UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Matematica e Informatica		
ACADEMIC YEAR	2019/2020		
BACHELOR'S DEGREE (BSC)	MATHEMATICS		
INTEGRATED COURSE	MATHEMATICAL ANALYSIS 2		
CODE	01250		
MODULES	Yes		
NUMBER OF MODULES	2		
SCIENTIFIC SECTOR(S)	MAT/05		
HEAD PROFESSOR(S)	MARRAFFA VALERIA	Professore Ordinario	Univ. di PALERMO
OTHER PROFESSOR(S)	MARRAFFA VALERIA TULONE FRANCESCO	Professore Ordinario Ricercatore	Univ. di PALERMO Univ. di PALERMO
CREDITS	12		
PROPAEDEUTICAL SUBJECTS	01249 - MATHEMATICAL ANALYSIS 1		
MUTUALIZATION			
YEAR	2		
TERM (SEMESTER)	Annual		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	**MARRAFFA VALERIA** Monday 10:30 12:30 Dipartimento di Matematica e Informatica, Via Archirafi 34, studio n.221 **TULONE FRANCESCO** Monday 15:00 17:00 Dipartimento di Matematica ed Informatica, 2° piano, studio personale del docente.		

DOCENTE: Prof.ssa VALERIA MARRAFFA

PREREQUISITES	Contents of the course of Mathematical Analysis I; matrix algebra, eigenvalues and eigenvectors of a matrix, diagonalization; knowledge of the space R3.
LEARNING OUTCOMES	Knowledge and understanding Arguments of the course of Mathematical Analysis 2 is the differential calculus of more variables, multiple integrals and differential equations. Aim of the course is to acquire a rigorous method of reasoning and the ability to use the specific language and methods of the discipline. This knowledge is achieved by participation in lectures and integrative teaching activities in the classroom. The achievement of objectives is verified by the specific tests and final exams. Applying knowledge and understanding Solve problems of moderate difficulty and repeat rigorous proofs. Capacity of application of the resolution techniques of the exercises in more general fields of Mathematics. These objectives are achieved through the completion of the demonstrations, not developed in full, and the resolution of problems of moderate difficulty regarding the topics taught. Making judgements Learners must be able to develop logical arguments with a clear identification of assumptions and conclusions; They must be able to recognize correct demonstrations; to understand mathematical models associated with concrete situations arising from other disciplines and to use these models to facilitate the study of the original situation. Communication skill Knowing how to exhibit in the written and oral, both in their own language and in English, with logical rigor, with property of language and competently ideas and problem-solving methods. Know mathematically formalize situations of practical interest, in industry or in economics. Lifelong learning skills Capacity to acquire information contained in texts of Mathematics and are able to deepen independently the study of mathematical problems.
ASSESSMENT METHODS	Final assessment consists of a written test and an oral test. The written exam can be replaced by two -course tests and consists in solving four / six exercises, which tend to ensure that they possess the resolution methods related to the arguments of the course. The oral exam consists of two / three questions on all parties covered by the program. Final assessment aims to evaluate whether the student has knowledge and understanding of the topics, he/she can prove the theorems and possesses property of language, mathematical rigor and language and reasoning skills. The criteria for evaluation are as follows: Rating: Excellent. Rating: 29-30 cum laude. Outcome: excellent knowledge of the topics, excellent property of language and analytical skill; the student is able to apply the knowledge to solve the exercises. Rating: very good. Rating: 26-28. Outcome: good knowledge of the topics, full ownership of language and analytical ability; the student is able to apply the knowledge to solve the exercises. Rating: Good. Rating: 22-25. Outcome: Basic knowledge of the main topics discreet property of language and limited analytical capacity; the student is able to apply partially the knowledge to solve the exercises. Rating: enough. Rating: 18-21. Outcome: minimum basic knowledge of the main topics and language; the student is able to solve very elementary exercises. Rating: Not enough. Rating: <18. Outcome: does not have an acceptable knowledge of the contents of the course topics and is not able to solve the exercises.
TEACHING METHODS	Lectures and exercises in classroom. Lectures and educational activities last one academic year, but they are divided into two semesters in the second year of the course . At the end of each module there is a written test (not compulsory), whose positive result can replace in whole or in part the final written test .

MODULE
COMPLEX ANALYSIS AND DIFFERENTIAL EQUATIONS

Prof. FRANCESCO TULONE

SUGGESTED BIBLIOGRAPHY

Pagani, Salsa, Analisi matematica 1 e 2, Zanichelli
M. Bertsch, Dal Passo, Elementi di Analisi Matematica, Aracne

Cosultabili:
Marcellini - Sbordone, Esercitazioni di Matematica, II volume, parte prima e parte seconda, Liguori
Markusevic, Elementi di teoria delle funzioni analitiche, Editori Riuniti

AMBIT	50198-Formazione Teorica
INDIVIDUAL STUDY (Hrs)	94
COURSE ACTIVITY (Hrs)	56

EDUCATIONAL OBJECTIVES OF THE MODULE

The goal of this module is to increase the knowledge of differential equations with their applications to physical phenomena, to study part of complex analysis and how to use it in classical math analysis

SYLLABUS

Hrs	Frontal teaching
8	Formulae of Gauss-Green and change of variables, surfaces and integral of surfaces, Stokes formula and divergence theorem
8	Differential equations, Cauchy problem, local existence and uniqueness, regularity of solutions, global existence and uniqueness, continuous dipendence of solution from the initial data, integration of equation of first order
8	Linear differential equations, method of variation of constants, linear differential equations with constant coefficients homogeneous and not homogeneous, systems of equations
8	Function with complex variables, Holomorfic functions, Cauchy-Riemann conditions, complex integration, Cauchy integral formula, complex power series, Taylor series, Laurent series, singularities, residue theorem

Hrs	Practice
6	Exercises on Gauss-Green formulase, change of variables, surfaces integrals, Stokes and divergence theorem
6	Exercises on differential equations, Cauchy problem, existence and uniqueness od solution, exttension of solution, equation of first order
6	Exercises on linear differential equations, method of variation of constants, linear differential equations with constant or non constant coefficients, homogeneous and not homogeneous, systems of equations
6	Exercises on complex variables functions, holomorfic functions, Cauchy-Riemann conditions, complex integration, Cauchy integral formula, complex power series, Taylor series, Laurent series, singularities and residue theorem

MODULE
SETS OF FUNCTIONS AND DIFFERENTIAL AND INTEGRAL CALCULUS

Prof.ssa VALERIA MARRAFFA

SUGGESTED BIBLIOGRAPHY	
Pagani, Salsa – Analisi matematica 1 e 2 – Zanichelli P. Marcellini - C. Sbordone, Esercitazioni di Matematica, II volume, parte prima e parte seconda, Liguori	
AMBIT	50198-Formazione Teorica
INDIVIDUAL STUDY (Hrs)	94
COURSE ACTIVITY (Hrs)	56
EDUCATIONAL OBJECTIVES OF THE MODULE	
Objective of the module is to deepen the knowledge of differential and integral calculus of more variable and the series of functions.	

SYLLABUS

Hrs	Frontal teaching
8	Sequences of functions: pointwise and uniform convergence. Exchange of limits; limit and derivative, limit and integral. Series of functions. Power series. Analytic functions. Fourier series .
8	Topology of R ^ n. Limits, continuity , derivability and differentiability of two or more variables. Problems of free and constrained optimization.
4	Local inversion theorem. Implicit functions, Dini theorem. Homogeneous functions.
8	Curves and integrals; linear differential forms.
4	Multiple integrals in normal domains and reduction formulas.

Hrs	Practice
8	Sequences of functions: pointwise and uniform convergence. Exchange of limits; limit and derivative, limit and integral. Series of functions. Power series. Analytic functions. Fourier series .
8	Topology of R ^ n. Limits, continuity , derivability and differentiability of two or more variables. Problems of free and constrained optimization.
6	Curves and integrals; linear differential forms.
2	Multiple integrals in normal domains and reduction formulas.