Material Physics

Component
École Nationale Supérieure d'Électrotechnique d'Électronique d'Informatique d'Hydraulique et des Télécommunications

Semester
Automne

In brief

- **Ametys Code:** N5EE05B
- **Open to exchange students:** Yes

Presentation

Objectives

By the end of this course, students will:
- understand the atomic properties of matter (microscopic scale)
- have a good understanding of the interaction between electromagnetic waves and matter (physical properties)
- know how to control the propagation of electromagnetic fields in matter (propagation, radiation, dielectric and thermal losses)
- be able to make connections with other subjects: electromagnetism, antennas, passive circuits, electrical machines

Description

The course is divided into two parts: dielectric and magnetic materials. The uses of different materials will be explained. The physical properties of materials (permittivity, permeability) will be given on a microscopic and macroscopic scale. Free and bound charges, polarization and magnetization vectors will be introduced in Maxwell's equations, which are also covered in the electromagnetism course. These charges and vectors will also be transcribed into the physical properties of materials. The transition relationships will be demonstrated.

Pre-requisites

Electrostatics

Magnetostatics

Mathematical basics