Summary
The presentation of tree growth and formation of wood anatomical structures, linked to the description of specific physical and mechanical properties, makes it possible to understand the different forms of utilisation of this material, including aspects of sustainable development.

Content

• Overview of forest management in function of the tree species and concept of sustainable development (specific to forestry and in the actual broad sense)
• Biology of wood formation
• Physiology and Chemistry of wood
• Microscopic and macroscopic structures of the main softwood and hardwood species (identification tests)
• Biological, physical and mechanical prop. of woods
• Forms of uses in function to the properties
• Wood modification processes
• Modern wood-based materials and their applications
• Life cycle assessments and potentials for sustainability.

Keywords
Trees/Wood/Anatomy/Structures/Properties/Utilisations

Learning Prerequisites

Required courses
General knowledge in materials science and biology

Recommended courses
Building materials, structures, properties, material recycling, composite materials

Important concepts to start the course
General notions of ecology

Learning Outcomes
By the end of the course, the student must be able to:

• Explain the different services provided by the forests
• Describe the wood anatomical structure of the main species
• Interpret the wood properties as a function of its structure
• Sketch the forms of utilisation of timbers as a function of their properties
• Characterize the relationship between species, structures, properties and uses
• Create a new product using wood or wood compounds

Transversal skills

• Take responsibility for environmental impacts of her/his actions and decisions.
• Access and evaluate appropriate sources of information.
• Make an oral presentation.

Teaching methods

Frontal and student-centered, case study, insight in laboratory work, student presentations

Expected student activities

Presentation (general portrait) of a tree species, linked with a specific form of wood utilisation (teams of 2-4 students), preparation of a group work in the frame of a case study on wood core for the ski production (in collaboration with First Trak Lab)

Assessment methods

Oral: wood species presentation and specific wood technology topic
Written: knowledge of features and properties of the major wood species in Europe. Selection of wood species for product development (with knowledge of wood chemistry, wood compounds, wood mechanical and physical properties). Apply wood modification technologies to accompany a product development. The final exam is an open-book exam and take home exam.

Supervision

Office hours: Yes
Assistants: No
Forum: No

Resources

Bibliography
Springer Handbook of Wood Science and Technology, Peter Niemz, Alfred Teischinger, Dick Sandberg, 2023

Ressources en bibliothèque
• Understanding Wood / Hoadley
• Comportement thermo-hydromécanique du bois / Navi

Notes/Handbook
A polycopy is distributed, and a personal collection of small wood samples.

Moodle Link
• https://go.epfl.ch/MSE-466

Prerequisite for

2023-2024 COURSE BOOKLET
Wood structures, properties and uses
Professional activities (choice of materials in projects)