UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Basic Calculus

2223-1-E3101Q100

Aims

In line with the educational objectives of the Degree in Computer Science, the course aims at providing the *knowledge* about the fundamental concepts and statements about limits, and differential and integral calculus for functions of one variable, together with some elementary basic logic. It will also build the *skills* needed to understand and use the most important arguments and techniques in the theory and the *ability* to solve exercises and deal with problems exploiting them.

Contents

Real numbers. Sequences and infinite series. Differential and integral calculus in one variable.

Detailed program

Real numbers

Elementary functions

Generalities on functions

Real variable functions

Sequences

Limits of real sequences

Induction principle

Limits and continuity

Limits of functions

Continuous functions

Global properties of continuous functions

Differential calculus

Derivatives of a function

Properties of differentiable functions

Convex and concave functions

Taylor's formula

Graphs of functions

Integral calculus

Riemann integrable functions

Fundamental theorem of calculus and antiderivatives

Integration methods

Series

Series, convergence, absolute convergence

Series with positive terms

Series with terms of non constant signs

Prerequisites

Elementary algebra: symbolic algebra, equations and inequations of first and second degree; elementary trigonometry; logarithm and exponential.

Teaching form

Lectures on the blackboard. The course is taught in Italian.

Textbook and teaching resource

A. Albanese, A. Leaci, D. Pallara, Appunti del corso di Analisi Matematica I

Semester

First semester

Assessment method

1. There are intermediate exams *for first year students only* and *provided the pandemic situation allows in presence exams*.
2. In both written and (optional) oral exams will be judged: the knowledge of the techniques shown during the course, the accuracy of the line of thinking, the ability to illustrate the results of the course.
3. The evaluation of both written and oral exams will take into account mainly of the knowledge of the subjects and the accuracy of the line of thinking.

Examination type: written examination (oral examination optional)

Intermediate written part

The intermediate written part is divided in two:

first part: 4 multiple choice questions (simple theoretical and practical exercises). Each answer: 1.5 points, if correct, -0.5 points, if wrong, 0 points, if not given. At least two multiple choice questions must be correctly answered (otherwise it is failed)

second part: exercises, together with a theoretical question (the student is asked to provide, for instance, definitions, statements of theorems, examples).

If the total score is no less than 9, the student can take the second part that will be delivered, with the same rules, at the same time of the first written exam. If the score of the second part is no less than 9, the final grade is the sum of the grades of the two parts.

Written part: maximum mark 30/30. The written part is divided in two:

first part: 8 multiple choice questions (simple theoretical and practical exercises). Each answer: 1.5 points, if correct, -0.5 points, if wrong, 0 points, if not given.

scond part: exercises, together with a theoretical question (the student is asked to provide, for instance, definitions, statements of theorems, examples).

If the total score of the first part is less than 6, the second part is not corrected and the student must repeat the written part of the exam.

The final mark of the written part is obtained by adding the mark of the first and the second part.

If the mark of the written part is more than, or equal to 18, the student can conclude the exam with the mark of the written part, without undergoing an oral exam, or, else, undergo an oral examination.

Oral part: If the mark of the written part is more than, or equal to 18, the student may as well decide to undergo the oral exam (this choice must be communicated in due time). The student will be asked to provide definitions, statements of theorems, simple proof according to the exam schedule.

The final mark can be greater, equal or lower than the mark of the written part.

Office hours

By appointment.

Sustainable Development Goals