UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Istituzioni e Didattica della Matematica con Laboratorio

2526-2-G8501R012

Course title

G8501R012 -- ISTITUZIONI E DIDATTICA DELLA MATEMATICA CON LABORATORIO

Topics and course structure

- The course aims to provide students with in-depth knowledge, including through exercises, of the disciplinary foundations of mathematics taught in elementary school or present in the experiences of introduction to mathematics in kindergarten, with the aim of reflecting on what it means to experience mathematics and lead students to do so.
  In particular, the themes of geometry will be explored in depth.

In detail, the following topics will be covered:

- elements of Euclidean geometry;
- measure and proportionality;
- elements of geometry of transformations (in particular similarities and isometries);
- constructions on squared paper;
- use of Problem-Based learning and problem solving in teaching mathematics

Objectives

Upon completion of the course, the student is able to

- understand basic arithmetic and geometric concepts;

- demonstrate the ability to conduct mathematical reasoning and justify mathematical procedures and results;
- illustrate the role of problem-solving in mathematics teaching.

Methodologies

- Frontal lessons 49 hours in delivery mode (24 lessons of 2 hours, one lesson of 1 hour) and in presence.
- Exercises in interactive mode in groups (6 meetings of 2 hours in e-learning mode).
- Pedagogical-didactic laboratory in interactive mode in presence with mandatory attendance (3 meetings of 4 hours).
- The course is delivered in italian.

Online and offline teaching materials

Textbooks, recommended books (see bibliography).
Online: interactive exercises on the wims platform and exercise sheets proposed for pen and paper resolution available on the wims page of the course.

Programme and references

The aim of the course is to give students a good knowledge – through lectures, exercise sessions and laboratories – of the foundations of mathematics as it is taught in primary school or in the pre-mathematical activities of kindergarten, completing the necessary background in order to teach mathematics effectively and suggesting some ways through which the teaching can unfold. We will focus particularly on themes in geometry.

Topics will include:

elements of euclidean geometry;
measure and proportionality;
elements of the geometry of transformations (in particular similarities and isometries);
constructions on graph paper;
introduction to Problem-Based Learning and Problem-Solving.
This list might be supplemented by the instructor with topics available in the reference texts.

Erasmus
Erasmus students may choose to write the part of the exam which is on paper (open question/exercise), and the oral examination, in English.The programme is the same as for non-Erasmus students.

Reference text:

M. Cazzola, Matematica per scienze della formazione primaria, Carocci, 2017.
Euclide, Elements Book 1
Teaching materials:

AAVV, Conorovesciato: un esperimento di didattica per problemi nella scuola primaria, Materiale per i Quaderni a Quadretti, Mimesis, Milano, 2007.

Further readings:

M. Dedò, Galleria di metamorfosi, Quaderni a Quadretti, Mimesis, 2010.
M. Cazzola, Per non perdere la bussola, Quaderni a Quadretti, Decibel/Zanichelli, Bologna, 2001.
Euclides, Les éléments, Extraits des livres I, II et VI, Textes choisis, présentées et commentés par André Deledicq, Les éeditions du KANGOUROU, 2011 (or any other edition of Euclides' Elements).
A. Millan Gasca, All'inizio fu lo scriba, Quaderni a Quadretti, Mimesis, Milano, 2004.
V. Villani, Cominciamo dal punto, Pitagora, 2006.
G. Polya, La scoperta matematica, vol 1 e 2, Feltrinelli, Milano.

Assessment methods

The profit examination aims to assess the knowledge and skills acquired, as described in the sections Topics, Course Structure, and Objectives.

The exam consists of a written test and a possible oral examination.

The written test includes an initial computerized section with automatic grading, consisting of a series of exercises to be completed on the WIMS platform. Candidates who score 12/18 or higher advance to the second paper-and-pen section (open-ended exercises).

- The final grade for the written exam is composed as follows: 12/30 from the paper-based section and 18/30 from the WIMS test.
- The written exam is considered passed with a score of 18 or higher.
- Candidates scoring between 18 and 21 (inclusive) must take a mandatory oral exam.
- Candidates scoring 22 or higher in the written test may opt for an oral exam.
- The oral exam is required whenever requested by the instructor or the student.
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Evaluation Criteria
Answers are assessed based on accuracy, completeness, and the ability to explain and justify solutions with clarity and precision.

Evalutazion table

An evaluation table (in Italian) is found on the web-site of the course.

Office hours

By appointment, writing an email to the teacher.

Programme validity

The programs are valid for two academic years.

Course tutors and assistants

Sustainable Development Goals

QUALITY EDUCATION