SF1683 Differential Equations and Transforms 9.0 credits

Differentialekvationer och transformmetoder

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 SF1683 valid from Autumn 2017

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

SF1672 Linear algebra, SF1673 Analysis in one variable and SF1674 Multivariable Calculus.

Language of instruction

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

Intended learning outcomes

After the course, the students should be able to

- solve first order ordinary differential equations (especially separable, linear and exact equations)
- solve second order linear differential equations using reduction of order and variation of parameters
- interpret and use the basic concepts: complex numbers, power series and analytic functions
- solve second order linear differential equations using power series
- solve differential and integral equations using Laplace transforms
- solve systems of first order linear differential equations
- classify critical points of autonomous systems, determine the trajectories and phase portraits for autonomous systems and investigate the stability of critical points
- calculate Fourier series and their sums
- solve approximation problems using orthogonal projections in inner product spaces
- solve problems using systems of orthogonal polynomials
- solve partial differential equations using separation of variables
- solve Sturm-Liouville problems
- calculate Fourier transforms, use Fourier transforms and convolutions in problem solving
- carry out computations using distributions and their derivatives and Fourier Transforms

Course contents

First order differential equations. Second order linear equations. The Laplace transform. Systems of differential equations. Qualitative methods for non-linear differential equations. Long term behaviour. Stability of critical points. Existence and uniqueness theorems. Fourier series, inner product rooms, orthogonal systems of functions. Sturm-Liouville problems. The Fourier transform. Distributions. Partial differential equations. Separation of variables. Applications to ordinary and partial differential equations. Introduction to analytical functions of one complex variable. Basic theory of power series. Elementary analytical functions.

Course literature

Boyce-Diprima:Elementary Differential Equations and Boundary Value Problems, 10:th ed.

Anders Vretblad: Fourier Analysis and Its Applications.

Examination

- TEN1 - Exam, 5.0 credits, grading scale: A, B, C, D, E, FX, F

- TEN2 - Exam, 4.0 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.

Other requirements for final grade

Two written exams (TEN1, 5 cr, and TEN2, 4 cr).

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.