UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Laboratory of Materials Physics

2223-3-E2701Q045-E2701Q049M

Aims

Provide the student with the basis for understanding the physical properties of materials and their measurement.

Contents

Introduction to the physics of materials: mechanical, elastic, electronic and magnetic properties.

Detailed program

LABORATORY OF PHYSICS OF MATERIALS

The laboratory consists of a series of experiences with a duration of two or three afternoons each, focusing mainly on the properties of semiconductor materials. The purpose of the experiences is mostly to develop a critical sense and autonomy in the process of measuring the physical properties of the materials. Experiences include:

- the Hall measurement of electrical and doping properties of semiconductors;
- voltage-current characteristics of a p-n junction;
- measurement of absorption and reflection properties;
- measurement of the efficiency of photovoltaic cells as a function of the wavelength of the incident light;
- life time measurements of photo-excited carriers.

Prerequisites

Good knowledge of General Physics and techniques of integral and differential calculus. Basic knowledge of Quantum Physics. Introductory lessons of Physics of Materials.

Teaching form

Labs (in italian)

Textbook and teaching resource

- Solid State Physics: An Introduction, di Philip Hofmann (Main reference book)

  - Principi di Fisica dei Semiconduttori di Mario Guzzi (Semiconductor book)
  - Notes from the lecturer.

Semester

I Semester

Assessment method

The Physics examination of the Materials with the Laboratory is divided into oral tests, with the compilation of a laboratory report. The Materials Physics course with Laboratory is composed of 14 CFU. The exam is divided into three modules, one relative to the laboratory and two modules dedicated to theory. These three modules can be passed either simultaneously or separately.

The laboratory module includes the evaluation of a report on one of the practical experiences of the laboratory. The mark on the report is based on the correctness, completeness and clarity of the exposure of the measurements. The oral test instead analyzes the knowledge of all the demonstrations that the student carried out in the laboratory. For this module it is not necessary to have a thorough knowledge of the theory, which is instead the object of the other modules, but it is sufficient to know the minimum notions of physics of the materials necessary for understanding the experiment. These minimum notions are those reported in the laboratory sheets related to the experiences carried out. Obviously, it is assumed that the arguments of the laboratories of previous years are known. This module mainly analyzes the understanding of the experiment methodology, the understanding of the instrumentation (for example the operation, instrumental limits, procedures), and the analysis of data (uncertainties, processing, presentation). This module weighs about 3/14 in the final mark.

Office hours

at the end of the lessons or by appointment

Sustainable Development Goals

AFFORDABLE AND CLEAN ENERGY | INDUSTRY, INNOVATION AND INFRASTRUCTURE