# Financial mathematics

## Prof. Michele Longo

***COURSE AIMS AND EXPECTED LEARNING OUTCOMES***

The course aims to provide the theoretical elements needed to formalize and solve financial problems. The main mathematical tools that find significant application in financial theory and business practice are presented and discussed. To this end, the basic concepts of standard financial mathematics are introduced, with examples and applications related to practices commonly used in workplaces and in financial markets.

The following learning abilities are provided and expected to be achieved by participants at the end of the course:

1. knowledge of concepts, terms and methods of financial mathematics, ability to correctly perform the calculations relating to financial flows and ability to understand the appropriate use of the main financial variables.
2. ability to correctly apply financial techniques and to solve autonomously mathematical financial problems that may appear new.
3. ability to analyze financial problems including their critical evaluation and the correct interpretation of their solutions.
4. ability to clearly communicate others their knowledge and their own considerations regarding financial problems.
5. ability of the autonomous use of the financial techniques in several activities and works in this sector, as well as ability to make autonomous and critical judgements.

***COURSE CONTENT***

Financial concepts of present and future values. Concepts of simple interest, discount and compound interest. Equivalent and convertible rates. The force of interest. Separability condition. Annuities: definition, classification and valuation. Capital formation. Amortization plans. Pay-back criterion, NPV criterion and IRR criterion. Fundamentals of fixed-income securities. Spot rates. Forward rates. The term structure of interest rates. Duration, convexity and overview of immunization.

***READING LIST***

S. Stefani-A. Torriero-GM. Zambruno, *Elementi di Matematica Finanziaria e cenni di Programmazione Lineare,* Giappichelli, Turin, 2017 (5th edition).

G. Bolamperti-G. Ceccarossi, *Elementi di Matematica Finanziaria e cenni di Programmazione Lineare, esercizi*, Giappichelli, Turin, 2017 (3rd edition).

Lecture notes by the instructor and published on http://blackboard.unicatt.it

***TEACHING METHOD***

The course involves face-to-face lectures and exercise sessions.

***ASSESSMENT METHOD AND CRITERIA***

Written examination in which students are required to answer theory questions and solve numerical problems, in multiple choice and open format.

The exam can also be taken through two partial tests: the first partial test during the class period and the second partial test at the end of the course in the exam session of June-July 2023. The two partial exams have the same weight in the final evaluation. The first partial test is open to all students, also those who have not yet passed the math exam (*matematica generale*).

More detailed information on the assessment process will be provided during the first lecture and posted on the e-learning platform *Blackboard.*

***NOTES AND PREREQUISITES***

It is highly recommend to attend General Mathematics before taking the course.

The Blackboard IT platform will be used for the distribution of teaching material, the communication of grades, the publication of all communications relating to the course.

In the event that the health situation relating to the Covid-19 pandemic does not allow face-to-face teaching, distance learning will be guaranteed in ways that will be communicated to students in time.