WCE RF study option
RF Technologies from 5G to 6G
Centre for Wireless Communications CWC-RT

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Microwave/RF engineering is a distinct art combining electronics, communications and miracles of physics in the same package.

Studies are a comprehensive set of RF & electronics & communications signal processing.

RF is learned from basics to how to design complete radio transceivers from blocks to architectures.

Industry and academia are very keen on new professionals in this area.

RF is not only theory – practical aspect is strong – good balance!

Possibility for life-long learning process in industry or academia.
Wireless content in a smart phone

Cellular modem:
- LTE Cat4 (150Mbps DL & 50Mbps UL), HSPA+, EV-DO, TD-SCDMA

Application processor

RFIC: 2/3/4G TRx

RFIC: 4G CA TRx

PA modules incl. Duplex filters

3G/2G PA

PA

LB PA

PA

BT

ANT tuner

PMIC WLS

ANT tuner

PA modules incl. Duplex filters

https://www.ifixit.com/Teardown/iPhone+6+Plus+Teardown/29206
RF from theory to wireless solutions

RF system analysis

RF related algorithms

RF measurements

IC design

Complete platforms

Antennas and radio channel
Competences of a modern RF engineer

Fundamentals
- Understand various applications of radios
- Master very well basic principles of communications
- Master very well basics of electronics design
- Excel in fundamentals of RF from Smith chart and matching to noise and non-linearity
- Prototyping and measuring RF
- Computer tools for electronics design
Competences of a modern RF engineer

Advanced
- RF transceiver architectures
- RF system design and block level partitioning
- RF control algorithms
- IC design
- Communication circuits (LNA, PA, mixers, filters, amplifiers, ADCs, DAC’s, VCO’s, PLL’s, digital for RF, …)
- Antenna design
- Radio propagation
- Various implementation technologies: fundamentals and their boundaries (CMOS, BiCMOS, SiGe, HBT, GaN, SAW, BAW, PCB, …)
- Material physics in some cases when closely involved to electronics
- Digital signal processing for wireless
- Embedded programming
- …
Competences of a modern RF engineer

Capability to co-operate and learn new things
- With and from your close colleagues
- In cross-disciplinary topics
- On your own

Team work
Prerequisites for WCE-RF

Basic courses of electronics: Understanding small signal behavior of a transistor in addition to circuit theory as prerequisite for Electronics design II & III

Preferably basic course of radio technology/microwave engineering to support further studies in Radio Engineering I & II
Devices and Circuits for Comms and Sensing

- RF HW for 6G from materials to transceivers and sensing up to THz range
- Approach from systems to HW and back
- Silicon based transceiver design from blocks to systems
- Integration, scalability and performance of antenna arrays including challenge of wideband modulation
- New technologies and materials

Devices & Circuits
THz communications materials & circuits
Enabling Unlimited Connectivity

6GFLAGSHIP.COM, #6GFLAGSHIP
RF/EMC lab from 900Hz to 330GHz and a bit beyond...
New THz Measurement System

TRx 330 GHz extender

4-port PNA-X

Object to be scanned

Rx 330 GHz extender

3D positioner

Control PC

Control SW

Leaf image

Attenuation map
New THz Measurement System

TRx 330 GHz extender
4-port PNA

3D positioner

Control PC
Control SW