

EE-543

Advanced wireless receivers

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
Lecture	2 weekly
Exercises	1 weekly
Number of positions	

Remark

Pas donné en 2023-24

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 Wireless Receivers: algorithms and architectures (or an equivalent course on fundamentals of wireless communications)

Learning Outcomes

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

- Implement an advanced (coded) wireless 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>