HF1901 Mathematics I 7.5 credits

Matematik I

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for HF1901 valid from Autumn 2009

Grading scale

A, B, C, D, E, FX, F

Education cycle

First cycle

Main field of study

Mathematics, Technology

Specific prerequisites

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

Upon completing this course students should be able to:

- Solve and apply systems of linear equations;
- Define, calculate and apply vector addition, scalar multiplication, dot product, vector product, and vector projections;
- Solve problems that include lines and planes in 3D space;
- Perform the matrix operations of addition, scalar multiplication, and multiplication, and find the transpose and inverse of a matrix;
- Demonstrate an understanding of the fundamental concepts of analysis: limits, continuity, differentiability and integrability of real-valued functions of a single real variable;
- Use the algebra of limits, and l'Hospital's rule to determine limits of simple expressions;
- Apply the procedures of differentiation accurately, including implicit and logarithmic differentiation;
- Apply the differentiation procedures to solve extreme value problems;
- Sketch graphs, using function, its first derivative, and the second derivative;
- Calculate definite and indefinite integrals, using substitution and integration by parts;
- Understand and apply the procedures for integrating rational functions;
- Use integration to find areas and volumes;

Course contents

- Systems of linear equations. Gaussian elimination.
- Vectors, vector addition, scalar multiplication, dot product, cross product, and vector projections.
- Lines and planes in 3D space.
- Determinants.
- Matrices and matrix algebra. Matrix inverse.
- Functions and their graphs.
- Limits and continuity: limits, one-sided limits, limits at infinity, continuity.
- Differentiation: Derivatives, tangent lines and normal lines, differentiation rules, higher-order derivatives.
- Applications to behavior of functions: curve sketching, maxima and minima.
- Basic integration techniques and applications.

Course literature

Rodhe – Sollervall: Matematik för ingenjörer
or
Glyn James: Modern Engineering Mathematics

Examination

- TEN1 - Examination, 7.5 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.