

Module: Wireless Networks for Cyber Physical Systems

Level	Master	Short Name	WiNet
Responsible Lecturers	Hellbrück, Horst, Prof. Dr.		
Department, Facility	Electrical Engineering and Computer Science		
Course of Studies	Applied Information Technology, Master		
Compulsory/elective	Compulsory elective	ECTS Credit Points	5
Semester of Studies	2	Semester Hours per Week	4
Length (semesters)	1	Workload (hours)	150
Frequency	WiSe	Presence Hours	60
Teaching Language	English	Self-Study Hours	90

The following section is filled only if there is **exactly one** module-concluding exam.

Exam Type	Portfolio Exam	Exam Language	German/English
Exam Length (minutes)		Exam Grading System	One-third Grades
Learning Outcomes	After successfully completing the course, students will be able to: <ul style="list-style-type: none"> • present the specialties of wireless sensor systems and the challenges and concepts of these systems. • interpret and follow actual research activities and technology trends. • design and analyze systematically protocols for sensor systems. • design, implement deploy and operate real-time applications based on wireless networks. • choose components for automation systems based on technical requirements and economic reasons. • perform diagnose, tests and optimizations of wireless networked systems. 		
Participation Prerequisites	Knowledge of modules: Principles of Electrical Engineering, Digital Technology, Communication Technologies, Digital Transmission Systems, Communication Networks		

The previous section is filled only if there is **exactly one** module-concluding exam.

Consideration of Gender and Diversity Issues	<ul style="list-style-type: none"> ✓ Use of gender-neutral language (THL standard) ✓ Target group specific adjustment of didactic methods ✓ Making subject diversity visible (female researchers, cultures etc.)
Applicability	
Remarks	

Module Course: Wireless Networks for Cyber Physical Systems (Lecture)

(of Module: Wireless Networks for Cyber Physical Systems)

Course Type	Lecture	Form of Learning	Presence
Mandatory Attendance	no	ECTS Credit Points	3
Participation Limit		Semester Hours per Week	3
Group Size		Workload (hours)	90
Teaching Language	English	Presence Hours	45
Study Achievements ("Studienleistung", SL)		Self-Study Hours	45
SL Length (minutes)		SL Grading System	

The following section is filled only if there is a course-specific exam.

Exam Type		Exam Language	
Exam Length (minutes)		Exam Grading System	
Learning Outcomes			
Participation Prerequisites			

The previous section is filled only if there is a course-specific exam.

Contents	<p>Introduction to Communication Systems (Workload 10h)</p> <ul style="list-style-type: none"> Principles of networks (ISO-OSI-Schichtenmodell) Overview of state-of-the-art technologies incl. field buses and their classification Quality of service requirements for networks (real-time) <p>Wireless Data Transmission (Workload 10h)</p> <p>Wireless Data Link Layer (Workload 10h)</p> <ul style="list-style-type: none"> Medium access control Error control Real-time aspects <p>Wireless Network Layer (Workload 15h)</p> <ul style="list-style-type: none"> Addressing Routing Path finding Real-time Aspects <p>Wireless Technologies (Workload 30h)</p> <ul style="list-style-type: none"> 802.15.4 WLAN GSM, 4G, 5G Bluetooth RFID LowPowerWANs
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	<ul style="list-style-type: none"> • (Broadcast, Satellite Systems) <p>Security in wireless Networks (Workload 10h)</p> <p>Applications (Workload 15h)</p>
Literature	<ul style="list-style-type: none"> • Jochen Schiller: Mobile Communications, Addison-Wesley • Andrew S. Tanenbaum: Computer Networks, Prentice-Hall • Holger Karl, Andreas Willig: Protocols and Architectures of Wireless Sensor Networks, Wiley • Feng Zhao, Leonidas Guibas: Wireless Sensor Networks, Morgan Kaufmann • Andreas F. Molisch: „Wireless Communications“, John Wiley & Sons • Kurose, Ross: „Computer Networks“, Pearson
Remarks	

Module Course: Wireless Network for Cyber Physical Systems (Practical Training)

(of Module: Wireless Networks for Cyber Physical Systems)

Course Type	Practical Training	Form of Learning	Presence
Mandatory Attendance	yes	ECTS Credit Points	2
Participation Limit		Semester Hours per Week	1
Group Size	12	Workload (hours)	60
Teaching Language	English	Presence Hours	15
Study Achievements ("Studienleistung", SL)	Practical Training	Self-Study Hours	45
SL Length (minutes)		SL Grading System	Pass

The following section is filled only if there is a course-specific exam.

Exam Type		Exam Language	
Exam Length (minutes)		Exam Grading System	
Learning Outcomes			
Participation Prerequisites			

The previous section is filled only if there is a course-specific exam.

Contents	<ul style="list-style-type: none"> • Concept, implementation of real-time networking with wireless components • Data acquisition, processing and transfer from the field to management systems
Literature	See lecture
Remarks	