Faculty of Science

MATB21, Mathematics: Analysis in Several Variables 1, 7.5 credits

Matematik: Flervariabelanalys 1, 7,5 högskolepoäng

First Cycle / Grundnivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2016-01-12 to be valid from 2016-01-13, spring semester 2016.

General Information

The course is a compulsory course for first-cycle studies for a Bachelor of Science degree in mathematics and in physics.

Language of instruction: English and Swedish

Main field of studies	*Depth of study relative to the degree requirements*
Mathematics	G1F, First cycle, has less than 60 credits in first-cycle course/s as entry requirements

Learning outcomes

The aim of the course is to enable students to acquire the following knowledge and skills on completion of the course.

Knowledge and understanding

On completion of the course, the student should be able to:

- give an account of relevant concepts and methods within basic multivariable analysis,
- give an account of basic applications of differential and integral calculus for functions in several variables,
- identify the logical structure in mathematical arguments within the frame of the course.

Competence and skills
On completion of the course, the student should be able to:

- identify, state and solve problems that concern real-valued functions of several variables,
- handle problems within differential and integral calculus using functions of several variables,
- set up and analyse simple mathematical models within multivariable analysis,
- express mathematical arguments in a structured and logical coherent way,
- present and discuss mathematical arguments in speech and writing.

Judgement and approach
On completion of the course, the student should be able to:

- use formal treatment of mathematics and argue for the purpose of mathematical proofs.

Course content

- Functions of several variables: continuity, basic topology in R^n;
- Differential calculus for functions of several variables: partial derivatives, differentiability, the chain rule, gradient and directional derivative, Taylor's formula, extreme values;
- Integral calculus for functions of several variables: multiple integrals, substitution of variables, differentiation under integral signs, improper integrals.

Course design

The teaching consists of lectures, seminars and, depending on the specialisation of the project, computer exercises. An essential element of the seminars is training in problem solving and oral mathematical communication.

A project that can consist of a number of assignments is included in the course requirements. The project consists of one of the following alternatives: to apply mathematical theory in computer programs to be able to solve problems relevant to the course content, a specialisation of theoretical aspects of the course or a didactic specialisation. The project also aims at providing the students with training in mathematical communication in speech and writing.

Assessment

The examination consists of the following parts:

- presentation of the project (1.5 credits)
- written examination (6 credits)

Students who fail the regular examination are offered a resit examination shortly thereafter.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, Pass, Pass with distinction.
To achieve a Pass grade, a student is required to pass the project and the written examination. Whether the grade Pass with distinction should be given is decided by combining the results of the included examination parts.

Entry requirements

To be eligible for the course, 30 credits in courses in mathematics equivalent to MATA21 Analysis in One Variable 15 credits, MATA22 Linear Algebra 1 7.5 credits, and one of the courses NUMA01 Computational Programming with Python 7.5 credits and MATA23 Foundations of Algebra, 7.5 credits, are required.

Further information

The course may not be included in a degree together with MATB15 Multivariable analysis 15 credits.

Subcourses in MATB21, Mathematics: Analysis in Several Variables 1

Applies from V16

1601 Written exam, 6,0 hp
Grading scale: Fail, Pass
1602 Project, 1,5 hp
Grading scale: Fail, Pass