

GRANDE PRAIRIE REGIONAL COLLEGE
DEPARTMENT OF SCIENCE AND TECHNOLOGY

Bachelor of Applied Forest Resource Management

Wood Technology and Utilization: FO 4200

Pre-requisite: FO 1200

Calendar Description:

Chemical and physical properties of wood; species identification; primary, secondary, and other uses of wood: lumber, plywood, chip and particle board, pulp and paper, panel products, wood fibre products, and reconstituted wood products. Introduction to integrated wood products.

Instructor: Jennifer Hacking
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Lectures: Tuesdays/Thursdays 10:00 – 11:20

Labs: Wednesdays 2:30 – 4:20

Please note: Some labs will be field trips to mills and will take more than two hours. Labs will not be offered every week to compensate for longer trips.

Texts: Required:
 Haygreen, John G., and Jim L. Bowyer, 1996. **Forest Products and Wood Science**. Iowa State University Press.

Recommended:
 Hoadley, R. Bruce, 1990. **Identifying Wood: Accurate Results with Simple Tools**, The Taunton Press, Inc., Connecticut.

Course Evaluation:

Course evaluation will consist of the following components:

Assignments and lab reports	30%
Midterm exam	20%
Wood quality assignment	25%
Final exam	25%

Due dates for assignments and lab reports will be given when they are assigned. The midterm date is negotiable within reason; the final exam will be held in the exam period in April.

Barring tragic circumstances, late assignments and lab reports will not be accepted, marked, or included in the course mark.

Course Outline:

I. Structure of wood and bark

- A. Course objectives/requirements & introduction. Week 1
i. Importance of wood as a material HB Introduction & Ch. 18
ii. Classification and naming of tree species HB Ch. 1: pp. 3-7
- B. Macroscopic character of wood Week 1; HB Ch. 2
i. three orientation planes
ii. growth rings
i. heartwood and sapwood
ii. rays
iii. spiral and interlocking grain
iv. branches and knots
- C. Basic process of tree growth and wood formation Week 2; HB Ch. 1; pp. 6-19
i. A tree's design needs
ii. Apical meristems, cambium, and cork cambium
iii. Cambial division and wood cell development
- D. Composition and structure of wood cells Week 3; HB Ch. 3
i. Photosynthesis and chemical composition
ii. Cell wall structure: types & sizes of cell wall layers & relation to wood density
iii. Cell wall sculpturing: pits & other features & relation to wood permeability
iv. Microfibrils, microfibril angle & relation to strength and shrinkage & swelling of wood
- E. Comparative softwood and hardwood anatomy Week 4; HB Ch. 4, 5
i. Different cell types and proportions
ii. Patterns of variation of cell characteristics
- F. Unusual wood types & bark Week 4; HB Ch. 6, 7
i. "Juvenile" and "mature" wood
ii. Growth stresses and reaction wood ("compression" wood & "tension" wood)
iii. Wood of branches and roots
iv. Bark

II. Wood properties

- A. Wood and water Week 5; HB Ch. 8
i. Moisture content definitions
ii. Homework project: measuring moisture content and shrinkage of a wood sample
iii. Shrinkage and swelling
iv. Drying and drying defects
- B. Density and specific gravity Week 6; HB Ch. 9
i. Definitions
ii. Homework project: measuring the specific gravity of a wood sample
iii. Patterns of variation
- C. Mechanical properties of wood Week 7; HB 10
i. Basic stress/strain concepts
ii. Clear wood strength variations (species, direction plane specific gravity, moisture content, etc.)

- iii. Determination of allowable stresses in lumber (visual versus machine stress grades)
- D. Other wood properties Week 7
 - i. Thermal properties
 - ii. Energy content for fuels
 - iii. Electrical properties

III. The connection between growth, silviculture, & wood quality

- A. Review of biology of tree growth and wood formation Week 8; HB Ch. 1: pp. 8-19
- B. Effects on silviculture & genetics of wood quality Week 8; HB Ch. 12

IV. Production of major forest products

- A. Biomass of tree & relation to utilization Week 9
- B. Roundwood products Week 9; HB Ch. 13
 - i. Logs
 - ii. Poles & piling
- C. Lumber-based products Week 10; HB Ch. 14
 - i. Structural lumber
 - ii. Lumber for remanufacturing industries
 - iii. Glu-lam beams & other engineering products
- D. Veneer based products Week 11; HB Ch. 14
 - i. Plywood
 - ii. Laminated veneer lumber
 - iii. Decorative veneer products
- E. Flake and particle-board based products Week 12; HB Ch. 15
 - i. Particleboard & OSB/waferboard
- F. Fiber based products Week 13; HB Ch. 16
 - i. Paper
 - ii. Hardboard & medium density fibreboard
 - iii. Insulation board
- G. Wood & energy Week 14; HB Ch. 17
- H. Deterioration of wood & wood products Week 14; HB Ch. 11
- I. Wood preservatives & finishes Week 14

V. Forest products marketing

- A. A primer in marketing Week 15
- B. Differences among the products Week 15