PLANT ECOLOGY
PCB 3601 C
SYLLABUS & LAB MANUAL
SPRING 2014

Instructor: Professor Francis E. "Jack" Putz
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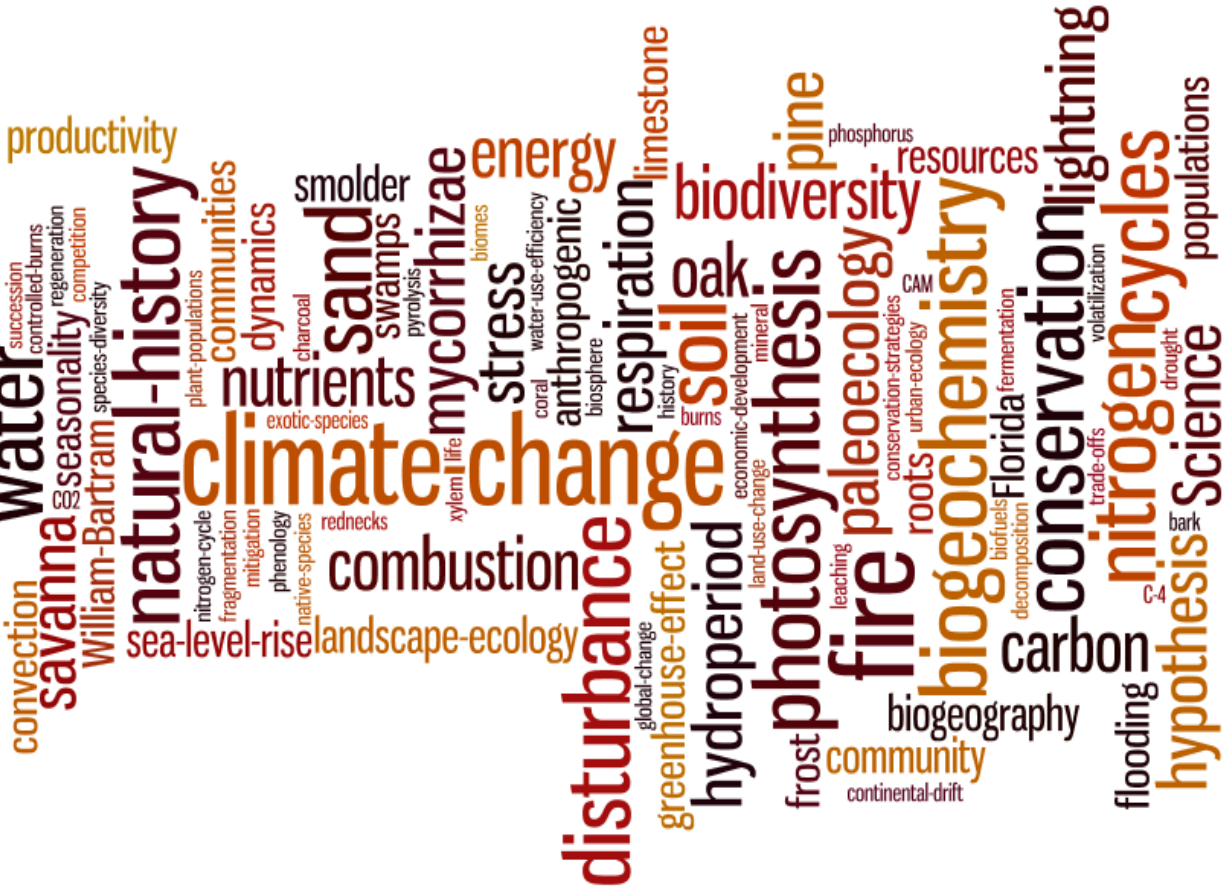

Plant Ecology (PCB3601C) Spring 2014

Lecturing Instructors:

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Laboratory Instructors

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Course Website: Go to E-Learning (http://lss.at.ufl.edu/) and login to e-learning in Sakai with your Gator Link ID. Reading quizzes must be taken on Sakai BEFORE the class meeting unless otherwise announced during the class. Updates to schedules and 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 and ecosystems. By the end of the course, students should be familiar with ecological principles related to how plant populations and communities interact with their environments at local, regional, and global scales. The labs emphasize the ability to recognize common plants, vegetation types and ecosystems of the region, and introduce students to hypothesis testing through field experiments.

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

Labs: Mondays and 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.

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 and 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).

Software: The required software packages are WORD and POWERPOINT, but it will behoove you to learn how to use EXCEL (although hand-drawn graphs that are scanned will be accepted with no penalty).

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 and not-so-strong) learn better when they work in cooperative groups and 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, and suggest modifications to experiments. Although this creative and 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 and 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 and 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 and other organisms.

Key Concepts and Learning Objectives (also see the "word-cloud" on the cover page)

1. **Biogeography**: geological history of the biosphere (with local emphasis); global and regional patterns of plant species and life form diversity; phenological adaptations to seasonality. (Chapters 18, 19, 20)
   - *Learning objective assessment*: Ability to describe global and local biogeographical regions as well as the major paleoecological events (e.g., continental drift and climate change) responsible for their development.
2. **Climate and Climate Change**: physics of climatological phenomena; global climate drivers; climate diagrams; past and 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, and distributions of continents and major mountain ranges.

3. **Resources and Productivity**: above and below ground resource acquisition and use; mycorrhizae; photosynthetic light utilization by leaves, whole plants, and vegetation; CO_2 limitation on photosynthesis; O_2 limitations on respiration; water-use efficiency. (Chapters 2 & 3)
   - *Learning objective assessment*: Ability to explain how environmental factors influence net photosynthesis and ecosystem productivity using graphs and concept maps.
4. **Populations, Communities, and Landscapes**: structures and dynamics of plant populations & communities; life histories; competition; disturbance (especially fire); stress (especially fire suppression and flooding); succession; regeneration; invasive exotic species. (Chapters 5-13)
   - *Learning objective assessment*: Ability to explain how population and community dynamics of plants are influenced by disturbance, stress, and species interactions.
5. **Biogeochemistry (Nitrogen, Phosphorus, Carbon, and Water Cycles):** soil structure and formation; nutrient cycles; anthropogenic effects (e.g., increased nitrogen deposition); mitigation and adaptation to climate change. (Chapters 4, 14, 15, 16)
   - *Learning objective assessment*: Ability to explain natural and anthropogenic factors that influence soil types, mineral nutrient availability, and plant community characteristics.
6. **Global Change, Biodiversity and Conservation**: climate-change impacts, land-use change, fragmentation and edge effects, conservation strategies, biofuels, urban ecology, and human "footprints." (Chapter 21)
   - *Learning objective assessment:* Ability to explain trade-offs involved in biodiversity conservation, economic development, and mitigation of climate change.
7. **Scientific Method**: formulation of falsifiable hypotheses, experimental design, data graphing and basic statistics (mean and variance), avoidance of bias, benefits of replication, minimum detectable difference, power.
   - *Learning objective assessment:* Ability to formulate a novel hypothesis and carry through with an experimental test.