FSF3625 Partial Differential Equations 7.5 credits

Partiella differentialekvationer

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

Establishment

Course syllabus for FSF3625 valid from Autumn 2010

Grading scale

G

Education cycle

Third cycle

Specific prerequisites

A Master degree including at least 30 university credits (hp) in in Mathematics (including differential equations).

Language of instruction

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

Intended learning outcomes

The aim is that students can use the basic mathematical methods to analyze linear and nonlinear partial differential equations. In particular this includes

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- use representation formulas
- prove well posedness
- analyze regularity

for the standard linear and some important non linear partial equations.

Course contents

Partial differential equations are used frequently in mathematics and science to describe models. Therefore its theory is an essential part in mathematical analysis.

The course includes basic representation formulas, existence and uniqueness, regularity and stability of linear and some nonlinear partial differential equations. Important concepts included in the examination are e.g. maximum principles, variational methods, well posedness, classical solutions, weak and generalised solutions.

Disposition

1. Representation formulas

- Transport equations and characteristics
- Hamilton-Jacobi equations and conservations laws
- Laplace equations and mean value theorems
- The heat equation, fundamental solutions and mean value formulas
- The wave equation, representation formulas and energy

2. Existence, uniqueness and regularity

- Elliptic partial differential equations, existence, uniqueness and well posedness
- Second order parabolic equations, existence, uniqueness and well posedness

3. Nonlinear partial differential equations

- Hamilton-Jacobi equations and optimal control theory, inverse problems
- Systems of conservation laws
- Calculus of variation

Course literature

Evans L.C., Partial Differential Equations, Second edition, American Mathematical Society, Providence RI, 2010.

Examination

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.

Homework problems, Written exam

Other requirements for final grade

Homework completed

Written exam passed

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.