UNIVERSITÀ DI PAVIA

Anno Accademico 2021/2022

MATHEMATICAL ANALYSIS 1

Enrollment year	2021/2022
Academic year	2021/2022
Regulations	DM270
Academic discipline	MAT/05 (MATHEMATICAL ANALYSIS)
Department	DEPARTMENT OF ELECTRICAL,COMPUTER AND BIOMEDICAL ENGINEERING
Course	ELECTRONIC AND COMPUTER ENGINEERING
Curriculum	PERCORSO COMUNE
Year of study	1°
Period	1st semester (27/09/2021 - 21/01/2022)
ECTS	9
Lesson hours	83 lesson hours
Language	Italian
Activity type	WRITTEN AND ORAL TEST
Teacher	FORNARO SIMONA (titolare) - 9 ECTS
Prerequisites	Entry requirements are the ones of the university admission
Learning outcomes	The aim of this course is to give the basic knowledge of differential and integral calculus for real-valued functions of one real variable, of numerical sequences and series, of complex numbers and of ODEs. In general, there will be much emphasis on the comprehension of the definitions and the principal results. Only few proofs will be treated in full details. There will be several examples and exercises. At the end of the course, the students should be able to do computations on limits, derivatives, graphs of functions, integrals, differential equations and series and have a deep knowledge of the mail notions.
Course contents	1. Basic properties of numerical sets and in particular of the real numbers (total ordered field, continuity axiom). The field of complex numbers: algebraic and trigonometrical form, exponential form.

	2. Functions: definition, properties, graphs. Invertible functions. Even, odd, periodic functions. Elementary functions and their graphs. Limits of functions. Continuous functions and their properties. Discontinuities and their classification. Global properties of continuos functions. Sequences and numerical series: definition, properties, and convergence criteria. 3. Derivative of a function; applications to Geometry and Physics. Basic rules for computing derivatives. Principal theorems. Higher order derivatives; Taylor approximation; Graph of a function; extremal points of functions; De l'Hopital rule. 4. Definite integral: definition, properties and applications to Geometry and Physics. Fundamental Theorems on integral calculus. Computing integrals. Improper integrals. 5. Differential equations Introduction to ordinare differenti equations; the Cauchy problem. First order linear differential equations. Second order linear differential equations with constant coefficients.
Teaching methods	Lectures (hours/year in lecture theatre): 45 Practical class (hours/year in lecture theatre): 38 Practicals / Workshops (hours/year in lecture theatre): 0
Reccomended or required readings	M. Bramanti, C.D. Pagani, S. Salsa, Analisi Matematica 1, Zanichelli, Bologna, 2009. M. Bramanti, Esercitazioni di Analisi Matematica 1, Ed. Esculapio, Bologna, 2011.
Assessment methods	The final exam consists in a written test and an optional oral examination on the course topics. The written test is structured as follows: exercises (first part) and theoretical questions (second part). The oral examination must be done in the same round and asks for: theorems statements, definitions, examples and counterexamples, some proofs given during the course.
Further information	The final exam consists in a written test and an optional oral examination on the course topics. The written test is structured as follows: exercises (first part) and theoretical questions (second part). The oral examination must be done in the same round and asks for: theorems statements, definitions, examples and counterexamples, some proofs given during the course.
Sustainable development goals - Agenda 2030	$lbl_legenda_sviluppo_sostenibile