UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Matematica per il Marketing - 2

2526-2-E1801M048-T2

Learning objectives

This class aims to give the student a solid foundation for the mastering of the fundamental concepts related to Numerical Series, Integrals, Linear Algebra and Financial Mathematics.

At completion, the student will be able 1) to study numerical series, compute integrals and use the fundamental notions of linear algebra, manipulate matrices and solve linear systems, and 2) to apply mathematical techniques to a broad class of financial models and linear programming.

Contents

This class, in the first part, introduces the student to the fundamental notions related to Numerical Series, Integrals. In the second par,t there is an extensive introduction to the fundamental concepts of Functions with Several Variables and some notions about Linear Programming.

Detailed program

Series
Definition of numerical Series and its sum. Telescoping Series. Geometric series. Necessary Condition for Convergence of a Series. Series with terms with eventually constant signs. Generalized Harmonic Series. The Ratio Test, the Comparison Test, the Asymptotic Test, and the Root Test. Absolute and Simple Convergence of Series.

Integrals
Definition of the Riemann Integral. Sufficient Conditions for Integrability. Main Properties of the Integral. Lagrange

Theorem. The Fundamental Theorem of Calculus. Definition of Antiderivative and its use in the computation of the Riemann Integral. Integration by parts and Integration by change of variable. Improper Integral. Sufficient Conditions for the existence of Improper Integrals.

Linear Algebra
Vector Spaces on R. Inner product. Matrices. Operations with Matrices. Determinants and main Properties. Laplace Theorem. Inverse Matrix: Uniqueness of the Inverse Matrix and Necessary and Sufficient Condition for its existence. Linear Transformations. Linear Systems. Cramer's Theorem. Rank of a Matrix. Rouche-Capelli Theorem.

Functions of Several Variables
Continuous Functions. Partial Derivatives. Differentiable Functions. High-Order Derivatives and Differentials. Quadratic Forms. Maxima and Minima. Constrained Maxima and Minima. Introductionto linear programming.

Prerequisites

Matematica Generale (General Mathematics), (Statistica I)Statistics I

Teaching methods

The lectures aim to present the theoretical results related to the class's material. In the lectures we will focus on presenting the theorems and mathematical results listed above. In addition, the lectures will also cover and discuss problems and exercises to illustrate the theoretical results. In the practice sessions the focus is on helping the student in solving problems.
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

A written exam.

The student can substitute the final exam with two mid-term exams.

The aim of the written exams is to establish if the student has developed a reasonable level of problem solving ability. Therefore there will be exercises similar to the ones presented in the suggested textbooks.

In the case the students opt to take the mid-term exams then the final grade will be the average of the two grades

Textbooks and Reading Materials

1. Angelo Guerraggio, MATEMATICA, Pearson Education, Italia

Semester

Second Semester

Teaching language

Italian

Sustainable Development Goals

QUALITY EDUCATION