Name of module:	**Packaging and Integration**
Keywords:	EMC, wiring harness, CMF, OSEK, AutoSar
Modulenumber:	**ASM 234**
Target group(s):	2nd semester ASM
ECTS-Credits:	7
Language of instruction:	english
Module owner:	Prof. Jürgen Minuth

Extent of work (hours)

Workload	Contact hours	Self study	Exam preparation
210	105	50	55

Prerequisites: advanced theoretical and practical knowledge in electronics (analogue and digital) and software technologies (language C) as well as serial communication

Total target: The job description of an automotive electrical engineer is based on the understanding how to deal with networked electronic control units often.

Module content:
protocol circuits and transceiver (e.g. CAN, LIN, FlexRay, MOST)
standardizations (e.g. OSEK, Autosar)
standardized SW-modules (e.g. network management, communication and operating system)
aspects of EMC when using e.g. switched inductive loads, valves, stepper motors, busses
aspects of EMC sceneries e.g. ground bounce (statically and dynamically), common mode and differential mode, X-talk, radiation and irradiation, Farady cage approaches to handle EMC e.g. common mode coils, ferrites, capacitors, layout, ground connections, arrangement of the wiring, shielding,
specifications and interfaces, cables and wiring harness, cable channel, splices, available, lead through, cut point (connectors)
technologies of ECUs e.g. standard design with printed circuit boards and surface mounted devices up to thick film integration modules with bond-out chips gateways
levels of abstraction e.g. applications, functions, tasks, signals, ECUs, messages simulations e.g. rest-bus, transmissions lines, electromagnetic fields

Reference material:
- handouts

Offered: Summer term only

Submodules and assessment

Title of submodule **Packaging and Wiring Harness**

Type of instruction / form of learning: Lecture
ECTS-Credits: 2
Hours per week: 2
Aims, learning outcomes: technologies of ECUs
packaging and wiring harness components
Type of assessment: Final written examination part I: 60 min (together with automotive EMC)

Title of submodule **Automotive EMC**

Type of instruction / form of learning: Lecture
ECTS-Credits: 1
Hours per week: 1
Aims, learning outcomes: sources of interferences, measurement procedures, design-rules
Type of assessment: Final written examination part II: 30 min (together with packaging and wiring harness)

Title of submodule	**Electronics and Communication 2**
Type of instruction / form of learning:	lecture
ECTS-Credits:	2
Hours per week:	2
Aims, learning outcomes:	protocol circuits, physical layer components, standardized software modules, software architecture
Type of assessment:	Final written examination 60 min

Title of submodule	**Lab Car Electronics**
Type of instruction / form of learning:	Lab
ECTS-Credits:	2
Hours per week:	2
Aims, learning outcomes:	design, test and start-up of electronic systems representing examples of automotive applications
Type of assessment:	Lab report, presentations, project work documentation