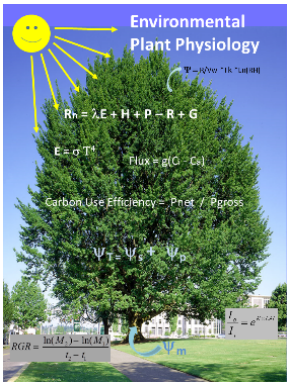
Environmental Plant Physiology



2020 Lecture and Exam Schedule

Plants, Soils and Climate 5270 / 6270

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Date	Topic	Energy component
January 8	Course Overview: Introduction	
10	Leaf Energy Balance: Energy input	Energy into the
15	Leaf Energy Balance: Types of Radiation	Plant Community
17	Leaf Energy Balance: Longwave radiation	
22	Leaf Energy Balance: Radiation absorption.	
24	Leaf Energy Balance: Transpiration	
29	Leaf Energy Balance: Conduction & Convection	
31	Plant Growth Analysis: Relative Growth Rate	
February 5	Plant Growth Analysis: Leaf and Stem partitioning	
7	Plant Growth Analysis: Community growth rate	Energy Intercepted
12	Plant growth analysis: Leaf angles	by the Plant Community
14	**In class EXAM: Radiation & Growth analysis**	
19	Canopy Photosynthesis: Radiation absorption	
22	Canopy Photosynthesis: Radiation attenuation	
26	Canopy Photosynthesis: Radiation attenuation	
28	Photosynthetic efficiency	
March 2 – 6	**Spring Break - no class**	
11	Photosynthetic efficiency	Energy conversion
13	Photosynthetic efficiency	in photosynthesis
18	C_3/C_4/CAM Characteristics in Plants	
20	Water Use Efficiency: stomatal control	
25	Maintenance and Growth Respiration	Energy Conversion
	(Take home mid-term - 24 hours- due next day at noon)	in respiration
27	Maintenance and Growth Respiration	
April 1	Long distance Transport: Pressure gradients	
3	Phloem Transport: Driving gradients	Energy Partitioning
8	Assimilate Partitioning: Source-Sink Relationships	to seeds
10	Assimilate Partitioning: Source-Sink Relationships	
15	Absorption Capacity of Root Systems	
17	Nitrogen: uptake, translocation, assimilation	
22	Stress Physiology: Water and temperature	

April 27 Monday **- Comprehensive Final Exam: 11:30 – 1:20**

Environmental Plant Physiology

Environmental Plant Physiology links the cellular and biochemical analysis in plant physiology with whole plant physiology. We seek to understand how physiological processes are integrated to cause whole plant responses in communities. The subject matter is related to Plant Physiological Ecology and Environmental Biophysics. The basic concepts and approaches are applicable to all types of plants, from turf grass to redwood trees, in rainforests or the alpine desert.

The emphasis is on the relationship between environmental parameters (radiation, temperature, water, nutrients), and their effect on physiological processes (photosynthesis, respiration), and plant responses (leaf expansion, partitioning of dry mass, water status, and transpiration). We will examine the integration of these plant responses into models that help to better understand and predict growth and yield.

TEXT: Environmental Plant Physiology (Selected readings)
Reference books:

1. Physicochemical and Environmental Plant Physiology, 4th ed. Park Nobel. 2009.
2. Plant Physiological Ecology. Lambers et al. 2008.
3. Plant Physiology, 6th Edition. Taiz and Zeiger. 2015.
4. The Physiology of crop yield. 2nd edition. Hay and Porter. 2006.
5. Plants and Microclimate, 2nd edition. 1992. Hamlyn Jones.
6. Physiology of Crop Plants by Gardner, Pearce and Mitchell. 1985
7. Environmental Biophysics. 2nd edition. Campbell and Norman. 1998.
8. Basic Growth Analysis. Roderick Hunt. 1990.
9. An Introduction to the Physiology of Crop Yield. 1990. Hay and Walker.
10. Plant Growth and Development. Leopold and Kridemann. 1975.

If a student has a disability that will likely require some accommodation by the instructor, the student must contact the instructor and document the disability through the Disability Resource Center. In cooperation with the Disability Resource Center, course material may be provided in alternative formats.

GRADING

Environmental Plant Physiology is quantitative and conceptual. Exams will aspire to test conceptual understanding. There will be an in-class midterm, a take-home midterm, and an in-class final. Some of the questions on the exams will require calculations so bring a calculator to the exams. *One page of notes (both sides of the page) will be allowed for reference information and equations during in-class exams.*

The underlying basis for testing and grading is to stimulate a thorough understanding of the subject matter without intimidating or discouraging interested students. Every effort will be made to help serious students learn the material.

GRADING DISTRIBUTION

	% of total	points
Homework & Modeling Assignments	15 %	150
In-Class Midterm	20 %	200
Take-Home Midterm	30 %	300
Comprehensive Final Exam	35 %	350
Total	100 %	1000