ED1110 Vector Analysis 4.5 credits

Vektoranalys

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

Establishment

The official course syllabus is valid from the autumn semester 2021 in accordance with Head of School decision: J-2021-0559.Decision date: 15/04/2021

Grading scale

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

Education cycle

First cycle

Main field of study

Electrical Engineering, Technology

Specific prerequisites

Knowledge in one variable calculus, 7.5 higher education credits, equivalent to completed course SF1625.

Active participation in a course offering where the final examination is not yet reported in LADOK is considered equivalent to completion of the course. Registering for a course is counted as active participation. The term 'final examination' encompasses both the regular examination and the first re-examination.

Language of instruction

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

Intended learning outcomes

After passing the course, the student shall be able to
- apply vector algebra and use the gradient of scalar field to solve elementary problems in physics
- carry out line, surface and volume integration as well as differentiation of scalar and vector fields
- interpret the divergence and the curl physically and apply these operators to carry out surface and line integration by means of Gauss and Stoke's theorems
- identify the most appropriate coordinate system for a given problem and apply the gradient, the divergence and the curl in the selected coordinate system
- use nabla operator and index notation to simplify and carry out vector analysis calculations
- solve Poisson's equation with appropriate boundary conditions for problems with cylindrical and spherical symmetries

in order to obtain understanding of vector analysis relationships, to demonstrate practical applications of vector analysis as well as to provide training in problem formulation and solution methods.

Course contents

- basic vector algebra
- differentiation and integration of vector-valued functions in Cartesian, cylindrical and spherical coordinate systems
- the gradient and the directional derivative
- the potential
- line integrals and surface integrals
- Gauss' and Stoke's theorems
- the nabla operator and index notation
- integral theorems
- curvilinear coordinate system
- important vector fields and integration of these
- the equations of Laplace and Poisson.

Examination

- TENA - Exam, 4.5 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.

Continuous examination is used. It consists of home assignments as well as individual assignments and group assignments during class room tutorials. Final, written examination is also given (necessary for higher grades).

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.