



Course syllabus

Faculty of Technology

Department of Physics and Electrical Engineering

4FY520 Fysikens matematiska metoder, 7,5 högskolepoäng

Mathematical methods for physics, 7.5 credits

Main field of study

Physics, Mathematics

Subject Group

Physics

Level of classification

Second Level

Progression

A1N

Date of Ratification

Approved by Faculty of Technology 2014-10-03

The course syllabus is valid from autumn semester 2015

Prerequisites

Physics 45credits, mathematics 45credits or equivalent

Objectives

At the end of the course the students:

- should have acquired a variety of mathematical skills and techniques used to solve partial differential equations commonly encountered in theoretical physics, such as the heat, wave and Schrödinger equations.
- should have acquired familiarity with some of the most common special functions in mathematic physics.
- Should be knowledgeable about the most fundamental integral transformations
- should have acquired a basic knowledge of the theory of Hilbert spaces and the spectral theorem for self-adjoint operators, and their relevance to quantum mechanics.

Content

The course covers:

- Functions of a complex variable and calculus of residues
- Partial differential equations in theoretical physics
- Hilbert spaces, self-adjoint operators
- Sturm-Liouville Theory and orthogonal functions
- The Gamma function
- Bessel functions
- Legendre functions

- Fourier Series
- Integral transforms (Fourier, Laplace, Hilbert)
- Introduction to Integral equations

Type of Instruction

The teaching consists of lectures and tutorials.

Students can also register for the “distance” version of the course and follow the course via the internet. IT support and technical information: Email and web connection. Real-time and recorded lectures on course homepage.

Examination

The course is assessed with the grades A, B, C, D, E, Fx or F.

The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student’s performance is assessed as fail (i.e. received the grade F).

Assessment of student performance is made through written test and/or oral examinations and/or presentation of mandatory assignments. Reexamination will be offered within six weeks under the regular semester periods. The number of examinations are limited to five times.

Course Evaluation

A course evaluation will be carried out at the end of the course in accordance with the guidelines of the University. The result of the course evaluation will be filed at the department.

Credit Overlap

This course cannot be part of a degree in combination with another course in which the content fully or partly correspond to the content of this course: 4FY820 Mathematical methods for physics, 7.5 credits

Other

Grade criteria for the A–F scale are communicated to the student through a special document. The student is to be informed about the grade criteria for the course by the start of the course at the latest.

Required Reading and Additional Study Material

Reference Literature

1. Mathematical Methods for Physicists, G. Arfken, Academic Press, sixth edition 2005.
2. Lecture Notes distributed by the instructor.