UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Calculus I

2526-1-E3202Q001

Aims

The course aims to achieve the following objectives: the acquisition of basic notions of mathematical analysis (differential and integral calculus in one variable), the development of logical and analytical skills in solving problems and exercises, and the ability to solve problems and apply the learned methods to the study and interpretation of physical and environmental phenomena.

Contents

Real numbers. Inequalities. Combinatorics. Limits. Continuity. Differential calculus. Functions and their graph. Taylor's formulas. Integration.

Detailed program

Combinatorics: sequences with and without repetitions. Permutations. Combinations. Newton's binomial formula.

Sets: subsets, relations and operations between sets; bounded and unbounded sets. Rational numbers. Real numbers. Sequences. Limits of sequences. Supremum and infimum. Functions. Composition of functions and inverse functions. Exponential and trigonometric functions. Inequalities.

Limit of a sequence: monotone sequences and the squeeze theorem. Elementary limits. The number e. Limits of functions. Limits of functions and limits of sequences. Continuous functions and their properties. Inverse functions of continuous functions. Elementary functions and limits.

Derivative and tangent line. Elementary derivatives. Rules of differentiation and calculation of derivatives. Maxima

and minima, the mean value theorem. Higher-order derivatives, convexity. Graph analysis of a function. Taylor and Maclaurin formulas.

The definite integral. Antiderivatives and the fundamental theorem of calculus. Elementary antiderivatives.

Prerequisites

Elementary algebra, elementary trigonometry, elementary analytic geometry.

Teaching form

20 lessons of 2 hours each delivered in person.
15 exercise classes of 2 hours each delivered in person.

Textbook and teaching resource

M. Conti, D. L. Ferrario, S. Terracini, G. Verzini Analisi matematica. Dal calcolo all’analisi Vol. 1. Editore: Apogeo.

Semester

First year, First semester.

Assessment method

Written exam, consisting of open-ended questions and exercises. Grading on a scale of 18-30/30.
Optional oral test (upon request of either the student or the instructor), which can be taken if a score of at least 18 is achieved in the written test.

The written exam assesses knowledge of the course content and the skills acquired, both through solving exercises and answering theoretical questions. The correctness of the answers, the appropriateness of the mathematical language used, and the rigor and clarity of the exposition will be evaluated.

The optional oral test consists of an interview on the topics covered in the course. The correctness of the answers, the appropriateness of the mathematical language used, and the rigor and clarity of the exposition will be evaluated.

During the year, 7 exam sessions are scheduled in the following periods: two in the winter session of January-February, one in April, one in June, one in July, one in September, and one in November.

Office hours

By appointment.

Sustainable Development Goals