

# UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria	
ACADEMIC YEAR	2020/2021	
BACHELOR'S DEGREE (BSC)	<b>BIOMEDICAL ENGINEE</b>	RING
INTEGRATED COURSE	MATHEMATICAL ANALY	SIS - INTEGRATED COURSE
CODE	19109	
MODULES	Yes	
NUMBER OF MODULES	2	
SCIENTIFIC SECTOR(S)	MAT/05	
HEAD PROFESSOR(S)	TRIOLO SALVATORE	Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	TRIOLO SALVATORE	Professore Associato Univ. di PALERMO
	CORSO ROSARIO	Ricercatore a tempo Univ. di PALERMO determinato
CREDITS	12	
PROPAEDEUTICAL SUBJECTS		
MUTUALIZATION		
YEAR	1	
TERM (SEMESTER)	Annual	
ATTENDANCE	Not mandatory	
EVALUATION	Out of 30	
TEACHER OFFICE HOURS	CORSO ROSARIO	
	Tuesday 14:30 16:00	Dipartimento di Matematica e Informatica, Via Archirafi 34, studio 102, 1º piano, contattare il docente per email.
	TRIOLO SALVATORE	
	Wednesday 10:00 12:00	Dip Metodi e modelli matematici primo piano.

#### DOCENTE: Prof. SALVATORE TRIOLO

	Classical knowledge of the concents of mathematical logic	
	Solution of equation system of equation inequalities system of inequalities	
	Set theory generalities	
	Basic knowledge of trigonometry	
LEARNING OUTCOMES	Knowledge and Understanding	
	methodologies to address and solve problems of differential and integral	
	Inelinouologies to audress and solve problems of differential and integral	
	The student must also know and understand the theorems and their proofs on	
	the above tonics	
	Anniving knowledge and understanding	
	The student must be able to use the differential and integral calculus in order to	
	solve mathematical problems arising also from classical mechanics.	
	Making judgements	
	The student will develop a critical ability in characterizing the suitable and	
	relevant solution to the proposed problem. The student will acquire the ability to	
	formalize and analyze new problems in full autonomy, both in gualitative way	
	and in rigorous way. The formative objectives will be reached using frontal	
	lessons and problems and exercises solved in classroom. The attainment of the	
	objectives is verified by written test and oral examination.	
	Communication skills	
	The student will acquire the ability to expose in clear and rigorous way, using	
	adequately the disciplinary lexicon, the results of the characterized qualitative	
	solution and problem analysis.	
	The communication abilities will be verified in the oral examination.	
	Learning skills	
	The student will acquire the ability to contextualize own knowledges, eventually	
	auapung in an independent way, in wide and multidisciplinary area of interests.	
ASSESSMENT METHODS	The knowledge and the understanding of	
	the student about the contents of the course will be verified through a written	
	test (2 nours) and an oral discussion.	
	The exercises will be structured in several questions in order to determine	
	whether the student has gained knowledge and understanding of the proposed	
	arguments	
	The final evaluation will be scaled according to the following conditions:	
	30-30 with honors	
	optimal knowledge of the contents of the course, optimal property of language,	
	very good analytic abilities and competence in problem solving;	
	26-29	
	good mastery of the contents of the course, very good property of language,	
	good competence in problem-solving ;	
	24-25	
	knowledge of base treated contents, discrete property of language, with	
	limited ability to independently apply the competence to solve the proposed	
	21-23	
	knowledge, satisfactory property of language, insufficient ability to independently	
	apply the acquired knowledge.	
	18-20	
	minimal base knowledge of the contents of the course and of the technical	
	language, most insufficient or null ability to independently apply the acquired	
	knowledge;	
	no sufficient	
	does not possess an acceptable knowledge of the contents of the presented	
	topics (no sufficient);	
TEACHING METHODS	The course consists of frontal lessons and discussion in which illustrative	
	problems are resolved.	

#### MODULE MATHEMATICAL ANALYSIS - MODULE 1

Prof. ROSARIO CORSO

#### SUGGESTED BIBLIOGRAPHY

M. Bramanti, C.D. Pagani, S. Salsa, Matematica, Calcolo infinitesimale e algebra lineare, Ed. Zanichelli (vol. unico). S. Salsa, A. Squellati, Esercizi di Matematica 1, Calcolo Infinitesimale e Algebra lineare, Ed. Zanichelli.			
AMBIT	50292-Matematica, informatica e statistica		
INDIVIDUAL STUDY (Hrs)	96		
COURSE ACTIVITY (Hrs)	54		
EDUCATIONAL OBJECTIVES OF THE MODULE			

This module aims to enable the student to acquire the fundamental concepts of Calculus for real-valued functions of a real variable with emphasis on the concepts of limit, continuity, derivative and integration. This module encourages the student to develop skills and confidence in the use of mathematical approaches in solving problems.

Hrs	Frontal teaching	
4	Numerical sets. Basic trigonometry. Complex numbers.	
4	Real sequences.	
4	Real-valued functions of a real variable. Limits and continuity.	
4	Differential calculus: derivative of real-valued functions of a real variable. Differentiation Rules: sum, product, quotient, chain rules, derivatives of the inverse functions.	
4	Mean Value Theorem. L'Hôpital's Rule. Taylor Polynomials.	
5	Graph of a function.	
4	Integration: Riemann sums and the definite integral, antiderivatives and indefinite integrals, immediate and quasi-immediate integrals, the Fundamental Theorem of Calculus.	
5	Basic techniques of integration: substitution, integration by parts. Applications. Improper integrals.	
Hrs	Practice	
5	Complex numbers. Real sequences.	
5	Real-valued functions of a real variable. Differential calculus: derivative of real-valued functions of a real variable.	
5	Taylor Polynomials. Graph of a function.	
5	Calculate integrals, areas and volumes of rotation solids. Calculate generalized integrals.	

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### MODULE MATHEMATICAL ANALYSIS - MODULE 2

Prof. SALVATORE TRIOLO

#### SUGGESTED BIBLIOGRAPHY Bertsch Dal Passo Elementi di Analisi matematica 2 Bramanti Pagani Salsa Calcolo infinitesimale e Algebra lineare. AMBIT 50292-Matematica, informatica e statistica **INDIVIDUAL STUDY (Hrs)** 96 **COURSE ACTIVITY (Hrs)** 54 EDUCATIONAL OBJECTIVES OF THE MODULE At the end of the course the student will acquire the knowledge on the main topics, methodologies on infinitesimal differential calculus for functions of two or more variables. In particular, the student will be able to understand the issues arising from the needing to create a rigorous language using the logical-deductive method to deal with intuitively simple math problems. The students will be also able to understand simple physical problems and to convert them in the correct mathematical

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language, for instance through differential equation.

Hrs	Frontal teaching
1	Objectives of the discipline.
3	Sequences of functions. Power series.
2	Topology of the real vector space R^n.
2	Differential equations.
5	Limits for functions of multiple real variables: definitions,main properties and theorem. Continuity of a function.
5	Differential calculus for functions of multiple real variables.
5	Integration theories.
5	Differential calculus.
Hrs	Practice
5	Sequences of functions. Power series.
4	Differential equations.
5	Differential calculus.
5	Integration theories.
5	Conservative and non conservative fields. Work of a conservative field.