

FNR 31110 – Identification and Basic Properties of Wood

Sem 2. 3 Cr. Lec. 2, Lab 3

Course Format and Instructors

The course will be taught in two modules:

Module 1 (weeks 1 to 9) will be taught by **Dr. Eva Haviarova, Professor**

Forest Products Bldg., Room 111A

E-mail: ehaviar@purdue.edu, Phone: 765-494-3619

Module 2 (weeks 9 to 15) will be taught by **Dr. Rado Gazo, Professor**

Forest Products Bldg., Room 103B

E-mail: gazo@purdue.edu, Phone: 765-494-3634

TA: Charlie Warner:

Forest Products Bldg., Room 105

E-mail: warner88@purdue.edu, Phone: 765-494-9133

Office Hours

Before or after class and via E-mail appointment.

Class Time

Lectures – Monday and Wednesday, 9:30 to 10:20 in **PFEN GO77**

Laboratory – Monday, 3:30 to 6:20 in **PFEN GO77**

Course Description

Module 1:

The identification of macro characteristics of commercially important North American wood species and discussion of their availability, distribution, and unique characteristics.

Module 2:

Fundamental physical, mechanical, and working properties of wood. These properties include the orthotropic nature of wood, grain, texture, moisture content, shrinking, swelling, specific gravity, machining, thermal properties, electrical properties, strength properties, natural characteristics affecting mechanical properties, the effect of manufacturing, and service environment on mechanical properties.

Course Objectives

Module 1:

1. To recognize essential macro characteristics of commercially important wood species (color, odor, cellular arrangement, grain patterns, character marks, etc.).
2. To learn how to utilize the ID key to identify the most important commercial wood species in North America.

Module 2:

1. To develop a basic understanding of the physical and mechanical properties of wood.
2. To understand the impact of the environment on the properties of wood.

Learning Outcomes

Module 1:

- Students will be able to utilize the ID key and identify upon sight the most important commercial hardwood and softwood species produced in North America.
- Students would be knowledgeable about availability, distribution, unique characteristics, and products made of these wood species.

Module 2:

- Students will be able to measure, test, and compare the basic mechanical and physical properties of wood.
- Students will be able to recognize how the environment affects the properties of wood-based products.

Required Textbooks

Module 1:

R. Bruce Hoadley 1990. Identifying Wood, The Taunton Press, ISBN 0-942391-04-7
Inside Wood Database:

<http://insidewood.lib.ncsu.edu/search;jsessionid=480B4B3D923302CB1D4A826E5C4B4C7F?0>

Module 2:

Wood Handbook: Wood as an Engineering Material. 1999, Forest Products Society,
Reprinted from Forest Service, U.S. Department of Agriculture. The online version is
available for free at: <http://www.fpl.fs.fed.us/documnts/fplgtr/fplgtr113/fplgtr113.htm>

Required Tools

Hand Lens – 10 to 14x magnification, available at the PU bookstore or
Illuminated Loupe Led light 40X – 25MM available online
Cutting Tools – pocketknife or single-edge razor blades

COURSE OUTLINE*

Week

Module 1 Subjects

- 1 **Wood Identification in general** – the classification of woods; the structure of woody plants; gross anatomical features of a tree stem (cross-section of a tree); transverse, radial, tangential sections; cellular structure – wood tissue, growth rings, etc.
Lab: Visual recognition of anatomical features of the woody stem.
- 2 **Introduction of macroscopic properties** – color, odor, cellular arrangement, grain patterns, figure, character marks, hardness, density, special features, etc.
Lab: Visual recognition of macroscopic properties.
- 3 **Structure of Hardwoods** – growth rings, vessels/pores, parenchyma, rays;
Lab: Introduction and utilization of Hardwood ID Key.
- 4 **Ring-porous hardwood species** – oaks, chestnut, elm, ash, honey locust, etc.

- Lab:** Hands-on wood ID – ring-porous hardwood species.
- 5 ***Semi-ring-porous hardwoods species*** – walnut, live oak, or persimmon, etc.
Lab: Hands-on wood ID – semi-ring-porous hardwood species.
- 6 ***Diffuse-porous hardwoods species*** – beech, sycamore, maple, poplar, cherry, etc.
Lab: Hands-on wood ID – diffuse-porous hardwood species.
- 7 ***Structure of softwoods*** – tracheid, parenchyma, rays; resin canals; softwoods with large resin canals (pines), softwoods with small resin canals (Doug fir, spruce, or larch), softwoods with no resin canals (hemlock, cedar, bald cypress, redwood, or yew).
Lab: Hand on macroscopy of softwoods and use of Softwood ID Key.
- 8 ***Review and integration*** – separate softwood from hardwoods; for softwood, separate species with resin canals from no resin canals; for hardwoods, separate by porosity; provide tips within each type of wood.
Lab: Hand on wood ID – all species.

Week Module 2 Subjects

9. ***Appearance of wood*** – Orthotropic nature of wood, grain, and texture, plain sawn and quarter sawn lumber, decorative features of common woods
Lab: Appearance of wood.
10. ***Moisture content*** – Green wood, fiber saturation point, equilibrium moisture content, shrinkage of the wood.
Lab: Moisture content and shrinkage.
11. ***Specific gravity*** – wood weight, density, and specific gravity.
Lab: Specific gravity
12. ***Physical properties*** – Working qualities, weathering, decay resistance, chemical resistance, thermal properties, electrical properties, acoustic properties.
Lab: Measurement of physical properties.
13. ***Mechanical properties of wood*** – Compression, tension, static bending.
Lab: American Society for Testing and Materials test of compression, tension, static bending of wood, part 1.
14. ***Natural characteristics affecting mechanical properties*** – Specific gravity, knots, grain, reaction wood, extractives.
Lab: American Society for Testing and Materials test of compression, tension, static bending of wood, part 2.

15. ***Effect of manufacturing and service environment on mechanical properties***
 – Moisture content, temperature, age, chemicals, stains, and decay.
Lab: American Society for Testing and Materials test of compression, tension, static bending of wood, part 3.

* Instructor reserves the right to make slight changes to the syllabus.

Grading	<u>% of grade</u>
Module 1:	
ID Quizzes 5 @ 1 & 2%	9 %
Lab Reports 6 @ 2%	12 %
Exam 1	10 %
Unknown Wood ID	10 %
Final Exam (optional)	5 %
<u>Attendance & Participation</u>	4 %
	50 %
Module 2:	
Quizzes 5 @ 1%	5 %
Lab Report	10 %
Homework 3 @ 2%	6 %
Exam 2	20 %
Final Exam (Optional)	5 %
<u>Attendance & Participation</u>	4 %
	50 %
Total Module 1 & 2	100 %

The final exam is optional, the choice between an average of exams from Module 1 and 2 or taking the final exam.

Grade	Range (%)
A+,A	93-100
A-	90.0 - 92.9
B+	87.0 - 89.9
B	83.0 - 86.9
B-	80.0 - 82.9
C+	77.0 - 79.9
C	73.0 – 76.9
C-	70.0 – 72.9
D+	67.0 – 69.9
D	63.0 – 66.9
D-	60.0 – 62.9
F	< 60.0

Student grades, status, and progress can be discussed at any time upon request of either the student or the instructor. Grade appeal procedures are available by university policy.

WARNING: No assignments will be accepted late, and no make-up exams will be given unless arrangements are made with the instructor before the due date of the assignment or exam.

Class Attendance

Absences during this semester will be addressed according to the current Purdue policy. Attendance is mandatory. In the case of absence, please notify instructors with an explanation. 10 unexcused absences will result in “F” grade in the course (exceptions, such as medical issues, must be communicated with the instructor).

Use of Electronic Devices

Use of laptops, cell phones, pagers, iPads, and other electronic devices is not permitted in class unless otherwise specified by the instructor. Electronic devices may be brought with you to class, but they are to be closed and off/silent during the class and used only with the permission of instructors.

Academic Dishonesty

Incidents of academic misconduct in this course will be addressed by the course instructor and referred to the Office of Student Rights and Responsibilities (OSRR) for review at the university level. Scholastic dishonesty includes, but is not limited to, cheating, use of illegal crib notes, copying during examinations, copying of assignments, exercises, and computer programs, plagiarism, and knowingly furnishing false information. Moreover, knowingly aiding and abetting, directly or indirectly, other parties in committing dishonest acts is in itself dishonest.

Any violation of course policies related to academic integrity will result minimally in a failing or zero grade for that particular assignment and at the lead instructor’s discretion may result in a failing grade for the course. In addition, all incidents of academic misconduct will be forwarded to OSRR, where university penalties, including removal from the university, may be considered. In addition, students should be made aware that they can report issues of academic integrity that they observe, either through the Office of the Dean of Students (purdue.edu/odos), call 765-494-8778, or email integrity@purdue.edu. While the information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern.

It is expected that students will follow the Purdue Honors Pledge in this class: “As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together – we are Purdue.”

What is Plagiarism?

The council of Writing Program Administrators (CWPA) states that plagiarism “occurs when a writer deliberately uses someone else’s language, ideas, or other original (not common knowledge) material without acknowledging its source”. Thus, whenever a person chooses to repeat the exact words written by another author, that person must mark them with quotation marks (“”) and provide a citation to the original source. Two excellent sources of additional guidance are:

1. Michael Harvey, *The Nuts and Bolts of College Writing* (Hackett Publishing Co.)

2. Gordon Harvey, *Writing with Sources: A Guide for Students* (Hackett Publishing Co.)

Use of AI

Academic dishonesty includes using Artificial Intelligence to write your assignment. If students are permitted to use AI for an assignment by the instructor, they must disclose how and where they used it. Instead of using openAI to edit your assignments, we encourage students to use Grammarly or Hemmingway Editor. AI technology is evolving, so this policy is subject to change and will be updated on Brightspace.

Campus Emergency

Purdue University is a very safe campus and there is a low probability that a serious incident will occur. However, emergency preparedness is your personal responsibility. Purdue University is continuously preparing for natural disasters or human-caused incidents with the ultimate goal of maintaining a safe and secure campus. Please review the following procedures:

- *To report an emergency, call 911.*
- *To obtain updates regarding an ongoing emergency, and to sign up for Purdue Alert text messages, view www.purdue.edu/ea*
- *There are nearly 300 Emergency Telephones outdoors across campus and in parking garages that connect directly to the Purdue Police Department (PUPD). If you feel threatened or need help, push the button and you will be connected immediately.*

- *If we hear a **fire alarm**, we will immediately suspend class, **evacuate the building**, and proceed outdoors, and away from the building. **Do not use the elevator.***
- *If we are notified of a Shelter in Place requirement for a **tornado warning**, we will suspend class and shelter in the lowest level of this building away from windows and doors.*
- *If we are notified of a Shelter in Place requirement for a **hazardous materials release, or a civil disturbance**, including a shooting or other use of weapons, we will suspend class and shelter in our classroom, shutting any open doors or windows, locking or securing the door, and turning off the lights.*

For additional information, please go to the Purdue Emergency Preparedness website:

https://www.purdue.edu/ehps/emergency_preparedness/index.html

Specific building information could be found in the **Building Emergency Plan (BEP)**.

https://www.purdue.edu/ehps/emergency_preparedness/bep

The BEP is normally maintained by the Building Deputy. “Shelter in place” means that student should not leave the building when the outdoor sirens are sounded. Moreover, if the building fire alarms are activated, everyone must evacuate the building and should proceed to their emergency assembly area as specified in the BEP.

In the event of major campus emergency, course requirements, deadlines, and grading percentages are subject to change that may be necessitated by a revised semester calendar or other circumstance. If necessary, information will be posted on the Blackboard.

Mental Health

Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at 765-494-6995 or <http://www.purdue.edu/caps/> during and after hours, on weekends and holidays or through its counselors physically located in the Purdue University Student Health Center (PUSH) during business hours.

Nondiscrimination

The existing Purdue University Nondiscrimination Policy: *Purdue University is committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life.*

Purdue University prohibits discrimination against any member of the University community on the basis of race, religion, color, sex, age, national origin or ancestry, marital status, parental status, sexual orientation, disability, or status as a veteran. The University will conduct its programs, services and activities consistent with applicable federal, state and local laws, regulations and orders and in conformance with the procedures and limitations as set forth in (http://www.purdue.edu/purdue/ea_eou_statement.html) which provides specific contractual rights and remedies.

Anti-Harassment Policy

Strictly following and interpreting existing University Policy: *Purdue University is committed to maintaining an environment that recognizes the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding and mutual respect; and encourages its members to strive to reach their potential. The most effective way to work toward preventing Harassment is through education that emphasizes respect for every individual.*

Harassment in the workplace or the educational environment is unacceptable conduct and will not be tolerated. Purdue University is committed to maintaining an educational and work climate for faculty, staff and students that is positive and free from all forms of Harassment. This policy addresses Harassment in all forms, including Harassment toward individuals with legally protected status for reasons of race, gender, religion, color, age, national origin or ancestry, genetic information or disability and Harassment toward individuals for other reasons such as sexual orientation, gender identity, gender expression, marital status or parental status. The University will not tolerate Harassment of its faculty, staff or students by persons conducting business with or visiting the University, even though such persons are not directly affiliated with the University.

Purdue Anti-Harassment Policy (III.C.1): <http://www.purdue.edu/policies/ethics/iic1.html>