

Biology 596 Plant Ecophysiology

3 units (2 hours lecture + 1 unit field trip)

Instructors: Matthew Edwards, David Lipson

Course Description:

This course covers the physiological mechanisms underlying the growth, reproduction, survival, abundance and geographic distribution of plants. How ecological phenomena are driven by patterns of photosynthesis, water relations, mineral nutrition, growth and allocation, and life cycles of plants in the context of their physical, chemical and biological environment.

Grading Criteria:

	points	%
Midterms* (3 x 100)	300	66.7%
Writing assignment	50	11.1%
Discussion participation	50	11.1%
Discussion presentation	50	11.1%
Total	450	100%

*In addition to the three midterms corresponding to the three portions of the class, there will be a cumulative final exam, also worth 100 points, covering all topics in the course. Students will drop their lowest exam score among the three mid-terms and the final exam.

Field Trip:

The class will schedule an overnight field trip to Santa Margarita Ecological Reserve, a field station operated by SDSU. The trip will include field activities demonstrating techniques in plant ecophysiology, learn about research at the reserve and an intensive discussion of classic and recent scientific literature on topics related to the lecture material. The class will break into groups, with each group discussing a different article. Each group will present an summary of their discussion to the entire class. For the discussion section, students will be graded on the clarity and content of their presentation, and on their level of participation in group discussions.

Writing Assignment:

Students will prepare a concise (3 pages, single spaced) synthesis of 2-3 primary literature articles that address one of the lecture topics. The articles and synthesis may support, modify or contradict the lecture material. The point of this assignment is not to produce a comprehensive review on a subject, but rather to develop basic skills required for scientific writing: to find relevant studies in the literature, understand them, and link them together to support a point.

Required text: Plant Physiological Ecology by Hans Lambers, F. Stuart Chapin, III, Thijs L. Pons (Springer)

DATE	TOPIC	CHAPTER	INSTRUCTOR
8/26	Course Intro		DL/ME
8/28	Photosynthesis I (light reactions)	2A	ME
9/2	Labor day (no class)		
9/4	Photosynthesis II (dark reactions)	2A	ME
9/9	Photosynthesis III (assimilation pathways)	2A	ME
9/11	Photosynthesis in the marine environment	2B	ME
9/16	Respiration	2B	ME
9/18	Transport of assimilates	2C	ME
9/23	Plant water relations I	3	DL
9/25	Plant water relations II	3	DL
9/30	Leaf energy budget: temperature and radiation	4-5	DL
10/2	Midterm 1		
10/7	Mineral nutrition I	6	DL
10/9	Mineral nutrition II	6	DL
10/14	Growth and allocation I	7	DL
10/16	Growth and allocation II	7	DL
10/21	Growth and allocation III	7	DL
10/23	Life cycles I	8	ME
10/28	Life cycles II	8	ME
10/30	Symbiotic associations I	9A	DL
11/4	Symbiotic associations II	9A	DL
11/6	Midterm 2		
11/11	Veterans Day (no class)		
11/13	Ecological biochemistry: allelopathy	9B	KW*
11/18	Ecological biochemistry: defense compounds	9B	ME
11/20	Microbial pathogens	9C	DL
11/25	Parasitic plants	9D	DL
11/27	Interactions among plants	9E	ME
12/2	Carnivorous plants	9F	ME
12/4	Ecophysiological controls on global processes I	10	DL
12/9	Ecophysiological controls on global processes II	10	ME
12/11	Midterm 3		
12/18	Final exam (8-10 AM)		

*- GUEST LECTURE (TENTATIVE)

Student Learning Outcomes

Identify the physiological mechanisms underlying the growth, reproduction, survival, abundance and geographic distribution of plants

Describe the physiological adaptations of plants to different environmental stresses

Explain how plant physiology is impacted by environmental variability and climate change

Describe how climate change could lead to altered patterns of plant distribution and allocation, and how this could feed back to have global impacts

Critically analyze and discuss scientific literature in the field of plant physiological ecology