Submodule	**TM abbreviation**
Advanced communication systems	**TCS**

Responsible person	Faculty
Prof. Dr Thomas Waas	Computer Science and Mathematics
Teacher / Lecturer	Frequency of supply
Tobias Jennewein (LB) Andreas Rath (LB)	
Teaching form	
Seminars with exercises (4 SWS)	

Semester of study according to curriculum	Teaching scope [SWS or UE]	Teaching language	Work effort [ECTS credits]
1.2.	4 SWS	English	5

Time commitment:

Classroom study	Self-study
60h	90h

Study and examination performance
90 minutes written exam

Contents
• The physical layer (properties and limits) • Communication in the vehicle (CAN, LIN, FlexRay) • Automotive Ethernet (AVB, TSN) • Charging communication (PLC, WiFi) • Basics of vehicle communication • Communication in AUTOSAR control units • Safety in vehicle communication • Security in vehicle communication • Gateways in vehicle communication
Learning objectives: Professional competence

After successful completion of the submodule, students are able to,

- Understand communication systems in the vehicle (3)
- Understand the peculiarities of the different communication channels and their influence on the higher communication layers (3)
- Select basic concepts of vehicle communication (2)
- Differentiate between safety and security issues (2)
- Selecting Safety and Security Concepts in Vehicle Immune Communication (2)
- Apply methods for the analysis and evaluation of communication systems (3)
- Select Automotive Gateway Concepts (2)

Learning objectives: Personal competence

After successful completion of the submodule, students are able to

- present in-depth subject content to an audience (2),
- ask professional questions (3) and
- reproduce advanced network technical contexts in correct technical language (3)

Teaching media

Blackboard, overhead projector, notebook, beamer, exercise equipment

Literature

- Working documents, own slides as PDF
- Graegert, Steve: "The Etherbook. A Comprehensive Introduction to Networking."
- Werner, Martin: "Networks, Protocols, Interfaces and Message Traffic: Fundamentals and Applications".
- Charles M. Kozierok, Robert B. Boatright, Jeffrey Quesnelle: "Automotive Ethernet - The Definitive Guide".
- Matheus, Kirsten and Königseder, Thomas: "Automotive Ethernet".

The numbers in brackets indicate the levels to be reached: 1 - know, - 2can, - 3understand and apply