



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2016/2017
BACHELOR'S DEGREE (BSC)	CIVIL AND BUILDING ENGINEERING
SUBJECT	MATHEMATICAL ANALYSIS I
TYPE OF EDUCATIONAL ACTIVITY	A
AMBIT	50279-matematica, informatica e statistica
CODE	13711
SCIENTIFIC SECTOR(S)	MAT/05
HEAD PROFESSOR(S)	TORNATORE Professore Associato Univ. di PALERMO ELISABETTA
OTHER PROFESSOR(S)	
CREDITS	9
INDIVIDUAL STUDY (Hrs)	144
COURSE ACTIVITY (Hrs)	81
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	TORNATORE ELISABETTA Wednesday 13:00 - 14:00 Ed 8. ex Dipartimento di Metodi e modelli matematici

DOCENTE: Prof.ssa ELISABETTA TORNATORE

PREREQUISITES	Typical high school syllabus
LEARNING OUTCOMES	<p>-Knowledge and understanding 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>-Applying knowledge and understanding 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>-Making judgment 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>-Communication skill 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>-Learning ability 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>
ASSESSMENT METHODS	<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. (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; (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; (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; (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; (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>
EDUCATIONAL OBJECTIVES	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.
TEACHING METHODS	Theoretical lessons and exercises.
SUGGESTED BIBLIOGRAPHY	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	Limits and convergence of functions. Monotonic functions. Continuous functions. Discontinuities of a function. Properties and theorems of limits of functions. The intermediate value theorem.

SYLLABUS

Hrs	Frontal teaching
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.
Hrs	Practice
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.