UE Electromagnetism

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:** PAX8ECAC

Presentation

Description

Content

1. Maxwell in a vacuum
   - Maxwell's equations
   - Notion of distribution, charge and current distribution
   - Invariances and symmetries of the EM field
   - Interface and boundary conditions
   - Electrostatic case: Coulomb law, electric potential, conductors, dipoles
   - Magnetostatic case: Biot and Savart, magnetic potential, dipoles
   - Magnetodynamic case: induction phenomenon, induced currents
   - Wave case: propagation, reflection on a plane conductor, guided waves
   - Electromagnetic energy in vacuum
2. Maxwell in matter
   - Polarization of material
   - Microscopic origin of polarization
   - Macroscopic aspects of static polarization of dielectric materials
   - Polarization charges
   - Macroscopic fields in matter, dielectric susceptibility (tensor)

- Microscopic origin of magnetization
- Paramagnetism, diamagnetism
- Macroscopic fields in matter, magnetic susceptibility (tensor)
- Ferromagnetism: spontaneous magnetic order, domains, hysteresis cycles and magnetization processes
- Electromagnetic energy in matter

3. Propagation of electromagnetic waves in materials
   - Reflection, transmission, absorption and dispersion

Course parts

UE Electromagnetism - TD	Tutorials (TD)	10h
UE Electromagnetism - CM/TD	Lectures (CM) & Teaching Unit (UE)	15h

Useful info

Campus

› Grenoble - Scientific Polygon