

# UNIVERSITÀ DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

## Fisica II

2324-2-E3002Q009

## Aims

The course Fisica II is aimed at providing the students with the basic knowledge of classical electromagnetic theory, from electrostatic and magnetistaic to time-depedent fields and electromagnetic waves.

### Contents

ELECTRIC FIELD

MAGNETIC FIELD

ELECTROMAGNETIC INDUCTION

MAXWELL EQUATIONS

### **Detailed program**

#### ELECTRIC FIELD

Electric charge; Coulomb law; electric field and its properties; electric field calculation by the Coulomb law; force lines of the electric field; Gauss law; electric field calculation by the Gauss law; electrostatic properties of a conductos; potential energy in the electric field; electric potential; voltage; relation betwee electric field and voltage; capacity and capacitors; series and parallel configurations of capacitors; electrostatic energy; electrical current and resistence; Ohm law; series and parallel configurations of resistors; electromotive force; electric energy and power; capacitor charge and discharge.

#### MAGNETIC FIELD

Lorentz force; force on a conductor with electric current; torque acting on a coil; Biot-Savart law; magnetic field calculation by the Biot-Savart law; Ampère law; magnetic field calculation by the Ampère law; magetic field in a coil; force acting between conductors with electric currents; Gauss law for magnetic fields; displacement current and changes of the Ampère law.

#### ELECTROMAGNETIC INDUCTION

Faraday Neumann law and Lenz principle; induced electromotive force; power supplies; induced electric field; self-induction; energy in RL circuits; mutual induction.

#### MAXWELL EQUATIONS

Armonic waves and wave equation; plane waves; relation between electric field and magnetic field in plane waves; wave equation for electric field and magnetic field; electromagnetic field; energy and momentum carried by electromagnetic waves; radiation pressure; Poynting vector.

#### Prerequisites

Basic knowledge from the courses of Mathematics I and II and Physics I.

#### **Teaching form**

Lessons and exercices in Italian.

#### Textbook and teaching resource

A university textbook about Classical electromagnetism can be the proper choice; a textbook with the right level for this Course is:

P. Mazzoldi, M. Nigro, C. Voci, Elementi di Fisica, elettromagnetismo e onde (Edises Università).

#### Semester

II year, II semester.

#### **Assessment method**

Written exam with problems similar as those discussed during the year; four possible levels: A, B, C, D. For the students reaching at least level C, oral exam.

The final mark considers both the written and oral exams.

## Office hours

Upon request, via e-mail: adele.sassella@unimib.it

## **Sustainable Development Goals**

QUALITY EDUCATION