

**For 3178**  
**Wood Technology/Utilization 2010**

**Course Structure and Information**

Course and Laboratory Lecturer: Dr. Mathew Leitch, #8659

Laboratory Demonstrator: Steve Elliott

**OBJECTIVES:**

On completion of this course, students should have an understanding and be able to:

- 1) describe macroscopic and microscopic features of hardwood and softwood xylem and phloem;
- 2) comprehend information regarding variability of wood;
- 3) describe wood and bark formation including cell differentiation, cell wall layering and modifications;
- 4) understand the effects cell wall organisation on some wood properties;
- 5) understand the basic chemical composition and properties of wood;
- 6) understand anatomical, chemical and physical characteristics associated with heartwood formation, growth stresses, reaction wood and natural features in wood;
- 7) comprehend several wood physical and mechanical properties and basic wood-moisture relationships and;
- 8) understand the principles of manufacturing lumber, wood based panels, wood composites, engineered wood products and pulp and paper.

**CONTENT:**

- 9) wood and bark structure;
- 10) anatomy and ultra-structure;
- 11) macroscopic and microscopic features of wood;
- 12) tree growth, woody cell development, reaction wood, variability of wood and wood quality;
- 13) identification methods, growth ring and measurement of wood properties;
- 14) wood chemistry, extractives;
- 15) chemical utilization of wood;
- 16) engineering properties of wood;
- 17) natural characteristics and physical properties of wood and;
- 18) industrial processing of wood.

**CONTACT:** 2 hours of lectures per week and 3 hours of laboratories per week.

***Lectures***      Friday 8:30am – 10:30am, BB1016

***Laboratories***    Tuesday 2:30pm – 5:30pm, BB1016

## **LECTURES:**

Lectures are as described on the “Lecture and Laboratory Schedule” attached. This is tentatively the list as it will be; however, class content for a particular day may change if circumstances require. The material to be covered on a changed day will be covered on another day.

## **Laboratories:**

The course includes a laboratory component that is designed:

- to illustrate material you learn in the lectures
- to see first hand the anatomical features of wood at macroscopic and microscopic levels
- to understand the 3 main planes of view for sectioning and viewing specific features
- to teach the methods for sectioning wood material to be viewed under the microscope
- to learn key identifying features in wood
- to help display variation between species as well as within a species
- to learn about and conduct mechanical property tests

Attendance at laboratories and completion of worksheets (any assignment) is required in the course. If you are ill and cannot meet deadlines, inform Dr. Mat Leitch as soon as possible, get a medical certificate, and apply for an extension or for Special Consideration if the situation is prolonged.

## **WORKSHEETS:**

There will be 2 worksheets (required reading) handed out during the semester. Answers to the worksheets will be presented during the semester following marking of the worksheet. These worksheets allow you to read up on pertinent material, expand your knowledge of lecture material and will be included in final exams. A lecture date will be allocated near the end of semester to discuss in more detail these worksheets.

## **TUTORIALS:**

Tutorials are not scheduled during the semester; however, if sufficient interest is shown for a tutorial to be arranged for particular aspects of the course this can be arranged. This will require a portion of the class to want and attend it.

**ASSESSMENT:**

Marks for Wood Technology 3178 will be allocated as follows:

Lecture final exam	40%
Worksheet assignments (2 x 7.5%)	15%
Laboratory final exam	20%
<u>Term project</u>	<u>25% (5)%</u>
Total	100%

- the lecture final exam will be held on a date in April, to be confirmed
- worksheet assignments are due at 5:00pm on the day stated, in the drop-off box for Dr. Mathew Leitch (located near the end of the hall opposite the faculty member offices).

Worksheet assignment #1, handed out on 15/01/10 – due on 22/01/10

Worksheet assignment #2, handed out on 12/02/10 – due on 19/02/10

Term project assigned in first 2-3 weeks – due on or before 19/03/10

Note: for term project a topic must be selected in the first 2 weeks and by the end of the third week a draft Title page, abstract and Table of Contents has to be submitted to Dr. Leitch. This part of the term paper is worth 5% of the term paper mark.

- the laboratory final exam (last week of classes) will be held in the laboratory classroom.

**TEXTS:**

Some items in the course content will be covered in more detail than other items. Some items will require you to explore them independently. The recommended reference text is “Identifying Wood: accurate results with simple tools” by Hoadley (is optional but highly recommended). Some lecture notes will be handed out during class and all notes will be on reserve in the library.

Course text : Hoadley, R.B. 1990. Identifying Wood: accurate results with simple tools.

Taunton Press, CT, USA.

Panshin, A.J. and DeZeeuw, C. 1980. Textbook of wood technology. 4th ed. McGraw-Hill, NY.

*Both are available through the Lakehead University book store.*

Other interesting and useful texts worth looking at (either on reserve in library or in the library somewhere):

- \* Desche, H.E. and Dinwoodie, J.M. 1981. Timber: its structure, properties and utilization. Timber Press, Oregon, USA.
- \* Esua, K. 1977. Anatomy of seed plants. John Wiley & Sons, NY.
- \* Hillis, W.E. and Brown, A.G. (eds) 1984. Eucalypts for wood production. Academic Press, Sydney.
- \* Hoadley, R.B. 2000. Understanding Wood: a craftsman's guide to wood technology. The Taunton Press. CT, USA.
- \* Ilic, J. 1987. The CSIRO family key for hardwood identification. CSIRO Austr. Div. Chem. & Wood Technology Tech. Paper No.8.
- \* Ilic, J. 1990. The CSIRO macro key for hardwood identification. CSIRO Austr. Div. For. & For. Prod.
- \* Jane, F.W. 1956. The Structure of Wood. Adam and Charles Black Ltd. Publishing, London.
- \* Kozlowski, T.T. 1971. Growth and development of trees, Vol. II. Academic Press, NY.
- \* Taiz, L. and Zeiger, E. 1991. Plant Physiology. Benjamin/Cummings Publ. Co. Inc.
- \* Wilson, K. and White, D.J.B. 1986. The Anatomy of Wood: its diversity and variability. Stobart and Son Ltd., London.
- \* Zimmermann, M.H. (ed.) 1964. The formation of wood in forest trees. Academic Press, NY.
- \* Zimmermann, M.H. and Brown, C.L. 1971. Trees: structure and function. Springer-Verlag, NY.

## **Wood Technology Laboratories**

### **ADMINISTRATION:**

Laboratory classes in Wood Technology will be held in the laboratory in the Braun Building (Rm BB0016). These will consist of a 3-hour session in the afternoon on Tuesdays (2:30pm-5:30pm). The laboratories are each week and cover macroscopic and microscopic wood anatomical features mainly. This will involve using hand lenses (to be purchased) and cutting and mounting sections to be viewed under the microscope. Some

computer tools will be used to aid in identifying wood blocks as will reference material such as texts. There will also be a lab or two where we will investigate wood strength properties of various timbers and products utilizing a Universal Wood Testing Machine

The class size is such that all will be able to attend the same laboratory session; there will be no need for two laboratory sessions this year.

You will generally work individually; however, students tend to work along side a friend and help each other with feature identification. This sort of helping each other is encouraged during laboratory classes.

It is recommended to carry a workbook to the laboratory so drawings and notes can be made from sections on the microscopes for future studying etc.

Safety rules in laboratories require closed shoes be worn (no sandals or open-toed shoes) at all times and a lab coat be worn while in the laboratory (optional). Lab coats are to be supplied by the student but are not mandatory (you may wear one if you wish to keep your cloths clean etc.). No playing up or goofing off is to occur in the laboratory. There is to be no food or drink in the laboratory.

Safe procedures for sectioning will be described and demonstrated during the first laboratory session. Sectioning represents the most dangerous activity in this course; therefore extra care should be displayed when sectioning. Demonstrators will be present to assist if you experience difficulties. Also sectioning boards are provided which are to be used at all times when sectioning. These boards have been designed to minimize the occurrence of you being in the path of the sectioning blades and also provide a sturdy and stable work area for sectioning

Two assignments (2 x 7.5%) and one term project (25%) constitute 40% of your total semester mark. Assignments and the project write-up should follow the format of a research paper (for example *The Canadian Journal of Botany* or *The International Association of Wood Anatomists Journal (IAWA Journal)*). It is preferred that computer-based techniques for report writing and graphics are used. These are available in the computer labs on campus. Assignments are to be handed in to the Assignment drop off box for Dr. Mathew Leitch by 5:00pm on the dates noted in the Schedule sheet with a completed assignment cover sheet. Marks will be deducted for late assignments, at the rate of 3% of the marks for that assignment per day, unless an application for an extension has been completed and approved by Dr. Mat Leitch.