UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Basic Calculus - 2

2122-1-E1803M047-T2

Learning objectives

This course aims at giving to the students the mathematical foundations of the models that describe the economic phenomena. In particular, students receive the mathematical instruments that allow, starting from the analytic formula of the function, to analyze properties such as monotonicity, convexity, maximum and minimum. The final aim is to be able to produce a qualitative plot of the function.

Contents

Study of functions with one variable and an introduction to functions with more than one variable.

Detailed program

Introduction to functions.

Definition and image set, graph of a function. Simple functions. Monotonicity, maximum and minimum. Inverse function.

Limits and theorems related to the topic.

Continuous functions: Weierstrass theorem, Zero's theorem, theorem of Intermediate values. Discontinuities.

Indeterminate forms in the computation of the limits. Landau's symbol.

Differential calculus: definition of the derivative and geometric interpretation. Points of non differentiability. Link

between continuity and differentiability. Some theorems: Rolle, Lagrange and Fermat.

L’Hospital's rule. Taylor's formula.

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

An introduction to sequences.

Functions with more than one variable: definition set, level curves, partial derivatives, critical points.

Prerequisites

Elements of algebra, equations and disequalities, basic knowledge of geometry.

Teaching methods

Theoretical lectures and practical sessions.

Assessment methods

Final written and (subsequent) oral exam.

In the written part the students have to solve exercises and to answer to some open questions (it is required to formulate and prove theorems and to discuss all the topics presented during the course). In the oral part should be able to discuss all the topics presented in the course.

Textbooks and Reading Materials

R. Pini, G. Monti "Lezione di Matematica Generale" LED Edizioni Universitarie

L. Scaglianti, A. Torriero, M. Scovenna "Manuale di Matematica- Metodi e applicazioni" Edizioni CEDAM

Semester

First term

Teaching language

Italian