Course name : **Embedded systems programming**		
Field of study: **Computer science**	Type of study: **Full-time**	Course code:
Course characteristics: **Mandatory on specialisation: programming engineering**	Level: **First**	Year: **IV** Semester: **VII**
Type of classes: **lectures, laboratories**	Hours per week: **2 lect, 2 lab**	ECTS points: 6 **ECTS**

COURSE GUIDE

AIMS

A1. To introduce students into advanced embedded systems programming by a complex applications implementation

A2. To acquire the practical skills in using software environments for designing, programming, running, testing and debugging complex application 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 knowledge how to implement complex applications in embedded systems,

EE 2 – knows programming environments to be used in complex applications for embedded system designing and programming,

EE 3 – knows selected micro controllers in terms of their hardware and programming possibilities,

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 complex programme

EE 6 – is able to prepare a report about implemented tasks.

CONTENT

Lectures	**Hours**
Lect. 1 - Introduction to the advanced embedded systems	**2**
Lect. 2 - Memory in embedded systems. Memory architecture.	**2**

Lect. 3 - Influence of software on hardware design. Migration of software to a new processor architecture.	**2**
Lect. 4 - CPU selection for an application requirements.	**2**
Lect. 5 - New technologies for embedded systems development.	**2**
Lect. 6 - Programming environment selection. Eclipse as a practical option of open programming environment.	**2**
Lect. 7 -C and C++ programming aspects.	**2**
Lect. 8 - Real time systems.	**2**
Lect. 9 - Real time operating systems.	**2**
Lect. 10 - Embedded systems networking.	**2**
Lect. 11 - Programable logic in embedded systems.	**2**
Lect. 12 - Programming for exotic memories.	**2**
Lect. 13 - Auto testing in embedded systems.	**2**
Lect. 14 - User interface components in embedded systems.	**2**
Lect. 15 - Application examples.	**2**
LABORATORIES	Hours
Lab. 1 - Advanced functions in the µVision environment.	**2**
Lab. 2 - Advanced procedures examples.	**2**
Lab. 3 - Advanced measurement function with use of timers.	**2**
Lab. 4 - EA and CA PWM generation.	**2**
Lab. 5 - 32-bit application project. Application selection, project requirements.	**2**
Lab. 6 - Project implementation	**2**
Lab. 7 - Project implementation cont.	**2**
Lab. 8 - Project implementation cont.	**2**
Lab. 9 - Project implementation cont.	**2**
Lab. 10 - Project implementation cont.	**2**
Lab. 11 - Project implementation cont.	**2**
Lab. 12 - Project implementation cont.	**2**
Lab. 13 - Project presentation. Discussion of implementation options.	**2**
Lab. 14 - Project presentation. Discussion of implementation options. cont.	**2**
Lab. 15 - Project presentation. Discussion of implementation options. cont.	**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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