DN2255 Numerical Solutions of Differential Equations 7.5 credits

Numerisk behandling av differentialekvationer

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

Establishment

Course syllabus for DN2255 valid from Spring 2009

Grading scale

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

Education cycle

Second cycle

Main field of study

Mathematics

Specific prerequisites

Language of instruction

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

Intended learning outcomes

The course gives the students knowledge of problem classes, basic mathematical and numerical concepts and properties, modern numerical methods, and software for solution of engineering and scientific problems formulated as differential equations.

After successful completion of course requirements the students will be able to

- design, implement and use numerical methods for computer solution of scientific problems involving differential equations;
- follow specialized and application-oriented technical literature in the area;
- understand properties of different classes of differential equations and their impact on solutions and proper numerical methods;
- use commercial software with understanding of fundamental methods, properties, and limitations

Course contents

Numerical treatment of initial value problems, boundary value problems and eigenvalue problems for ordinary and partial differential equations. The emphasis on different parts may vary from year to year. Relevant linear algebra, well-posedness, convergence, stability, error estimates, finite differences, finite elements, finite volumes, method of lines, modern iterative methods, problems with shocks. Computer labs and application oriented projects.

Course literature

To be announced at course start. Previous year: R. Le Veque: Finite Volume Methods for Hyperbolic Problems.

Examination

- LAB2 - Project, 1.5 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Task, 3.0 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.

Other requirements for final grade

Examination (TEN1; 3 university credits).
Computer assignments (LAB1; 3 university credits).
Project (LAB2; 1,5 university 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.