EE-543

Advanced wireless receivers

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Cursus	Sem.	Type
Data and Internet of Things minor	E	Opt.
Electrical and Electronical Engineering	MA2, MA4	Opt.

Language of teaching	English
Credits	3
Session	Summer
Semester	Spring
Exam	During the semester
Workload	90h
Weeks	14
Hours	**3 weekly**
Courses	2 weekly
Exercises	1 weekly
Number of positions	

Summary

Students extend their knowledge on wireless communication systems to spread-spectrum communication and to multi-antenna systems. They also learn about the basic information theoretic concepts, about channel coding, and bit-interleaved coded modulation.

Content

Spread-Spectrum-Modulation:
Basic concept, direct sequence spread spectrum, CDMA
Channel coding:
Principles and basic idea of channel coding, block codes, convolutional codes, Viterbi decoder
Information theory:
Basic concepts, channel capacity, mutual information
Multi-antennas systems / MIMO:
Basic idea of spatial multiplexing, MIMO capacity, MIMO receivers (maximum-likelihood, linear, SIC, VBLAST)
Final PROJECT:
Implement and simulate the IS-95 cellular downlink and extend the standard to MIMO

Learning Prerequisites

Required courses

EE-442 Wirelss Receivers: algorithms and architectures (or an equivalent course on fundamentals of wirelss communications)

Learning Outcomes

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

- Implement an advanced (coded) wireles standard from a specification in MATLAB
- Realize complex receiver algorithms
- Analyze wireless system performance
- Explain performance limits of wireless systems

Teaching methods

Ex-cathedra lectures, lab exercises, and final MATLAB project

Assessment methods

Final Project

Resources

Moodle Link

- https://go.epfl.ch/EE-543