UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Financial Mathematics - 1

2627-2-E1807M011-E1807M011-1-T1

Learning objectives

The aim of this course is to provide the basic knowledge and tools of Mathematical Finance, fundamental to understand and solve problems of economic-financial nature. The course will tackle the main concepts about the value of money in time, the calculation of interest, analysis and evaluation of annuities, amortizations and bonds.

The teaching combines theory and exercise, proposing examples and applications related to business financial management and markets, in order to develop the ability to apply quantitative methods to practical economic and financial decisions.

At the end of the course:

1. **Knowledge and understanding:** students will have developed a solid understanding of the main concepts and will be able to calculate correctly the cash flows, knowing the adequate use of the fundamental financial variables.
2. **Ability to apply knowledge and understanding:** students will be able to apply properly the studied mathematical tools in order to solve practical problems related to business financial management and analysis of basic financial tools and to understand and evaluate real economic-financial situations.
3. **Independent judgment:** students will be able to evaluate financial problems, to critically analyze the solutions and to provide consistent and well-founded interpretation.
4. **Communication skills:** students will be able to communicate in a clear and structured way their evaluations and conclusions related to subjects of mathematical finance.
5. **Learning ability:** students will have developed a good autonomy in learning the subject, in data analysis and interpretation, that will let them deepen more advanced subjects in business finance and financial markets with awareness.

Contents

Financial transactions. Capitalization. Annuities. Capital accumulation. Amortizations. Investment appraisal. Bonds' market.

Detailed program

1. **Capitalization.** Financial transactions. Accumulated value, interest, discounted value. Capitalization and discounting. Interest rates and discount
   rates. Equivalent rates. Instantaneous intensity of interest. Decomposability property.
2. **Annuities.** Classification of annuities. Value of an annuity at time t. Present value and final value. Time indexes.
3. **Capital accumulation and amortizations.**
4. **Investment appraisal.**
5. **Bonds' market.** Bond pricing. Yields. Duration. Term structure of interest rates and forward rates.

Prerequisites

The course "Matematica Generale I" (part of the course "Metodi Quantitativi per l'Amministrazione delle Imprese") is a prerequisite for the course of "Matematica Finanziaria" for students enrolled from 2024/2025.

The course "Metodi Quantitativi per l'Amministrazione delle Imprese" (formed by "Matematica Generale I" and "Statistica I") is a prerequisite for the course of "Matematica Finanziaria" for students enrolled before 2024/2025.

Teaching methods

The teaching method is based on lectures, exercises and tutoring in preparation for the exam.
Lectures will take place mainly in presence.

Assessment methods

The final assessment will be carried out with a compulsory written exam, either divided into two parts or in one unique exam.
The written exam is formed by exercises and theory questions.

There may be an oral examination in the following three cases:

1. exam requested by the professor
2. exam requested by the student
3. exam in order to have 30 cum laude

The exam evaluates the formal correctness of the passages, the adequacy of the mathematical language adopted, the skills
and knowledge acquired during the course.

Textbooks and Reading Materials

- G. Ceccarossi, F. Tramontana - Matematica Finanziaria. Con quiz di autovalutazione ed esercizi svolti e commentati, Giappichelli, Torino, 2025
- F. Grassetti, F. Tramontana - Esercizi svolti di matematica finanziaria, Giappichelli, Torino, 2025
- S. Stefani, A. Torriero, G.M. Zambruno - Elementi di Matematica finanziaria e cenni di programmazione lineare Giappichelli, Torino, 2017
- G. Bolamperti, G. Ceccarossi - Elementi di Matematica finanziaria e cenni di programmazione lineare - Esercizi

Semester

First semester.

Teaching language

Italian.

Sustainable Development Goals

QUALITY EDUCATION