UNIVERSITY OF PANNONIA

COURSE DATASHEET

Semester:	2015/16/2
Course:	Embedded System in automotive systems
Code:	VEMKGEM444B
Responsible department:	Institute of Mechanical Engineering
Department code:	MKGEI
Responsible instructor:	Dr. Dénes Fodor

Course objectives:

Gives comprehensive theoretical and practical knowledge from the so called …embedded systems". The embedded systems are electronic/informatic based, highly integrated applications, which can be described with high-grade autonomy, and intensive contact with the environment. Real time systems, newest ways of real time information processing, system technology theorems, and programming technology theorems will be presentated.

Course content:

Definitions of the embedded system, requirements, typical usages.
Real time applications, time-handling in real time systems.
Event triggered and time triggered real time systems
Communication protocols (CAN, FlexRay, MOST)
Attributes of real time operating system.
Resource allocation, communication, synchronize.
Asynchronous and synchronous languages.
Examples for real time operating systems.
Real time systems' requirement analysis, modeling, and modeling tools.
The continuous, discrete, hybrid, heterogen models, and modeling tools of the receiver environment. Transient effects.
Observing time changed requirements, adaptivity.
Examples for real-time information processing.
Designing embedded systems: hardware-software common design, generating application, optimizing.
Ambiguous handling of the information, safety critical systems.
Monitoring, diagnostic.
Verification, validation, measurement.
AUTOSAR , Operating Systems, OSEK - Offene Systeme und deren Schnittstellen für die Elektronik im Kraftfahrzeug (Open Systems and their corresponding interfaces for automotive electronics). Task handling, activation and termination of tasks, management of task states, task switching, multitasking. Interrupt handling, services for interrupt processing.
Layers, interfaces. Low Level Drivers, connection between different types of MCUs and higher layers.
Developing software without going into details of the current MCU's electrical architecture, without having to know all the details about addresses and bit positions of information in registers.
Advanced Programming assembler and C (programing examples)
Precondition: nothing

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Requirements, evaluation and grading:

Condition of entering the exam: achieve minimum 30% score on the in-term test, attendance minimum 50% of the lectures. The mark will be assigned on a compulsory written exam based on the result. After the compulsory written test there is a possibility of an oral test.
Score (Mark)
90- 100 (5)
76-89 (4)
61-75 (3)
51-60 (2)
0-50 (1)

Required and recommended readings:

H. Kopetz: Real-Time Systems, Design Principles for Embedded Applications, Kluwer-Academic Publishers, 1997.
Jane W.S., Real-Time Systems, Prentice-Hall 2000.
Foster C. Real-Time Programming, Addison-Wesley 1983.
Dimitros Hristu-varsakelis, William S. Levine, " Handbook of Networked and Embedded Control Systems" Birkhauser, 2005