



ACCADEMIC YEAR: 2017–2018

COURSE: Mathematical Analysis I

TYPE OF EDUCATIONAL ACTIVITY: (Basic, Characterizing, Affine, Free choice, Other) 12 ECTS Basic + 3 ECTS

TEACHER: Prof. Paolo Vitolo

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mobile (optional):

Language: Italian

ECTS: (lessons and tutorials/practice) 15

n. of hours: (lessons and tutorials/practice) 120

Campus: Potenza  
Dept./School: DiMIE  
Program: Mathematics degree

Semester: Annuale

**EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES:**

Being able to solve some fundamental types of inequalities.  
Understand the basic concepts of mathematical analysis.  
Calculate limits of functions or sequences.  
Draw a qualitative and quantitative representation of the graph of a function.  
Acquire the tools of differential and integral calculus for functions of one variable.

**PRE-REQUIREMENTS:**

The language of set theory.  
First and second degree equations.  
First degree inequalities.  
Elementary analytic geometry.

**SYLLABUS:**

Real numbers. Functions and their graphs.  
Continuity and uniform continuity. Limits.  
Induction principle. Sequences. Cauchy criterion.  
Subsequences; theorem of Bolzano-Weierstrass.  
Heine-Cantor theorem. Weierstrass theorem.  
Derivatives. Rules of derivation; derivatives of elementary functions.  
Derivative of a monotonic function. Fermat's theorem. Rolle's theorem.  
Theorems of Cauchy and Lagrange. Theorem of De L'Hôpital.  
Study of functions.  
Riemann integration. Improper integrals.



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**TEACHING METHODS:**

Usual lectures and exercises in the classroom.

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**EVALUATION METHODS:**

Three partial written tests (optional) in the period of the course.  
Final written test, as an alternative to partial tests.  
Oral exam with final examination and attribution of voting.

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**TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL:**

Testbooks:

- E. Giusti: Analisi Matematica I, Bollati Boringhieri.
- E. Acerbi, G. Buttazzo: Primo corso di Analisi Matematica, Pitagora Editrice.
- E. Giusti: Esercizi e Complementi di Analisi Matematica, vol. 1, Bollati Boringhieri.
- G. Gilardi: Analisi Uno, McGraw-Hill

On-line material:

Some notes provided by the teacher.

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**INTERACTION WITH STUDENTS:**

- Weekly office hours: Wednesday from 15:30 to 17:30.
- E-mail messages.
- Updated information about the course on the teacher's webpage.
- Telephone announcements by the teacher for urgent communications (eg. any changes in time, or classroom).
- Announcements via Twitter.

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**EXAMINATION SESSIONS (FORECAST)<sup>1</sup>**

February 8, 2018  
April 10, 2018  
June 5, 2018  
July 10, 2018  
September 11, 2018  
December 12, 2018

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SEMINARS BY EXTERNAL EXPERTS YES  NO

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**FURTHER INFORMATION:**

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