

SYLLABUS

Linear Systems and Transforms 7.5 credits M0053M

Linjära system och transformmetoder

Course syllabus admitted: Autumn 2023 Sp 1 - Present

**DECISION DATE
2022-02-14**

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Linjära system och transformmetoder

First cycle, M0053M

Education level	Grade scale	Subject	Subject group (SCB)
First cycle	G U 3 4 5	Matematik	Mathematics

Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language and Differential Calculus (M0047M), Linear Algebra and Calculus (M0048M), Linear Algebra and Differential Equations (M0049M), Multivariable Calculus (M0055M) and the course Circuit Theory (E0003E) or their equivalents.

Selection

The selection is based on 1-165 credits.

Course Aim

After completed course, the students should be able to:

- describe, model and analyze electric circuits and other physical/technical systems with ordinary differential equations.
- Use laplace transform as a tool for solving ordinary differential equations with initial conditions.
- Solve systems of linear differential equations using diagonalization and matrix exponential.
- Compute and use fourier series and fourier transforms for some elementary functions and distributions.
- Explain and use concepts as transfer function, LTI-systems, causality, stability, impulse response and convolution integrals for linear systems.
- Explain elementary theory of distributions and be able to use distributions as e.g. Dirac's delta function and Heaviside's step function to model certain physical phenomena.
- formulate a few common partial differential equations with boundary- and initial conditions, starting with problems from physics and then be able to solve them with variable separation techniques.

Contents

This course treats basic principles and techniques used to analyze and solve linear and continuous systems such as laplace transform, fourier series, fourier transform as well as how those are used to solve differential equations. Systems of differential equations. Elementary theory of distributions with applications. Mathematical models for diffusion, heat conduction and wave propagation. Solution of PDE with separation of variables (Fourier's method).

Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

Teaching and learning are achieved through lectures (in classroom or online), problem solving, home studies (mainly problem solving) and computer tasks carried out in groups of 1-3 students.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided. The course aims are examined by a written individual exam and compulsory computer tasks. Grading according to the scale G U 3 4 5.

Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term “unauthorized aids” refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

Overlap

The course M0053M is equal to M0046M

Course offered by

Department of Engineering Sciences and Mathematics

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0002	Laboration	U G#	0.6	Mandatory	S20	
0003	Written exam	G U 3 4 5	6.9	Mandatory	A21	

Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

Last revised

by Niklas Lehto, Programme Director 2022-02-14

Syllabus established

by Head Faculty Programme Director Niklas Lehto 2021-02-17