



## UNIVERSITI TEKNOLOGI MARA

### BCT441: STRUCTURE AND IDENTIFICATION OF CELLULOSIC MATERIALS

<b>Course Name (English)</b>	STRUCTURE AND IDENTIFICATION OF CELLULOSIC MATERIALS <b>APPROVED</b>
<b>Course Code</b>	BCT441
<b>MQF Credit</b>	3
<b>Course Description</b>	<p>Woody materials like timber, bamboo, rattan, and agricultural fibers are the world's most valuable renewable resources. An understanding of the anatomical structure of this material is essential for its best utilization. To help students achieve this understanding, the major part of the module discusses the macroscopic features common to all local woods such as the tree growth, wood formation, and the composition of wood. Next is a study of Hardwood and Softwood anatomy that emphasizes the relationship between structure, function, and material characteristics. Students will learn to identify the common commercial woods of Malaysia using features that are identifiable through the naked eye, by using hand lens and microscope. Students will also learn the macroscopic features of major agricultural crops in Malaysia such as oil palm, rice, and other important agricultural plants.</p> <p>Woody materials like timber, bamboo, rattan, and agricultural fibres are the world's most valuable renewable resources. An understanding of the anatomical structure of this material is essential for its best utilization. To help students achieve this understanding, the major part of the module discusses the macroscopic features common to all local woods such as the tree growth, wood formation, and the composition of wood. Next is a study of Hardwood and Softwood anatomy that emphasizes the relationship between structure, function, and material characteristics. Students will learn to identify the common commercial woods of Malaysia using features that are identifiable through the naked eye, by using hands lens and a microscope. Students will also learn the macroscopic and microscopic features of major agricultural crops in Malaysia such as oil palm, rice, and other important agricultural plants.</p>
<b>Transferable Skills</b>	Identification of woody materials and agricultural plants
<b>Teaching Methodologies</b>	Lectures, Lab Work, Discussion
<b>CLO</b>	<p>CLO1 Outline and identify the various types of general Bio-Composite resources</p> <p>CLO2 Explain and differentiate the structural and physical features of wood and agricultural waste used in Bio-Composite industry</p> <p>CLO3 Discover and report the important characteristic of the common commercial woods and major agricultural plants in Malaysia</p> <p>CLO4 Discuss within groups and describe the characteristic and applications of various types of common commercial wood in Malaysia based on their species</p>
<b>Pre-Requisite Courses</b>	No course recommendations
<b>Topics</b>	<p><b>1. 1.0 Introduction</b></p> <p>1.1) 1.1 Plant Kingdom and Their Botanical Origin</p> <p>1.2) 1.2 General Classification</p> <p>1.3) 1.3 Classification of Plants</p> <p>1.4) 1.4 Classification of Tree – Softwoods and Hardwoods</p>

<p><b>2. 2.0 General Structure of Wood</b></p> <p>2.1) 2.1 Tree Growth and Wood Formation  2.2) 2.2 Macroscopic Structure of Wood  2.3) 2.3 Chemical Composition of Wood  2.4) 2.4 Ultrastructure of the Wood Cell  2.5) 2.5 General Types of Cells, Pitting, etc.  2.6) 2.6 Earlywood and Latewood  2.7) 2.7 Growth Ring  2.8) 2.8 Sapwood and Heartwood  2.9) 2.9 Spiral Grain, Knots, etc.</p>
<p><b>3. 3.0 Structural Features of Hardwood</b></p> <p>3.1) 3.1 Vessels/Pores – Size, Arrangement, Density, Contents  3.2) 3.2 Wood Parenchyma – Apotracheal and Paratracheal  3.3) 3.3 Ray Parenchyma  3.4) 3.4 Fibers  3.5) 3.5 Other Structural Features – Phloem, Latex Traces, Intercellular Canals</p>
<p><b>4. 4.0 Structural Features of Softwoods</b></p> <p>4.1) 4.1 Tracheids  4.2) 4.2 Wood Parenchyma  4.3) 4.3 Rays  4.4) 4.4 Intercellular Canals  4.5) 4.5 Pitch Pockets</p>
<p><b>5. 5.0 Physical Features of Wood</b></p> <p>5.1) 5.1 Colour  5.2) 5.2 Weight/ Density  5.3) 5.3 Hardness  5.4) 5.4 Texture  5.5) 5.5 Grain  5.6) 5.6 Figure  5.7) 5.7 Odour or Smell  5.8) 5.8 Other Features – Burning Characteristics and Froth Test</p>
<p><b>6. 6.0 Classification of Malaysian Timbers</b></p> <p>6.1) 6.1 Heavy Hardwood  6.2) 6.2 Medium Hardwood  6.3) 6.3 Light Hardwood  6.4) 6.4 Softwood  6.5) 6.5 Vernacular Names  6.6) 6.6 Scientific Names  6.7) 6.7 Trade Names</p>
<p><b>7. 7.0 General, Anatomical Structural, Physical Features and Classificati</b></p> <p>7.1) 7.1 Bamboo  7.2) 7.2 Rattan  7.3) 7.3 Oil Palm  7.4) 7.4 Kenaf  7.5) 7.5 Paddy, Pineapple, Cocoa and Coconut</p>
<p><b>8. 8.0 Examination of Wood, Bamboo, Rattan and Major Agricultural Crops f</b></p> <p>8.1) 8.1 Examination with Naked Eye  8.2) 8.2 Examination with a Magnifier  8.3) 8.3 Use of Dichotomous Key  8.4) 8.4 Application of Light Microscope and Scanning Electron Microscope (SEM)</p>

Assessment Breakdown	%
Continuous Assessment	60.00%
Final Assessment	40.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	Assignment	5%	CLO2 , CLO3
	Lab Exercise	Laboratory Reports	10%	CLO2 , CLO3 , CLO4
	Quiz	n/a	5%	CLO1
	Test	Test 1	10%	CLO1 , CLO2
	Test	Test 2	10%	CLO3
	Test	Test 3	10%	CLO4
	Test	Laboratory Exam	10%	CLO2 , CLO3 , CLO4

Reading List	Recommended Text	<ul style="list-style-type: none"> <li>• Haygreen, J.G and J.L. Bowyer, <i>Forest Products And Wood Science: An Introduction</i></li> <li>• Suhaimi Muhammed, <i>Anatomi Kayu-Kayan</i>, Unit Penerbitan Universiti Teknologi MARA (UPENA)</li> </ul>
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	