GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Mathematics II (I610019)

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 2025-2026

A (semester 2)	Dutch	Kortrijk	seminar	
			lecture	
			independent work	0.0h

Lecturers in academic year 2025-2026

Schelfaut, An	LA26	staff member
Baetens, Jan	LA26	lecturer-in-charge
Mattheijssens, Joris	LA26	co-lecturer

Offered in the following programmes in 2025-2026	**crdts**	**offering**
Bachelor of Science in Bioindustrial Sciences	6	A
Linking Course Master of Science in Bioindustrial Sciences: Circular Bioprocesstechnology	6	A

Teaching languages

Dutch

Keywords

linear systems, matrices, determinants, complex numbers, eigenvalues, eigenvectors, vector-valued functions, functions of several variables, double and line integrals, differential equations, Python.

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 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 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

Linear algebra:

- Systems of linear equations
- Vector and matrix equations
- Linear transformations
- Matrix calculus
- Subspaces
- Determinants
- Eigenvalues and eigenvectors
- Diagonalization of matrices
- Complex numbers
- Complex eigenvalues

Calculus:

- Vector-valued functions
- Functions of several variables
- Double and line integrals

Differential equations:

- Mathematical modelling
- Quantitative analysis for 1st order differential equations
- Analytical and numerical solution methods for 1st order differential equations

Initial competences

We advise that you took the course Mathematics I before.

Final competences

1 Have insight into the mathematical, geometric and physical meaning of matrices, determinants, eigenvectors, eigenvalues, vector-valued functions, functions of several variables, double and line integrals and differential equations.
2 Use matrices, determinants, eigenvectors, eigenvalues, vector-valued functions, functions of several variables, double and line integrals and differential equations.
3 Follow a reasoning regarding linear algebra, functions of several variables and differential equations and act accordingly.
4 Being able to analyze the correctness of logical reasonings.

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, Independent work

Extra information on the teaching methods

During the theory lectures the concepts are introduced and made clear via examples and applications. During the coached exercise sessions, the students are further trained using examples and exercises.

Study material

Type: Syllabus

Name: Mathematics II : partim Linear Algebra
Indicative price: € 10
Optional: no
Language : Dutch
Oldest Usable Edition : 2023-2024
Available on Ufora : Yes
Online Available : No
Available in the Library : Yes
Available through Student Association : No

References

David Lay. Linear Algebra and its applications, 5th edition.
Hartman, G., Siemers, T., Heinold, B., Chalishajar, D., Bowen, J., APEX Calculus
R. Adams and C. Essex, Calculus, a complete course
Trench, W.F., Elementary differential equations, Brooks/Cole Thomson Learning, 2001.
Boyce, W.E., DiPrima, R.C., Meade, D.B., Elementary Differential Equations Boundary Value Problems, Wiley, 2017.

Course content-related study coaching

The lecturer answers questions related to the theory by appointment or before/after the lectures, the teaching assistants answer questions regarding the exercises and there is support through Ufora.

Assessment moments

end-of-term assessment

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

Written assessment

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

Written assessment

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

not applicable

Extra information on the examination methods

The exam consists of exercises and insight questions of a more theoretical nature.

Calculation of the examination mark

The weighting coefficients that are used to calculate the final score for this course are as follows:
Algebra: 3/6
Calculus: 2/6
Differential equations: 1/6
Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.