

<b>Modul – No.</b>	<b>780</b>	<b>Mandatory</b>	
<b>Module name</b>	<b>Wireless Sensor Networks</b>		
Module coordinator	Prof. Dr. Schölzel / Prof. Dr. Hühn		
Title	Wireless Sensor Networks		
Title of examination	Wireless Sensor Networks		
Semester	1		
Course Type	Language	Lecture including exercises	English
SWS/ ECTS/ Workload	2/1/1	5	150
Requirements for attendance	None		

## 1. Content and objectives

### Content:

WSNs and their applications and limitations

Hardware and Operating System part:

- Basics of transmission technology and ISM regulations
- Hardware architectures for WSN motes
- Low power techniques in motes
- Operating systems for WSNs

Simulation of WSNs

Protocols for WSNs

- PHY-Layer
- MAC- and WSN MAC state monitoring at the PHY-layer
- routing protocols for WSNs: bable, olsr v1/v2 & batman

Addressing in WSNs

- publish/subscribe

Network topologies and network stacks

- ZigBee
- Linux network stack implementation
- monitore/collect/merge measurement races with open source tools

### Objectives:

After successfully passing the lecture, the students

- know typical applications of wireless sensor networks
- know and can assess the properties of various WSN protocols
- can choose and compile an appropriate hardware base for setting up a wireless sensor network
- can develop low-power applications for wireless sensor networks
- can implement WSN applications for collecting data and transmitting data to a data sink

### Recommended Literature:

Protocols and Architectures for Wireless Sensor Networks Holger Karl; Andreas Willig, Wiley, ISBN 0-470-09510-5

Distributed Sensor Networks S. Sitharama Iyengar and Richard. R. Brooks, Chapman & Hall/CRC, ISBN 1-58488-383-9

Wireless Sensor Networks, Architectures and Protocols Edgar H. Callaway, Jr, Auerbach Publications ISBN 0-8493-1823-8

Sensor Technology Handbook John S. Wilson, Newnes ISBN 0-7506-7729-5

Ad Hoc Wireless Networks Mohamed Ilyas, CRC Press, ISBN 0-8493-1332-5

Markus Krauß, Rainer Konrad: Drahtlose ZigBee-Netzwerke – ein Kompendium, Springer Vieweg, 2014.

Fred Eady: Hands-On ZigBee – 1st edition, Elsevier, 2007.

## **2. Methods of instructions**

Lecture with integrated exercises and labs on selected topics

## **3. Requirements for attendance**

No course specific requirements.

## **4. Usability of this module**

The module is offered as mandatory course in the master study course „Computer Engineering for IoT Systems“ as well as elective course in other master courses of the Engineering Department.

## **5. Requirements for assessment**

Assessment is performed either as written examination (90 minutes) or oral examination. Students need to pass the module examination, which encompasses all contents of the lecture.

## **6. ECTS credits**

5 ECTS credits

## **7. Frequency of offer**

Every summer term

## **8. Work load**

150 h of total work load, from:

- 45 h of presence at lectures/exercises
- 55 h of self-study
- 50 h of preparation for examination

## **9. Duration of module**

1 semester