UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Physics and Physics Teaching

2122-3-G8501R017-G8501R017M

Course title

Physics and Physics Teaching, with Laboratory

Topics and course structure

The course is composed as follows:

49 hours of classroom lesson

6 hours of exercise (3 shifts of 2 hours one)

12 hours of laboratory.

Laboratory and exercises are foreseen for all attending and non-attending students. Class attendance is not mandatory, but it is recommended. The material on the platform and the texts in the bibliography will be sufficient to be prepared for the exam,but certainly participating in classroom lessons is an important resource for the understanding of the students. The course focuses on topics such as light, shadow and color, motion, water / float and basic astronomy, as well as knowledge of some basic physical dimensions and cartesian graphic representations.

The topics and methods presented are subject to changes due to the COVID-19 emergency. In the Covid-19 emergency period, if forced, lessons will take place online.

Objectives

The main objective of the course is to equip the future teachers with skills that will enable them to introduce physics at the primary school in an adequate and respectful way to children. The course focuses in particular on the topics:

light, shadows and color, motion, water / floating and basic astronomy. For each topic, we propose a reflection on the fundamental contents and learning pathways designed to build basic physical knowledge and ways of exploring the natural world proper to this scientific discipline. It proposes a systematic reflection on educational choices regarding contents, approaches, spaces and materials adopted, in order to take into account the motivations underlying such choices. It is therefore required: 1. Knowledge of the fundamental contents of movement and light, also in connection with basic astronomy; Knowledge of the procedures of measuring the quantities weight P and volume V; Meaning and expression of Archimedes law; Use of the graph representation in the plane P-V to determine the specific weight of a material and find the floating conditions. Through observation, description and representation of celestial phenomena, we want to answer the questions: how can we agree what we observe with what we know about the sky and celestial bodies? Understanding and using the "parallel globe". 2. Understanding the methods of experimental sciences, with particular reference to the relationship between observation (in natural or controlled situations), description (with different languages), construction of interpretative models and theories. 3. Skills in the design of teaching activities and educational path aimed at the interpretation of some physical phenomena.

Methodologies

For each topic, we propose a reflection on the fundamental contents and learning paths aimed at building basic physical knowledge and ways of exploring the natural world of this scientific discipline. A systematic reflection is proposed on the didactic choices concerning contents, approaches, spaces and materials adopted, in order to become aware of the motivations underlying these choices. The approach to the scientific study of each theme will be phenomenological, to allow the reconstruction of the fundamental game between experience, language, representative knowledge. We start from observing reality to ask ourselves cognitive problems that must appear to students understandable, interesting and not insurmountable and placed in terms that are part of their language, close to their experience. Starting from the use of tools, representations and models, students will have the opportunity to experience the knowledge building process directly. In particular, they will confront themselves, actively and personally, with what it means to observe, describe and interpret a natural phenomenon.

Online and offline teaching materials

The main source on which to study is the e-learning page of the course, on which lessons, notes, videos, in-depth materials, and everything the student needs to study will be uploaded.

Programme and references for attending students

For the program see "objectives".

For the references: The main source on which to study is the e-learning page of the course, on which lessons, notes, videos, in-depth materials, and everything the student needs to study will be uploaded.

In addition to the material on the elearning page, the following texts are suggested:

“Metodi e strumenti per l'insegnamento e l'apprendimento della Fisica” M.Gagliardi, E. Giordano (a cura di), Edises ed, Napoli.

“Guardare per sistemi, guardare per variabili” di M. Arcà e P. Guidoni (nella sezione materiali). In particolare, i capitoli 1 e 3 per la parte generale e il capitolo 4 per il galleggiamento.

Programme and references for non-attending students

The same as attending students

Assessment methods

The results learned by the student are assessed through a written test and an oral test, on the contents proposed in the course and in the educational pedagogical laboratory, consistently with the expected results described above.

Office hours

By appointment (via email).

Programme validity

The programs last two academic years.

Course tutors and assistants

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