



THE FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE

Department of Forestry and Wood Technology

FWT 311 – Wood Chemistry

COURSE PARTICULARS

Course Code: FWT 311

Course Title: Wood Chemistry

No. of Units: 2

Course Duration: 2 hours of theory and three hours of practicals per week for 15 weeks.

Status: Compulsory

Course Webpage:

Prerequisite: NIL

COURSE INSTRUCTORS

Professor A. O. Oluyeye

Room 104, SAAT Building,

Dept. of Forestry & Wood Technology,

Federal University of Technology, Akure, Nigeria.

Phone: +2348033908574

Email: aooluyeye@futa.edu.ng

and

Dr. J. S. Fabiyi

Room 02a, Postgraduate Research Phase I Building,

Dept. of Forestry & Wood Technology,

Federal University of Technology, Akure, Nigeria.

Phone: +2348165111175

Email: jsfabiyi@futa.edu.ng

and

Mrs. H. B. Dafieware

Room 01, FWT Lab. Obakekere,

Dept. of Forestry & Wood Technology,

Federal University of Technology, Akure, Nigeria.

Phone: +2348161748884

Email:

COURSE DESCRIPTION

Chemical composition of wood: elemental and molecular. Structure of wood primary components: Cellulose, hemicellulose, lignin and wood extractives (classes and effect on wood

and wood utilization). Determination of wood primary components. Physical and chemical reactions of wood. Wood chemical derivative: hydroxymethyl cellulose, acetate, xanthrate, and nitrate. Introduction to the chemistry of wood conversion to pulp and paper.

COURSE OBJECTIVES

The objectives of this course are to:

- give the students an understanding of the wood chemicals composition; and
- furnish students with information on the influences of wood chemicals on wood properties and their uses.

COURSE LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this course, the student will be able to:

(Knowledge based)

- describe fundamental aspects of wood chemistry and how these will impact wood processing and utilization; and
- understand the opportunities available in lignocellulosic modification for various uses

(Skills)

- conduct basic wet laboratory wood/biomass chemical extraction.

GRADING SYSTEM FOR THE COURSE

This course will be graded as follows:

Class Attendance	5%
Assignments	5%
Practicals	20%
Test(s)	10%
<u>Final Examination</u>	<u>60%</u>
<u>TOTAL</u>	<u>100%</u>

GENERAL INSTRUCTIONS

Attendance: It is expected that every student will be in class for lectures and also participate in all practical exercises. Attendance records will be kept and used to determine each person's qualification to sit for the final examination. In case of illness or other unavoidable cause of absence, the student must communicate as soon as possible with any of the instructors, indicating the reason for the absence.

Academic Integrity: Violations of academic integrity, including dishonesty in assignments, examinations, or other academic performances are prohibited. You are not allowed to make

copies of another person's work and submit it as your own; that is plagiarism. All cases of academic dishonesty will be reported to the University Management for appropriate sanctions in accordance with the guidelines for handling students' misconduct as spelt out in the Students' Handbook.

Assignments and Group Work: Students are expected to submit assignments as scheduled. **No late assignments will be accepted without prior arrangement.** Missing assignments due to improper submission by the student will be given a grade of zero.

Code of Conduct in Lecture Rooms and Laboratories: Students should turn off their cell phones during lectures. Students are prohibited from engaging in other activities (such as texting, watching videos, etc.) during lectures. Food and drinks are not permitted in the laboratories.

READING LIST

^{2,4}Rowell R.M. (2006). *Handbook of Wood Composites and Chemistry*, CRC press.

^{2,4}Lin, S.Y. and Dence, C.W. (1992). *Methods in Lignin Chemistry*. Springer-Verlag, Berlin. 569p.

^{2,4}Harris, D.C. (1999). *Qualitative Chemical Analysis*. 5th Edition. Freeman and Company. New York. 569p. [ISBN 0-7167-2881-8].

^{2,4}Hon, D.N.-S. and Shiraishi, N. (2006). *Wood and Cellulosic Chemistry*. 2nd Edition. Marcel Dekker. New York. USA. 923p. [ISBN 0-8247-0024-4].

Legend

- 1- Available in the University Library
- 2- Available in Departmental/School Libraries
- 3- Available on the Internet.
- 4- Available as Personal Collection

COURSE OUTLINE

Week	Lecture	Laboratory
1	Introduction Organic chemistry essentials	No Lab.
2-4	Cell wall chemistry <ul style="list-style-type: none"> • Wood extractives • Lignin • Carbohydrates and polysaccharides 	Safety issues will be discussed.
5-6	Chemistry of lignin <ul style="list-style-type: none"> • Biosynthesis • Structure • Isolation 	Extractives content determination
6	Cellulose Chemistry	Extractives content determination

	<ul style="list-style-type: none"> • Structure • Modification • Applications 	
7	Review for the Mid Semester Test Cellulose Chemistry <ul style="list-style-type: none"> • Structure • Modification • Applications 	MID-SEMESTER TEST
8	MID-SEMESTER BREAK	MID-SEMESTER BREAK
9&10	Hemicelluloses Applications	Klason lignin content determination
11	Lignin and Extractives Applications	Klason lignin content determination
12	Chemicals and energy from wood	Klason lignin content determination
13&14	Introduction to Analytical Instruments	No Lab
15	REVISION	No Lab

Laboratory content:

- Production of particleboard (cement bonded composites, resin bonded composites, wood plastic composites)
- Testing of wood-based panel composites
- Submission of the laboratory report on extractives content determination is due by week 9 while Klason lignin determination report is due by week 14