# Financial mathematics

## Prof. Salvatore Vassallo

***COURSE AIMS AND INTENDED 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***

First six weeks: 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.

Last six weeks: 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***

Textbooks

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 (2rd edition).

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

***TEACHING METHOD***

The course involves face-to-face lectures and exercise sessions. Specific material for the computer-based exam will be available on the platform https://progettominerva.unicatt.it

***ASSESSMENT METHOD AND CRITERIA***

The exam is written and consists of two different parts lasting one hour each to be taken consecutively and covering subjects relative to the first six weeks and the last six weeks. Every part is on a total of 16 points and consists of: 7 closed questions, both theoretical and numerical, for a total of 10 points (given on the pc); 4 points open numerical exercise and a 2 points theoretical question. The final grade is the sum of points got in the two parts. The exam is passed if the final grade is greater than or equal to 18 with a minimum score of 7 in each one of the two parts.

Theoretical closed questions test the knowledge of fundamentals. Numerical closed questions test the ability to apply knowledge to standard problems. The open numerical exercise test the ability to manage a more complex problem requiring both ability and competence to be solved. The theoretical open question tests, beyond knowledge, the development of critical thinking. The minimum score of 7 to be get in each part grants that a minimal level in every course subject has been reached.

***NOTES AND PREREQUISITES***

The exam of Mathematics is a mandatory prerequisite.

In case the current Covid-19 health emergency does not allow frontal teaching, remote teaching will be carried out following procedures that will be promptly notified to students.