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General Plant Ecology/ Plant Ecology

BOT 4601 and BOT 5605 - Fall 2017

lecture: T,R at 12:30 pm - 1:45 pm in PG6 rm 112

[Blackboard Learn](#)

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Course Description

This is a Discipline-specific Global Learning course that counts toward your graduation requirement. We will examine the ecology of plants at different levels: individual, population, community, and global. Our focus will be on the interactions of plants with each other, with other organisms, and with their environment. A general background in ecology is assumed (Prerequisite: PCB 3043, a general ecology class, or permission of instructor). Basic principles and foundations of the field will be considered as well as current research. Readings will come from a textbook, articles from the literature, and various other resources to expand the topics. Our textbook highlights recent advances in research as well as historic studies that have laid the foundation of this important field of biological science. Students are expected to do the readings prior to each class, familiarizing themselves with the content, and coming to class to work on activities that will put the knowledge to use. By maximizing student participation in the learning process, class members will gain competencies in all aspects of plant ecology.

Students are expected to do assigned readings, and watch the lectures on the class content posted in our blackboard course. There will be a clicker quiz that students take at the beginning of class each day to receive quiz credit and to be fully prepared to undertake the activities of the class meeting.

Class meetings will include team-based learning and active learning strategies, including categorizing grids, concept maps, consequences maps, debates and role-playing, group work with reporting, minute papers, misconception checks, pro and con grids, and problem solving.

There will be five exams during the semester and a final exam. There will be two large-scale group projects with oral presentations. Lecture grades will be determined as follows: each exam 10% (the best 5 of 6 -- 50% total), projects 30%, and class participation 20% (clicker quizzes 10%; in-class work (individual and group) 10%). Field trip attendance is an enrichment activity, highly recommended but not required, and those who come will be awarded one extra credit point (1% of course grade) for each one in which they participate. Extra credit points may also be awarded for participation in work-days of conservation organizations up to a total of 10 points.

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Global Learning Outcomes

Global Awareness:

Students completing the lecture course will attain familiarity with the ecology of plants around the world, with special attention to plants of south Florida and tropical environments. Students will be able to understand the many environmental forces that determine the occurrence of species, various forms of the plant body, and the performance and reproductive success of plants in different situations. They will discover the diversity present in different plants families, and compare and contrast their findings with those of counterparts in other parts of the world. By working on activities with students from other countries, students will experience international collaboration in solving problems.

Global Perspective:

After this course, students should be able to: appreciate and explain how and why all life on earth depends on plants. They will be able to discuss and illustrate how plants adapt to environmental stresses, and explain how basic plant parts have been modified for a variety of functions and purposes. They will compare plant strategies for reproduction, competition, and interactions with other species (plant and animal) using the details of plant life cycles and life history. They will recognize different habitats based on the plants present and/or their adaptations, and be able to measure species richness, evenness, and diversity, and compare habitats and communities. They will assess the "quality" of habitats and evaluate them; make informed recommendations for plantings in urban/suburban environments ("the right plant in the right place"); trace and appreciate all the connections and human activities that depend on plants; and find and share information on rare plants, conservation projects, and organizations in the U.S. and other parts of the world.

Global Engagement:

In addition, students may appreciate that humans have caused threats to many plants and their habitats, the perils faced by diverse plants in different habitats, and be cognizant of actions taken to conserve species, their genetic diversity, and environments. Students will know how to utilize the scientific literature, especially peer-reviewed journals, important and relevant books, websites, botanical and ecological organizations, to answer questions and meet future challenges.

Finally, students will be able to use their knowledge in planting their own yards and neighborhoods, making gardens, working with others in community gardens and habitat restoration projects. They will be able to think like scientists, exhibiting skepticism about claims made by others, and display a "show me" attitude in requiring data and analyses to back up claims made by others/ agencies/ companies/ governments. They will become aware of projects around the world investigating the important role that plants play in regulating the global climate, projects and organizations that conserve habitats and the biodiversity contained within, and become personally involved in one or more of these projects as a member or contributor of ideas and other resources.

PLANT ECOLOGY LAB

Students pursuing lab activities will gain experience in field and lab research in plant ecology, be able to collect and analyze data, and interpret findings in written and oral presentations. They will succeed in working in teams, monitoring the growth of experimental plants, and measuring the outcome of manipulative experiments in the field. All these skills will prepare them for future work in natural areas management, research, or teaching in science.

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FIU Code of Ethics and our course:

You are expected to be on time to class, and to stay the full period. You are expected to maintain high standards of academic honesty, avoiding plagiarism, and turning in or presenting work that is original and citing sources when used. Any student found in violation of these standards will earn an automatic F and be reported to the Deans Office, no exceptions made. In accordance with FIU's policy on academic honesty, as set forth in Section 2.44 of the Academic Affairs Policies and Procedures Manual (<http://academic.fiu.edu/docs/aapolicies.htm>), it is expected that students in Plant Ecology will not submit the academic work of another person or persons as their own (both individual students and groups). Additional discussion of academic honesty and integrity may be found in the Manual on Student Conduct. We will use Turnitin.com in this course.

Textbooks

required: Gurevitch, J., S.M. Scheiner, and G.A. Fox. 2006. *The Ecology of Plants*, 4th ed. Sinauer Associates, Inc. Sunderland, Massachusetts. Read chapters before the date they appear in the syllabus to be prepared for class that day.

recommended: Stewart, Amy. 2009. *Wicked Plants: The Weeds that Killed Lincoln's Mother and Other Botanical Atrocities*. Algonquin Books.

Week 1 T: Plant Ecology – what will you experience? Pretest for later comparisons of knowledge gained. Course goals rated by students. Read textbook ch. for an overview of this subject.

Week 1 R: quiz on syllabus – feedback on what students want to learn most -

Week/dates	topic	text
Week 1 – T 22 Aug 2017	Plant Ecology – what will you experience? Pretest for later comparisons of knowledge gained. Student instructions. Course goals rated by students. Read textbook ch. for an overview of this subject. Before next class complete Student Assessment of Learning Gains pre-course survey at salgsite.org for one extra credit point.	1
Week 1 – R 24 Aug	Photosynthesis and light – Read two articles about Tillandsia photosynthetic adaptation for class discussion. Succulent plants visit class as subjects for group problem solving. Watch news videos about crop plants in extreme weather to prepare for consequences mapping activity using white boards in groups.	2
Wk 2 – T 25 Aug	Water relations – water potential – groups diagram the movement of water through a tree describing water potential changes over the course of 24 hours using large post-it papers and small post-its (groups assigned various habitats in different regions of world).	3
Wk 2 – R 31 Aug	Soil and nutrients – soil properties. Watch animations of different soil types from the Scottish Crops Research Institute in preparation for making a character	4

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	to represent a soil type found in Florida and one in another part of the world with your group.	
Wk 3 – T 5 Sep	Presentations - Plant Challenges – group presentations on soil types and the challenges they present to plants living in them.	
Wk 3 – R 7 Sep	Exam 1 – IFAT format – students take individually first for 50% of their score, then do in a group for the other 50% (in this way everyone learns from each other and goes away with better understanding)	
Wk 4 - T 12 Sep	Population structure, growth and decline – concept map activity on studying rare plant populations. Jigsaw #1 project assignment on plant reproduction (presentations in week 5)	
Wk 4 - R 14 Sep	Processes of Evolution - Population Biology – read article on desert annuals for class discussion. Feedback on rare plant concept maps from other groups and professor. Time for some group work on jigsaw	5
Wk 5 – T 19 Sep	Outcomes of Evolution – Habitats, plant adaptations, life forms – Pro/con grids examine why certain life forms are more common in some places. Read two articles about pollination, and watch the two jungle videos and The Beauty of Pollination videos for class discussion. Establish first contact with plant ecologists (of Dra. Cecilia Diaz-Castelazo and Dr. Jose Garcia Franco) at Instituto de Ecologia in Xalapa, Veracruz, Mexico, using polycom or Adobe Connect. First topic of comparison – plant life forms in habitats around campus/institution, with students sharing photos, videos, and conversation.	6
Wk 5 – R 21 Sep	Jigsaw presentations by groups on topics of vegetative reproduction and sexual reproduction. Each group is assessed using a rubric by every student and the professor, and each student also assesses the members in their group on preparation, participation, collaboration.	7
23 Sep Saturday	Field Trip to Fairchild Tropical Garden 9 am - 1 pm – observe plants from different parts of the world and discuss their adaptations to survive, grow, and reproduce	
Wk 6 – T 25 Sep	Plant life histories – plant reproductive phenology – group work concept map compare/contrast plants of tropical wet and tropical dry forests, temperate vs. subtropical habitats. Seeds and seedlings – watch videos about Millennium seed bank and Vavilov's seed bank in Russia – contrast with germplasm reserve for tropical plants at Chapman Field in Miami. Read articles on seed dispersal and seed predation, and watch the videos, for discussion. Class skype long distance-interaction (Q & A) with Dr. Denise Costich, head of maize germ plasm collection at CIMMYT (Mexico).	8

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Wk 6 - R 28 Sep	Exam 2 - IFAT format – students take individually first for 50% of their score, then do in a group for the other 50%	
Wk 7 - T 3 Oct	Plant Communities – sampling and classification. Read two articles about community change for class discussion; also watch videos on plant community boundaries and Dutch ecological networks for discussion. In-class “fieldwork” via website that allows students to sample plots all over Everglades conservation areas – demonstration, then each student individually explores an area selected in their groups – next class come together and compare/contrast.	9
Wk 7 – R 5 Oct	Competition (intraspecific and interspecific) and other interactions. DeWit replacement experiment diagrams to plot and interpret in group exercise. Amazon water lily video to discuss all the interactions of this species with others in its environment. Jigsaw #2 assignment – plant-plant interactions. Presentations in week 9.	10
Wk 8 – T 10 Oct	Herbivory and plant pathogen interactions – read articles to prepare for class discussion. Plant defenses – human tableau of how different kinds work in different plant/herbivore examples assigned to each group. Polycom interactions with INECOL plant ecology students in Mexico on topic of plant defenses. Wicked Plants group assignment – each group makes five good quiz questions for upcoming quiz on this book (due next class).	11
Wk 8 – R 12 Oct	Disturbance and Succession – primary and secondary succession. Watch videos on glacier recession and fire in the chaparral for discussion. Group brainstorming and write-board presentations on how succession (what type?) proceeds (including time scale) for a variety of scenarios – share with everyone at end of class.	12
15 October - Sunday	Fieldtrip to Corkscrew Swamp Sanctuary (arrange carpooling, it is far but gorgeous!)	
Wk 9 – T 17 Oct	Jigsaw presentations on Plant/plant interactions - Each group is assessed using a rubric by every student and the professor, and each student also assesses the members in their group on preparation, participation, collaboration.	
Wk 9 - R 19 Oct	Clicker Quiz on Wicked Plants AND Exam 3 - IFAT format – students take individually first for 50% of their score, then do in a group for the other 50%	
Wk 10 24 Oct	Diversity and Rarity – what are the different ways a plant can be rare? Read article about twinflowers in Scotland, visit websites, and watch videos on course website to prepare for class discussion. Group activity: concept map to evaluate what factors cause the rarity of various plant species, assigned one per group.	13

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Wk 10 – R 26 Oct	Ecosystem Processes - Read articles about Ecosystem Processes to discuss in class, after presentations by groups about reasons for rarity (previous class). Network analysis activity with host trees and parasitic plants. Pro/con grids in group work considering the use of network analysis to describe and understand communities and ecosystems.	14
Wk 11 - T 31 Oct	Communities in Landscapes – community classification and remote sensing – team-based learning activity on changes in biodiversity and productivity in cleared fields of different sizes, data from LTER in Minnesota JIGSAW #3 assignment – Parasitic Plants (presentations due week 13)	15
Wk 11 – R 2 Nov	Landscapes, metapopulations, habitat fragmentation – the entire class will play The Metapopulation Game, looking at dynamics of small populations with different rules (connectivity, dispersal parameters changing).	16
Wk 12 – T 7 Nov	Exam 4 – IFAT format - students take individually first for 50% of their score, then do in a group for the other 50%	
4-5 November - Sat/Sun	Fieldtrip to Archbold Biological Station – exploration of scrub and flatwoods habitats, field problems with overnight stay, morning birding and pollinator study	
Wk 12 – R 9 Nov	Climate and vegetation – read articles on plant migration and watch videos for class discussion. Biomes – group work comparing/contrasting two biomes, and finding where in the world these biomes occur. Concept map of challenges to conservation of biota in this biome. Each group examines one conservation organization and describes what it does for endangered plants and their habitats.	17 18
Wk 13 – T 14 Nov	Jigsaw presentations: Parasitic Plants - Each group is assessed using a rubric by every student and the professor, and each student also assesses the members in their group on preparation, participation, collaboration.	
Wk 13 – R 16 Nov	Regional and Global Diversity – team-based learning exercise examining diversity of selected plant families in Florida and around the world. Adobe Connect interactions with Brazilian botanists at Universidade de Campinas to discuss these families in South America, and Dr. Jose Garcia Franco and students at INECOL in Xalapa Mexico (parasitic plant ecologist).	19
Wk 14 – T 21 Nov	Paleoecology – read articles and watch videos on the history of (plant) life on earth. Group work on pollen records from lake cores, from pollinators’ bodies, and from flower stigmas (female receptive parts).	20
23 Nov - R	Thanksgiving holiday, no class meeting	

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Wk 15 - T 28 Nov	Global Change: Humans and Plants – Each group investigates a different crop plant, tracing its history of cultivation and future prospects under climate change. Skype interactions w/ Dr. Denise Costich and colleagues of CIMMYT (Mexico). Student evaluations of instructor(s) in class time allocated at end of class.	21
Wk 15 - R - 30 Nov	Exam 5 – IFAT format - students take individually first for 50% of their score, then do in a group for the other 50% Students complete SALG survey post-course at salgsite.org by the end of finals week for one extra credit point.	
Wk 16 - T 5 Dec	Final exam 12 - 2 pm – multiple choice test of same format as pre-test, cumulative over entire course content	

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