UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Financial Mathematics - 1

2526-2-E3303M015-E3303M016M-T1

Learning objectives

Aim of this course is to provide mathematical tools useful to applications in finance. Students should be able to define and then solve the proposed mathematical models.

Knowledge and Understanding
At the end of the course, students will be familiar with the main financial concepts and the mathematical tools used to evaluate investments, loans, and bonds. They will have learned the fundamental concepts of linear algebra, with particular attention to the properties of matrices and linear systems.

Applying Knowledge and Understanding
Students will be able to calculate future values, present values, payments, bond prices, and profitability indicators (e.g., NPV, IRR). They will be capable of solving linear systems using various techniques.

Judgment and Autonomy
Students will be able to interpret and evaluate different investment solutions, comparing scenarios with various time and financial parameters (e.g., duration, interest rate). They will be able to determine whether a linear system is solvable and choose the most appropriate solution method depending on the context.

Communication Skills
Students will be able to clearly and formally present economic and financial evaluations, communicating results to both technical and non-technical audiences. They will be able to explain the mathematical reasoning behind problem-solving using appropriate technical language.

Learning Skills
Students will be able to independently update their knowledge on additional topics related to financial mathematics. They will also be able to deepen their understanding of linear algebra and connect it with other fields (e.g., statistics, computer science), using textbooks, software, or digital resources.

Contents

Linear algebra. Financial Mathematics.

Detailed program

Linear algebra: linear spaces; linear dependence and independence; matrices; determinant; inverse matrix; rank; linear systems and their resolution.

Financial Mathematics: Principles of financial calculus. Simple and compound interest, trade discount. Present and future values. Annuities and perpetuities. Amortization plans. Financial flows analysis: DCF. Investment appraisal. Bond pricing. Yields. Duration. Term structure of interest rates. Forward rates.

Prerequisites

Calculus

Teaching methods

Teaching consists of lectures, exercises and tutoring in preparation for the final assessment.
Lectures will be delivered in presence, the exercises mainly in interactive mode (in-progress verification of understanding, proposal of interactive exercises).
Some of the lectures will be provided remotely (at most 30% of the hours). The teacher will communicate in advance which lessons will be provided remotely

Assessment methods

Written exam on all topics of the course, including exercises and theoretical questions. Each question equally contributes to the final grade.
The written exam evaluates the knowledge of the mathematical formal language, the proficency and competencies gained during the course. There are no intermediate tests.

Textbooks and Reading Materials

S. Stefani, A. Torriero, G. Zambruno, Elementi di matematica finanziaria e cenni di programmazione lineare, Giappichelli Editore, V
M.I. Bertocchi, Manuale Modulare di Metodi Matematici Modulo 4. Algebra lineare, Giappichelli Editore, V

Semester

First Term

Teaching language

Italian

Sustainable Development Goals

QUALITY EDUCATION