EE-205

Circuits and systems II

Gastpar Michael

Cursus	Sem.	Type
Communication systems minor	E	Obl.
Communication systems	BA4	Obl.
Computer science	BA4	Opt.
Electrical and Electronical Engineering	BA4	Obl.
HES - EL	E	Opt.
HES -SC	E	Obl.

Language of teaching	English
Credits	4
Session	Summer
Semester	Spring
Exam	Written
Workload	120h
Weeks	14
Hours	**3 weekly**
Courses	2 weekly
Exercises	1 weekly
Number of positions	

Summary

This class teaches the theory of linear time-invariant (LTI) systems. These systems serve both as models of physical reality (such as the wireless channel) and as engineered systems (such as electrical circuits, filters and control strategies).

Content

The design of advanced systems (such as WiFi, cell phones, drones, airplanes) requires a thorough theoretical underpinning. This class teaches one of the most powerful and important pillars: The theory of linear time-invariant (LTI) systems. These systems serve both as models of physical reality (such as the wireless channel) and as engineered systems (such as filters and control strategies).
The class will cover the following topics:

1. Systems: Definitions (1 week)
2. LTI Systems (3 weeks)
3. The Frequency Response of stable LTI Systems (1 week)
4. Fourier Techniques for stable LTI Systems (3 weeks); with applications to Communication Systems and Signal Processing
5. Laplace and Z-Transform Techniques for LTI Systems (5 weeks); with applications to Control Systems

Keywords

Systems, Circuits, Signals, Frequency Response, Transfer Function, Fourier Transform, Laplace Transform, Z Transform, Stability, Causality, Sampling

Learning Prerequisites

Required courses

Analysis I, II, III. Linear algebra I.

Recommended courses

Linear algebra II

Learning Outcomes

By the end of the course, the student must be able to:

- Describe properties of LTI systems
- Solve for poles and zeros of LTI systems

- Recall properties of CT Fourier transform
- Analyze LTI systems by spectral analysis
- Operate with Fourier transform tools
- Work out / Determine impulse response of CT LTI

Teaching methods

- Classroom lectures
- Written exercises
- Graded homework problems

Expected student activities

- Read course book in english (the course is taught in english)

Assessment methods

Homeworks and written mid-term exam and final exams

Resources

Bibliography

The following is a recommended (but not required) book:
A. V. Oppenheim and A. S. Willsky, with S. Hamid Nawab, Signals and Systems. Upper Saddle River, NJ: Prentice Hall, 2nd ed., 1996.

Ressources en bibliothèque

- Signals and Systems / Oppenheim

Notes/Handbook

will be made available