UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2021/2022
BACHELOR'S DEGREE (BSC)	BIOMEDICAL ENGINEERING
INTEGRATED COURSE	MATHEMATICAL ANALYSIS - 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 BILECI EZIO Professore a contratto Univ. di PALERMO
CREDITS	12
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	Annual
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**TRIOLO SALVATORE** Wednesday 10:00 12:00 Dip Metodi e modelli matematici primo piano.

DOCENTE: Prof. SALVATORE TRIOLO

PREREQUISITES	Classical knowledge of the concepts 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 The student, at the end of the course, will have acquired knowledge and methodologies to address and solve problems of differential and integral calculus. The student must also know and understand the theorems and their proofs on the above topics. Applying 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 qualitative 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 adapting 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 hours) and an oral discussion. In the written test the resolution of four exercises is demanded. 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 problems; 21-23 not have full mastery of the main contents of the course but possesses 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); The assessment will be based on class test + oral. The following score table will be applied: Indicator - Knowledge and competence of contents Descriptor and score range: Excellent 10 Autonomous and effective 8-9 Acceptable 6-7 Fragmentary or partly superficial 4-5 Inadequate 0-3 Indicator - Applicative skill, precision, logical-thematic coherence Descriptor and score range: Excellent 10 Adequate 8-9 Acceptable also if partly driven 6-7 Limited 4-5 Inadequate 0-3 Indicator - Expression and terminology, reprocessing skills and multi-disciplinary connections

	Descriptor and score range: Excellent 10 Effective and well-structured 8-9 Generally satisfactory 6-7 Hesitant and rough 4-5 Inadequate 0-3
TEACHING METHODS	The course consists of frontal lessons and discussion in which illustrative problems are resolved.

MODULE
MATHEMATICAL ANALYSIS - MODULE 1

Prof. EZIO BILECI

SUGGESTED BIBLIOGRAPHY

- R.A. Adams - Calcolo differenziale I - Casa Editrice Ambrosiana, Milano, ISBN: 978-88-408-1389-9.
- P. Marcellini, C.Sbordone - Analisi Matematica uno - Ed. Liguori, Napoli; ISBN:88-207-2819-2.
- P. Marcellini, C.Sbordone - Esercitazioni di Matematica - Ed. Liguori, Napoli; ISBN: 88-207-1684-4; ISBN: 978-88-207-1704-9.
- M. Bertsch, R. Dal Passo, L. Giacomelli, Analisi Matematica, McGraw-Hill, Milano 2011; ISBN: 9788838668944. - Pagani S. Salsa, Analisi Matematica I, Zanichelli, 2014 Bologna; ISBN: 9788808254214.

Approfondimenti
- C. D. Pagani S. Salsa, Analisi Matematica, vol. I Masson, 1990 Milano; ISBN: 978-88-08-09259-5

English version:
- R.A. Adams - Single Variable Calculus - Addison Wesley, ISBN: 978-0201828269.

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.

SYLLABUS

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.

MODULE
MATHEMATICAL ANALYSIS - MODULE 2

Prof. SALVATORE TRIOLO

SUGGESTED BIBLIOGRAPHY	
M. Bertsch, R. Dal Passo, L. Giacomelli, Analisi Matematica (2Ed) McGraw-Hill Isbn 8838662819 Mathematical Analysis II Edizione Inglese | di V. A. Zorich , Roger Cooke, e al	
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 language, for instance through differential equation.	

SYLLABUS

Hrs	Frontal teaching
1	Objectives of the discipline.
3	Sequences of functions. Power series.
2	Topology of the real vector space R^n.
3	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.
6	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.