Óbudai Egyetem Kandó Kálmán Villamosmérnöki Kar	Műszertechnikai és Automatizálási Intézet		
Tantárgy neve és kódja: Embedded systems		**KMABR12AND**	**Kreditérték: 8**
nappali tagozat *tavaszi félév*			
Szakok melyeken a tárgyat oktatják: Villamosmérnöki szak			
Tantárgyfelelős oktató:	Sándor Tamás adjunktus	Oktatók:	Molnár Ferenc
Előtanulmányi feltételek: (kóddal)	**KMEDT21ANC**		
Heti óraszámok:	Előadás: **4**	Tantermi gyak.: **0**	Laborgyakorlat: **2**	Konzultáció:
Számonkérés módja (s,v,f):	**v**		
Ismeretanyag leírása:			

Class schedule of lectures

1. Microcontrollers in embedded systems. PIC microcontrollers.
   Computer networks and topology.   4 hrs
2. PIC peripheral devices.
   OSI layers, physical layer.
3. Preparation for laboratory practice.   4 hrs
   TCP/IP protocols.
4. Preparation for laboratory practice.   4 hrs
   TCP/IP protocols.
5. Preparation for laboratory practice.   4 hrs
   TCP/IP protocols.
6. ATMEGA 8 microcontroller family.   4 hrs
   General information processing system.
7. ATMEGA 8 microcontroller family.   4 hrs
   Types of firewalls.
8. ATMEGA 8 microcontroller family.   4 hrs
   Packet filtering.
9. FPGA CPAD.   4 hrs
   Server concepts.
10. FPGA CPAD.   4 hrs
    Traffic routing networks.
11. ARM 7.   4 hrs
    On-chip bus.
12. ARM 7.   4 hrs
    CAN bus.
13. Software systems.   4 hrs
    Integrated process control systems.
14. Multiprocessor systems.   4 hrs
    Examples.

Schedule of laboratory practice

Activities during laboratory practice based on Electronics I-II., Digital technics I-II. subjects. Compulsory contact lessons: 10 x 3 hours.

Measurements, topics:

Weeks	Topics
1.	Examination of amplifiers stability, measurements of dynamic specifications
2.	Active RC filters
3.-6.	Analog switches (electronic, elektromechanic). Digital oscilloscope.
3.-6.	Measurements of digital-analog converters
3.-6.	Simulation of analog and digitalis circuits
3.-6.	RPM regulation in engines
7-13.	Measurements of analog- digital converters
7-13.	PIC microcontroller applications I.
7-13.	PIC microcontroller applications II.
7-13.	Measurements of circuits of switching power supply

- Week 12 is official university break.

Evaluation processes

During the semester students must pass one written test for evaluating their mid-term knowledge (passing threshold: 40%) and perform all laboratory practices in a sufficient level (mark: 2). Both are pre-conditions for executing the final exam in the examination period.

In case of failure, mid-term test and laboratory practices they can be retried once during the study period.

Final exam is verbal and consists of two parts. Students shall answer two separate questions and prove sufficient knowledge in both independently to pass the exam.

Final evaluation (final mark) affected not only the result of the final exam, but also the calculated average of marks received in laboratory practices (weight: 0.5).

Evaluation processes during laboratory practice

Each laboratory practice must be performed in a sufficient level.

In most laboratory practices (minimum 5, maximum 7 times) two marks are given to a student
- o one for evaluating his or her preparation for the practice as a written test (admission test),
- o one for evaluating the actual measurement or simulation he or she performs during the laboratory practice.

The calculated average of all marks given in laboratory practices will impact the final evaluation of the semester (see above).

All failed admission test must be retried and passed before examination period.
All measurement must be performed in a satisfactory level before examination period.

Compulsory materials for preparation can be found in Neptun, connected to the actual laboratory practices.

Compulsory readings

Lectures:
Readings and support materials provided during the lectures.

Laboratory practice:
1. Elektronikus laboratórium mérési útmutató II. (1183/II.)

2. Elektronikus áramkörök II. (1044/I., II.)
3. Digitális technika II. (49273/II.)

Support materials in Neptun and Internet.