UNIVERSITÀ DI TRENTO

[145433] Geometry I

General information

Course	PHYSICS
Curriculum	standard
Academic year	2022/2023
Training activity type	Basic compulsory subjects
CFU	9 CFU
Didactic Activity Type	Lecture
Evaluation	Voto Finale
Teaching period	First semester
Holders	PIGNATELLI ROBERTO
Teachers	FALLUCCA FEDERICO, FRANCESCHINI ALBERTO, CASAROTTI ALEX
Length	84 hours (84 hours Lecture)
Frequency	Not mandatory
Subject area	MAT/03
Location	Polo di collina - Povo A - via Sommarive, 14

Goals

The course aims to provide students with the basics of geometry and linear algebra.
At the end of the course students will be able to
a) show understanding of the theory of vector spaces, linear and scalar product applications,
b) recognize when an affine geometry problem can be addressed with linear algebra techniques,
c) solve exercises in affine geometry,
d) discuss the solutions of linear systems depending on parameters,
e) recognize whether a linear map is diagonalizable and (if possible) diagonalize it
f) diagonalize a quadratic form

Required skills

None.

Subjects

The course program includes the presentation and discussion of the following topics

- Vector spaces.
- Matrices.
- Systems of linear equations.
- Elements of abstract linear algebra.
- Rank.
- Determinants.
- Elements of affine geometry in the plane and in space.
- Linear applications.
- Linear applications and matrices.
- Linear operators and square matrices.
- Diagonalization of linear operators.
- Scalar products.
- Symmetric operators.
- Diagonalization of quadratic forms.

Teaching methods

a) The theoretical part will be carried out by the teacher through classroom lectures, possibly integrated by recorded videos.

b) The teacher will provide weekly to the students a list of exercises related to the theoretical lessons that took place during the week.

c) During the classroom exercise sessions, the assistants will solve with the students some exercises chosen by the weekly list provided by the teacher. For the exercise sessions the students are divided into two groups, one for each assistant.

d) Students also have the opportunity to ask the tutors, during the weekly tutoring, for clarifications on the other exercises.

e) Further clarifications may be asked to the teacher and / or the assistants during the weekly office hours.

f) On some topics, students will be provided with self-assessment tests.

Verification of learning

The exam includes a written test and an oral examination. The written test will assess the student's ability to perform practical exercises in linear algebra (linear systems, diagonalize matrices or scalar products, etc. etc.) and recognize when a problem can be solved with linear algebra techniques. The written test, if sufficient (18/30), gives admission to the oral examination. During the oral examination the student will discuss his written test, and then the teacher will evaluate his understanding of the theory developed during the course. In particular the student may be asked to perform one or (rarely) more of the proofs carried out by the teacher during the lessons. During the semester the students will be given the opportunity to perform two partial tests. Each partial tests will contain 8 theoretical multiple choice questions and three exercise, one of which being a theoretical exercise. The partial tests give exemption to the written test. In other words, students who will perform positively the partial tests will be admitted to the oral examination directly. Here "positively" means average 18/30.

Books

- E. Sernesi: GEOMETRIA 1, Seconda Edizione, Bollati Boringhieri 2000 (ISBN: 8833954471).

Extra info

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