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# Mathematical analysis AB

## Finalità

The course provides the basic notion of calculus

## Programma

Elementary algebraic properties of the real numbers (standard types of equations and inequations); maximum and supremum of a set or a function; algebraic properties and n-th roots of the complex numbers.

Graphs of the elementary functions and geometric transformations of the same; properties of continuous functions (including mean value, existence of a maximum, Lipschitz continuity); limits of functions and of sequences of real numbers; infinitesimals.

Properties of differentiable functions (including Rolle, Lagrange, Hopital theorems); Taylor expansion (with Peano and Lagrange remainder); graphing a function.

Indefinite and definite integral: definition and computation (straightforward, by parts, by change of variables); integral mean and fundamental theorems; Torricelli theorem; generalised integrals: definition and comparison principles.

Numerical series: definition, convergence criteria, Leibniz and integral criteria.

## Attività d'esercitazione

In smaller groups of students.

## Modalità d'esame

The cross-examination consists in a written text divided into two parts (during the same day) followed by a colloquium.

## Propedeuticità

Prerequisites are basic facts on theory of sets, functions, trigonometry, analytic geometry.

## Testi consigliati

E. Acerbi - G. Buttazzo: *Analisi Matematica ABC vol.1*, Pitagora, Bologna, 2003;

D. Mucci: *Analisi Matematica - Esercizi 1*, Pitagora, Bologna, 2004.