RTU Course "Embedded systems"

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General data

Code	DST701
Course title	Embedded systems
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Valerijs Zagurskis
Volume of the course: parts and credits points	1 part, 4.5 credits
Language of instruction	LV, EN
Annotation	The aims of studio subject are to give understanding about embedded systems at sensor network for different industry and business implementations. Special attention was attracted for advanced innovative technologies and implementations of microcontroller platforms, such as operational real time system (RTOS). Three categories of microcontrollers are considered, which illustrated with some examples by signal processing and converting processors (DSP). In subject content are included embedded system design methods and service oriented architecture realization base topics by using (RTOS). There are possibilities for student experimental and technological practice works.. The students are introduced with embedded system realizations (wireless sensor network) at laboratory tasks.
Goals and objectives of the course in terms of competences and skills	To train specialists, which can implement, develope, analyze embedded system technologies for real control and management processes of the base indusry, business and society progress directions
Structure and tasks of independent studies	Student requirements for preparing seminar and course work: Seminars for all lecture chapters. Course work consisted with innovative embedded system technology perception with personal proposed materials and themes. Student requirements for preparing laboratory works: Before laboratory work students must be prepared for writing results as for theoretical as practical works. Evaluation separation:exam and seminars- 50%, laboratory works-25%, course work-20%, presence at lectures- 5%
Recommended literature	1. Morgan Kaufmann. Computer Architecture. 3rd edition, 2002. – 1141 pp. 2. Willam Stallings. Computer organization & Architecture. Sixth edition, Prentice-Hall, Inc., 2003. – 826 pp. 3. V.Zagurskis, R. Kuzmenkovs, Harvardas arhitektūras RISC-procesoru ar sadalītu datu un programmas atmiņas piekļuvi, (Laboratorijas darbi, mācību līdzekli), 2008.g., 29. lpp., RTU, DITF, DADI, DTSTK, (elektr. vers.)
Course prerequisites	Necessary bachelor academic (professional) degree engineer or native or social sciences directions and also equate education directions.

Course contents

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
Electronic signals and forms.	2	0	0	0
Microprocessors and microcontrollers architecture.	4	0	0	0
Microelectronics elements.	2	0	0	0
Memory organisation architecture.	2	0	0	0
Memory types for microcontrollers	4	0	0	0
Digital I/O lines in microcontrollers	4	0	0	0
Analog I/O lines and ADC in microcontrollers.	2	0	0	0
Interrupts and ISR (interrupt service routine).	4	0	0	0
Timers and PWM (pulse-wide modulation).	2	0	0	0
Watchdog timer and energy saving in microcontrollers.	2	0	0	0
Communication interfaces.	6	0	0	0
Microcontroller programming issues.	4	0	0	0
OS (operation systems) for embedded systems..	4	0	0	0
ARM and PowerPC architectures.	4	0	0	0
FPGA(full programming gate array) in embedded systems.	2	0	0	0
Total:	48	0	0	0

Learning outcomes and assessment

Learning outcomes	Assessment methods

Possibility to take in the base principles of the embedded systems , main advantage and limitations, the knowledge of infrastructure elements and technology life cycles.	Successfully pass exam, which contents as theoretical as situation analyze with tasks to improve controlled processes by means of embedded system technology implementation
Possibility argue embedded system utilization (non utilization) necessity consisted with industry (business) process kind.	During situation analyze developed decision for process improving, by means of embedded system technology components.
Possibility to choose between appropriated methods and techniques take in account the main aims.	By yourself perform laboratory works.

Study subject structure

Part	CP	Hours			Tests		
		Lectures	Practical	Lab.	Test	Exam	Work
1.	4.5	2.0	0.0	1.0		*	