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.