INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

Materials science

Introducing

Description

Detailed programme for common materials:

6 CMs of 1.25h each
Crystallography of metals and ceramics - Amorphous structures
Thermodynamics of binary metal alloys: Gibbs free energy - Entropy - Enthalpy Binary iron-carbon metal alloy: Phase equilibrium diagram - Eutectoid transformation
Mechanical behaviour of construction materials at room temperature: Elasticity - Plasticity - Ductility - Fragility
Mechanical properties of materials in use and mechanical tests at room temperature
Physical properties of construction materials and associated non-destructive testing
Chemical properties of construction materials and corrosion phenomena

Tutorial topics: 4 tutorials of 1.25 hours each
1/ Crystallography: Pattern - Atomic density - Miller indices
2/ Phase diagram: Iron-carbon diagram - Determination of the microstructure of a steel at room temperature
3/ Mechanical properties: Tensile strength curve and skimming - Strain energy
4/ Chemical properties: Corrosion

Practical work session: 2 TPs of 3 hours each
TP1 Mechanical tests: tensile test - Hardness test - Impact test
TP2 Chemical tests

Objectives

Make the link between the mechanical, physical and chemical properties of construction materials (metals, ceramics and polymers) and the characteristics of these materials on an atomic (crystallographic) and microstructural (binary phase diagram) scale.

Necessary prerequisites

For the common core of materials: Notion of Crystallography and Thermodynamics from 1A

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

Toulouse