GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Analysis: Functions of Several Variables (I002910)

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

Credits 4.0 **Study time 120 h**

Course offerings and teaching methods in academic year 2025-2026

A (semester 2)	Dutch	Gent	independent work	0.0h
			lecture	20.0h
			seminar	20.0h

Lecturers in academic year 2025-2026

Schelfaut, An	LA26	staff member
Van de Walle, Elien	LA26	staff member
Baetens, Jan	LA26	lecturer-in-charge
Waegeman, Willem	LA26	co-lecturer

Offered in the following programmes in 2025-2026	**crdts**	**offering**
Bachelor of Science in Bioscience Engineering	4	A

Teaching languages

Dutch

Keywords

Vector-valued functions, multivariable calculus, extrema of functions of several variables, Lagrange multipliers, multiple integrals, coordinate transformations, cylindrical and spherical coordinates, vector fields, line, contour and surface integrals
Python, SymPy

Position of the course

This course provides the students with the tools and techniques that are needed to approach and solve engineering problems and to understand, analyse and describe biological, natural and productions processes. Such a solid mathematical background is needed in engineering disciplines, and is surely pervaded by differential and integral calculus. The focus of this course will be on functions of several variables. Problem solving and a sound theoretical underpinning of the presented techniques, concepts and methods are key to this course. Given the growing complexity of engineering problems and the omnipresence of computers, the students will also be introduced to numerical and symbolical calculations in Python and SymPy,.

Contents

1 Functions of several variables
2 Optimisation
3 Vector-valued functions
4 Multiple integration
5 Vector calculus

Initial competences

Analysis I: functions of one variable; Linear algebra

Final competences

1 Understand the mathematical, geometric and physical meaning of functions of several variables.

2 Understand the mathematical, geometric and physical meaning of vector-valued functions, coordinate transformations, cylindrical and spherical coordinates, multiple integrals, vector fields and line, contour and surface integrals.

3 Use vector-valued functions, functions of one variable, coordinate transformations, cylindrical and spherical coordinates, multiple integrals, vector fields and line,contour and surface integrals.

4 Proofs statements regarding functions of several variables.

5 Work correctly and with mathematical precision with functions of several variables.

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 lectures important concepts and properties are introduced, which form the starting point for solving problems during the seminars.

Study material

Type: Syllabus

Name: Analysis of functions of one and several variables
Indicative price: € 30
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 : Yes
Additional information: This syllabus contains the course material for both Analysis: functions of one variable, and Analysis: functions of multiple variables.

References

Hartman, G., Siemers, T., Heinold, B., Chalishajar, D., Bowen, J., APEX Calculus; R. Adams and C. Essex, Calculus, a complete course

Course content-related study coaching

The lecturer answers questions concerning the theory upon appointment and before and after the lectures, the teaching assistants are available for questions related to the exercises and practical sessions, interactive support via Ufora.

Assessment moments

end-of-term assessment

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

Written assessment with multiple-choice questions, Written assessment with open-ended questions

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

Written assessment with multiple-choice questions, 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 exam consists of exercises and questions of a more theoretical nature.

Calculation of the examination mark

Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.