LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Signaler och system
Signals and Systems

BMEA05, 7,5 credits, G1 (First Cycle)

Valid for: 2023/24
Faculty: Faculty of Engineering, LTH
Decided by: PLED BME
Date of Decision: 2023-04-13

General Information

Compulsory for: BME2
Language of instruction: The course will be given in Swedish

Aim

The course provides basic knowledge in digital signal processing and is costomized for the BME students' prior knowledge and requirements. Signal processing is about representing, manipulating and transforming signals and the information contained in signals using mathematical methods. Applications are found in many different areas such as biology, medicine, sound, image and communication.

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- understand the differences between discrete time and continuous time signals and systems
- understand the relationships between time and frequency properties of discrete time systems and signals.
- understand how transforms can be used to analyze discrete signals and systems
- know basic terminology and definitions in the field

Competences and skills

For a passing grade the student must

- be able to analyze the time and frequency characteristics of signals
- be able to calculate the system's time and frequency properties
- be able to analyze how a given system affects a given signal
- be able to apply methods from the course to obtain desired information from a measured signal.

Judgement and approach
For a passing grade the student must

- be able to critically review and assess the plausibility of calculations and analysis results
- have gained insight into possibilities and limitations with the basic signal processing methods used in the course.
- have the ability to access literature in the field

Contents

The course deals with methods for analyzing discrete time signals and systems. The Fourier transform, the discrete Fourier transform (DFT) and the z-transform are introduced as tools for analysis. Discrete time systems are described in terms of differential equation, impulse response, frequency response and system function and pole-zero diagrams. The relationships between these system descriptions and how the system affects different input signals in the time and frequency domain are analyzed. Sampling and aliasing are handled. The focus is on applying the methods in practice for the analysis of biomedical signals. Matlab is used in laboratory work and projects.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)
Assessment: Written exam, laboratory work and projects.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Parts
Code: 0120. **Name:** Written Examination .
Credits: 4,5. **Grading scale:** TH. **Assessment:** Written examination
Code: 0220. **Name:** Laborations and Project.
Credits: 3. **Grading scale:** UG. **Assessment:** Preparation assignments, active participation and report.

Admission

The number of participants is limited to: No

The course overlaps following course/s: EITA50, EITF75, EITG10, BMEF25

Reading list

- John G Proakis, Dimitris K Manolakis: Digital Signal Processing. Pearson, ISBN: 9781292025735.

Contact and other information

Course coordinator: Frida Sandberg, frida.sandberg@bme.lth.se