DN2221 Applied Numerical Methods, part 1 6.0 credits

Tillämpade numeriska metoder, del 1

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

Establishment

Grading scale

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

Education cycle

Second cycle

Main field of study

Specific prerequisites

Single course students: 90 university credits including 45 university credits in Mathematics or Information Technology. English B, or equivalent.

Language of instruction

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

Intended learning outcomes

An overlying goal with the course is to give the student knowledge about how to formulate, utilise, analyze and implement advanced computer oriented numerical methods for solving those differential equation problems that are of importance in scientific and engineering applications.

After completing this course the student should be able to

- for a given problem, identify problem type within the area of differential equations, ordinary and partial, and suggest an algorithm for the numerical solution
- utilise and analyze the most important algorithms for the kind of problems presented in this course
- utilise algorithms from other areas of numerical analysis which are necessary for solving differential equations, direct and iterative methods for large sparse systems of equations and Fourier analysis
- set up and explain some fundamental mathematical models in science which are based on differential equations
- implement the algorithms i a programming language suitable for numerical computation, e.g. Matlab
- utilise computer tools for simulation and visualization of differential equation models in science and engineering.

Course contents

Numerical treatment of initial value problems, boundary value problems, and eigenvalue problems for ordinary and partial differential equations. Discretization by finite differences and finite elements. Convergence, stability and error estimation. Orientation about mathematical modeling. Application oriented computer labs and a project.

Course literature

Lennart Edsberg "Introduction to Computation and Modeling for Differential Equations", Wiley 2009.

Examination

- TEN1 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory, 3.0 credits, grading scale: A, B, C, D, E, FX, 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 all the regulations of the code of honor at the School of Computer science and Communication apply, see: http://www.kth.se/csc/student/hederskodex/1.17237?l=en_UK.

Other requirements for final grade

Examination (TEN1; 3 hp)
Computer assignments and project work (LAB1; 3 hp)

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.