

UE Electromagnetism



ECTS
3 crédits



Crédits ECTS
Echange
3.0



Composante
UFR Physique,
Ingénierie,
Terre,
Environnement,
Mécanique
(PhITEM)



Période de
l'année
Printemps (janv.
à avril/mai)

Diplômes intégrant cet élément

- Master Electronique, énergie électrique, automatique

- **Langue(s) d'enseignement:** Anglais
- **Ouvert aux étudiants en échange:** Oui
- **Crédits ECTS Echange:** 3.0
- **Code d'export Apogée:** PAX8ECAC

Présentation

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

Heures d'enseignement

TD	TD	10h
CMTD	Cours magistral - Travaux dirigés	15h
Période : Semestre 8		

Infos pratiques

Campus

➤ Grenoble - Polygone scientifique