

## Specification for the book of courses

<b>Study program</b>	Electrical Engineering and Computer Science			
<b>Module</b>	Control Systems			
<b>Type and level of studies</b>	Undergraduate Academic Studies			
<b>The name of the course</b>	Microcontrollers and Programming			
<b>Lecturer (for lectures)</b>	Petrović D. Branislav			
<b>Lecturer/associate (for exercises)</b>	Petrović D. Branislav			
<b>Lecturer/associate (for OFE)</b>	Nikolić S. Goran			
<b>Number of ECTS</b>	5	<b>Course status (obligatory/elective)</b>	Obligatory	
<b>Prerequisites</b>				
<b>Course objectives</b>	Introducing students with the architecture of the most frequently used microcontrollers and acquiring basic knowledge for the practical application and programming of embedded microcontroller systems using assembler and C language.			
<b>Course outcomes</b>	Knowing the architecture of microcontrollers and acquiring knowledge for application in embedded applications. Programming the microcontroller of the MCS51 family on assembler and C language. Use of development environments.			
<b>Course outline</b>				
<b>Theoretical teaching</b>	Overview and history of development of 8-bit microprocessors and microcontrollers. The basic structures of the most famous microcontrollers on the chip. Intel MCS51, Silicon Laboratories C8051Fxxx, Microchip PIC, Atmel AVR, Motorola 68HC. Interfaces of microcontroller. Memory model of basic architecture MCS51. Functional structure: digital input output lines - ports, interrupt system, input output units, timers, serial interfaces. A set of commands and programming at the assembler. Modular programming, segments, modules, translation, linking. Directives, examples of program templates. C programming for microcontrollers. Types of variables, memory model, bit addressing. Pointer in C language. Application of microcontrollers.			
<b>Practical teaching (exercises, OFE, study and research)</b>	Development systems, Assembler, program loading. Work with built-in peripherals. Seven Segment Display, Keyboard. Serial communication with a PC.			
<b>Textbooks/references</b>				
1	"MCS51 microcontroller architecture and programming", auxiliary teachers handbook (in Serbian) .			
2	Selected articles. Keil documentation.			
3				
4				
5				
<b>Number of classes of active education per week during semester/trimester/year</b>				
<b>Lectures</b>	<b>Exercises</b>	<b>OFE</b>	<b>Study and research work</b>	<b>Other classes</b>
2	2	1	0	0
<b>Teaching methods</b>	Auditory instruction using computers and projectors. Basic examples of system simulation. Practical display of implemented embedded systems that work in real time. Lectures. Practical exercises. Laboratory exercises. Homework. Colloquiums. Seminary work. Consultations.			
<b>Grade (maximum number of points 100)</b>				
<b>Pre-exam duties</b>	<b>Points</b>	<b>Final exam</b>	<b>Points</b>	
<b>Activity during lectures</b>	10	<b>Written exam</b>	20	
<b>Exercises</b>	15	<b>Oral exam</b>	20	
<b>Colloquia</b>	20			
<b>Projects</b>	15			