

Linear Algebra and Geometry (C001094)

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 2)

Dutch

Gent

seminar
lecture

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 Computer Science](#)

crdts

6

offering

A

Teaching languages

Dutch

Keywords

First degree equations, systems of linear equations, matrices, determinants, vector spaces, linear maps, eigenvalues and eigenvectors, inner product spaces and Euclidean spaces.

Position of the course

Linear algebra provides a basis for on the one side numerical applications (solving numerically systems of equations, eigenvalue problems), and on the other side applications of linear structures in computer science and communication technology. It plays a crucial role in AI. Concepts from linear algebra are closely connected to (Euclidean) geometry. One obtains a better intuition by connecting the algebra directly to the geometry.

Contents

- 1 First degree equations and matrices (Gauss elimination, echelon form, computing with matrices, invertibility, elementary row operations and elementary matrices)
- 2 Determinants (definition, existence, properties)
- 3 Vector spaces (subspaces, linear combinations, sum and direct sum, linear independence, basis, dimension)
- 4 Linear maps and linear operators (matrix representation, base change, dimension theorem, rank, linear problems)
- 5 Eigenvalues, eigenvectors and diagonalizability (definition, applications, Google PageRank)
- 6 Inner product spaces and Euclidean spaces (Euclidean geometry, orthogonality, projections)

Initial competences

Being able to work with algebraic structures: groups, fields and polynomial rings as introduced in the course Discrete Mathematics.

Final competences

- 1 Mastering the techniques to solve linear problems.
- 2 Obtaining theoretical insight in fundamental concepts in linear algebra.
- 3 Recognizing eigenvalue problems and being able to solve them.
- 4 Explaining the connections between theoretical concepts and applications of different nature.
- 5 Analyzing geometric transformations in the plane and in higher-dimensional

spaces.

6 Being able to interpret algebraic concepts geometrically and vice versa.

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: overview, discussion, and clarification of the course material, with the textbook projected and annotated via a tablet, and with certain parts explained in detail on the blackboard.

Exercise sessions: selected problems and the methods for solving them are discussed. Practice of the techniques required to solve problems independently.

The lectures will **not be recorded**.

Study material

Type: Handbook

Name: Lineaire Algebra

Indicative price: € 42

Optional: no

Language : Dutch

Author : Paul Igodt & Wim Veys

ISBN : 978-9-46270-490-9

Number of Pages : 328

Online Available : No

Available in the Library : Yes

Available through Student Association : Yes

Usability and Lifetime within the Course Unit : intensive

Usability and Lifetime within the Study Programme : one-time

Usability and Lifetime after the Study Programme : not

References

Lineaire Algebra, Paul Igodt & Wim Veys, 4th edition, Leuven University Press, 2025.

Course content-related study coaching

Interactive support via Ufora. The teacher and the teaching assistants are always prepared to give additional explanation at any time.

Assessment moments

end-of-term assessment

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

Written assessment open-book

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

Written assessment open-book

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% - 25% - 50%.

Facilities for Working Students

Work students can choose to get an alternative task, if they wish, in place of a fixed period examination, so that they have the possibility to spread this over a larger period of time.