SF1692 Analytical and Numerical Methods for Ordinary Differential Equations 5.5 credits

Analytiska och numeriska metoder för ordinära differentialekvationer

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

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

Establishment

Course syllabus for SF1692 valid from Autumn 2021.

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

- Completed basic course in multivariable calculus (SF1674 or equivalent)
- Completed basic course in linear algebra (SF1672 or equivalent)
- Participated in a basic course in numerical methods (SF1550 or equivalent)

Language of instruction

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

Intended learning outcomes

After completion of the course the student should be able to:

- apply concepts, theorems, and methods included in the course to solve and present solutions to problems within parts of the theory of differential equations;
- apply, implement, and evaluate the numerical methods included in the course to solve ordinary differential equations and show insight about the possibilities and limitations of the methods;
- read and comprehend a mathematical text and present mathematical results.

Course contents

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- First order ordinary differential equations, fundamental theory and concepts, separable and linear equations, variation of parameters, modeling.
- Existence- and uniqueness theorems, Picard iterations, convergence, condition, accuracy, explicit and implicit numerical methods.
- Linear ordinary differential equations of higher order and systems of linear ordinary differential equations, basic theory, finding solutions in specific cases, discussion of properties of solutions.
- Autonomous systems, qualitative properties and stability analysis for linear and non-linear systems, with applications in dynamical systems including modeling.
- Integral transforms, Laplace transform and applications to differential equations and Green functions.

Examination

- PRO1 - Project, 2.5 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.

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.