**Mathematics**

Gr. A-K: Prof. Enrico Miglierina; Prof. Łukasz Piasecki; Gr. L-Z: Prof. Carlo Alberto De Bernardi; Prof. Davide Radi

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

The course has two objectives: to present several fundamental mathematical tools for dealing with economic-financial problems, and to help students to acquire a precise and essential language. The course will emphasize how to develop a view toward critically re-examining mathematical concepts, which students will find in their academic pursuits, and how to stimulate the capacity to use mathematical methods, tools and models in a wide array of applications.

At the end of the course students should:

1. Have acquired the knowledge and understanding of fundamental mathematical tools for dealing with economic-financial problems.

2. Be able to apply the mathematical methods described in the program in order to solve problems and exercises.

3. Be able to understand the translation of a real world situation into a mathematical model.

4. Be able to deal with complex problems by using the mathematical tools.

5. Have learned a rigorous and essential language that allows them to communicate the knowledge clearly and effectively.

6. Have developed good learning skills that allow them to continue their plan of studies.

***COURSE CONTENT***

First Term - *Real functions of one variable*

*Unit 1*: Preliminary concepts (the set of real numbers, the notion of function and its basic properties)

*Unit 2*: Limits and continuity.

*Unit 3*: Differential calculus and its applications.

*Unit 4*: Integral calculus.

Second Term

*Unit 5*: Linear Algebra: vectors, matrices and systems of linear equations.

*Unit 6*: Real functions of two variables: preliminary notions, differential calculus, unconstrained and constrained optimization.

***READING LIST***

Lecture Notes*,* Exercise Sets and additional materials are available on the e-learning platform *Blackboard*.

The material on Blackboard is self-contained and covers all the topics of the course. For further reading the following book is suggested:

G. Bosi-C. Corsato-M.E. Zuanon, *Essential Mathematics for Economics,* Apogeo Education, Maggioli Editore, 2018.

Moreover, about preliminary notions and for the OFA course, the students may use the following book:

C.A. De Bernardi, M. Longo, *Maths Notes: Preliminary Notions*, Educatt, 2023 (available from September 2023)

***TEACHING METHOD***

Lectures, exercises groups, preliminary course (see also below: NOTES AND PREREQUISITES).

***ASSESSMENT METHOD AND CRITERIA***

Three written *partial tests* are planned during the course: the first one at the middle of the first term, the second at the end of the first term (on the same day as the official exam in November/December session – see official exams calendar) and the third at the end of the second term (on one among the two dates of the official exams in the March session).

The maximum score of each test is 11, the final mark of the whole exam will be given by the sum of the marks of the three partial tests.

Alternatively, written *exams* concerning the whole program of the course are set accordingly to the Faculty calendar.

Partial tests and exams contain multiple choice, true/false, and short answer questions. The knowledge of theoretical aspects and methods of application to specific exercises are necessary to solve the proposed question.

An assessment (OFA Assessment - about the basic knowledge) is compulsory for the students that have been assigned an Additional Training Obligation (see the slides General Information on Blackboard – section Information) after the admission test. The OFA test has 12 multiple choice questions (without penalty). In order to pass this test, it is necessary to answer correctly at least 7 questions.

For a detailed overview about the assessment method (official exam, partial tests and preliminary test) see the document “Rules and instructions for partial tests and exams” available on Blackboard – section Information

***NOTES AND PREREQUISITES***

All the students are strongly recommended to attend partial tests.

*Preliminary Notions*:

The following arguments are assumed to be known in advance:

Natural, integer, rational and real numbers. Basic elements of logic and set theory. Elementary algebra. Powers, logarithmic and exponential functions. Equations and inequalities (polynomial, fractional, irrational, logarithmic and exponential). Systems of equations and inequalities. Plane analytical geometry. Basic notions of trigonometry.

The preliminary notions are strictly needed to attend the course. The preliminary notions are reviewed in the Additional Training Obligation course (the calendar of this course will be published on the web site of the university and on Blackboard) All the students that should satisfy an Additional Training Obligations must attend this course (at least 70% of lectures of the Additional Training Obligation Course) and pass the OFA test. Additional information about Additional Training Obligations course and test will be available on the e- learning platform Blackboard (see the dedicated course in Blackboard)

To review all the preliminary notions is also available the online ambient TEOREMA ( <https://elearning.teorema.cineca.it> ).

*Group A-K*: Units 1-2 and 5-6 will be taught by Enrico Miglierina whereas Units 3-4 will be taught by Łukasz Piasecki (visiting professor from Maria Curie-Skłodowska University – Lublin, Poland)

*Group L-Z*: Units 1-4 will be taught by Davide Radi whereas Units 5-6 will be taught by Carlo De Bernardi.

*Office Hours*

Gr. A-K:

Prof. Enrico Miglierina: by appointment to be fixed by e-mail ([enrico.miglierina@unicatt.it](mailto:enrico.miglierina@unicatt.it)). The office hours are held in room 207, second floor, building Via Necchi 9

Prof. Łukasz Piasecki: by appointment to be fixed by e-mail ([piasecki@hektor.umcs.lublin.pl](mailto:piasecki@hektor.umcs.lublin.pl)). The office hours are held in room 207, second floor, building Via Necchi 9 (only during the period October 22, 2023 – November 15, 2023)

Gr. L-Z:

Prof. Carlo Alberto De Bernardi: by appointment to be fixed by e-mail (carloalberto.debernardi@unicatt.it). The office hours are held in room 211b, second floor, building Via Necchi 9

Prof. Davide Radi: by appointment to be fixed by e-mail ([davide.radi@unicatt.it](mailto:davide.radi@unicatt.it)). The office hours are held in room 216, second floor, building Via Necchi 9