



SI1141 Mathematical Methods in Physics, Course I 6.0 credits

Fysikens matematiska metoder, kurs I

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 SI1141 valid from Autumn 2007

Grading scale

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

Education cycle

First cycle

Main field of study

Physics, Technology

Specific prerequisites

Recommended prerequisites: Knowledge of mathematics and vector analysis corresponding to the courses given during the first two years.

Language of instruction

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

Intended learning outcomes

The subject of this course are initial- and boundary value problems for linear partial differential equations which are important in electrodynamics, quantum mechanics etc. The students should learn to formulate specific physics problems through mathematical models of this kind, to master various important analytical methods to solve such models, and to give physical interpretations of the solutions.

Course contents

Physical problems that can be modeled by differential equations such as the wave equation, the Laplace- and the Poisson equation. d'Alemberts method, separation of variables, Hilbert spaces, spectral theory of self-adjoint Hilbert space operators, Sturm-Liouville systems. Separation of variables in cartesian, cylindrical and spherical coordinated; special functions like Bessel functions, Legendre polynomials and spherical harmonics. Relation to numerical methods.

Course literature

G. Sparr and A. Sparr, Kontinuerliga system, Studentlitteratur, Lund (2000) together with the corresponding "Övningsbok".

Examination

- LAB1 - Laboratory Work, 1.0 credits, grading scale: P, F
- TEN1 - Examination, 5.0 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

Written examination in partial differential equations (TEN2; 5 university credits) and one homework problem requiring numerical computations (LAB1; 1 university credits).

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.