UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

# COURSE SYLLABUS

## Preparation of Didactic Experiences

**2425-1-F4001Q033**

### Aims

This class has three main goals:

1. teach the basis of the experimental physics to the students of Mathematics
2. become familiar in designing, building and conducting a physics experiment with emphasis on how to teach these aspects
3. go through the main physics subjects studied previously with the experimental approach in mind

### Contents

Foundation of Physics and experimental method

Basis of physics science, physics of common sense and science teaching

Introduction to history of physics

Introduction to error analysis

Science teaching

Preparation and execution of simple experiments (mechanics, thermodynamics, electromagnetism, optics)

Basis of modern physics

## Detailed program

Basis of experimental science: scientific method

History of physics and introduction to experimental physics

Role of mathematics in physics: use of mathematics in experimental sciences

Experimental approach to physics phenomenons: conduct a measurement, uncertainties and error theory, measure instruments

Scientific theories and their relation with the experiments.

Introduction to science teaching

Introduction to modern physics and quantum mechanics

## Prerequisites

General physics classes from previous years, including basis of mechanics, thermodynamics and electromagnetism.

## Teaching form

Lessons and laboratory sessions will be held in person.

## Textbook and teaching resource

### Suggested books

- J. R. Taylor, Introduzione all'analisi degli errori, Zanichelli
- S. Rosati, Fisica Generale vol. 1, CEA
- L. Lovitch, S. Rosati, Fisica Generale vol. 2, CEA
- A. B. Arons, Guida all'insegnamento della Fisica, Zanichelli
- U. Besson, Didattica della Fisica, Carocci

### Additional material

- PSSC (a cura di), Fisica (3 voll.), Quarta Edizione, Zanichelli
- F. Tibone, G. Pezzi, La Fisica secondo il PSSC, Zanichelli
- I video del PSSC, Zanichelli (reperibili sul sito della Zanichelli qui)
- R. P. Feynman, La Fisica di Feynman (3 voll.), Zanichelli
- U. Besson, M. Malgieri, Insegnare la Fisica Moderna, Carocci
- P. Doherty, D. Rathjen, Exploratorium Teacher Institute, Gli Esperimenti dell'Exploratorium (a cura di P. Cerreta), Zanichelli
- A. Rigamonti, A. Varlamov, Magico caleidoscopio della fisica, La Goliardica Pavese

- G. Johnson, I dieci esperimenti più belli, Bollati Boringhieri

## Semester

First semester

## Assessment method

Scientific report on the laboratory activity and oral exam.

At the moment we foresee that the oral exams will be held in person.

## Office hours

Please make an appointment via email.

## Sustainable Development Goals