

MODULE DESCRIPTION

General

School	Geotechnical Sciences
Department	Forest and Natural Environment Sciences

Module Information

Title	Chemistry & Chemical Products of Wood
Course Code	H.Y.1
Level of Studies	Undergraduate Studies
Teaching Period	Spring
Attendance Type	Compulsory
Prerequisites	Wood Technology & Biocomposites

Orientation	Weekly Hours		Year	Semester	ECTS
	Lectures	Laboratory work			
Management and Protection of Natural Sources & Climate Change	3	2	4	8	6

Faculty Instructor

Dr. Antonios N. Papadopoulos

Type of Module

- General Foundation
- Specific Foundation / Core
- Knowledge Deepening / Consolidation

Mode of Delivery

- Face to face
- Distance learning

Digital Module availability

- E-Study Guide
- Departments Website
- E-Learning

Language

	Teaching	Examination
Greek	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
English	<input type="checkbox"/>	<input type="checkbox"/>

Erasmus

- The course is offered to exchange programme students

Learning Outcomes

Upon the successful completion of this course, students will know about the analysis of wood in its components, its chemical composition, as well as the origin, isolation, chemical structure, biosynthesis, chemical reactions and the importance of cellulose, hemicelluloses, lignin and wood extracts. Students will also be familiar with the chemical properties of wood (reagent uptake, adsorption-desorption, shrinkage-swelling, chemical degradation of wood, thermal degradation, biological degradation, climatic changes), the thermal and chemical modification of wood, wood pulp and paper production processes (pulping methods, treatment, bleaching, paper types), the polymeric derivatives of cellulose (regenerated, ethers, esters, microcrystalline, nanocellulose), chemicals (lignin, extracts) and energy production methods (combustion, pyrolysis, gasification). The students will be aware of the recent advances in chemical and thermal modifications techniques and the application of nanotechnology in wood science.

List of General Competences

- Apply knowledge in practice
- Work autonomously
- Work in teams
- Work in an international context
- Work in an interdisciplinary team
- Respect natural environment
- Advance free, creative and causative thinking

Module Content (Syllabus)

Chemical composition and chemical analysis of wood components. Characteristics, properties and chemical reactions of wood components (cellulose, hemicelluloses, lignin and extracts). Chemical properties and behavior of wood, production of chemical products from wood and extractives, methods of energy production from wood. Break-through technologies for wood protection, based on chemical and thermal modification of wood and the application of nanotechnology in wood science.

Keywords

Chemical analysis of wood, Lignin, Cellulose, Hemicellulose, Extractives, Chemical utilization of wood, Bioenergy, Chemical and thermal modification, Nanotechnology

Educational Material Types

- Book
- Notes
- Slide presentations

- Video lectures
- Multimedia
- Interactive exercises
- Other:

Use of Information and Communication Technologies

- Use of ICT in Course Teaching
- Use of ICT in Laboratory Teaching
- Use of ICT in Communication with Students
- Use of ICT in Student Assessment

Module Organization

Course Activity	Workload (hours)
Lectures	39
Laboratory work	26
Field Trip/Short Individual Assignments	45
Independent Study	40
Total	150

Student Assessment Methods

- Written Exam with Multiple Choice Questions
- Written Exam with Short Answer Questions
- Written Exam with Extended Answer Questions
- Written Assignment
- Report
- Oral Exams
- Laboratory Assignment

Suggested Bibliography (Eudoxus and additional bibliography)

Φιλίππου, Ι.Λ. (1986). *Χημεία και χημική τεχνολογία του ξύλου*. Εκδόσεις Γιαχούδη – Γιαπούλη. Θεσσαλονίκη. (Κωδ. Εύδοξου 2268)

Fengel, D. and Wegener, G. (1983). *Wood: Chemistry, ultrastructure and reactions*. New York: de Gruyter.

Hill, C.A.S. (2006) *Wood Modification—Chemical, Thermal and other Processes*. John Wiley and Sons Ltd.: West Sussex, UK.

Hon, D.N.S. (1996). *Chemical modification of lignocellulosic materials*. Marcel, Dekker, Inc., pp: 159-183.

Rowell, R.M. (1984). *The chemistry of solid wood*. ACS, Washington, D.C., pp: 175-210.

Stamm, A.J. (1964). *Wood and Cellulose Science*. New York: The Ronald Press.

Wood Handbook (1999). *Wood as an engineering material*. USDA Forest Service, Forests Products Laboratory

Παπαδόπουλος Α.Ν. (2019). *Χημική τεχνολογία του ξύλου*. Διδακτικές Σημειώσεις, Τμήμα Δασολογίας & Φυσικού Περιβάλλοντος, Διεθνές Πανεπιστήμιο της Ελλάδος.