EPFL

EE-617   Wireless Transceivers: Radio Architectures, System and Circuit Design(2019)

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Cursus	Sem.	Type
Electrical Engineering		Obl.

Language of teaching	English
Credits	3
Session	
Exam	Oral
Workload	90h
Hours	**42**
Courses	42
Number of positions	**20**

Frequency

Every year

Remark

Every year. CANCELLED

Summary

The students will learn about modern RF transceiver architectures used in the radio section of advanced wireless transceivers. Various architectures, RF system design and circuit implementation will be discussed.

Content

Fundamentals
Introduction to wireless communications, modulation, up- and down-conversion, FDD vs TDD systems.
Receiver Architectures
Low-IF vs direct-conversion, traditional vs analog-lite architectures, cognitive radio and its limitations.
Receiver Impairments
Thermal and flicker noise, phase noise and reciprocal mixing, intermodulation, image rejection, DC-offset, in-band drooping.
Receiver RF System and Circuit Design
Introduction into receiver system budgeting, receiver implementation possibilities and their challenges.
Transmitter Architectures
Low-IF vs direct-conversion, polar vs. Cartesian transmitters.
Transmitter Impairments
Out-of-band noise, distortion and adjacent channel leakage, image rejection, DC offset, in-band drooping.
Transmitter RF System and Circuit Design
Introduction to transmitter system budgeting, transmitter implementations and their challenges.

Learning Prerequisites

Recommended courses

Wireless receivers: algorithms and architectures.

Learning Outcomes

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

- Discuss advantages and drawbacks of various transceivers architectures
- Propose an architecture for given transceivers requirements
- Elaborate a basic system budget for the proposed architecture

- Estimate receiver and transmitter impairments and include these in the system budget

Teaching methods

Ex cathedra with computer exercises/labs.

Assessment methods

Oral exam.