

EE-442

Wireless receivers: algorithms and architectures

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Cursus	Sem.	Type
Electrical Engineering		Obl.
Electrical and Electronical Engineering	MA1, MA3	Obl.

Language of teaching	English
Credits	4
Session	Winter
Semester	Fall
Exam	During the semester
Workload	120h
Weeks	14
Hours	4 weekly
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Summary

The students will learn about the basic principles of wireless communication systems, including transmission and modulation schemes as well as the basic components and algorithms of a wireless receiver. They develop an understanding for the wireless channel and the performance and limitations.

Content**Fundamentals**

Modulation, baseband and passband signals, vector-space representation, matched filtering, maximum-likelihood estimation, performance metrics

Synchronized receiver

Carrier frequency and sampling frequency offset, time- and frequency synchronization, interpolation, equalization, diversity receiver

The wireless channel

Basic AWGN channel, signal propagation and attenuation, fading channels, multipath propagation, Doppler shift

Wideband modulation

Multicarrier communication, orthogonal frequency division multiplexing (OFDM), training based channel estimation and equalization for OFDM, synchronization, tracking, some OFDM based communication standards

Learning Prerequisites**Recommended courses**

Telecommunication systems

Learning Outcomes

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

- Construct a basic wireless transmitter
- Explain the performance limitations of a wireless system
- Derive basic optimum receiver structures
- Develop a simulation model of a wireless system
- Develop and simulate OFDM communication systems

Teaching methods

Ex cathedra with computer exercises/labs

Assessment methods

Continuous control with presentation of a final project

Supervision

Office hours	Yes
Assistants	Yes
Forum	Yes

Resources

Bibliography

Slides distributed during the lecture.

H. Meyr, M. Moeneclaey, S. A. Fechtel: Digital Communication Receivers: Synchronization, Channel Estimation, and Signal Processing, John Wiley & Sons.

D. Tse, P. Viswanath: Fundamentals of Wireless Communication, Cambridge University Press

Ressources en bibliothèque

- [Digital Communication Receivers / Meyr](#)
- [Fundamentals of Wireless Communication / Tse](#)