UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Calculus

2021-1-E0201Q001

Aims

The course aims to provide basic mathematical tools, in order to understand quantitative descriptions of natural phenomena and analyze simple mathematical model.

- 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 problems, including problems of applied nature.

- Autonomy of judgment.
  The student will be able to elaborate on notions that he learned and to choose the most appropriate tools toward the mathematical formalization of a problem.

- Communication skills.
  The student will expand his mathematical vocabulary and he will be able to make appropriate use of it in written and oral reports.

- Learning ability.
  The student will be able to place in an appropriate context any mathematical issue it may occur in future studies.

Contents

Review of set theory and 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. Applications to life sciences problems will be discussed.

Prerequisites

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

Prerequisites: none.

Teaching form

- Classroom lectures (48 h) supported by slides.
- Exercise sessions (16 h).
- Tutorials (20 h): supplementary activities to help students in their study.

Teaching language: Italian.

All classes will be video recorded and will be available on the Moodle page of the course.

Textbook and teaching resource

Slides and further material as exercises, quizzes, discussions of mathematical models in biotechnological applications (prepared jointly with teachers of other courses), 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 examination splits into two parts, that will take place the same day.

The first part consists of a multiple-choice test. In the second part, it is required to solve some problems.

The second part will be evaluated under the condition that the score in the first part reaches a fixed threshold.

Office hours

By appointment arranged via email.