SF1536 Simulations with Differential Equations 9.0 credits

Simulering med differentialekvationer

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

Establishment

Course syllabus for SF1536 valid from Autumn 2013

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Recommended prior knowledge.

Basic courses in mathematical analysis in one and several variables, linear algebra and numerical analysis and programming techniques.

Language of instruction

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

Intended learning outcomes

A general aim with the course is to help the student to develop a good understanding of simulation with differential equations including basic mathematical concepts as ordinary and partial differential equations, initial condition, boundary condition, stability, finite difference methods, function approximation, finite element methods and error estimate. And to give skills in, by using computers, approximately solving basic partial differential equations with numerical methods, interpreting computational result and estimating the numerical error in calculations.

On completion of the course, the student should be able to

- account for basic mathematical concepts as ordinary and partial differential equations, initial condition and boundary condition, stability, function approximation, finite element methods, finite difference methods and error estimate.
- formulate numerical methods for basic partial differential equations
- design and implement program for solution of ordinary and simple partial differential equations
- use and modify existing computer programs for solving differential equations
- present results in a clear way
- use existing functions for visualisation of results

Course contents

Basic ideas and concepts: ordinary and partial differential equations, initial conditions, boundary conditions and stability, finite difference method, function approximation, weak formulation, finite element methods, error estimate.

Algorithms and programming: calculation of approximate solution to basic partial differential equations with numerical methods.

Course literature

Announced no later than 4 weeks before the start of the course on the course web page.

Examination

- LABB - Laboratory Work, 3.0 credits, grading scale: P, F
- TEN1 - Examination, 4.0 credits, grading scale: A, B, C, D, E, FX, F
- LABA - Laboratory Work, 2.0 credits, grading scale: P, 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.

If the course is discontinued, students may request to be examined during the following two academic years.

In this course, the code of hounor of the school is applied, see:
http://www.kth.se/sci/math/student/hederskodex/.

Other requirements for final grade

A written examination (TEN1; 4 credits). Laboratory assignments with oral and written presentation (LAB A+LAB B; 5.0 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.