

Plant Ecology (PCB3601C) Spring 2014

Lecturing 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 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 this website. Be sure that you are receiving these messages (several sent even before classes commenced).

Course Description: This course will introduce students to 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, & introduce students to hypothesis testing through field experiments.

Lectures: Mondays & Wednesday, Period 5, 11:45-12:35 in 211 Bartram Hall

Labs: Mondays & Tuesdays, Periods 6-9, 12:50-4:55 PM. 114 Rolf Hall. For field labs specified as Field (van), meet behind Bartram/CARR Hall unless otherwise notified. We will try to return to campus on time, but provisions should be made in case we fail to do so.

NOTE THAT THERE WILL ALSO BE **TWO REQUIRED ALL-DAY SATURDAY FIELD TRIPS** (with optional overnights), one in late January/early February & one in mid-March.

Required and Recommended Books, Supplies, and a Tool

REQUIRED: Plant Ecology Syllabus and Lab Manual (available at Target Copy on University Avenue for about \$10).

REQUIRED: Gurevitch, Scheiner, and Fox. 2006. The Ecology of Plants. 2nd ed. Sinauer Associates, Sunderland, MA. (used copies of this textbook should be available—order early)

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: Strunk, W. and E.B. White. 2000. The Elements of Style. 4th or 5th Edition by now. Longman Publishers. Other basic grammar books can substitute, but this is one is inexpensive & perfectly adequate. 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 drudgework.

A prerequisite for effective “active learning” is that class participants come to each session prepared. Generally this preparation involves reading of the assigned pages in the textbook or other sources 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 approaches to teaching constantly evolves, often in a saltatory manner, the syllabus 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 & communities are affected by natural & anthropogenic environmental factors through lectures, discussions, & hands-on experience with the scientific processes of hypothesis formulation, experimental design, data analysis, & written & oral presentation of research results.

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

Key Concepts & Learning Objectives (also see the “word-cloud” on the cover page)

1. **Biogeography:** geological history of the biosphere (with local emphasis); global & regional patterns of plant species & life form diversity; phenological adaptations to seasonality. (Chapters 18, 19, 20)

- *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. (Chapters 17 & 18)

- *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. (Chapters 2 & 3)
- *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. (Chapters 5-13)
- *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. (Chapters 4, 14, 15, 16)
- *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.” (Chapter 21)
- *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.