
COURSE: Mathematics I

ACADEMIC YEAR: **2018-2019**

TYPE OF EDUCATIONAL ACTIVITY:

TEACHER: Rinauro Silvana

e-mail: silvana.rinauro@unibas.it

website:

phone: 0971205888

mobile (optional):

Language: **italian**

ECTS: 6 (5 lessons
and 1 tutorials)

n. of hours: 52 (40
lessons and 12 tutorials)

Campus: **Potenza**
Dept./School: **Dipartimento di
Scienze**
Program: **Chemistry**

Semester: **I**
(date: 1/10/2018 form
18/01/2019) to

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

Mathematics I is the first teaching in mathematics area and it deal with functions, limits, derivatives and linear systems.

Principal knowledge are:

- o basics on real numbers and functions
- o real functions: maximum, minimum, monotony, convexity, flexes
- o definitions and theorems on limits and continuous functions
- o derivatives
- o the study of the graph of a function
- o complex numbers

Principal abilities are:

- o calculus of limits
 - o calculus of derivatives
 - o find the graph
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PRE-REQUIREMENTS

It is necessary to know the following basic arguments:

- o algebraic geometry (cartesian plane, line);
 - o algebraic equations and disequations (polynomial, fractional, irrational exponential e logarithmic).
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SYLLABUS

(10 hours) Functions and sequences.

Basic set theory – Real numbers – Basic elements of topology – Elementary functions and their cartesian graph –

Invertible functions – Definition of sequence – Bounded functions – Monotone functions

(10 hours) Limits and continuity.

Definition of limit – Cauchy sequences – The squeeze Theorem – Computation of elementary limits – Indeterminate

forms – Limits of extra interest – Asymptotes – Continuity at a point – Continuous functions – The middle value

theorem – Theorem of zeros for continuous functions – The Weierstrass Theorem

(10 hours) Derivability.

Derivative at a point – Computation of elementary functions derivative – The derivative function – Theorems on the

calculus of derivatives – Geometric interpretation of the derivative –

(10 hours) Application of derivatives to the graph of a function

Monotony intervals of a derivable function – Local maxima and minima – Fermat Theorem – The Rolle Theorem and

its geometric interpretation – Lagrange Theorem and geometric interpretation – Cauchy Theorem – De L'Hopital

Theorem and application in solving some type of indeterminate forms – Concavity and convexity intervals for a twice

derivable function – Flex points –

(8 hours) Representation of the Graph of a function

(6 hours) Complex numbers.

Definition. Operations. geometric representation. De Moivre formula.

TEACHING METHODS

40 hours of Theoretical lessons and 12 hours of Classroom tutorials.

EVALUATION METHODS

Either Intermediate verifications, or Written examination, Oral examination (optional).

The aim of examination is to verify the level of the achievement of the above educational goals. The final test consists of a written examination which requires both numerical exercises and theoretical ones. The time for the written examination is 2 hours. In order to overcome the exam it is necessary to achieve at least 18/30. The student that wants to improve the grade may require to do also an oral examination.

The student that achieves 16/30 or 17/30 to the written examination, has to do also an oral examination in order to overcome the final test. There will also be two optional tests the overcoming of which "exempt" students from the oral test. In these tests are included both the exercises and the questions related to theoretical knowledge. Each test is overcome with 16/30 and the final grade is the average grade of all two tests plus 2 points (bonus) .

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

- Bramanti M., Pagani C.D., Salsa S., Analisi Matematica 1, Zanichelli

- Salsa S., Squellati A., Esercizi di Analisi Matematica 1, Zanichelli

INTERACTION WITH STUDENTS

Educational goals, syllabus and evaluation methods are described at the beginning of the course.

Office hours: Monday 10:30-11:30, Tuesday 10:30-11:30, next to the office n. n. 3D257 of the Department of Mathematics, Informatics and Economics.

It can be possible to contact the professor also by e-mail.

EXAMINATION SESSIONS (FORECAST)

25/02/2019, 18/03/2019, 03/06/2019, 08/07/2019, 23/09/2019, 28/10/2019, 09/12/2019.

SEMINARS BY EXTERNAL EXPERTS YES NO

FURTHER INFORMATION
