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.

Ressources en bibliothèque

• Fundamentals of Wireless Communication / Tse
• Digital Communication Receivers / Meyr