



UNIVERSITY OF BASILICATA STUDIES
DEPARTMENT OF MATHEMATICS, INFORMATICS AND ECONOMICS

COURSE: General Mathematics		
ACADEMIC YEAR: 2019-2020		
TYPE OF EDUCATIONAL ACTIVITY: Basic		
TEACHER: Antonio Azzollini		
e-mail: antonio.azzollini@unibas.it		website:
phone: 0971205856		mobile (optional):
Language: Italian		
ECTS: (lessons e tutorials/practice) 6	n. of hours: (lessons e tutorials/practice) 48	Campus: Potenza Dept.: DiMIE Program: Business Economics degree

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The course provides the basics of Mathematical Analysis by dealing with functions, continuity and limits, derivability, function graphs, and integration.

The main goal of the course is to provide students with the basics to deal with function graphs study. The main knowledge provided will be:

- basics of real numbers and functions
- properties of real functions of one real variable: relative and absolute maximum and minimum, monotonicity, convexity, inflection points.
- definitions and theorems on continuous functions and limits
- definitions and theorems on derivatives
- determining the graph of a real function of one real variable
- definition, property, and calculation of indefinite and definite integrals

PRE-REQUIREMENTS

It is required the math skills normally acquired in secondary school. In particular:

- basics of analytical geometry (Cartesian coordinates in the plane, equation of the straight line);
- know how to solve first and second degree equations as well as first-degree disequations and systems of first-degree disequations.

SYLLABUS

Real numbers and functions

The language and some basic notions of the set theory. Real numbers. Intervals and neighbourhoods. Definition of function. Invertible functions. Elementary functions and their graphs. Bounded functions. Monotonic functions.

Continuity and Limits

Continuity at a point. Continuous functions. Intermediate value theorem. Theorem on existence of zeros. Weierstrass theorem. Definition of limit of a function. Limit Comparison Theorem. Calculation of limits. Indefinite forms. Some fundamental limits. Asymptotes of a function.

Derivatives

Definition of derivative at a point. Calculation of the derivative of elementary functions. Definition of derived function. Theorems on calculation of derivatives. Geometric meaning of the derivative.

Derivative theorems

Intervals of monotonicity of a derivable function. Relative maximum and minimum. Fermat theorem. Rolle theorem. Lagrange theorem. De L'Hopital Theorem. Intervals of concavity and convexity of a twice derivable function. Inflection points.



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Graphs of functions

Representation of the graph of a function on a Cartesian plane.

Integration

Indefinite and definite integral. Integral mean theorem. The fundamental theorem of integral calculus. Primitive of a function. Definition of indefinite integral. Immediate Integrals. Integration by parts and by substitution.

TEACHING METHODS

Theoretical lectures with examples.
Exercises in the classroom.

EVALUATION METHODS

The purpose of the examination is to verify the level of achievement of the above mentioned educational goals.

The examination consists of a written test, with a subsequent brief oral interview for the confirmation of the vote.

The test time is 3 hours. In order to pass the written test and be admitted to the oral interview it is necessary to acquire at least 17 points out of 30.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

- A. Guerraggio, *Matematica*, Pearson ed. 2009;

- P. Marcellini, C. Sbordone, *Esercitazioni di Matematica, Volume 1 parte prima* (1995), Liguori Editore, Napoli;

- P. Marcellini, C. Sbordone, *Esercitazioni di Matematica, Volume 1 parte seconda* (1995), Liguori Editore, Napoli. .

INTERACTION WITH STUDENTS

Weekly office hours. Tuesday from 15 to 18 (The office hours may vary in the second semester)

- E-mail messages.
- Notices via Twitter.

EXAMINATION SESSIONS (FORECAST)¹

February 4, 2020

February 18, 2020

March 24, 2020 (reserved to students who have not completed exams within set time period)

May 12, 2020

July 7, 2020

September 8, 2020

November 17, 2020

SEMINARS BY EXTERNAL EXPERTS YES NO x

FURTHER INFORMATION

¹Subject to possible changes: check the web site of the Teacher or the Department/School for updates.



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