Mathematics (46-60)

Programme course

15 credits

Matematik (46-60 hp)

93MA41

Valid from:

Determined by
The Board of Educational Science

Date determined
2013-04-15

Main field of study
Mathematics

Course level
First cycle

Advancement level
G1X

Course offered for
- Secondary School Teacher Programme with a specialization in Teaching in the Upper-Secondary School, subject Biology
- Secondary School Teacher Programme with a specialization in Teaching in the Upper-Secondary School, subject English
- Secondary School Teacher Programme with a specialization in Teaching in the Upper-Secondary School, subject History
- Secondary School Teacher Programme with a specialization in Teaching in the Upper-Secondary School, subject Internationell Mathematics
- Secondary School Teacher Programme with a specialization in Teaching in the Upper-Secondary School, subject Internationell Social Studies
- Secondary School Teacher Programme with a specialization in Teaching in the Upper-Secondary School, subject Mathematics
- Secondary School Teacher Programme with a specialization in Teaching in the Upper-Secondary School, subject Social Studies

Entry requirements
Specific entry 6c and Sh B and participated in General Education, 5 credits, Development and Learning, 10 credits, skills assessment and grading, 7.5 credits, Education History, the School's role in society and values, 7.5 credits, 91MA11 Mathematics (1-15 credits), 91MA21 Mathematics (16-30 credits) and 93MA31 Mathematics (31-45 credits) or equivalent, and other subject (1-60 credits).

Intended learning outcomes

After completing this course with a passing grade the student should be able to
• know and be able to use, explain and apply fundamental concepts and methods of calculus of several variables;
• demonstrate basic skills in calculus, problem solving and applications of calculus of several variables by applying its fundamental concepts , theorems and methods;
• to perform standard calculations in calculus of several variables with good security;
• perform didactic analysis of key concepts, operations , theorems and methods in algebra and statistics;
• demonstrate the understanding of mathematical proofs and analyze how intuitive and logical thinking can complement each other to the understanding of mathematical concepts and methods;
• analyze students' perceptions of and ways to acquire basic mathematical concepts and skills in algebra, probability and statistics based on a critical review of the research literature;
• describe, analyze and reflect on various aspects of mathematical problem solving and its impact on teaching and learning mathematics;
• describe and critically analyze various approaches to interdisciplinary and project-oriented work in school mathematics;
• conduct, report and evaluate a larger mathematical problem-solving and project exercises

Course content

Euclidean n-space. Basic topological concepts of the Euclidean n-space. Functions of several variables and vector-valued functions, including the following concepts: Graph, level curve, level surface. Limits and continuity, differentiability, partial derivatives, differentials, the chain rule. Gradient and directional derivative. Tangent and normal planes, linear approximation. Taylor's Formula. Extreme-value problems. Invertibility and implicitly defined functions. Jacobian matrix and Jacobian determinant. Coordinate changes. Multiple integrals and iterated integral. Change of variables for multiple integrals: polar and spherical coordinates. Applications: area, volume, moments and center of mass.
Mathematical reasoning, the mathematical proof and didactic analysis in connection to the relevant concepts and skills in algebra, calculus, probability and statistics related to mathematics education research.
The course also discusses various approaches to and aspects of mathematical problem solving and project work at the school level in relation to a relevant mathematics education research on problem solving and project work.

Teaching and working methods

Lectures, seminars, group work, independent study.

Examination

The course is assessed by written examinations and written and oral presentations.

EXAM CODES
STN1 written examinations: Calculus of several variables, 6 credits
SRE1 written presentation: Project work, 4 credits
SRE2 written presentation: Didactics report, 3 credits
MRE1 oral presentation: Mathematical proof and problem solving, 2 credits

Grades

Three-grade scale, U, G, VG

Other information

Planning and implementation of a course must take its starting point in the wording of the syllabus. The course evaluation included in each course must therefore take up the question how well the course agrees with the syllabus. The course is carried out in such a way that both men´s and women´s experience and knowledge is made visible and developed.

Department

Matematiska institutionen