



DEPARTMENT OF MATHEMATICAL SCIENCES

MMG200 Mathematics I, 30 credits

Matematik 1, 30 högskolepoäng

First Cycle

Confirmation

This course syllabus was confirmed by Department of Mathematical Sciences on 2013-08-23 and was last revised on 2021-10-21 to be valid from 2022-08-29, autumn semester of 2022.

Field of education: Science 100%

Department: Department of Mathematical Sciences

Position in the educational system

The course is read during the first semester in the Mathematical program, but can also be read as a freestanding course.

The course can be part of the following programmes: 1) Bachelor's Programme in Mathematics (N1MAT), 2) No translation available (NMDSM) and 3) Bachelor of Science Programme in Chemistry (N1KEM)

Main field of studies

Mathematics

Specialization

G1N, First cycle, has only upper-secondary level entry requirements

Entry requirements

General entrance requirements for university studies and the Swedish upper secondary course Mathematics E or Mathematics 4 or equivalent.

Learning outcomes

On successful completion of the course, the student will be able to:

Knowledge and understanding

- explain and use basic mathematical concepts, such as function and relation, limit and continuity, integrals and the fundamental theorem of calculus,
- explain and use basic methods in algebra, analysis and linear algebra.

Competence and skills

- formulate important definitions and theorems in the course and prove some of them,
- carry out simple mathematical arguments and proofs, including proof by induction, on their own,
- differentiate a function and use the derivative for optimisation,
- analyse the behaviour of a function of one variable,
- solve simple ordinary differential equations,
- solve simple combinatorial problems,
- solve linear equation systems by means of Gauss elimination and analyse solvability,
- treat problems in linear geometry by means of vectors,
- show familiarity with linear transformations and analyse them by means of eigenvectors,
- use central information from several sources to write a summary which is correct both with regard to content and language,
- give and receive feedback on writing in a constructive way.

Judgement and approach

- identify central or peripheral information from several sources.

Course content

The aim of the course is to give a good basis for continued studies in mathematics. The course is divided into three modules: Introductory algebra, Linear Algebra I and Single variable calculus. Furthermore, there is a component on written communication.

Initial algebra: Logic and sets. Induction. Integer arithmetic. Functions and relations. Combinatorics. A little about groups, rings and fields. The structure of the number systems - mainly \mathbb{N} , \mathbb{Z} and \mathbb{Q} .

Linear Algebra: Vector algebra. Linear equation systems and Gauss elimination. Linear (in)dependence. Linear transformations and their matrices. Vector spaces and subspaces in \mathbb{R}^n . Eigenvalues and eigenvectors. Something about diagonalisation and orthogonality. Matrix computations in Python.

Single variable calculus: Elementary functions. Limits. Continuity. Derivatives. Integrals. Taylor expansions. Differential equations. Applications of derivatives and integrals on relevant problems, and associated calculations in Python.

Written communication: The basics of LaTeX. Training to write a summary of information from several sources, lectures on the Professional Mathematics Day.

Form of teaching

Language of instruction: Swedish

Assessment

There will be a written examination at the end of each module. During the course, there may be optional assignments that give bonus points on the exam. Examples of such components are tests, written assignments, laboratory sessions or project work.

Information for the current course instance is given via the course homepage.

The course also includes compulsory written assignments and computer exercises. There is also compulsory attendance during the Professional Mathematics Day, including the question time.

If a student, who has failed the same examined component twice, wishes to change examiner before the next examination, a written application shall be sent to the department responsible for the course and shall be granted unless there are special reasons to the contrary (Chapter 6, Section 22 of Higher Education Ordinance).

Grades

The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).

To obtain the grade Pass on the whole course, Pass is required on all three modules, including compulsory computer exercises and compulsory written assignments in written communication. If one furthermore has the grade Pass with distinction on at least 15 credits of the modules, one obtains the grade Pass with distinction on the whole course.

Course evaluation

The course is evaluated with an anonymous questionnaire and/or a discussion with the student representatives. The results of and possible changes to the course will be shared with students who participated in the evaluation and students who are starting the course.

Additional information

For a list of course literature, see:

<https://www.chalmers.se/sv/institutioner/math/utbildning/grundutbildning-goteborgs-universitet/kurslitteratur/Sidor/Kurslitteratur-i-matematik.aspx>