HAW Kiel
Hochschule für Angewandte Wissenschaften Kiel
Kiel University of Applied Sciences

MK117 - Moderne Mobilkommunikationssysteme
MK117 - Modern Mobile Communication Systems

General information	
Module Code	MK117
Unique Identifier	
Module Leader(s)	Prof. Dr. Jetzek, Ulrich (ulrich.jetzek@haw-kiel.de)
Lecturer(s)	Prof. Dr. Jetzek, Ulrich (ulrich.jetzek@haw-kiel.de) Rohrandt, Christian (christian.rohrandt@haw-kiel.de)
Offered in Semester	Wintersemester 2019/20
Module duration	1 Semester
Occurrence frequency	Regular
Module occurrence	In der Regel im Wintersemester
Language	Deutsch
Recommended for international students	Yes
Can be attended with different study programme	No

Curricular relevance (according to examination regulations)
Study Subject: M.Eng. - MET - Elektrische Technologien (PO 2017, V3) Study Specialization: Kommunikationstechnik und Embedded Systems Module type: Wahlmodul Semester: 1, 2, 3
Study Subject: M.Sc. - MIE - Information Engineering (PO 2022, V3) Study Specialization: Information Technology and Systems Module type: Wahlmodul Semester: 1, 2, 3
Study Subject: M.Sc. - MIE - Information Engineering (PO 2022, V3) Study Specialization: Intelligent Systems Module type: Wahlmodul Semester: 1, 2, 3
Study Subject: M.Sc. - MIE - Information Engineering (PO 2022, V3) Study Specialization: Business IT-Management Module type: Wahlmodul Semester: 1, 2, 3
Study Subject: M.Sc. - MIE - Information Engineering (PO 2022, V3) Study Specialization: IT Security Module type: Wahlmodul Semester: 1, 2, 3

Qualification outcome
Areas of Competence: Knowledge and Understanding; Use, application and generation of knowledge; Communication and cooperation; Scientific self-understanding / professionalism.
Students have understood the concepts and essential characteristics of 5G Technology. They are capable of characterizing the 5G System Architecture, Radio Interface, Access Procedures (Layer 2 and 3) and the Physical Layer (Layer 1).

The laboratory of this module is organized as seminar work, where small student groups of two or three students will prepare and present a specific 5G Topic to the entire class. Topics will be handed out at the beginning of the semester, such that each team has sufficient time for preparing its presentation. In Addition to the presentation each time shall prepare a handout (a few pages) for the class summarizing the most important Facts of their Topic.
The Students perform a lab project in small teams. Therefore the students know how to manage a Project, organize the Project into workpackages, define responsibilities and are capable of presenting their Project results.The students have the capability of applying their knowledge to development projects in mobile communication.

Content information

Content	Lecture will closely follow the Content of reference 1 (book of Dahlman, Parkvall, Sköld on 5G). In order to have a direct reference for the individual chapter numbers, chapter numbers given here correspond 1:1 as given in reference 1. However, chapter numbers given in brackets will not be part of the lecture. 1. What is 5G? 2. 5G Standardization 3. Spectrum for 5G (4. LTE - An Overview) 5. NR (Next Radio) Overview 6. Radio-Interface Architecture 7. Overall Transmission Structure 8. Channel Sounding 9. Transport-Channel Processing 10. Physical-Layer Control Signalling (11. Multi-Antenna Transmission) (12. Beam Management) 13. Retransmission Protocols 14. Scheduling 15. Uplink Power and Timing Control 16. Initial Access (17. LTE/NR Interworking and Coexistence) 18. RF Characteristics 19. RF Technologies at mm-Wave Frequencies 20. Beyond the first Release of 5G
Literature	1. Erik Dahlman, Stefan Parkvall, Johan Sköld: "5G NR - The Next Generation Wireless Access Technology", Academic Press, 2018, ISBN: 978-0-12-814323-0 2. 5G-Standard: https://www.3gpp.org/DynaReport/38-series.htm, 3GPP (3rd Generation Partnership Project) 3. John G. Proakis : “Digital Communications”, McGraw-Hill International Editions, 3rd edition, 1995, ISBN: 0-07-113814-5

Teaching formats of the courses

Teaching format	SWS
Labor	2
Lehrvortrag	2

Workload

Number of SWS	4 SWS
Credits	5,00 Credits
Contact hours	48 Hours
Self study	102 Hours

Module Examination	
Examination prerequisites according to exam regulations	None
MK117 - Präsentation	Method of Examination: Präsentation Duration: 15 Minutes Weighting: 15% wird angerechnet gem. § 11 Absatz 2 PVO: Yes Graded: Yes
MK117 - Bericht	Method of Examination: Bericht Weighting: 35% wird angerechnet gem. § 11 Absatz 2 PVO: Yes Graded: Yes
MK117 - Klausur	Method of Examination: Klausur Duration: 90 Minutes Weighting: 50% wird angerechnet gem. § 11 Absatz 2 PVO: Yes Graded: Yes