**Financial Mathematics**

## Prof. Gabriele Bolamperti

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

The course aims to provide students with the key concepts to formalise and solve financial problems. Furthermore, it will explore and analyse the mathematical tools that can play a relevant role in the finance theory and in business practices. To this end, it will introduce the key concepts of traditional financial mathematics, with examples taken from common business and financial practices.

At the end of the course, students will be able to:

1. identify and describe the key financial variables that can be found in operations like capitalising and discounting, calculating incomes, depreciating, and assessing financial projects and bond securities; recognise, understand, and describe the cause and effect relationships existing between different financial variables in the field of investments and funding; get familiar with the key methods and techniques to estimate financial flows, as indicated in the course programme.

2. put into practice the theoretical information and know-how acquired during the course, and therefore make full use of the most relevant methods and techniques used to evaluate financial operations; in addition, they will be able to identify the most convenient investment and financing operations for a company or an individual, solve problems related to the evaluation of financial transactions (similar to the ones presented in class) or financial mathematics.

3. collect and interpret financial data in order to form independent judgments on the validity of financial transactions and investments, the analysis of issues related to financial mathematics, and the critical evaluation and interpretation of the possible solutions that have been proposed.

4. present in a clear and efficient way information, ideas, problems, and solutions to specialist (companies) and non-specialist (individuals) audiences, using appropriate terminology.

5. put into practice the learning skills acquired during the course, in order to read and interpret financial data, search for useful information on the topics explained in class, and therefore pursue further studies in this field with a high degree of autonomy.

***COURSE CONTENT***

*Financial Mathematics*

Capitalisation and discount. Simple, anticipated, and compound interests. Equivalent and convertible exchange rates. Force of interest. Separability. Incomes: definition, classification, and evaluation. The creation of capital. The amortisation of undivided loans, the US amortisation plan, the Italian amortisation plan, and the French amortisation plan. The different criteria that can be adopted when choosing financial transactions: the pay-back period, the net present value, and the internal rate of return. Bond securities.

***READING LIST***

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

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

Further teaching material will be made available on *Blackboard*.

***TEACHING METHOD***

Frontal lectures and practical classes, based on problem solving activities.

***ASSESSMENT METHOD AND CRITERIA***

Written exam, consisting in a theoretical question, followed by three numerical exercises on the course programme (each question will be based on a different topic). The theoretical question is aimed to test students’ knowledge of the subject, and their ability to find connections between the topics explained in class and current events, or their working experience. In addition, they will be assessed on use of proper terminology, belonging to the field of financial mathematics. The numerical exercises, instead, will test students’ understanding and application of the methods and techniques used to evaluate financial transactions, choosing the most appropriate ones according to the context under analysis; in addition, they will be tested on their ability to understand financial problems, and find links between different financial variables.

After the written assessment, students will have the possibility to take an oral exam (which is optional). Also students who obtained an ‘almost sufficient’ mark in the written test (15/30, 16/30, 17/30, etc.) will be allowed to take the oral exam. The final mark will result from the average between the written and the oral exam. Further information will be made available on Blackboard.

***NOTES AND PREREQUISITES***

Further information can be found on the lecturer's webpage at http://docenti.unicatt.it/web/searchByName.do?language=ENG, or on the Faculty notice board.