SD2130 Signal Analysis 8.0 credits

Signalanalys

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 SD2130 valid from Autumn 2007

Grading scale

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

Education cycle

Second cycle

Main field of study

Language of instruction

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

Intended learning outcomes

The aim of the first part of the course is to give the students knowledge about the theoretical foundations of signal analysis, and ability to apply this knowledge for analysis of mechanical

systems. The aim of the application part of the course is to acquire knowledge and practical ability in important methods in analysis of mechanical systems.

The student should after finishing the course be able to:

- Use a signal analyser (FFT-analyser) and be able to choose the measurement setup: frequency range, length of time record, time windows, number of averages etc.
- Perform signal analysis on measured time record in Matlab.
- Choose appropriate signal analysis methodology for a given problem. For example choosing between time or frequency domain analysis, one-channel or multi-channel analysis, different types of filtering etc.
- Interpret results from different types of signal analysis, for instance spectra, correlation functions or frequency response functions.
- Be able to extract information about the character of the studied signal such as periodicity, time delays and linearity.

Course contents

Fundamental part: Amplitude characterisation, classification of signals, Fourier analysis and Laplace transforms in signal analysis, discrete signals (sampling, averaging, DFT, FFT, windowing), spectrum analysers, correlation methods, signals and linear systems - frequency response functions, the coherence function. Z-transforms and digital filtering.

The students will get practical training in using the theoretical concepts and signal analysis methods by computer exercises.

Application part: In the laboratory exercises signal analysis methods are used in two important applications in sound and vibration analysis: sound intensity measurements and active control of sound and vibration.

Specific prerequisites

Basic courses in mathematics, mechanics and noise control.

Course literature

Compendium: H. Bodén, K. Ahlin, U Carlsson, Signals and Mechanical Systems, KTH Aeronautical and Vehicle Engineering.

Collected additional material.

Examination

- INL1 - Assignments, 1.0 credits, grading scale: P, F
- LAB1 - Laboratory Work, 3.0 credits, grading scale: P, F
- TEN1 - Examination, 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

Written tests (TEN1; 4 university credits).
Computer and laboratory exercises (LAB1; 3 university credits),
Assignments (INL1; 1 university credits).

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.