



# UNIVERSITÀ DEGLI STUDI DI PALERMO

<b>SCHOOL</b>	POLYTECHNIC SCHOOL		
<b>ACADEMIC YEAR</b>	2016/2017		
<b>FIRST CYCLE COURSE</b>	CIVIL AND BUILDING ENGINEERING		
<b>SUBJECT</b>	MATHEMATICAL ANALYSIS I		
<b>TYPE OF EDUCATIONAL ACTIVITY</b>	A		
<b>AMBIT</b>	50279-matematica, informatica e statistica		
<b>CODE</b>	13711		
<b>SCIENTIFIC SECTOR(S)</b>	MAT/05		
<b>HEAD PROFESSOR(S)</b>	TORNATORE ELISABETTA	Ricercatore	Univ. di PALERMO
<b>OTHER PROFESSOR(S)</b>			
<b>CREDITS</b>	9		
<b>INDIVIDUAL STUDY (Hrs)</b>	144		
<b>COURSE ACTIVITY (Hrs)</b>	81		
<b>PROPAEDEUTICAL SUBJECTS</b>			
<b>YEAR</b>	1		
<b>TERM (SEMESTER)</b>	1° semester		
<b>ATTENDANCE</b>	Not mandatory		
<b>EVALUATION</b>	Out of 30		
<b>TEACHER OFFICE HOURS</b>	TORNATORE ELISABETTA Wednesday 11:00 - 13:00 studio del docente ex Dipartimento di Metodi e Modelli Matematici II piano, stanza 15		

DOCENTE: Prof.ssa ELISABETTA TORNATORE

<b>TEACHING METHODS</b>	Theoretical lessons and exercises.
<b>ASSESSMENT METHODS</b>	<p>The written exam consists of exercises. To be admitted to the oral exam, the student have to obtain the score of at least 18/30 in the written exam. The oral exam consists of questions and proofs on the theory presented in the course. In addition, based on the written exam, we can be required clarifications on errors and resolutions of exercises.</p> <p>The final vote will be given in thirtieths.</p> <p>(rating 30-30L): Excellent knowledge of subjects and theories addressed in the course; excellent level of awareness and autonomy in the application of theories to solve problems;</p> <p>(rating 26-29) : Good knowledge of subjects and theories addressed in the course; good degree of awareness and autonomy in the application of theories to solve problems;</p> <p>(rating 24-25): Good knowledge of subjects and theories addressed in the course; fair degree of awareness and autonomy in the application of theories to solve problems;</p> <p>(rating 21-23); fair knowledge of subjects and theories addressed in the course; sufficient degree of awareness and autonomy in the application of theories to solve problems;</p> <p>(rating 18-20): sufficient knowledge of subjects and theories addressed in the course; sufficient degree of awareness and autonomy in the application of theories to solve problems;</p>
<b>LEARNING OUTCOMES</b>	<p><b>-Knowledge and understanding</b> The student must know and understand the basic concepts of the course. Know and be able to work in different numerical sets, know, understand and be able to apply knowledge relating to succession, elementary functions, limit of sequences and functions, differential and integral calculus.</p> <p><b>-Applying knowledge and understanding</b> The student will be able to use mathematical language, apply the acquired knowledge in solving proposed problems and generally include the use of mathematical methods in the applied sciences.</p> <p><b>-Making judgment</b> At the end of the course the student will have specific knowledges in identifying the most relevant technical solutions in relation to different problems. at the same time understand how to use the knowledge acquired in the study of other disciplines.</p> <p><b>-Communication skill</b> During lectures and exercises the student will be urged to interact with relevant questions to clarify any doubts and to develop capacity to apply the techniques learned to other scientific subjects.</p> <p><b>-Learning ability</b> Ability to attend, using the knowledge acquired in the course. Knowledge of the differential and integral calculus for functions of one real variables. The student will be able to study of the graphs of elementary functions, to solve integration problems of elementary character, to discuss the nature of numerical sequences, to state and prove basic theorems of Mathematical Analysis.</p>
<b>EDUCATIONAL OBJECTIVES</b>	The aim of the course of Mathematical Analysis is that to stimulate the student to reasoning and logic deduction and to provide useful tools for engineering studies.
<b>PREREQUISITES</b>	Typical high school syllabus
<b>SUGGESTED BIBLIOGRAPHY</b>	P. Marcellini – C. Sbordone Elementi di Analisi Matematica uno Liguori Editore

## SYLLABUS

Hrs	Frontal teaching
4	Axioms of real numbers. natural, integers and rational numbers. Set theory. Maximum, minimum, supremum and infimum of a set. Uniqueness of the maximum and minimum of a set. Theorem of existence of the supremum and infimum of a set.
2	Complex numbers. Complex conjugate, modulus. Complex plane. Properties of complex numbers.
4	Functions of a real variable. Surjective, bijective functions. Composite mappings. Monotonic functions. The exponential and logarithmic functions. Powers functions. The circular functions.
8	Sequence. Bounded sequence, convergent sequence. Limit of the sequence. Properties .
8	Limitis and convergence of functions. Monotonic functions. Continuous functions. Discontinuities of a function. Properties and theorems of limits of functions. The intermediate value theorem.

## SYLLABUS

<b>Hrs</b>	<b>Frontal teaching</b>
8	Differentiation at a point. The chain rule theorem. Differentiation of the inverse mapping. Convex functions. Properties of derivatives functions. Local minimum and maximum. Rolle Theorem. Darboux continuity. The mean value theorem. Taylor theorem with Lagrange and Cauchy remainder. Higher derivatives of order $n$ . Convex functions. L'Hopital rule.
8	Integration and elementary integrals. Upper and lower Riemann integrals. Riemann integrable functions. Algebraic property of integrable functions. Mean value theorem. The fundamental theorem of calculus. Change of variable formula. Integration by parts. Improper integrals and singular integrals.
<b>Hrs</b>	<b>Practice</b>
6	Exercises on real functions
10	Exercises on limits of sequences and functions.
10	Exercises on continuity and differentiation at a point.
10	Exercises on integrals.