UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Calculus

2627-1-E0202Q001

Aims

The course aims to provide basic mathematical tools, finalized to the analysys and the formulation of simple mathematical models for the quantitative description of natural phenomena.

Knowledge and understanding.
The student will gain knowledge of basic notions of calculus for single variable real functions, ordinary differential equations, and linear algebra.

Ability to apply knowledge and understanding.
The student will be able to employ the acquired knowledge to solve simple problems, possibly of applied nature.

Autonomy of judgment.
The student will be able to elaborate the acquired notions and to choose the most appropriate tools for the mathematical formalization of a problem.

Communication skills.
The student will learn to make appropriate use of mathematical vocabulary in written and oral reports.

Learning ability.
The student will learn how to approach the mathematical issues mosto likely to occur in future studies.

Contents

Review of basic set theory and properties of functions. Limits and continuous functions. Differentiable functions and derivative. Applications to the study of a graph. Primitive functions and Riemann integral. Ordinary differential equations. Fundamentals of linear algebra.

Detailed program

Review of set theory and functions: number sets and elementary functions. Limits of single-variable functions. Continuous functions: basic properties and fundamental results. Differential calculus: derivative of a single-variable function, derivatives of elementary functions, derivative rules. Fundamental theorems of differential calculus: Rolle, Lagrange, Fermat. Derivatives and limits: De l'Hospital theorem. Drawing the graph of a function. Primitive functions and Riemann integral. The fundamental theorem of calculus. First-order ordinary differential equations: separable and linear equations. Linear algebra: linear systems and matrices. The course may included applications to problems from life sciences.

Prerequisites

Background: basic algebra of real numbers, analytic geometry, trigonometry.

Prerequisites: none.

Teaching form

24 2 hours-lectures and 10 2 hours tutorial activities delivered didactics focused on the presentation-illustration of contents by the lecturer and the tutor. The teaching is held in person in the Italian language.

Textbook and teaching resource

- Registered lectures.
- Slides and further material as exercises, quizzes, etc., will be published on the e-learning page of the course.

Textbook: A. Guerraggio, Matematica per le scienze (seconda edizione), Pearson 2018.

Semester

First semester

Assessment method

Written and **optional oral** examinations.

Written exam
It consists of two parts, which will take place on the same day, usually the first one in the morniong and the second

one in the afternoon:

the **first part**(1 hour) consists of a multiple-choice test;
the **second part** (2 hours) involes the solution of some problems.
Both are evaluated on the basis of correctness, completeness, precision, and clarity of the answers.
The maximum score is 33 points for each part, but the second part will be evaluated only if the score in the first part reaches 15, the final score is the average. The passing score of the written exam is 18 points.
The optional oral test can be taken only if the written test is sufficient. In order to pass the exam the oral test must be sufficient and the final score is the average of the scores obtained in the written and oral tests.

There are 8 exam sessions.

Office hours

By appointment arranged via campus email.

Sustainable Development Goals

QUALITY EDUCATION