

Linear Algebra (I002422)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course size (nominal values; actual values may depend on programme)
Credits 5.0 Study time 150 h Contact hrs 50.0 h

Course offerings and teaching methods in academic year 2020-2021

A (semester 2)	Dutch	Gent	seminar: practical PC room classes	5.0 h
			lecture	25.0 h
			seminar: coached exercises	20.0 h

Lecturers in academic year 2020-2021

Waegeman, Willem LA26 lecturer-in-charge

Offered in the following programmes in 2020-2021

	crdts	offering
Bachelor of Science in Bioscience Engineering (main subject Agricultural Sciences)	5	A
Bachelor of Science in Bioscience Engineering (main subject Cell and Gene Biotechnology)	5	A
Bachelor of Science in Bioscience Engineering (main subject Chemistry and Food Technology)	5	A
Bachelor of Science in Bioscience Engineering (main subject Environmental Technology)	5	A
Bachelor of Science in Bioscience Engineering (main subject Forest and Nature Management)	5	A
Bachelor of Science in Bioscience Engineering (main subject Land and Water Management)	5	A
Joint Section Bachelor of Science in Bio-Engineering	5	A

Teaching languages

Dutch

Keywords

Linear algebra: theory and applications

Position of the course

To teach students the most essential mathematical techniques, methods and skills, starting from a clearly defined level of foreknowledge. In this way students should be able to explore problems in their study field (bio-engineer) with a certain degree of exactness and to understand, to analyse and describe the different biological systems and production processes. A solid mathematical background needed in almost all engineering disciplines is surely based on a number of algebraic and analytic locus techniques (see table of contents). It is important that the students learn how to reason in a critical, logical, deductive and analytical way, without losing their sense for generality and abstraction. The subject matter of this course stimulates students to synthesize, plan and to work independently, essential qualities in the context of long-life learning. Various examples and exercises illustrate the theory. The proofs are restricted to a necessary minimum.

Contents

Logic and proving methods
Systems of linear equations
Vector and matrix equations
Matrix calculus
Linear transformations
Vector spaces

Coordinate systems
Determinants
Eigenvalues and eigenvectors
Diagonalization of matrices
Complex numbers
Complex eigenvalues
Orthogonality
Symmetric matrices and quadratic forms
Extrema of functions of several variables
Extrema in a restricted domain
Lagrange multipliers
Numerical methods for finding extrema
Applications: flow in networks, balancing chemical equations, image processing, discrete dynamical systems, linear regression, linear programming

Initial competences

Final competences of secondary school or equivalent. Advise: required subjects in the curricula 'Mathematics' of the officially recognized educational networks in Flanders for programmes with at least 6 hours of mathematics training per week in the last two years of the secondary school program (general secondary education) are recommended.

Final competences

- 1 Obtain skills with respect to hand calculations
- 2 Understand the mathematical, geometrical and physical interpretation of concepts and their applications.
- 3 Being capable of deriving formal reasonings and writing them down in a structured way (proving skills).
- 4 Being capable of evaluating logical reasonings with respect to correctness.

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

Lecture, seminar: coached exercises, seminar: practical PC room classes

Learning materials and price

Handouts in Dutch and a syllabus in English (price +- 25 euro).

References

D. Linear algebra and its applications, 5th edition.

Course content-related study coaching

There are assistants to answer questions of students and to help them with their problems.

The course is issued in the e-learning environment Minerva.

Evaluation methods

end-of-term evaluation

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

Written examination

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

Written examination

Examination methods in case of permanent evaluation

Written examination

Possibilities of retake in case of permanent evaluation

examination during the second examination period is not possible

Extra information on the examination methods

The exam consists of exercises, questions of a more theoretical nature and proving techniques.

Calculation of the examination mark

