UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Applied Physics

2122-2-E3201Q073

Aims

The course allows to complete general physics topics that have not been addressed in first-year physics course. In particular to learn about the world of mechanical wave physics, acoustics, optics and electromagnetism. The topics will be carried out in the light of their environmental applications. In particular with reference to noise, light and electromagnetic pollution.

Lectures will be used to provide the basis for the topics of physics. The exercises to learn more about the topics and learn about the first environmental applications. In laboratory real cases of environmental pollution from physical agents (noise, light, electromagnetic) will be addressed.

The course will allow to have a basic knowledge of the environmental problems connected with physical agents, and to give the first tools to assess the environmental situation and indicate any mitigation measures.

Contents

The course will regard a theoretical introduction to different aspects of acoustics, optics, electromagnetism and e.m. radiation, followed by laboratory and outdoor experiments.

Detailed program

The Waves

- Mechanical waves

- The place to wave theory

The Sound

- Nature of Sound

- Intensity

- Spherical waves and plane waves

- Standing waves interference and resonance

- Vibrations

- Overview of noise pollution

The Light

- Nature of Light

- Interference and Diffraction

- Reflection and refraction

- Lenses and mirrors

- Introduction to Lighting

- Light pollution

Electromagnetism

- Charge, electric forces and fields

- Electric potential

- Electrostatic Energy and capacitors

- Electric current and circuitry

- Magnetism, magnetic forces and fields

- Electromagnetic induction

- Circuitry in alternate current

- Maxwell Equations and electromagnetic waves

- Electromagnetic pollution

EXERCISES

During the exercises the information of the frontal lessons will be integrated according to the laboratory experiences. Some simple exercises will also be carried out to facilitate the understanding of the topics that will be addressed during the laboratory hours.

LABORATORY

- Overview of electromagnetic pollution

- Measurement of electromagnetic pollution

- Interior lighting measurements and dimensioning of an external lighting system

- Noise pollution measurements

Prerequisites

First year math and physics courses.

Teaching form

- Lessons: 48 hours (6 credits)

- Tutorials: 10 hours (1 credit)

- Laboratory: 10 hours (1 credit)

There are 20 hours of tutoring for the preparation of the written part of the exam.

Textbook and teaching resource

J.S. WALKER, Fondamenti di Fisica (con MasteringPhysics), Pearson Education Italia (2015)

Semester

Second semester

Assessment method

The verification method includes two written tests and an oral test.

Each written test, corresponding to about half of the program, produces a maximum score of 33/30.

Students who have obtained an average of no less than 16/30 in the two written tests can take the oral exam. Otherwise it is necessary to repeat one or both of the written tests.

One or both of the written tests can also be taken "in progress" during the lessons of the course.

Each writing test is valid for one year from the date of delivery. For each of the two writings, for the purposes of calculating the mark, the last test delivered is valid.

Each written test consists of about 10 exercises, to be answered in 120 minutes.

During the written tests the use of textbooks and a calculator is allowed. The use of personal notes or exercise books is not allowed.

During the oral exam the preparation of the laboratory part will be checked in particular.

The final grade will be the average between the grade of the oral exam and the average of the written tests.

Office hours

Every day but during the t4eaching activities, after appointment to be taken via email: giovanni.zambon@unimib.it