



Course syllabus

Faculty of Technology
Department of Mathematics

4MA403 Partiella differentialekvationer, 7,5 högskolepoäng
Partial Differential Equations, 7.5 credits

Main field of study

Mathematics

Subject Group

Mathematics

Level of classification

Second Level

Progression

A1F

Date of Ratification

Approved by Faculty of Technology 2015-11-26
The course syllabus is valid from autumn semester 2016

Prerequisites

4MA112 Distribution Theory 7.5 credits or equivalent.

Objectives

The student should be able to:

- solve first order linear partial differential equations (PDE)
- explain basic concepts as existence, uniqueness, wellposed problems etc. and know the classical PDE's
- understand the interplay between operator and geometry
- have a knowledge about systems of linear PDE especially how to obtain the canonical form
- in detail present the spectral theorem for regular Sturm-Liouville problems and know how to apply it
- solve elementary non-homogeneous PDE by series expansions or by Green function technique
- explain how singular Sturm-Liouville problems can appear and describe the differences (similarities) compared to the regular case
- solve second-order, weakly singular differential equations with, series solutions (Frobenius method).

Content

The course includes:

- first order linear PDE
- orientation about systems of linear PDE

- existence/uniqueness/well-posed problems
- second order pde
- boundary value and eigenvalue problems
- Sturm-Liouville theory
- solution of singular problems with help of power series
- orientation about important functions in mathematical physics.

Type of Instruction

Lectures and seminars. Compulsory and group assignments may be given during the course.

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).

The student's knowledge is assessed in the form of oral and/or written examinations. The principal assessment method for the course is determined at the beginning of the course.

Course Evaluation

During the course or in close connection to the course, a course evaluation is to be carried out. The result and analysis of the course evaluation are to be communicated to the students who have taken the course and to the students who are to participate in the course the next time it is offered. The course evaluation is carried out anonymously. The compiled report will be filed at the Faculty.

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: 4MA103 Partial Differential Equations 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

Required reading

Boyce E & Di Prima R C. *Elementary Differential Equations and Boundary Value Problems*, 8th Ed, 2005 or later. ISBN 0-471-43338-1. Pages: 243-306, 657-717 (790).