# General Mathematics II

## Prof. Piera Mazzoleni; Prof. Paola Biffi

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

The course aims to complete the students’ preparation of basic mathematics, started in the first year, by providing an in-depth study of some calculation tools that are particularly useful for a course that focusses on economic, financial and actuarial issues.

*Knowledge and understanding*

Students are expected to:

* Analyse in detail the quantitative tools and be able to understand their characteristics in order to recognize the application sector to which they refer.
* Learn the solution methods for the different tools with special attention to their flexibility aspects.
* Acquire the ability to recognize and evaluate the solutions obtained.

*Application ability*

Students are expected to learn to use the analytical tools studied for the economic-financial analysis, especially in the dynamic and multidimensional area, in order to transfer their knowledge to more specific disciplines of economics, finance and actuarial sciences.

***COURSE CONTENT***

Part one (5 ECTS in semester I) Prof. Piera Mazzoleni

1. Functions of two or more variables and differential calculus.

2. Quadratic forms and unconstrained optimal solutions.

3. Constrained optimal solutions and inequality constraints.

4. From recurrence relations to difference equations.

5. Differential equations with immediate solution.

6. Discrete and continuous probability distributions (brief overview)

Second part (5 ECTS in semester II) Prof. Paola Biffi

1. Calculation of double integrals.
2. Integrals with parameter.
3. Vector spaces, bases and systems of generators.
4. Eigenvalues, eigenvectors and eigenspaces.
5. Bilinear spaces, isometries.

***READING LIST***

K. Sydsaeter-P. Hammond-A. Strom, *Metodi matematici per l’analisi economica e finanziaria*, Pearson Italia, 2015.

M. Candilera-A. Bertapelle, *Algebra lineare e primi elementi di Geometria,* McGraw-Hill, Milan, 2011.

P. Baldi, *Calcolo delle Probabilità,* McGraw-Hill, Milan, 2011 (2nd edition).

C. Canuto–A. Tabacco, *Analisi Matematica II (teoria ed esercizi),* springer verlag, Berlino 2014.

Additional study material is available on the Blackboard platform.

***TEACHING METHOD***

Classroom lectures.

***ASSESSMENT METHOD AND CRITERIA***

The assessment of the student’s knowledge is based on a written test consisting of open, theoretical, and numerical exercises both in the first and in the second module.

  The mark will be based on the students’ ability to present the theoretical results and to interpret the results obtained in economic and financial terms.

Students pass the exam test only if they obtain a pass grade in both modules.

Students may also take an interim test (on the first module topics) and a final test (on the topics of the second module).

***NOTES AND PREREQUISITES***

Prerequisite for the student is to accurately master the General Mathematics tools already acquired.

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.

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.