

Module Handbook (<https://modhb.uni-kl.de/>)

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Module EIT-FUN-412-M-7

5G Mobile Systems and Internet of Things (M, 4.0 LP)

Module Identification

Module Number	Module Name	CP (Effort)
EIT-FUN-412-M-7	5G Mobile Systems and Internet of Things	4.0 CP (120 h)

Basedata

CP, Effort	4.0 CP = 120 h
Position of the semester	1 Sem. in WiSe
Level	[7] Master (Advanced)
Language	[EN] English
Module Manager	Schotten, Hans D., Prof. Dr.-Ing. (PROF DEPT: EIT) (/staff/347/)
Lecturers	Schotten, Hans D., Prof. Dr.-Ing. (PROF DEPT: EIT) (/staff/347/)
Area of study	[EIT-FUN] Wireless Communication and Navigation
Reference course of study	[EIT-88.-SG#2021] M.Sc. Automation and Control (A&C) [2021] (/mhb/FB-EIT/cos-676/)
Lifecycle-State	[NORM] Active

Courses

Type/SWS	Course Number	Choice in Module-Part	SL	PL	CP	Sem.
2V+1U	EIT-FUN-412-K-7 (/mhb/courses/EIT-FUN-412-K-7/)	P	-	PL1	4.0	WiSe

- About [EIT-FUN-412-K-7]: Title: "5G Mobile Systems and Internet of Things"; Presence-Time: 42 h; Self-Study: 78 h

Examination achievement PL1

- Form of examination: **oral examination (30 Min.)**
- Examination Frequency: each semester

Evaluation of grades

The grade of the module examination is also the module grade.

Contents

From [EIT-FUN-412-K-7] 5G Mobile Systems and Internet of Things (/mhb/courses/EIT-FUN-412-K-7/):

1. Introduction to wireless (review): wireless transmission, coding, modulation, multiple antenna techniques, retransmission protocols, TDMA and OFDM, acquisition and tracking, link adaptation
2. Wireless Communication Systems – classification, topologies, spectrum, use cases, markets, trends
3. Mobile and cellular systems – 2G to 4G, 5G, B5G, use cases, requirements, key concepts, architecture, numerologies, spectrum, key performance indicators and their calculation
4. 4G or LTE details: key characteristics, performance
5. 5G introduction: use cases, deployment concepts, spectrum,
6. 5G Radio 1: 5G RAN and 5G NR
7. 5G Radio 2: small cell, MIMO, beam steering
8. 5G networks: CN and functionalities
9. 5G security: cellular security from 2G to 4G, new concepts in 5G
10. 5G campus networks: use cases, topologies
11. 5G and B5G: Release 18 and beyond, initial concepts for 6G
12. IoT system concepts: NBIoT, LoRAN and overview on other concepts
13. LoRAN: concepts, numerology, key properties
14. LORAN: Radio and network

Competencies / intended learning achievements

After completing this module you can...

- ... explain the specialities of industrial and general professional applications of wireless communication technology and develop such application scenarios on your own.
- ... derive a requirements analysis for given applications and the requirements for the necessary radio equipment in order to select or develop appropriate radio devices.
- ... list the capabilities of 5G/6G and LPWAN solutions, classify the supported (today and in the future) professional use cases, and develop related system integrations.

Requirements for attendance (informal)

Modules:

- [EIT-FUN-402-M-4] Wireless Communication (M, 5.0 LP) (/mhb/modules/EIT-FUN-402-M-4/)

Requirements for attendance (formal)

None

References to Module / Module Number [EIT-FUN-412-M-7]

Module-Pool	Name
[EIT-AUT-CAS-WP-MPOOL-7 (/mhb/modulepools/EIT-AUT-CAS-WP-MPOOL-7/)]	CAS Core Electives

