



Corso di Laurea in
**SCIENZA E TECNOLOGIA
DEI MATERIALI**

Triennale – L30

Principali informazioni sull'insegnamento	
Denominazione dell'insegnamento	MATHEMATICAL METHODS OF PHYSICS AND INSTITUTIONS OF THEORETICAL PHYSICS MOD. A
Corso di studio	MATERIALS SCIENCE AND TECHNOLOGY
Crediti formativi universitari (CFU) / European Credit Transfer and Accumulation System (ECTS):	: 6
SSD	FIS/02 - FISICA TEORICA, MODELLI E METODI MATEMATICI
Lingua di erogazione	ITALIAN
Periodo di erogazione	I semestre 2021-2022
Obbligo di frequenza	Optional

Docente	
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Sede	Dipartimento di Fisica Interateneo di Bari
Sede virtuale	
Ricevimento (giorni, orari e modalità)	15-18 lunedì – mercoledì e venerdì

Syllabus	
Obiettivi formativi	The training unit of Mathematical Methods and Institutions of Theoretical Physics Mod A aims to provide the student with the knowledge of the theoretical and methodological foundations relating to the differential calculus of real functions of several variables, to curves and line integrals, to the integral calculus of functions of several variables, to surfaces and surface integrals, to power series and Fourier series, by Laplace. At the end of the course the student will master the formal description of the fundamental mathematical structures and of the main algorithms used in the differential and integral calculus of multi-variable functions.
Prerequisiti	Knowledge of the fundamentals of analysis 1 and 2
Contenuti di insegnamento (Programma)	Gradient, Divergence, Laplacian, Rotor and their properties. Divergence theorem, Stokes' theorem. Exercises. Definition of vector space, definitions on matrices. Eigenvalues and eigenvectors. Problems with eigenvalues. Exercises. Analytic functions. Cauchy-Riemann equations. Singular points. Regions simply connected and multiply connected. Convention on the closed path. Cauchy-Goursat theorem and its consequences. Integral formulas of Cauchy. Exercises Taylor's theorem. Laurent's theorem. Taylor series and Laurent series. Meromorphic functions. Exercises. Residues. Calculation of residuals. Residual theorem. Exercises. Elements of analytical mechanics. Principle of least action. Euler-Lagrange equations. Canonical moments and cyclic coordinates. Hamilton equations. Poisson's parenthesis. Transform by Fourier. Identity of Parseval. Convolution theorem. Fourier's integral theorem. Exercises. Laplace transforms and their properties. Laplace anti-transform and their properties. Null functions. Exercises



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	Gamma function, Heaviside function. Dirac Delta and its properties. Exercises. Partial differential equations with 2 variables. Resolution and their properties. Exercises.
Testi di riferimento	Lecture notes - De Cicco e Giachetti – METODI MATEMATICI PER L'INGEGNERIA – casa editrice ESCULAPIO
Note ai testi di riferimento	

Organizzazione della didattica			
Ore			
Totali	Didattica frontale	Pratica (laboratorio, campo, esercitazione, altro)	Studio individuale
150	40	15	95
CFU/ETCS			
6	5	1	

Metodi didattici	Lectures and exercises

Risultati di apprendimento previsti	
Conoscenza e capacità di comprensione	Basic knowledge of the acquired notions
Conoscenza e capacità di comprensione applicate	Through the numerous exercises carried out during the lessons

Valutazione	
Modalità di verifica dell'apprendimento	Through exercises carried out and to be carried out at the end of each module
Criteri di valutazione	Autonomy of judgment: evaluating themselves and others after an argument Communication skills: comparing arguments apparently unrelated to each other Ability to learn: through discussion in the classroom and exercises to be carried out
Criteri di misurazione dell'apprendimento e di attribuzione del voto finale	Analysis of the theory and exercises, using a criterion that possibly identifies errors and their severity.
Altro	