Course name : **Embedded systems**		
Field of study: **Computer science**	Type of study: **Full-time**	Course code:
Course characteristics: **Mandatory within the additional content**	Level: **First**	Year: **II** Semester: **IV**
Type of classes: **lectures, laboratories**	Hours per week: **2 lect, 2 lab**	ECTS points: **5 ECTS**

COURSE GUIDE

AIMS

A1. To introduce students into embedded systems by a review of selected micro controllers families, analysis of architecture examples, look through hardware and software options as well as examples of typical applications implemented in different software environments

A2. To acquire the practical skills in using software environments for designing, programming, running, testing and debugging application examples for embedded systems

PREREQUISITES

1. Knowledge of mathematics, digital techniques and basic programming.
2. Being acquired with electrostatic safety conditions.
3. Ability to perform mathematical operations for micro controller peripheral selection.
4. Ability to use different sources of information and technical documentation.
5. Ability to work independently and in a group.
6. Ability to correctly interpret and present their own activities.

LEARNING OUTCOMES

EE 1 – has basic knowledge how to programme micro controllers using assembler and C language,

EE 2 – knows tendencies development directions of embedded system designing and programming,

EE 3 – is able to use right micro controller peripheries to implement selected application,

EE 4 – is able to design a logical structure of the programme to implement tasks in selected application,

EE 5 – is able to use a software environment to write, compile, run, test and debug a programme

EE 6 – is able to select an appropriate embedded system for an application,

EE 7 – is able to prepare a report about implemented tasks.

CONTENT

Lectures	**Hours**

Lect. 1 - Introduction to the embedded systems	**2**
Lect. 2 - Programme architecture of selected system. Parallel ports.	**2**
Lect. 3 - Memory map, registers, stack organisation. ADC converter.	**2**
Lect. 4 - Interrupts	**2**
Lect. 5 - Timers, counters	**2**
Lect. 6 - Serial ports	**2**
Lect. 7 -Serial ports cont.	**2**
Lect. 8 - USB port	**2**
Lect. 9 - Other peripherals	**2**
Lect. 10 - PWM generation	**2**
Lect. 11 - LCD display control	**2**
Lect. 12 - Operating systems	**2**
Lect. 13 - Networking	**2**
Lect. 14 - Reliability in embedded systems	**2**
Lect. 15 - FPGAs in embedded systems	**2**
LABORATORIES	Hours
Lab. 1 - Introduction to the µVision environment	**2**
Lab. 2 - Parallel ports	**2**
Lab. 3 - ADC converter	**2**
Lab. 4 - Timer-counter.	**2**
Lab. 5 - PWM generation	**2**
Lab. 6 - LCD display control	**2**
Lab. 7 - Serial ports	**2**
Lab. 8 - DBGU communication	**2**
Lab. 9 - Using USART	**2**
Lab. 10 - USB communication	**2**
Lab. 11 - USB communication cont.	**2**
Lab. 12 - Temperature measurement with one wire interface	**2**
Lab. 13 - SD memory communication via SPI interface	**2**
Lab. 14 - SD memory communication via SPI interface cont.	**2**

Lab. 15 - Sound sampling and generation	**2**

TEACHING TOOLS

1. – lectures using multimedia presentations
2. – blackboard and chalk or whiteboards and pens
3. – laboratory guides
4. – reports from laboratory activities
5. – computers with software

LITERATURE

Colin Walls: „Embedded Software: The Works", Elsevier, Boston, 2006,
Zurawski R.:"Embedded Systems" CRC Press 2006,
Wayne Wolf: "Computers as Components: Principles of Embedded Computing System Design" Morgan & Kaufman 2000,
Stephen A. Edwards: "Languages for Digital Embedded Systems" Kluver, 2000,
Marwedel P.: "Embedded System Design" Kluwer Academic Publishers, Boston 2003.

TEACHERS

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