

Linear Algebra and Geometry I (C003554)

Course size *(nominal values; actual values may depend on programme)*

Credits 6.0

Study time 180 h

Course offerings and teaching methods in academic year 2026-2027

A (semester 1)

Dutch

Gent

lecture

seminar

Lecturers in academic year 2026-2027

De Medts, Tom

WE02

lecturer-in-charge

Offered in the following programmes in 2026-2027

[Bachelor of Science in Mathematics](#)

crdts

offering

6

A

Teaching languages

Dutch

Keywords

Vector spaces, matrices, determinants, linear maps, linear operators, affine spaces, inner product spaces

Position of the course

A broad foundation is laid in the theory of vector spaces and linear algebra over arbitrary fields, with particular attention to linear operators. Afterwards, the geometric aspects are studied in greater depth in the general setting of inner product spaces. The structure of the course material will encourage students to adopt a more abstract mathematical way of thinking and then apply it in concrete situations.

Contents

After a general introduction including the required basic notions, the course takes off with a thorough study of vector spaces over arbitrary fields, and the related linear maps and linear operators; afterwards, spaces of homomorphisms and dual spaces are introduced.

In the next part, the theory of matrices and determinants is considered, as well as its connection with linear maps, and their importance for coordinate transformations.

Then the linear operators are the subject of a deeper study, including the eigenvalue problem, diagonalization of matrices, and the Cayley-Hamilton theorem.

The theory built up so far is then used in a treatment of Euclidean spaces in n dimensions. The emphasis is on the geometric interpretation, including a study of subspaces, lines, hyperplanes, and of the Euclidean group, including subgroups that are relevant for mathematical and physical purposes.

Initial competences

This course builds on secondary school (high-school) mathematics (matrices, vectors, plane geometry, solid geometry).

Final competences

- 1 Analyzing and solving problems (theoretical, practical, or arising from an application) situated in vector spaces, in theory of matrices and determinants, or in Euclidean geometry.
- 2 Using the new techniques both in pure mathematical or in applied context.
- 3 Performing abstract reasonings and writing down the arguments in a rigorous

proof.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Seminar, Lecture

Extra information on the teaching methods

Lectures in which the theory is presented.

Exercises classes in which the students solve exercises under supervision.

The lectures will **not be recorded**.

Study material

Type: Syllabus

Name: Linear Algebra and Geometry 1

Indicative price: Free or paid by faculty

Optional: no

Language : Dutch

Number of Pages : 186

Oldest Usable Edition : 2023-2024

Available on Ufora : Yes

Available through Student Association : Yes

References

- Paul Igodt & Wim Veys, "Lineaire algebra", 4th edition, Leuven University Press, 2025. ISBN 9789462704909. [Dutch.]
- Gilbert Strang, "Introduction to Linear Algebra", 6th edition, Wellesley-Cambridge Press, 2023. ISBN 9781733146678.

Course content-related study coaching

Students can ask questions on the theory and the exercises before, during and after the lectures. This is also possible on appointment or by email.

Assessment moments

end-of-term assessment

Examination methods in case of periodic assessment during the first examination period

Written assessment with open-ended questions

Examination methods in case of periodic assessment during the second examination period

Written assessment with open-ended questions

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

not applicable

Extra information on the examination methods

The written exam is "open book" and consists of 3 parts:

(1) Theory: commenting on and explaining arguments, proofs, notions, ...

(2) True/false questions: Theoretical questions probing the insight in the material and the ability to make connections.

(3) Exercises: Problems on linear algebra and geometry.

Calculation of the examination mark

Marks per part: 25% – 30% – 45%