

Mobile Radio Networks 2: Advanced Network Concepts					AR-235	
Rota annually SoSe	Duration 1 Semester	Semester 2nd	Credits 5	Presence 35 h	Self-Study Load 115 h	
1	<b>Module Structure</b>					
	<b>No.</b>	<b>Element / Course</b>	<b>LSF-No.</b>	<b>Type</b>	<b>SWS</b>	
	1	Mobile Radio Networks 2: Advanced Network Concepts: Lecture	XXX	V	2	
2	Mobile Radio Networks 2: Advanced Network Concepts: Lab Course	XXX	P	1		
2	<b>Language</b> English					
3	<b>Content</b> <ol style="list-style-type: none"> <li>Local radio networks (WLAN/Wi-Fi, WPAN, Mesh, DECT)</li> <li>Wireless Internet of Things networks (Low Power Wide Area Networks, Cellular-IoT)</li> <li>Advanced features of 4G and 5G networks (Carrier Aggregation, Device-to-Device, Network Slicing, Beamforming, Ultra Reliable and Low Latency Communications)</li> <li>Satellite networks, Aerial Wireless Networks</li> <li>Future mobile network concepts for 5G-Advanced and 6G (e.g. mmWave/THz spectrum, Reflective Intelligent Surfaces, Integration of Artificial Intelligence)</li> </ol> <p>The discussion of theoretical content is complemented by practical demonstrations and by case studies on ongoing research and business aspects of mobile radio networks.</p> <p><b>Literature</b> (respective latest version)  Liberg, Olof, et al. Cellular Internet of Things: From Massive Deployments to Critical 5G Applications. Academic Press, 2019.  Dahlmann, E.; Parkvall, S.; Sköld, J.: 4G: LTE/LTE-Advanced for Mobile Broadband, Academic Press  P. Marsch, A. Osseiran, J.F. Monserrat, 5G Mobile and Wireless Communications Technology, Cambridge University Press</p>					
4	<b>Competencies</b> Upon successful completion of the module, students understand advanced and upcoming mobile radio network concepts and terminology which enables them to characterize research-related challenges of integrating the considered features, assess the feasibility, and to develop design solutions according to design goals. Students further deepen their knowledge base on specific network designs for particular fields of application, and to make a technically sound selection.					
5	<b>Examination</b> <i>Module exam: oral exam (max. 40 minutes) or written exam (max. 180 minutes)*</i> <i>Course work: successful completion of lab tasks</i> *The exact examination modalities will be announced by the 2nd event at the latest.					
6	<b>Forms of examination and performance</b> <input checked="" type="checkbox"/> <i>Module exam</i> <span style="margin-left: 200px;"><input type="checkbox"/> Part of modular exam</span>					
7	<b>Participation requirements</b> None. Basic knowledge of mobile radio networks is recommended.					
8	Module type and usability of the module Mandatory Elective Course in Master Degree Program „Electrical Engineering and Information Technology“, Major „Information and Communications Engineering“. Elective Class in Master Degree Program „Industrial Engineering“, recommended in major „Information Technology“, module reference number: MB- Elective Class in Master Degree Program „Automation & Robotics“, recommended in major „Cognitive Systems“, module reference number: AR-235 . Elective Class in Master Degree Programs „Applied Computer Science“ and „Computer Science“, both with application subject „Electrical Engineering“, module reference number: INF-MSc-AF-ET-263.					
9	<b>Module Supervisor</b> Prof. Dr.-Ing. Christian Wietfeld		<b>Faculty in Charge</b> Faculty of Electrical Engineering and Information Technology			