

## 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

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