

# FOR6340, Section 7668

## Physiology of Forest Trees - Spring 2009

**Instructor:** Dr. Tim Martin  
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**Office:** 359 Newins-Ziegler Hall

**Office Hours:** Feel free to drop in anytime if my office door is open; Otherwise by appointment

**Class Meetings:** Fridays Periods 6-9 (12:50 p.m. - 4:55 p.m.), 219 Newins-Ziegler Hall

### Objectives:

- I. To develop an understanding of the physiological ecology of forest trees, with special emphasis on:
  - (a) the unique morphological and physiological adaptations that set trees apart from other plants;
  - (b) the integration of physiological information across levels of biological organization from the cell to the landscape; and
  - (c) the interactions among forest management, physiology, and tree and forest productivity.
- II. To become familiar with current issues in ecophysiological research through discussions of the literature.
- III. To become familiar with current experimental and measurement approaches used in ecophysiological research.

### Textbooks (optional; both are available on reserve in the library):

Lambers, H., F.S. Chapin III and T.L. Pons. 2008. Plant Physiological Ecology, Second Edition. Springer-Verlag, New York. 610 p.

Pallardy, S.G. 2007. Physiology of Woody Plants, Third Edition. Academic Press, San Diego. 480 p.

### Grades:

*Exams* 50% of course points

There will be one midterm exam and one comprehensive final exam, each worth 25% of the course points. You will be responsible for material from the lectures and literature discussions. The final exam will be held on Wednesday, April 29, 7:30-9:30 a.m.

*Participation in literature discussions* 30% of course points

We will periodically discuss papers from the peer-reviewed literature. I will give you the citation for the paper to be discussed at least one week in advance. Responsibility for leading discussions will be spread around the class by randomly assigning each figure or table to a student, who will describe the methods used to generate the data presented, highlight the key interpretations of the figure/table, and lead a pertinent discussion. To ensure that all students become familiar with the material, figure/table assignments will be made on the day of the discussion.

*Participation in carbon seminars* 20% of course points

I will be organizing a seminar series of speakers from UF and elsewhere who will be speaking on topics related to carbon sequestration. Dates and times of the seminars are noted in the class schedule. Attendance at four seminars is required. To register your attendance, check in with me or my designee at the seminar.

Final grades will be assigned as: A (90-100 %), B+ (85-89 %), B (80-84 %), C+ (75-79 %), C (70-74 %), D+ (65-69 %), D (60-64 %), E (< 60 %).



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## Lecture and Discussion Schedule

Date	Lecture Topic	Suggested Reading in Lambers, Chapin and Pons, 2 <sup>nd</sup> Edition (chapters are similar in 1 <sup>st</sup> Edition)	Paper for Discussion Or Carbon Resources Seminar (3:00-4:00, 112 Newins-Ziegler Hall)
Jan 9	Course introduction; review material.	Chapter 1, "Assumptions and Approaches"	Seminar: Dr. Tim Martin, UF SFRC, "UF Carbon Resources Science Center: Introduction and Opportunities"
Jan 16	Carbon dynamics I: Photosynthesis, C isotope discrimination,	Chapter 2A, "Photosynthesis"	Paper discussion: Ryan, M.G. 2002. Canopy processes research. <i>Tree Physiology</i> 22:1035-1043.
Jan 23	Carbon dynamics I (continued)	Chapter 2A, "Photosynthesis"	Seminar: Dr. Sabine Grunwald, UF Soil and Water Science Department,
Jan 30	Carbon dynamics II: CHO transport, storage and utilization	Chapter 2C, "Long-Distance Transport of Assimilates" Chapter 7, Section on "Allocation to Storage"	Paper discussion: Nicotra <i>et al.</i> 2003. Sexes show contrasting patterns of leaf and crown carbon gain in a dioecious rainforest shrub. <i>Am.J.Bot.</i> 90:347-355.
Feb 6	<b>No Lecture</b>		Seminar: Dr. Roger Sedjo, Resources for the Future, Washington, D.C., "The Role of Forests in Climate Change and in Possible Mitigation"
Feb 13	Carbon dynamics III and IV: respiration and net primary production	Chapter 2B, "Respiration" Chapter 10B, Section 2, "Ecosystem Biomass and Production"	Paper discussion: Zwieniecki, M.A., C.K. Boyce, and N.M. Holbrook. 2004. Hydraulic limitations imposed by crown placement determine final size and shape of <i>Quercus rubra</i> L. leaves. <i>Plant, Cell and Environment</i> 27:357-365.
Feb 20	Effects of radiation I: Shade tolerance, light acclimation, phytochrome	Chapter 7, Section 5.1, "Growth as Affected by Irradiance"	Seminar: Dr. Jim Jones, UF Agricultural and Biological Engineering Department
Feb 27	Effects of radiation II: UV radiation, photoinhibition	Chapter 4B, Section 2, "Radiation"	Paper discussion: TBD
Mar 6	<b>Midterm Exam</b>		Seminar: Dr. Nick Comerford, UF Soil and Water Science Department
Mar 13	<b>Spring Break, No Class</b>		--
Mar 20	Energy balance of leaves and canopies	Chapter 4A, "The Plant's Energy Balance"	Paper Discussion: Baldocchi, D.D. and C.A. Vogel. 1996. Energy and CO <sub>2</sub> flux densities above and below a temperate broad-leaved forest and a boreal pine forest. <i>Tree Physiology</i> 16:5-16.
Mar 27	Water relations I: Water potential; uptake, transport and storage of water	Chapter 3, "Plant Water Relations"	Seminar: Dr. Francisco Escobedo, UF SFRC, "Urban Forests and Carbon"
Apr 3	Water relations II: Regulation of transpiration at the leaf, tree, and canopy scales	Chapter 3, "Plant Water Relations"	Paper discussion: TBD
Apr 10	Water relations III: Hydraulic architecture	Chapter 3, "Plant Water Relations"	Seminar: Dr. Leda Kobziar, UF SFRC, "Fire and Climate Change: Facts, Predictions, and Stumpers"
Apr 17	Shoot, crown and canopy architecture	Chapter 5, "Scaling-Up Gas Exchange and Energy Balance from the Leaf to the Canopy Level"	Paper discussion: TBD
Apr 24	No Class, Reading Day		
Apr 29	<b>Final Exam</b> Wed April 29, 7:30-9:30 a.m		