UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Mathematics II

2021-1-E2701Q002

Aims

The aim of this course is to provide a second course in Mathematical Analysis with elements of Linear Algebra.

Contents

Elements of linear algebra. Functions of several variables. Line integrals. Ordinary differential equations.

Detailed program

Elements of linear algebra. **Vectors and geometry in the Euclidean space. Lines and planes. Matrices. Determinant. Linear systems: Cramer's rule and Gaussian elimination. Quadratic forms.**

Functions of several variables. **Limits and continuity. Partial derivatives. Differentiability, tangent planes and linear approximations. Directional derivatives and gradient. The chain rule. Surfaces and level curves. Taylor's formula. Maxima, minima, and saddle points. Constraints and Lagrange multipliers.**

Line integrals. **Curves in the space. Length of a curve and line integrals for scalar functions. Vector fields and line integrals. Path independence, potentials function, conservative vector fields and exact forms.**

Ordinary differential equations. **Separation of variables. Linear differential equations. Linear independence of the solutions, the Wronskian. The variation of the constants method. The case of constant coefficients. Systems of first order ordinary differential equations. Integral**

curves. Systems of two linear equations with constant coefficients: the case of real eigenvalues. Qualitative aspects of the theory of ordinary differential equations.

Prerequisites

The course of Mathematics I

Teaching form

- Lessons, 6 credits

- Classes, 2 credits

Textbook and teaching resource

***1. Lecture notes*.**

2. James Stewart: Multivariable Calcululs.

Semester

Second semester

Assessment method

Written and oral examination. Usually the written examination consists in the solution of 6 problems: one problem of linear algebra, two problems of differential calculus, a line integral or the computation of the potential of a conservative vector field, a differential equation (or a system of differential equations). Minimum score to pass to the oral part: 15 points.
The oral examination can be performed in the same session of the written part, as well as in the subsequent session.

Office hours

By appointment.