Linnæus University

Course syllabus

Faculty Board of Science and Engineering
School of Computer Science, Physics and Mathematics

4FY820 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 the Board of the School of Computer Science, Physics and Mathematics 2011-08-17

The course syllabus is valid from spring semester 2012

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 Fail (U), Pass (G) or Pass with Distinction (VG).
On request, students may have their credits translated to ECTS-marks. Such a request must be sent to the examiner before the grading process starts.

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.

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.