



Exchange programme Vrije Universiteit

Vrije Universiteit Amsterdam - Exchange programme Vrije Universiteit - 2022-2023

Exchange

Vrije Universiteit Amsterdam offers many English-taught courses in a variety of subjects, ranging from arts & culture and social sciences, neurosciences and computer science, to economics and business administration.

The International Office is responsible for course approval and course registration for exchange students. For details about course registration, requirements, credits, semesters and so on, please [visit the exchange programmes webpages](#).

Multivariable Calculus

Course Code	XB_41008
Credits	6.00
Period	P4+5
Course Level	100
Language Of Tuition	English
Faculty	Faculty of Science
Course Coordinator	prof. dr. R.C.A.M. van der Vorst
Examiner	prof. dr. R.C.A.M. van der Vorst
Teaching Staff	prof. dr. R.C.A.M. van der Vorst
Teaching method(s)	Partial Exam, Seminar, Lecture

Course Objective

At the end of this course students will be able to ...

1. ... differentiate functions of several variables (partial derivatives), find local extreme values and use these to graph functions;
2. ... parametrize curves and surfaces;
3. ... apply the implicit and inverse function theorem;
4. ... calculate and investigate multivariable Taylor polynomials of functions of several variables;
5. ... calculate multivariable integrals (2D and 3D integrals) using appropriately chosen methods, such as the substitution method, integration by parts and changing the order of integration;
6. ... investigate vector fields and line integrals;
7. ... work with differential k-forms;
8. ... formulate (the general) Stokes theorem and derive the classical integral theorems of Gauss, Green and Stokes;
9. ... write down the arguments involved in solving a calculus problem in a logically correct manner.

Course Content

This course deals with the calculus of functions of several variables. In particular, we cover

- * parametrized curves and arc length
- * planes and lines
- * functions of several variables and level sets
- * partial derivatives, gradients and directional derivatives
- * tangent planes and multivariable Taylor polynomials
- * the multivariable chain rule
- * the implicit and inverse function theorem
- * optimization and optimization under constraints
- * 2D integrals, order of integration
- * 3D integrals, cylindrical and spherical coordinates
- * changes of variables
- * vector fields
- * line integrals and surface integrals
- * parametrized hyper-surfaces and manifolds
- * differential k-forms
- * (the general) Stokes theorem and the classical integral theorems of Gauss, Green and Stokes

Additional Information Teaching Methods

Class meetings (twice per week) and office hours (twice per week)

Method of Assessment

Weekly MyMathLab exercises (10%), one Midterm exams (35%) and a Final exam (55%). The resit exam counts for 90%, with the 10% of the MyMathLab exercises still counting for the resit grade. There is no resit opportunity for the MyMathLab exercises.

Entry Requirements

Single Variable Calculus (XB_41007)

Literature

Calculus: A Complete Course, by Adams and Essex, 9th edition, Pearson, 2016. ISBN 978-0134154367

Additional Information Target Audience

Bachelor Mathematics Year one