# Financial mathematics

## Gr. A-K: Prof. Marina Santacroce Gr. L-Z: Prof. Davide Radi

***COURSE AIMS AND INTENDED LEARNING OUTCOMES***

The aim of the course is to supply the theoretical elements needed for formalizing and solving financial and actuarial problems. The principal mathematical instruments having significant application in financial theory and business practice will thus be presented and discussed.

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 related 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;

3. ability to analyze financial problems and, through a critical evaluation, give a correct interpretation of the solution;

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. Simple, discount and compound interest. Equivalent and convertible rates. Force of interest. Decomposability. Annuities: definition, classification and evaluation. Amortization plans. Financial choices: common evaluation methods (Net Present Value, Internal Rate of Return, Adjusted Present Value). Fundamentals of fixed-income securities. Spot rates. Forward rates. Interest rates term structure.

***READING LIST***

Castagnoli-Cigola-Peccati, *Financial Calculus with applications,* Egea 2013.

Notes, exercise sets and additional materials are available on the e-learning platform Blackboard.

***TEACHING METHOD***

Face-to-face lectures, tutoring sessions.

***ASSESSMENT METHOD AND CRITERIA***

The final exam is composed of open questions, including theory and practical applications, possibly in subitems. Each question/subitem is assigned a score (clearly indicated in the text of the exam), maximum in case of correct answer. The maximum total score is 32/30. The scores 31 and 32 correspond to the honors. The score attributed to each subitem depend on the complexity of the question.

In particular, an open question allows to check not only the correct answer but also to evaluate how the final answer is reached and the related comments added by the student.

The theoretical questions are conceived to test knowledge and, the harder ones, to test the competence in model development and critical thinking, the impact of underlying hypotheses, the comparison among alternative models.

The practical applications, from the simpler to the harder, check the capacity to apply the basic principles. Harder exercises require an analysis of the best model to choose.

The exam can also be taken through two partial tests: first partial test during the class period and second partial test at the end. The two partial exams have the same weight in the final evaluation.

For more details, please refer to the information available on Blackboard.

*Office Hours*

Gr. A-K: Prof. Santacroce receives by appointment to be fixed via email (marina.santacroce@unicatt.it). She receives in Office 218, second floor, Via Necchi 9.

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## Gr. L-Z: Prof. Radi receives by appointment to be fixed via email (davide.radi@unicatt.it). The office hours are held in Office 216, second floor, Via Necchi 9.