Linear Systems

Programme course

6 credits

Linjära system

TSEI50

Valid from: 2017 Spring semester

Determined by
Board of Studies for Electrical Engineering, Physics and Mathematics

Date determined
2017-01-25

Main field of study
Electrical Engineering

Course level
First cycle

Advancement level
G1X

Course offered for
- Engineering Electronics, B Sc in Engineering

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
Calculus, Linear algebra, Circuit Theory

Intended learning outcomes
The aim of the course is to give basic knowledge about methods for the analysis of linear discrete-time systems and to serve as preparation for other courses. After the course, the student is expected to be able to:

- analyze and perform computations on discrete-time systems,
- use transforms to solve problems within discrete-time systems,
- analyze and perform computations on mixed continuous-time/discrete-time systems (sampling and reconstruction),
- use computer programs to solve problems within discrete-time systems.

Course content
Signals and systems. Classification of signals. Classification of systems. System analysis. Discrete-time signals and systems. Difference equations. Convolution. Stability. Representation of linear discrete-time systems. Applications. Analysis with the z-transform. Transfer function. Poles and zeros. Stability and causality. Frequency response. Fourier transform. Sampling and reconstruction. The sampling theorem. Systems with different sampling frequencies. Fourier series. DFT. Introduction to discrete-time filters.

Teaching and working methods
The course is organised in lectures/lessons and laboratory work.

Examination

LAB1	Laboratory work	1.5 credits	U, G
TEN1	Written examination	4.5 credits	U, 3, 4, 5

Grades
Four-grade scale, LiU, U, 3, 4, 5

Other information
Supplementary courses: Automatic Control, Digital Filters.

Department
Institutionen för systemteknik

Director of Studies or equivalent
Klas Nordberg

Examiner
Håkan Johansson

Course website and other links

Education components
Preliminary scheduled hours: 64 h
Recommended self-study hours: 96 h

Course literature

Additional literature

Books

H. Johansson, *Discrete-Time Systems*

Compendia

Material handed out during the course.

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.