UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Laboratorio di Fisica II

2223-2-E2701Q042

Aims

The aim of the course is to provide theoretical and applicative knowledge of electromagnetism and optics. Through targeted laboratory experiences, the course also aims to consolidate the theoretical knowledge obtained in the Physics II course and extend it to basic concepts of circuitry. Finally, the experiences in the laboratory aim to teach experimental criteria and methodologies and data analysis.

Contents

The course deals theoretically and practically with topics of electromagnetism presented in the Physics 2 course and complements the knowledge with the contents of analysis of direct current and alternating current circuits. Also in this case, the discussion takes place in a theoretical way with lectures and the validation of the concepts is obtained experimentally by the same students with experiences in the laboratory.

Detailed program

** The course includes the following topics covered in sequential order: **

1) Elements of error analysis with the least squares method

2) Kirkhoff laws and analysis of elementary electric circuits

3) Resistors and power supplies in series and in parallel

4) Principles of operation of voltmeters, ammeters and oscilloscopes

5) Capacitors: charge and discharge, series and parallel connection, RC circuits

6) Magnetic fields and induced currents

7) Inductors and transient behavior, LR circuits

8) Electromagnetic oscillator, LC circuit

9) Alternating current circuits: Resitive, capacitive and inductive impedance

10) LRC circuits

11) Electric transformers

12) Basics of interferometry

** Laboratory experiences are as follows: **

A) Resistivity of metals

B) Charge / discharge capacitors

C) Electrolytic cell

D) LRC

E) Triode

F) Transformers

G) Measurement of magnetic fields

H) Michelson interferometer

I) Impedance measurement

L) Resistance vs. Temperature

M) Measurement of the dielectric constant of vacuum, ?0

Prerequisites

Knowledge of mathematics and differential calculus, knowledge of electromagnetism from Physics 2, knowledge of error analysis.

Teaching form

Lectures in which the topics are dealt with in a theoretical way and the experimental methods are exposed. Practical laboratory experiences. The lessons are held in Italian language.

Textbook and teaching resource

ELEMENTS of PHYSICS, P. Mazzoldi, M. Nigro, C. Voci, EdiSES)

Error analysis book (for example INTRODUCTION TO ERROR ANALYSIS, J.R.Taylor, Zanichelli)

Notes provided by the teacher

Semester

Second semester

Assessment method

Written report on two laboratory experiences chosen by the student.

Oral exam on theoretical and practical knowledge concerning the topics of the course.

The oral exam, with a mark out of thirty, aims to verify:

1) the language property

2) knowledge of the theories addressed in the course

3) the level of understanding of the theories addressed in the course

Office hours

To be agreed with the teacher.

Sustainable Development Goals