FORESTRY 431 – Functional Tree Biology
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Course overview:

The lecture portion of the class will focus on physiological processes and the laboratory portion will focus on tree structure. When possible, the laboratory sessions will coincide with material presented in the lectures. Lecture presentations and outside reading assignments will be posted in D2L under FOR 431.

This course aligns with the following UWSP Forestry Program Learner Outcome:

(1.) Demonstrate broad knowledge of forest ecology and biology by:
  (a.) identifying tree species and associated basic silvics of Lake States tree species, and
  (b.) applying basic principles of forest ecology.

Text:
The "text" will consist of a compilation of materials including outside readings from various books and journals.

List of books:

- The Physiological Ecology of Woody Plants. T. Kozlowski, P. Kramer, and S. Pallardy
- The Physiology of Woody Plants. T. Kozlowski and S. Pallardy.
- Plant Physiology. L. Taiz and E. Zeiger
- A New Tree Biology. A. Shigo
- Plant Biomechanics. K. Niklas
- Trees: The Mechanical Design. C. Mattheck.
- Plant Defense. D.R. Walters

Learner Outcomes:
At the end of the semester students will be able to:

1. Detail the development of a tree's above- and below-ground structure over time.
2. Provide descriptions of the processes trees use to:
   - capture and transfer solar energy
   - manufacture compounds to support growth, respiration, and defense.
   - acquire and transport water, essential mineral elements, and manufactured compounds
3. Identify, at the tissue level, the components of a tree's vascular system and differentiate between common types of vascular systems.
4. Describe the external forces that act upon a tree and growth/development adaptations to these forces.

Grading:

Grades will follow the University scale (i.e. A = 90-100, B = 80-89, etc.). The instructor reserves the right to adjust the scale downwards. Exams constitute 70% of your grade in the class. There are 3 exams during the semester and an optional, comprehensive final exam. The average score (%) for your exams will be multiplied by 70. The remaining points are from the 6 quizzes that will be administered during the lab session throughout the semester and one field assignment at the end of the semester (average x 30).

Exams (3/4)	70%
Quizzes (6 + 1 assignment)	30%

Date	Lecture Topic	Date	Lecture Topic
1/20	NO LECTURE	1/22	NO LECTURE
1/27	Course Introduction	1/29	What is a Tree?
2/3	How do Trees Grow?	2/5	How do Trees Grow?
2/10	How do Trees Grow?	2/12	How do Trees Grow?
2/17	**Exam 1**	2/19	How Big Can Trees Get?
2/24	How Big Can Trees Get?	2/26	How Big Can Trees Get?
3/2	How Big Can Trees Get?	3/4	How Big Can Trees Get?
3/9	How do Trees Acquire and Use Resources?	3/11	How do Trees Acquire and Use Resources?
3/16	SPRING BREAK	3/18	SPRING BREAK
3/23	How do Trees Acquire and Use Resources?	3/25	**Exam 2**
3/30	How do Trees Defend Themselves	4/1	How do Trees Defend Themselves
4/6	How do Trees Defend Themselves?	4/8	Why do Leaves Change Color?
4/13	Why do Leaves Change Color?	4/15	How do Trees Survive Winter?
4/20	How do Trees Survive Winter?	4/22	Why can we tap trees for sap?
4/27	Why can we tap trees for sap?	4/29	Open
5/4	Open	5/6	**Exam 3**
Final Exam (Optional) Tuesday 5-12-20, 12:30-2:30 pm			

Attendance and Expectations:

Although attendance will not be recorded, there is an expectation that students will be prepared (i.e. outside reading assignments completed) to attend all lectures and lab periods. There is an expectation, unless instructed otherwise, that students will turn in original work. Failure to meet this expectation will be viewed as academic misconduct and will be addressed per Chapter 14 of the Wisconsin Administrative Code, Rules of the Board of Regents of the University of Wisconsin System.

Lab Manual:

Lab worksheets will be made available at the start of each new topical area. The majority of the lab periods will involve the dissection and examination of tree tissue samples. In most cases, samples will be prepared using a microtome. However, in some instances there will be a need to prepare the samples yourself using razor blades or an Xacto knife. You are to develop a detailed drawing illustrating the various tissues. To accomplish this, please purchase the following for use during the lab periods:

- Very sharp knife, X-acto knife with replaceable blades or similar.
- Box of colored pencils

LAB MATERIAL IS INCLUDED IN THE EXAMS!

Week	Lab Topic	Quiz Material
1	NO LAB	
2	Lab Information/Buds & Primary Growth	
3	Secondary Growth (Ring)	Week 2
4	Secondary Growth (Diffuse & Conifer)	
5	Pith and Heartwood	Weeks 3-4
6	Branches	Week 5
7	Branches	
8	Tree Defense – wound level	Week 6-7
9	Spring Break – NO CLASS	
10	Tree Defense – whole tree	
11	Decay Detection - resistograph	Weeks 8 & 10
12	Roots – Dissection	Week 11
13	Roots Demo (Field - Schmeekle)	
14	Roots Assignment (Field - Schmeekle)	

SOCIETY OF AMERICAN FORESTERS
CODE OF ETHICS

Principles and Pledges

1. Foresters have a responsibility to manage land for both current and future generations. We pledge to practice and advocate management that will maintain the long-term capacity of the land to provide the variety of materials, uses, and values desired by landowners and society.

2. Society must respect forest landowners' rights and correspondingly, landowners have a land stewardship responsibility to society. We pledge to practice and advocate forest management in accordance with landowner objectives and professional standards, and to advise landowners of the consequences of deviating from such standards.

3. Sound science is the foundation of the forestry profession. We pledge to strive for continuous improvement of our methods and our personal knowledge and skills; to perform only those services for which we are qualified; and in the biological, physical, and social sciences to use the most appropriate data, methods, and technology.

4. Public policy related to forests must be based on both scientific principles and societal values. We pledge to use our knowledge and skills to help formulate sound forest policies and laws; to challenge and correct untrue statements about forestry; and to foster dialogue among foresters, other professionals, landowners, and the public regarding forest policies.

5. Honest and open communication, coupled with respect for information given in confidence, is essential to good service. We pledge to always present, to the best of our ability, accurate and complete information; to indicate on whose behalf any public statements are made; to fully disclose and resolve any existing or potential conflicts of interest; and to keep proprietary information confidential unless the appropriate person authorizes its disclosure.

6. Professional and civic behavior must be based on honesty, fairness, good will, and respect for the law. We pledge to conduct ourselves in a civil and dignified manner; to respect the needs, contributions, and viewpoints of others; and to give due credit to others for their methods, ideas, or assistance.