



UNIVERSITÀ DI PISA

LINEAR ALGEBRA AND MATHEMATICAL ANALYSIS II

ALDO PRATELLI

Anno accademico 2020/21
CdS BIOMEDICAL ENGINEERING
Codice 519AA
CFU 12

Moduli	Settore/i	Tipo	Ore	Docente/i
ALGEBRA LINEARE	MAT/03	LEZIONI	60	GIUSEPPE PUGLISI
ANALISI MATEMATICA II	MAT/05	LEZIONI	60	ALDO PRATELLI

Learning outcomes

Knowledge

The student who successfully completes the course will be able to demonstrate a good knowledge of elementary linear algebra and real analysis of several variables

Assessment criteria of knowledge

Methods:

- Final oral and written exam

Skills

The students will be able to manipulate matrix calculus, vector spaces, spectral theory in finite dimension, to analyze functions with several variables (in particular two and three), to solve optimization problems (max and min), to solve multiple integrals as well as line and surface integrals.

Assessment criteria of skills

Methods:

- Final oral and written exam

Behaviors

To provide basic mathematical knowledges very useful for engineering applications as well as to perform qualitative and analytic analysis of experimental data.

Assessment criteria of behaviors

Methods:

- Final oral and written exam

Prerequisites

Concerning the second part of the class (analysis 2) it is strongly recommended a good knowledge of the functions of one variables (analysis 1).

Teaching methods

Delivery: face to face

Learning activities:

- attending lectures
- individual study following the suggested bibliography, further material can be found on the web-page of the teachers

Attendance: Advised but not necessary



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Syllabus

Vector spaces and linear applications, matrices, determinants, elementary affine geometry, scalar products, eigenvectors and eigenvalues, diagonalization, multivariable functions, limits, partial derivatives and differential, chain rule, max and min local and global, hessian and restriction methods, max and min on compact sets: Lagrange multipliers and parametrization method to analyze the boundary, integrals in 2d and 3d, reduction methods, change of variables (in particular polar in 2d and spherical and cylindrical in 3d), integrals of functions and vector fields along curves, conservative vector fields, irrotational and divergence free vector fields, Gauss-Green formula in the plane, surface integrals and the divergence theorem.

Bibliography

Recommended reading includes the following C. Petronio, Geometria e Algebra Lineare, Esculapio-Bologna; M. Abate, Algebra Lineare, McGraw-Hill; Bramanti-Pagani-Salsa, Analisi matematica 2, Zanichelli; Salsa-Squellati, Esercizi di Analisi matematica 2, Zanichelli.

Non-attending students info

It could be useful to study the textbooks suggested as well as to exploit the home-page of the teacher for instance to check the exams of the previous years and to get further exercises.

Assessment methods

The written exam is splitted in two parts
(only students which are sufficient at the first test have access at the second part)
The oral exam concerns questions about the course content.

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