UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Matematica e Informatica		
ACADEMIC YEAR	2018/2019		
BACHELOR'S DEGREE (BSC)	MATHEMATICS		
INTEGRATED COURSE	MATHEMATICAL ANALYSIS 1		
CODE	01249		
MODULES	Yes		
NUMBER OF MODULES	2		
SCIENTIFIC SECTOR(S)	MAT/05		
HEAD PROFESSOR(S)	TRAPANI CAMILLO	Professore Ordinario	Univ. di PALERMO
OTHER PROFESSOR(S)	TRAPANI CAMILLO CIRAOLO GIULIO	Professore Ordinario Professore Associato	Univ. di PALERMO Univ. di PALERMO
CREDITS	12		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	Annual		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	**CIRAOLO GIULIO** Thursday 14:30 16:30 Studio del docente: Dipartimento di Matematica e Informatica, Via Archirafi 34, I piano, stanza 5 **TRAPANI CAMILLO** Wednesday 14:30 16:30 Studio del docente: Dipartimento di Matematica e Informatica, Via Archirafi 34, 1° Piano, Ufficio 115b		

DOCENTE: Prof. CAMILLO TRAPANI

PREREQUISITES	The prerequisites are those provided by the Board for access to the degree course
LEARNING OUTCOMES	KNOWLEDGE AND UNDERSTANDING: The student must know the basic concepts of mathematical analysis (real numbers, limits, derivatives, integrals) APPLYING KNOWLEDGE AND UNDERSTANDING: The student must acquire the ability to use the mathematical tools presented in the course and to use them in theoretical or applicative situations other than those typical of the course. MAKING JUDGEMENT: the student must be able to analyze the data of a problem and identify the mathematical tools to solve it. COMMUNICATION SKILL: the student must be able to express mathematical concepts in a correct and complete way. LEARNING SKILLS: the student must be able to develop and deepen independently additional skills with reference, in particular, to the consultation of bibliographic material.
ASSESSMENT METHODS	Final assessment consists of a written test and an oral test. Written tests regards the resolution, without the aid of textbooks or notes, of a number of questions concerning the various topics covered in the two teaching modules. The written test is intended to evaluate not only the acquired computing capacity, but also the degree of knowledge of the concepts and theorems presented in the course and the ability of the students to apply them independently. The oral test consists of an interview concerning the enunciation and demonstration of key results presented in the course and their application to simple theoretical or practical questions. The interview allows to evaluate, not only the knowledges of the candidate and his ability to apply them, but also the possession of property 'of language and mathematical rigor. Both the written test and the oral examination are part of the final evaluation. The final assessment will be made on the basis of following conditions: a) Basic knowledge of the proposed topics and limited capacity to apply them independently; sufficient capacity to carry out a rigorous reasoning and sufficient command of the language (18-21 rating); b) good knowledge of the proposed topics and fairly good capacity to apply them independently; good ability to complete a rigorous reasoning and good properties of language (22-25 rating); c) In-depth knowledge of the proposed topics and ability to apply them with mathematical rigor, but not independently; possess of good mathematical language (26-28 rating); d) in-depth and extensive knowledge of the proposed topics; ability to apply them with readiness, rigor and independently; possess of excellent communication skills (29-30L vote).
TEACHING METHODS	Lectures and other didactical activities last the whole year but take place in the two educational periods of the first year of the degree course. The didactical activity is developed through lectures and exercises. The lessons are designed to present and discuss the fundamental concepts of mathematical analysis (numbers, sequences, functions, limits, derivatives and integrals) and their consequences. During the exercises students learn how and in what situations to apply the concepts and methods learned in class. After each teaching module there will be a written (not compulsory) test whose positive outcome can replace, in whole or in part, the final written test.

MODULE
INTRODUCTORY ANALYSIS ISSUES

Prof. CAMILLO TRAPANI

SUGGESTED BIBLIOGRAPHY

Testo di riferimento: C.Trapani, Analisi Matematica (funzioni di una variabile reale), McGraw-Hill 2015
Letture consigliate: E.Acerbi, G. Buttazzo, Primo corso di Analisi matematica, Pitagora Editrice;
A. Bacciotti, F. Ricci, Analisi Matematica 1, Liguori
Testi di esercizi:
P.Marcellini, C. Sbordone, Esercitazioni di matematica, I,II, Liguori
C. Trapani e R. Messina, Esercizi di Analisi uno, Aracne 2004

AMBIT	50197-Formazione Matematica di base
INDIVIDUAL STUDY (Hrs)	94
COURSE ACTIVITY (Hrs)	56

EDUCATIONAL OBJECTIVES OF THE MODULE

This module is aimed to the acquisition of the fundamental aspects of Real Analysis , of the structure properties of number sets and of the concepts of limit, continuity and their applications.

SYLLABUS

Hrs	Frontal teaching
5	Ordered sets, Natural numbers and induction principle; Integers and rational numbers
5	Supremum and infimun of a set; Real numbers and their completeness (various characterizations); Complex numbers.
5	Real functions and their basic properties (monotonicity, parity, etc); Elementary functions and their inverses (trigonometric functions, exponentials and logarithms, hyperbolic functions)
5	The topology of the real line (open and closed sets; adherence points, cluster points and their existence); Intervals of the real numbers; Numerical sequences
7	Limits of functions and of sequences; Continuous function at a point; Local comparison of functions and sequences; Infinitesimal and infinite functions
5	Continuous functions on an interval (Intermediate values; Weierstrass theorem; continuity of the inverse function; uniform continuity; Lipschitz functions)

Hrs	Practice
3	Exercises on the numerical sets and on the induction principle
3	Exercises on real numbers and on the algebra of complex numbers
5	Exercises on elementary functions and on their inversion
3	Exercises on the topology of the real line
4	Exercises on continuous functions and their properties
6	Exercises on the calculus of limits and on local comparisons

MODULE
DIFFERENTIAL AND INTEGRAL CALCULUS

Prof. GIULIO CIRAOLO

SUGGESTED BIBLIOGRAPHY	
C. Trapani, Analisi Matematica (funzioni di una variabile reale), McGraw-Hill 2015 C. Trapani e R. Messina, Esercizi di Analisi uno, Aracne 2004	
AMBIT	50197-Formazione Matematica di base
INDIVIDUAL STUDY (Hrs)	94
COURSE ACTIVITY (Hrs)	56
EDUCATIONAL OBJECTIVES OF THE MODULE	
This module is aimed to the acquisition of the fundamental aspects of differential and integral calculus and the ability to apply them in a scientific context.	

SYLLABUS

Hrs	Frontal teaching
4	Derivative and differential
6	Fundamental theorems of differential calculus
5	Convex functions. Taylor formula.
8	Riemann integral. Primitives of a function. Methods of integration. Applications.
5	Improper integrals
4	Series

Hrs	Practice
5	Exercises and complements on derivatives and differentials.
5	Exercises and complements on fundamental theorems of differential calculus and convex functions.
4	Exercises and complements on Taylor formula and applications to limits.
4	Exercises and complements on integrals.
3	Exercises on improper integrals.
3	Exercises and complements on numerical series.