

Name of module:	System Design
Keywords:	System Development Automotive Systems Architecture Software Architecture Communication Protocols Standards Multiplexing Networking AUTOSAR ASAM HIS OSEK ISO SAE CAN FlexRay MOST LIN ODX FIBEX CCP XCP Development Process Quality Assurance Functional Safety
Modulnumber:	ASM 102
Target group(s):	1. Semester ASM
ECTS-Credits:	8
Language of instruction:	english
Module owner:	Prof. Dr.-Ing. Werner Zimmermann

Extent of work (hours)

Workload	Contact hours	Self study	Exam preparation
240	120	90	30

Prerequisites:	<ul style="list-style-type: none"> • Basic knowledge in electronics and computer science. • Familiarity with one of the major programming languages, C/C++ preferred. • Own experience in self-management of a project, i.e. Bachelor thesis
Total target:	<ul style="list-style-type: none"> • Ability to understand the architecture of automotive electric and electronic systems and their development process • Be prepared to work in an interdisciplinary system development team
Module content:	<ul style="list-style-type: none"> • System Development <ul style="list-style-type: none"> - Typical components and functions of automotive systems. E - Typical engine management system and its development process. - Software life cycle. - Requirements engineering and Requirements management. - SW-documentation and data specification, coding guidelines. - Software and system test. - Application example for a simple function • System and Software Architecture <ul style="list-style-type: none"> - Application domains powertrain, chassis, body, driver assistance, infotainment - Basics of distributed systems. ECU hardware requirements and structure, communication relations and communication problems under real-time constraints - Automotive bus systems and communication protocols - Diagnosis and diagnostic communication. Functional safety. - Qualitative and quantitative assessment of system safety and reliability - ECU software architecture and software standards (OSEK, HIS, AUTOSAR)

Reference material:	<ul style="list-style-type: none"> • J. Schäuffele, T. Zurawka: Automotive Software Engineering. Vieweg. • H. Wallentowitz, K. Reif: Handbuch Kraftfahrzeugelektronik. • R.K. Jurgen. Automotive Electronics Handbook. McGraw-Hill. • W. Zimmermann, R. Schmidgall: Bussysteme in der Fahrzeugtechnik, Springer-Vieweg. • Robert Bosch GmbH (Publisher): Automotive Handbook Series. Springer-Vieweg
Offered:	Winter term only

Submodules and assessment

Title of submodule	Automotive Systems Development Process and System Test
Type of instruction / form of learning:	Lecture
ECTS-Credits:	4
Hours per week:	4
Aims, learning outcomes:	<ul style="list-style-type: none"> • To understand the complete automotive system development process including system test and application. • To know the difference between systems, functions and components and their respective development processes.
Type of assessment:	final written examination part I: 60 min

Title of submodule	Automotive System and Software Architectures
Type of instruction / form of learning:	Lecture
ECTS-Credits:	4
Hours per week:	4
Aims, learning outcomes:	<ul style="list-style-type: none"> • To know the structure of distributed automotive electronic systems, their software architectures and the communication principles and channels. • Be able to analyze communication protocols, especially bandwidth and latency. • Be able to assess the safety and reliability of systems.
Type of assessment:	final written examination part II: 60 min