EQ1110 Continuous Time Signals and Systems 6.0 credits

Tidskontinuerliga signaler och system

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

Establishment

The official course syllabus is valid from autumn semester 2026 as decided by the Director of First and Second Cycle Education. Decision date: 2026-04-16

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Knowledge in one variable calculus, 7.5 higher education credits, equivalent to completed course SF1625. Active participation in SF1625 during study period 1 of the same academic year is equated with completed course. Those who are registered are expected and considered to be active participants.

Intended learning outcomes

The course gives basic knowledge of differential equations and time continuous signals and systems.

On completion of the course, the student should be able to

• describe and analyse technical systems especially electric circuits, by means of differential equations.

• solve linear differential equations and systems of differential equations with constant coefficients both by means of time- and transform-domain methods.

• carry out analytical calculations with generalised functions especially Dirac-pulses.

• calculate Fourier coefficients for periodic functions and utilise the general properties of Fourier series.

• calculate Fourier transform and inverse transform for functions and generalised functions and utilise general properties for Fourier transforms.

• calculate both one-sided and double-sided Laplace transform and inverse transform for functions and generalised functions and utilise general properties for Laplace transforms.

• calculate the convolution of two functions.

• give an account of implication and practical importance of system concepts such as linearity, time-invariance, causality, stability, impulse response, transfer function and frequency function.

• describe LTI-system and calculate the output signal from them by means of impulse response, convolution, transfer function and frequency function.

• in a simple way calculate the output signal for an LTI-system when the input signal is a stationary sine.

• interpret, analyse and synthesise time continuous systems in the form of electric circuits and block models.

• present and discuss a technical solution orally.

For higher grades, the student should also be able to

• decide which solution method that fits best for a given problem.

• combine different concepts and methods from the course and apply them on more complex mathematical and technical problem formulations.

Course contents

Linear differential equations, characteristic equation, generalised functions, Fourier series, Fourier transform, one- and double-sided Laplace transform, systems, system properties, convolution, impulse response, transfer function, frequency function and sine in sine out. Basic state models.

Examination

- PRO1 - Project Work, 1.0 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Examination, 4.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Experiment, 1.0 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

Approved examination in all course components.

Final mark is combined 80% based on TEN1 and 20% based on PRO1.

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.