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

Course syllabus for EQ1110 valid from Spring 2019

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Mandatory for CELTE

For single course students: General admission requirements, 60 credits and documented proficiency in English B and Swedish B or equivalent.

Language of instruction

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

Intended learning outcomes

The aim is to provide basic knowledge about differential equations and continuous-time signals and systems.

After completing the course you should be able to

- Describe and analyze technical systems, especially electrical circuits, by using differential equations
- Solve linear differential equations and systems of linear differential equations with constant coefficients, both using time domain methods as well as transform based methods
- Do analytic calculation using generalized functions, especially Dirac pulses.
- Compute Fourier series for periodic functions and use the Fourier series general properties
- Compute the Fourier transform and inverse transform for functions and generalized functions and use general properties of them
- Compute single and double sided Laplace transform and inverse transform for functions and generalized functions and use general properties of the transform
- Compute the convolution of two functions
- Understand the meaning and practical relevance of system properties such as linearity, time invariance, stability, causality, impulse response, transfer function, and frequency function.
- Describe LTI systems and calculate their output signal, using impulse response, convolution, transfer function and frequency response.
- calculate poles and zeros of an LTI system and relate their position to system properties like transfer function and frequency response.
- In a simple way calculate the output signal for a stationary sinusoid input signal.
- Interpret, analyze and synthesize continuous time systems in the form of electrical circuits and block diagrams.
- Orally present and discuss technical solutions.

For higher grades you should be able to

- Decide which solution method is suitable for a given problem.
- Combine different concepts and methods from the course and apply them on more complex mathematical and technical problems.

Course contents

Linear differential equations, characteristic equation, generalized functions, Fourier series, Fourier transform, single and double sided Laplasce transform, system and system properties, convolution, impulse response, transfer function, frequency function, sinus in sinus out, basic state space models.

Course literature

See course homepage.

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

Passing grade in all partial examinations.

Final grade based on 80% from TEN1 and 20% from 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.