end of the course, students should be familiar with ecological principles related to how plant populations & communities interact with their environments at local, regional, & global scales. The labs emphasize the ability to recognize common plants, vegetation types & ecosystems of the region while they introduce students to hypothesis testing and scientific reporting through field experiments, manuscripts and posters, and oral presentations.

Lectures: Tuesday & Thursday, Period 5, 11:45-12:35 in CLB-C130

Labs: Periods 6-9, 12:50-4:55 PM. 114 Rolf Hall on either Monday (section 7425, class #17958), Tuesday (sections 27GB and 8206, class #s 17957 and 17959), or Wednesday (section 8223 class #17960). For field labs specified as “Field” in the syllabus, meet at the specified location at the specified time. We often depart from the parking lot behind Bartram/Carr Halls, but be sure to check your syllabus. We will try to return to campus on time, but provisions should be made in case we fail to do so. Weekday field trips start at 12:50. The two Friday trips depart from behind Bartram/Carr Halls sharply at 9:30 AMs.

NOTE THAT THERE WILL ALSO BE TWO MOST-OF-THE-DAY **FRIDAY** FIELD TRIPS (IN LIEU OF OTHER LABS) FOR WHICH THERE IS A LIBRARY OPTION FOR ANYONE WHO REALLY CANNOT ATTEND OR WHO WOULD RATHER RESEARCH AND WRITE A PAPER THAN VISIT SOME REALLY BEAUTIFUL PLACES

Required and Recommended Books, Supplies, and Tools

REQUIRED: Plant Ecology Syllabus and Lab Manual (available during the first week of classes at Target Copy on University Avenue for about \$10).

REQUIRED: A bound field notebook specific for this course. We recommend that you obtain a field-book with waterproof paper such as the Elan e-64 soft-cover with 50 pages.

RECOMMENDED HIGHLY: Shimel, J. 2012. Writing Science. Alternatively, you can always use Strunk, W. and E.B. White. 2000. The Elements of Style. Note that the focus of this course is on Science, but that focus covers the ability to communicate about Science effectively.

RECOMMENDED: A 10X hand lens (=loope = magnifying glass).

RECOMMENDED: Finding Home in the Sandy Lands of the South by F.E. Putz, available at Amazon, on Kindle, & at the Florida Museum of Natural History Book Store.

Software: The required software packages are CMAP, WORD, POWERPOINT, & EXCEL.

Pedagogical Approach (including reading requirements): This course is designed to reflect current research on learning. For example, this pedagogical research (i.e., studies on the science of teaching) reveals that students (both strong & not-so-strong) learn better when they work in cooperative groups & when they have opportunities to discover information for themselves that is relevant to their own lives. To foster learning, therefore, inquiry-based activities are extensively used in this course. Interestingly enough, inquiry-based learning looks remarkably like the scientific method. Most labs begin before you report for your session—in preparation for each lab, you will typically be asked to answer or reflect on a situation (Pre-Lab Questions to be submitted on-line before your scheduled lab). During most labs, you will formulate hypotheses, design experiments, carry out experiments, analyze data, reach conclusions, & suggest modifications to experiments. Although this creative & iterative process is at the heart of Science, it is too often disregarded to the point that Science seems like boring drudgework and meaningless memorization.

A prerequisite for effective “active learning” is that class participants come to each session prepared. Generally this preparation involves reading of the assigned material that will be provided. In recognition that all class participants have conflicting demands on their time, in addition to your inherent thirst for ecological knowledge, thorough reading will be motivated by pre-“lecture” quizzes (on-line) that will weigh fairly heavily in the calculation of course grades.

Given that every group of learners is different & our approach to teaching constantly evolves, often in a saltatory manner, the syllabus is not specific about the number of assignments nor the natures of all of them. This vagueness will allow the instructors to respond to perceived needs in an adaptive manner. For example, if many class members are struggling with a topic or concept, additional time & possibly assignments will be devoted until the learning impediments are removed or circumvented.

Over-Arching Learning Goals: To understand how local plant populations and communities are affected by natural and anthropogenic environmental factors through lectures, discussions, and hands-on experience with the scientific processes of hypothesis formulation, experimental design, data analysis, and written and oral presentation of research results.

Underlying Theme: Importance of plants for sustainable resource use and maintenance of hospitable environments for humans & other organisms.

Key Concepts & Learning Objectives

- 1. Biogeography:** geological history of the biosphere (with local emphasis); global & regional patterns of plant species & life form diversity.
- *Learning objective assessment:* Ability to describe global & local biogeographical regions as well as the major paleoecological events (e.g., continental drift & climate change) responsible for their development.
- 2. Climate & Climate Change:** physics of climatological phenomena; global climate drivers; climate diagrams; past & on-going climate change.
- *Learning objective assessment:* Ability to explain regional climate patterns from basic physical principles, global atmospheric circulation patterns, ocean currents, & distributions of continents & major mountain ranges.
- 3. Resources & Productivity:** above & below ground resource acquisition & use; mycorrhizae; photosynthetic light utilization by leaves, whole plants, & vegetation; CO₂ limitation on photosynthesis; O₂ limitations on respiration; water-use efficiency.
- *Learning objective assessment:* Ability to explain how environmental factors influence net photosynthesis & ecosystem productivity using graphs & concept maps.
- 4. Populations, Communities, & Landscapes:** structures & dynamics of plant populations & communities; life histories; competition; disturbance (especially fire); stress (especially fire suppression & flooding); succession; regeneration; invasive exotic species.
- *Learning objective assessment:* Ability to explain how population & community dynamics of plants are influenced by disturbance, stress, & species interactions.
- 5. Biogeochemistry (Nitrogen, Phosphorus, Carbon, & Water Cycles):** soil structure & formation; nutrient cycles; anthropogenic effects (e.g., increased nitrogen deposition); mitigation & adaptation to climate change.
- *Learning objective assessment:* Ability to explain natural & anthropogenic factors that influence soil types, mineral nutrient availability, & plant community characteristics.
- 6. Global Change, Biodiversity & Conservation:** climate-change impacts, land-use change, fragmentation & edge effects, conservation strategies, biofuels, urban ecology, & human “footprints,” life in the Anthropocene.
- *Learning objective assessment:* Ability to explain trade-offs involved in biodiversity conservation, economic development, & mitigation of climate change.
- 7. Scientific Method:** formulation of falsifiable hypotheses, experimental design, data graphing & basic statistics (mean & variance), avoidance of bias, benefits of replication, minimum detectable difference, power.
- *Learning objective assessment:* Ability to formulate novel hypotheses, design experimental protocols to falsify those hypotheses, graph/analyze/interpret results, and present studies in oral and written forms in manners appropriate for science.
- 8 Restoration Ecology and Invasive Exotic Species:** different approaches to restoration/reforestation/reclamation; restoration as a redemptive opportunity for destruction; invasiveness vs. invasibility.
- *Learning objective assessment:* Recognize some of the pros and cons of different approaches to ecological restoration; understand the factors that govern the invasibility of communities and the invasiveness of species.

Grading:

“Lecture” (including exams, in class assignments, take-home assignments): 60%

Lab (including weekly assignments, research papers, plant collection, poster, lab practical, etc.): 40%

A large portion of your lab grade will be based on your independent research on fire ecology (an oral presentation and two submissions of a written manuscript) and edge effects (a poster presentation).

Your grade will be calculated as follows:

93-100% A; 90-92% A-; 87-89% B+; 83-86% B; 80-82% B-; 77-79% C+;

73-76% C; 70-72% C-; 67-69% D+; 63-66% D; 60-62% D-; 0-59% E

Grades will be rounded to the nearest whole point (e.g. 89.5 = 90, 89.49 = 89)

Information on current UF grading policies for assigning grade points can be found at:

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

*Remember that the time to improve your grade is during the semester, not after final grades are calculated. Grades will only be changed at the end of the semester if there were calculation errors.

Special Assignments (note there will be many more):

Self-portrait with plant: To help your instructors to learn the names of class participants, submit a digital photograph of yourself with a plant you feel represents you. Your picture should include your selected plant species either as a sample in your hand or as the backdrop to your portrait and a legible sign with your name. You will submit your portrait to Canvas and include a message in which you identify the species portrayed (common names will suffice this early in the semester but not afterwards), why you feel it represents you, and one natural history observation about that species. For example, you might have your picture taken in front of a camphor tree (*Cinnamomum camphorum*) and point out in your message that its crushed leaves smell like a mentholated chest poultice (e.g., Vick's Vapo-rub). Before your second lab, which will be held during the second week of the semester, send your picture as an e-mail attachment to both your laboratory instructor and fep@ufl.edu.

Plant collection: Learning to “read” a landscape requires knowledge about the principal species. To foster your ability to recognize plant species and interpret their status in communities, you are required to prepare and submit a collection of 50 native plant species and 2 invasive exotics. The collections can be predominantly digital (i.e., photographs), analogue (i.e., physical collections of small but recognizable samples of each species), or artistic (e.g., recognizable line drawings, ink impressions, or etc.), but each depiction or collection must be your own (and identifiable as such)—no downloaded images will be accepted. Each sample should be identified to species (Latin binomial and vernacular name), its taxonomic family noted, its growth form described (at least tree, shrub, vine, herb, or graminoid), its habitat briefly described, and two distinctive characteristics noted. Included in the 50 should be two complete herbarium specimens (in newspaper, not mounted) with labels prepared as instructed.

Notes on Attendance and Related Issues:

1. Quizzes will be administered mostly on our e-learning site and are often due 1 hour before the scheduled class. No makeups will be allowed.
2. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>).
3. Assignments will be accepted late but, without appropriate excuse, the grades will be reduced somewhat.
4. Make-up exams will be administered to students with legitimate and documented excuses submitted to the instructor in advance (or at the earliest date possible in case of serious illness). The makeup exam will be given only at a later date, likely with more challenging content and in a different format.
5. If you miss a lab for an acceptable reason (e.g., health issues or course conflict), arrange with your instructor for a make-up activity in advance or as soon as possible afterwards to receive credit.

6. Students with disabilities requesting classroom accommodation should register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/), which will provide documentation that should be given to the instructor when requesting accommodation.

Academic Honesty: All students registered at the University of Florida have agreed to comply with 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”. Furthermore, 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-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. 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. Written assignments will be assessed using the internet-based anti-plagiarism software **Turnitin**, a web-based program that is able to identify matching and partially altered phrases from web content and Turnitin databases, allowing for the evaluation of proper and improper citation as well as for dishonest plagiarism.

Student Complaint Process: *If you want to complain about this course in an official manner, please use this website:* https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

Online Course Evaluation Process: Students should provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. Evaluations are typically open during the last week of the semester. **If >80% of your classmates submit their evaluations**, 1 percentage point will be added to all grades, so do exert some peer pressure. Summary results of these assessments are available at <https://evaluations.ufl.edu/results/>.

Field Trip Preparation:

Listed below are the tools required (1-6) or recommended (7-13) every time we go to the field in lab.

1. **Long pants** (first line of defense against catbrier vines, snakes, chiggers, and ticks), preferably light in color so that “seed ticks” show up like a patch of pepper.
2. **Boots or sturdy closed-toed shoes.** We will visit wet places with catbrier vines, snakes, chiggers, burning embers, smoldering duff, and ticks. Rubber boots are fine, except for controlled burns. **NO SANDALS.**
3. **Water** or dilute Gatorade (and something to carry it in so your hands are free).
4. **Field notebook and pencil** - bound, water proof with half the pages graph paper. Be sure to date every page and note your location. The first pages of the notebook should contain space for a table-of-contents and be labeled with your name and contact information. Always bring it; your instructor may announce a surprise notebook check.
5. **Random number table:** extract and write at least 100 on the inside cover of your field book.
6. **Raingear** - a folding umbrella works well.
7. Bug repellent – please apply in a well-ventilated place.
8. Food - blood sugar levels must be maintained for the duration.
9. Hand lens - 10X or 15X—reasonably good ones can be purchased for about \$10.
10. Calculator or phone, the latter for taking pictures.
11. Binoculars if you have them.
12. Hat and sunscreen.
13. Ruler - also mark the outside of your field book with centimeters.

IMPORTANT CAUTIONARY NOTE: In addition to beautiful landscapes, fascinating ecosystems, and compelling environmental problems, Florida offers us ticks, chiggers, mosquitoes, and poisonous snakes. Furthermore, given that our controlled burns involve open flames and smoke, they involve some small risks as well. We will do all we can to assure your safety in the field but you need to dress appropriately, follow instructions, and otherwise being careful so as to minimize risks and unpleasanties.