

Faculty of Applied Sciences



ELEC2350 Electromagnetics

[30h+30h exercises] 5 credits

This course is taught in the 1st semester

Teacher(s): Christophe Craeye, Danielle Janvier
Language: French
Level: Second cycle

Aims

This course provides a general background in electromagnetism, ending with a comparison with lumped elements electricity (circuit theory). At the end of this course, the students will be able to :

- write the equations and calculate the electrostatic and electromagnetic fields for various structures containing conductors and charges
- understand the interaction between electromagnetic waves and materials and use properly the concepts of electric permittivity, magnetic permeability and conductivity to describe the materials for various applications
- apply Maxwell's equations and boundary conditions to solve simple electromagnetic radiation problems
- calculate the equivalent circuit (RLC) of a tri-dimensional structure under electromagnetic field

Main themes

Identical to the contents of the course

Content and teaching methods

- Stationary field equations in vacuum : electromagnetic and magnetostatic
- Solving methods and solving of static problems : method of image, conformal mapping and separation of variables
- Materials : dielectric, magnetic, supraconductors and chiral, levitation
- Maxwell's equations and their applications : relativity, Poynting, charges moving in electromagnetic fields, plasma, theorems (unicity, Babynet, ...) Green functions
- Circuit elements : link with circuit theory, skin effect, eddy currents, magnetic circuits, limitations to the theory of lumped elements, introduction to distributed circuits.

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Prerequisites :

Foundations in electricity and magnetism

Assessment :

Written exam : exercices, with notes, and optional complementary oral examination

Programmes in which this activity is taught

ESP3DS/HY Diplôme d'études spécialisées en santé publique (hygiène et sécurité du travail)

Other credits in programs

ELEC21	Première année du programme conduisant au grade d'ingénieur (5 credits) civil électricien	Mandatory
MAP21	Première année du programme conduisant au grade d'ingénieur (5 credits) civil en mathématiques appliquées	