

<b>Study program: Modern computer technologies</b>			
<b>Course title:</b> Microcontrollers and Interfaces			
<b>Professor/assistant:</b> Zoran Veličković / Milan Savić			
<b>Type of course:</b> elective			
<b>ECTS credits:</b> 6			
<b>Pre-requisites:</b> none			
<b>Aims of the course:</b> Preparing students to: - adopt basic concepts of microcontrollers and interfaces; - learn about architecture, specificity of integrated peripherals and basic interfaces of microcontrollers for interaction with the environment; learn how to solve practical problems related to the interaction of microcontroller systems with sensors and actuators.			
<b>Learning outcomes:</b> It is expected that after passing the exam students can: - describe the basic components for connection of sensors and actuators into microcontroller systems; - use standard interfaces to interact with the environment; - design specialized measuring microcontroller systems; analyze concrete solutions and offer suggestions for improvement.			
<b>Syllabus</b> <i>Theoretical part:</i> Microprocessors and microcontrollers. Base architecture of microcontrollers. RISC microcontrollers. Microcontrollers for processing mixed signals. Operating modes of microcontrollers. Peripherals on the chip. System crash, reset and interrupt. Organization of memory. RAM, ROM E2ROM. Software model of 8/16-bit microcontrollers. Programmed digital inputs and outputs. Timer modules. Hardware multiplier. Peripherals for serial communication UART, USART, SPI and I2C. Standard serial interfaces RS232 / 422/485. LCD modules. A / D and D / A converters. Other microcontroller modules. Application of mixed-signal microcontroller in measurements. Embedded systems. <i>Practical part:</i> Using Input / Output Ports. Realization of human-microcontroller interaction. Connecting sensors and microcontrollers. A / D and D / A converters. Measurement of electricity. Measurement of flow and heat energy. Controlling DC motors. Generating and recognizing DTMF signals. Getting to know Arduino and Raspberi pi platforms.			
<b>Literature</b> 1. Application Report, MSP 430 Family, Texas Instruments. 2. User's Guide, MSP 430 Family, Texas Instruments.			
<b>Number of active classes</b>			Other forms of teaching:
Lectures: 30	Practical classes: 30	Research work:	
<b>Teaching methods</b> Combination of interactive approach with practical problem solving.			
<b>Grading system</b> (maximum 100 points), <b>grading scale</b> from 5 to 10: below 51 points grade 5, grade 6 from 51-60 points, grade 7 from 61-70 points, grade 8 from 71-80 points, grade 9 from 81-90 points, grade 10 from 91-100 points.			
<b>Pre-exam obligations</b>	<b>points</b>	<b>Final exam</b>	<b>points</b>
activity during theoretical lectures	10	written exam	30
practical training	20	oral exam	
colloquium(s)/seminar papers	40		
<b>Sum</b>	<b>70</b>	<b>Sum</b>	<b>30</b>