SF1619 Analytical Methods and Linear Algebra II 12.0 credits

Analytiska metoder och linjär algebra II

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

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

Establishment

Course syllabus for SF1619 valid from Autumn 2008

Grading scale

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

Education cycle

First cycle

Main field of study

Mathematics,Technology

Specific prerequisites

To be able to profit by the course, the student should have the previous knowledge corresponding to Analytical Methods and Linear Algebra 1.

Language of instruction

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

Intended learning outcomes

To found a basis for further studies within the engineer education by

- providing practical mathematical skills in using introduced terms
- developing a trust in the own ability to use mathematics
- presenting different methods of proof and illustrating the deductive character of mathematics.
- practicing the ability to communicate with the language and symbols of mathematics
- developing the ability to formulate and analyze relevant problems using mathematical terms
- practicing the ability to follow and carry out logical and mathematical reasoning
- contributing the satisfaction of mastering mathematical terms and methods and in experiencing the beauty and logics of mathematics

After passing the course, the students should be able to

Fundamental concepts

use the fundamental concepts of linear algebra and calculus of several variables: the vector spaces Rn, basis, linear transformation, eigenvalue, eigenvector, limit of a function of several variables, differentiability, partial derivative, gradient, multiple integral, surface integral, line integral, curl, divergence.

Usage of language

communicate using the language and symbols of mathematics.

Reasoning

perform mathematical reasoning using: implications, equivalences.

Mathematical modelling

set up mathematical models and problems expressed in terms of the fundamental concepts.

Problem solving

use classical solution methods of linear algebra and calculus.

Complementary aims

After the course the students should have

- Enhanced their study technique so that it is well adjusted to the learning of the mathematical scientific and technical subjects.
- Insights on how mathematical tools and thinking can be used in the further education and future professional life.

Course contents

After passing the course, the students should be able to

- Define the fundamental concepts: the vector space Rn, linear dependence and independence, linear transformation, eigenvalue and eigenvector, vector-valued functions, partial derivatives, gradient, directional derivative, differentiability, Jacobian matrix and Jacobian determinant multiple integral, surface integral, line integral, curl, divergence.
- Apply the method of least squares for solving over-determined system of equations.
- Find eigenvalues and corresponding eigenvectors and use them in diagonalization of matrixes and to classify conics and quadric surfaces.
- Transform expressions for derivatives under a change of coordinates and use them to solve some partial differential equations.
- Use the gradient to find directional derivatives and tangent planes to level surfaces.
- Evaluate some multiple integrals, line integrals and surface integrals.
- Find the areas and volumes by using multiple integrals and find the length of a curve using integrals.
- Solve maximum-minimum problems for functions of several variables, also constrained.
- Derive some formulas and theorems.

Course literature

E. Petermann, Linjär geometri och algebra. ISBN 91-44-02119-4.

E. Petermann, Analytiska metoder II, 4:e upplagan. ISBN 91-44-01457-0.

A. Falkne, B. Krakus, Analytiska metoder II, Övningsbok. ISBN 91–44–37441–0.

Examination

- TEN1 - Examination, 12.0 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.

Other requirements for final grade

The course aims are written with a direction to the grade E and will be examined through continuous examination and a written exam (TEN1; 12 credits). It will be up to the coordinating teacher to decide the forms of the continuous examination.

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.