UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Basic Calculus - 1

2425-1-E1801M047-T1

Learning objectives

The course aims at providing a set of analytical methods to deal with economic and social phenomena.

Students will be provided with tools useful to analyze simple mathematical models in economics.

Contents

Real functions of real variables.

Detailed program

Introduction to functions.

Functions of one variable. Domain, image, graph. Elementary functions. Monotonicity, maxima and minima. Inverse function.

Limits and related theorems.

Continuous functions: Weierstrass, Bolzano and Darboux theorems. Discontinuity points.

Indeterminate forms in the computation of limits.

Differential calculus: definition of the derivative and geometric interpretation. Points of non-differentiability. Relationship between continuity and differentiability. Rolle, Lagrange and Fermat theorems.

L’Hospital rule. Taylor’s formula and its applications.

Convexity and concavity of a function: definition and characterization based on the second order derivative.

An introduction to functions of two variables.

Prerequisites

Algebra and analytic geometry at an elementary level.

Teaching methods

The lectures will take place in person and will be based on a hybrid teaching approach, combining conventional and interactive methods. The conventional methods include the detailed presentation and explanation of theoretical topics, which usually cover the first part of each class. The interactive methods consist in students taking an active part during lectures, answering questions and solving problems proposed by the professor, or in the form of collective discussions. Such kind of teaching approach is usually adopted during the second half of the class. It is not possible to determine in advance the exact number of hours devoted to conventional and interactive teaching methods, since they are linked together in a dynamic manner, so as to adapt to the course needs and in view of favouring the students' learning process, by combining theoretical and practical aspects.

Assessment methods

Written exam, consisting of practical exercises and of open theoretical questions.

Optional oral exam, possible only if the grade of the written exam is at least 18/30.

There will be a midterm written exam.

In grading the written exams, in addition to the correctness of the results, the ability in explaining the various steps will be considered as well.

The oral exam starts with a discussion of the written exam, followed by some questions regarding the topics of the course.

Textbooks and Reading Materials

- Guerraggio, A. , "Matematica" , Pearson, 2014.

- Brega F., G. Messineo, "Esercizi di Matematica Generale: Funzioni, Limiti , Continuità", Giappichelli Editore, 2013.

- Brega F., G. Messineo, "Esercizi di Matematica Generale: Calcolo Differenziale in R. Studio di Funzione",

Giappichelli Editore, 2013.

- Brega F., G. Messineo, "Esercizi di Matematica Generale: Ottimizzazione in R2 ", Giappichelli Editore, 2013.

Semester

First semester.

Teaching language

Italian.

Sustainable Development Goals