Wood-Based Composite Science and Technology Online Distance Education Series

Course Module: Wood Structure

Instructor:

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Course Description:

This course introduces the macro- and micro-structure of wood. It focuses on the practical implications of anatomical structure in the field of wood-based composites. Many wood species are discussed, but limited to species of commercial importance in North America. Examples include species that are commonly used in the manufacture of wood-based composites. Many photomicrographs and animations are used to illustrate concepts. Anatomical features of wood are discussed in relation to wood properties, such as density, permeability, and bending modulus. Understanding how and why wood behaves the way that it does is critical for efficient processing, troubleshooting, and product performance.

Course Lectures:

Lecture	Title
1	Introduction
2	Cell wall structure
3	Chemical composition
4	Softwood structure
5	Hardwood structure
6	Identification**
7	Juvenile wood and reaction wood

8	Structure –c property relationships

**This lecture's quizzes require the use of the pdf file "Wood Identification Quiz 1&2," which can be found in the Course Documents section of this course (Below "Lectures" in the Modules view).

Approximate Time:

10 hours of asynchronous online instruction, available during 13-week period. Each lecture requires 45 to 90 minutes.

Learning Assessment:

Each lecture contains a quiz. Quizzes are not graded and may be retaken. A one-hour final examination is required for completion and may also be retaken. The course is graded on a pass or fail basis, with 70% score on final examination to pass. The exam may be retaken multiple times, but must be completed prior to the end of 13 weeks after enrolling.

Certificate of Completion:

Students must complete all lectures, quizzes and the final exam to receive a Certificate of Completion. To request a certificate, students must email the instructor after passing the final exam.

Questions and Comments:

Students may contact the instructor about course-related inquiries using the email listed above. For technical questions (e.g., receiving a Certificate of Completion), students should email **workspace@oregonstate.edu**

Recommended Reading:

The following documents can be downloaded from the Course Documents section of this course (Below "Lectures" in the Modules view).

Larson, P.R., D.E. Kretschmann, A.Clark III, and J.G. Isebrands. Formation and properties of juvenile wood in southern pines. USDA For. Serv. For. Prod. Lab. Gen. Tech. Rep. FPL-GTR-129.

Maeglin, R.R. 1987. Juvenile wood, tension wood, and growth stress effects on processing hardwoods. In: Proc. 15th Annual Hardwood Symp. Of Hardwood Research Council, May 10-12, 1987. Memphis, TN. Hardwood Research Council.

USDA Forest Products Laboratory. 2010. Wood handbook—Wood as an engineering material. General Technical Report FPL-GTR-190. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. 508 p. Chapters 2 and 3.

References:

Barnett and Jeronimidis. 2003. Wood Quality and its Biological Basis. Blackwell Publishing, Oxford, UK.

Bowyer, J. and J. Haygreen. 2003. Forest Products and Wood Science – an introduction. Iowa State Press, Ames. Iowa.

Downes, G. 2004. CSIRO, Australia. Personal communication.

Center for Wood Anatomy Research, USDA Forest Products Laboratory, Madison, Wisc. http://www2.fpl.fs.fed.us/ [accessed Jan. 18, 2008].

Core, H.A.; W.A. Cote; and A.C. Day. 1976. Wood Structure and Identification. Syracuse University Press, Syracuse, New York.

Butterfield, B.G. and B.A. Meylan. 1980. Three-Dimensional Structure of Wood – an ultrastructural approach. Chapman and Hall, London.

Fengel, D. and G. Wegener. 1989. Wood Chemistry, Ultrastructure, Reactions. Walter de Gruyter, Berlin.

Hoadley, R.B. 1980. Understanding Wood. Taunton Press, Newtown, Conn.

Hoadley, R.B. 1990. Identifying Wood. Taunton Press, Newtown, Conn.

Hough, R.B. 1910. The American Woods: exhibited by actual specimens and with copious explanatory text. Special Collections Research Center, North Carolina State University Libraries, Raleigh, North Carolina. Digital image collection available at http://www.lib.ncsu.edu/specialcollections/forestry/hough/ (accessed 9/20/08).

InsideWood. 2004-onwards. Published on the Internet. http://insidewood.lib.ncsu.edu/search [accessed Jan. 11, 2008].

Jozsa, L.A. and G.R. Middleton. 1994. A discussion of wood quality attributes and their practical implications. Forintek Canada, Vancouver, B.C. Special Publication No. Sp-34.

Lewin, M. and I.S. Goldstein. 1991. Wood Structure and Composition. Marcel Dekker, New York.

Marra, A.A. 1992. Technology of Wood Bonding. Van Nostrand Publ.. New York.

McDonald, I., 2006. Wood anatomy image library. University of British Columbia. http://yellowcedar.forestry.ubc.ca/cawp_lor/wa_imagelibrary/Images1/Forms/AllItems.aspx [accessed Jan. 11, 2008].

McMillin, C.W. and F.G. Manwiller. 1980. The wood and bark of hardwoods growing on southern pine sites – a pictorial atlas. USDA For.Ser.Gen.Tech.Rep. SO-29. 58pp.

Panshin, A.J. and C. de Zeeuw, 1980. Textbook of Wood Technology. McGraw-Hill, New York.

Schoch,W., Heller,I., Schweingruber, F.H., Kienast,F., 2004. Wood anatomy of central European species. Online version: http://www.woodanatomy.ch [accessed Jan. 18, 2008].

USDA. 1981. Wood – Colors and kinds. USDA Forest Serv. Agr. Handbook No. 101. 36pp.

Center for Wood Anatomy Research, USDA Forest Products Laboratory, Madison, Wisc. http://www2.fpl.fs.fed.us/ [accessed Jan. 18, 2007].

USDA Forest Products Laboratory. 2010. Wood handbook—Wood as an engineering material. General Technical Report FPL-GTR-190. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. 508 p., http://www.fpl.fs.fed.us/documnts/fplgtr/fpl_gtr190.pdf [accessed Sept.11, 2010].