BREF2102 Wood anatomy and properties

[30h+30h exercises] 4.5 credits

This course is taught in the 1st semester

Teacher(s): Tomas Avella y Shaw
Language: French
Level: Second cycle

Aims

The aim of this course is to give students the knowledge and the competences which will allow them to :
- understand and analyze the behavior of wood based on its chemical composition and its structure.
- understand the relationships between the physiological functioning of the tree and the anatomy of the wood produced .
- identify the link between the sylvicultural practices and the properties of the wood produced.
- identify the wood of major species from temperate and tropical regions.

Main themes

The objective of the course is the in-depth study of the main aspects of " Wood Science ". The emphasis will be placed on : (i) the fundamental properties of wood, their interactions and their relationships with the structure of the wood, and (ii) the relationships anatomy- functionality of the cambium. The following aspects will be developed more particularly :
- the anatomical characteristics of wood
- the wood cell chemistry and ultrastructure.
- the variability of wood, the physical and mechanical properties of wood.
- the deterioration of wood by physical and biological agents.

The exercises will consist of :
- determination of the mechanical properties.
- identification of the major temperate and tropical species.

Content and teaching methods

1st part : Lessons
- Wood Anatomy : Gross structure of Wood. Microscopic Planes of Wood. Structure of the Wood of Gymnosperms and Dicotyledons of the Angiosperms.
- Chemistry of Wood : macromolecules and extractives. Cell wall ultrastructure.
- Variability : Natural Wood defects, (knots, cross grain..). Reaction Wood.
- Physics of Wood : Density : within-ring, within-tree and between trees of the same species. Influence of the sylviculture on the density.
- Wood-Water Relations : hygroscopicity and sorption. Dimensional instability of timber.
- Thermal, Acoustical and Electric properties of Wood.
- Mechanics of Wood : Elasticity, Plasticity and Creep. Young modulus and Poisson's Ratios Major technical properties of Wood and the influences of the variability affecting them.
- Deterioration of Wood by Physical and Biological factors (Fungi and Insects).

2nd part : Exercices :
- Determination of the mechanical properties of standardized samples
- Identification of the major temperate and tropical species.

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Evaluation Oral examination, with written preparation
Support - transparencies and slides
- Bibliography:
H.A.CORE, W.A.COTE, A.C. DAY - Wood Structure and Identification. Syracuse University Press, 1979
J.C.F. WALKER - Primary Wood Processing - Chapman & Hall, 1993-

Programmes in which this activity is taught

BIR2	Bio-ingénieur		

Other credits in programs

BIR22/6E	Deuxième année du programme conduisant au grade de bio-ingénieur : Sciences et technologie de l'environnement (Nature, eau & forets)	(4.5 credits)	Mandatory