UE Materials Science

Level
Baccalaureate +4

ECTS
3 credits

Component
UFR PhITEM (physique, ingénierie, terre, environnement, mécanique)

Semester
Printemps

- **Teaching language(s):** English
- **Open to exchange students:** Yes
- **Code d'export Apogée:** PAX8NCAC

Presentation

Description

This lecture aims to present the main classes of material and their physical properties via two complementary approaches. One is based on the bondings between atoms and how these bonds influence the elastic, thermal, and electrical conductivity properties of materials, whereas the second one is related to the Fermi surface analysis. Microscopical models of physical phenomena like permittivity, piezoelectricity, or ferromagnetism will be described and how the material properties change at the surface.

Contents

Chapter 0 : Introduction - Functional materials
Chapter 1: The various types of bonds and the classes of materials
Chapter 2: Relationship between bonds and simple properties of materials (thermal, mechanical, electrical properties)
Chapter 3: Quantum models of materials (Sommerfeld and band theory)
Chapter 4: Dielectric, ferroelectric, piezoelectric, and magnetic properties and their measurements.
Chapter 5: Surface properties

Objectives

Bibliography :

‘Physique des matériaux’, M. Gerl and J-P. Issi
‘Sciences des matériaux’, M. Dupeux
‘Physics of materials’, Y. Quéré
‘Engeneering materials’, Ashby and Jones
‘La matière à l’état solide’, A. Guinier and R. Jullien
‘Des matériaux’, J-P. Baïlon and J-M. Dorlot

Course parts

CMTD	Lectures (CM) & Teaching Unit (UE)	24h

Recommended prerequisites

General knowledge of physics and chemistry

Period : Semester 8

Useful info

Campus

- Grenoble - University campus
- Grenoble - Saint-Martin d'Hères