MSE-466 **Wood structures, properties and uses**

Pichelin Frédéric

Cursus	Sem.	Type
Materials Science and Engineering	MA2, MA4	Opt.

Language of teaching	English
Credits	2
Session	Summer
Semester	Spring
Exam	Written
Workload	60h
Weeks	14
Hours	**2 weekly**
Lecture	2 weekly
Number of positions	

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 fonction 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 knowleddge of wood chemistry, wood compounds, wood mechanical and physical properties). Apply wood modification technologies to accompaign 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

Spinger Handbook of Wood Scince and Technology, Peter Niemz, Alfred Teischinger, Dick Sandberg, 2023

Ressources en bibliothèque

- Spinger Handbook of Wood Scince and Technology, Peter Niemz, Alfred Teischinger, Dick Sandberg, 2023

Notes/Handbook

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

Moodle Link

- https://go.epfl.ch/MSE-466

Prerequisite for

Professional activities (choice of materials in projects)