UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Calculus

1920-1-E0201Q001

Aims

The course aims to provide the basic tools of mathematical analysis, in order to build a critical attitude and the ability to solve simple problems arising from the understanding of physical phenomena and from the need to interpret experimental data.

Knowledge and understanding. At the end of the course, students will learn the definitions and the fundamental of limit calculation, differential calculus, and integral calculation for real functions of a real variable.
Ability to apply knowledge and understanding. At the end of the course, students will be able to apply the acquired knowledge to solve problems, even of applicative nature.
Autonomy of judgment. Students will be able to elaborate what they learned and identify the most appropriate mathematical tools for the formalization of a problem.
Communication skills. At the end of the course, students will be able to use an appropriate vocabulary to describe mathematical issues in written and oral reports.
Learning ability. At the end of the course, students will be able to contextualize the mathematical and logical issues occurring in other courses and studies.

Contents

Review of set theory and functions. Limits for real functions of real variable. Continuous functions. Basic results for continuous functions. The derivative. Fundamental theorems for differentiable functions. Applications to the study of a graph. Riemann integration and primitive functions.

Detailed program

Some theories on numerical sets and functions. Limits of real functions of real variable. Continuous functions and

their properties. Fundamental theorems for continuous functions. Differential calculation: the derivative of a function and the rules for calculating derivatives. Fundamental theorems of differential calculus: Rolle, Lagrange, Fermat. Applications to the calculation of limits: the theorem of De l'Hospital. Study of the qualitative graph of a function. Notes on the integral according to Riemann. The indefinite integral and the Torricelli-Barrow theorem. Notes on improper integrals. Some applications of differential and integral calculus to models from life sciences.

Prerequisites

Background: basic algebra of real numbers, analytic geometry, trigonometry.
Prerequisites: none

Teaching form

Classroom theoretical lectures implemented with exercices.
Tutorials (20 h): supplementary classroom activities to help students in their study.
Teaching language: italian.

Textbook and teaching resource

Recommended texbook.
S. Secchi, Lezioni di analisi infinitesimale. Liguori 2013.

Further references will be given during the classroom lectures.

Semester

First semester

Assessment method

Written examination. The examination consists of two parts: the first part consists of multiple-choice tests; the second contains some problems.
The achievement of a threshold score in the multiple-choice test gives the possibility to access the second part.

Office hours

Contact: preferably on demand, upon request by mail to lecturer, or at the end of each lecture.