



## Course Specification Document

<b>Title</b>	Electrostatics and Magnetostatics
<b>Credits</b>	3.5 ECTS
<b>Aims</b>	This course aims to introduce the student to the concepts of point charge, electric field, electric potential, magnetic field, electric dipole and magnetic dipole, in a way that contributes to his study of specialized engineering courses and later to his work practice.

### Intended learning outcomes

On successful completion of this course, the student will be able to:

- Identify the electric field resulting from point charge or continuous distributions of charges, and calculate it directly or by applying Gauss' law.
- Study of electrical potential and its relationship to the electric field.
- Identify the magnetic field resulting from intermittent or continuous distributions of currents, and calculate it directly or by applying Ampere's law.
- Study the electric dipole and magnetic dipole and their fields.

### Syllabus

- **The electric field:** Infinite element of length, of surface, of volume, mathematical operators (grad, div, rot), Coulomb's law, definition of the electric field and electric field lines, calculating the intensity of the electric field resulting from continuous distributions of charge.
- **Gauss's law:** Flux of the electric field, Ostrogradsky's theorem, symmetrical properties of the electric field, Gauss's law, examples.
- **Electric potential:** The circulation of the electric field, the electric potential energy, the definition of electric potential and electric potential difference, the relationship between the field and the electric potential, calculating the intensity of the electric potential resulting from continuous distributions of charge.
- **Electric dipole:** Definition of electric dipole, field lines and electric potential isosurfaces, dipole within an external field.
- **Ampère's law:** Magnetic field lines, symmetrical properties of the magnetic field, the circulation of magnetic field and Stokes' theorem, Ampère's law, examples.
- **Magnetic dipole:** Definition of the surface vector, definition of the magnetic dipole, calculation of the intensity of the magnetic field caused by the magnetic dipole.