SF2527 Numerical Methods for Differential Equations I 7.5 credits

Numeriska metoder för differentialekvationer I

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

Establishment

Course syllabus for SF2527 valid from Autumn 2024

Grading scale

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

Education cycle

Second cycle

Main field of study

Mathematics, Technology

Specific prerequisites

English B / English 6

Completed basic course in numerical analysis (SF1544, SF1545 or equivalent)

Completed course in differential equations (SF1633, SF1683 or equivalent)

Language of instruction

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

Intended learning outcomes

For the differential equations in the course contents, the student shall after completion of course be able to:

- classify and characterize the differential equation, as well as choose an appropriate numerical method to solve it

- analyze numerical methods with respect to computational cost, accuracy and stability

- apply and implement numerical algorithms in a suitable programming langugae, as well as assess the accuracy of numerical results

- explain key concepts and fundamental ideas within numerical methods covered in the course, and be able to apply them to argue for advantages and descibe limitations of the methods

Upon approved completion of the course, the student shall also have the skills to work in a group to solve a numerical problem and to present, discuss, and summarice the problem, solution method, and results clearly.

Course contents

The course will give you knowledge about advanced numerical methods for solving differential equations in engineering and natural science applications. The course explores how these methods are formulated and implemented on a computer, as well as the theory regarding the accuracy, stability, and computational cost of these methods. The course covers numerical methods for ordinary differential equations, finite difference methods for linear partial differential equations, and an introduction to mathematical modeling with differential equations. It includes computer labs and projects with various applications.

Examination

- LABA - Laboration, 3.5 credits, grading scale: A, B, C, D, E, FX, F
- LABB - Laboration, 1.0 credits, grading scale: P, F
- TEN1 - Written exam, 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.

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.