

Specification for the book of courses

Study program		Electrical Engineering and Computer Science		
Module		Electronics - Electronic Circuits and Embedded Systems		
Type and level of studies		Undergraduate Academic Studies		
The name of the course		Electronic Systems Design		
Lecturer (for lectures)		Milić Lj. Miljana		
Lecturer/associate (for exercises)		Jovanović D. Borisav		
Lecturer/associate (for OFE)		Jovanović D. Borisav		
Number of ECTS	5	Course status (obligatory/elective)	Elective	
Prerequisites	Basics of electronics			
Course objectives	Adoption and systematization of knowledge related to electronic system design. The emphasis is put on hardware design, which begins with the definition of user requirements, to the ultimate implementation of the system on the printed circuit board and writing the program code of the microcontroller.			
Course outcomes	Acquiring competence for designing electronic systems using the necessary software and hardware tools. Students gain engineering confidence and skills that are needed in their future jobs. The knowledge that is obtained is applicable, independent of the choice of the platform, programming language or type of microcontroller.			
Course outline				
Theoretical teaching	Types of electronic systems. System design: levels and phases of system design, development of specifications, modeling, modularization, hardware-software compromise, software and hardware design, integration, evaluation. Creation of technical documentation according to standards. Compilers. Mechanical language. Assembly language. Higher programming languages. Analysis of the source program. Detecting errors. Code optimization. Basics of operating systems. Programs and processes. Basic process states. OS operations with processes. System calls. The concept of a virtual machine. Techniques for expanding the internal memory of computers. Design of printed circuit boards. Designing the supply of circuits with non-linear connections. Methods of propagation of ground and power signals. Sources of radio frequency interference with PCB. Measures for minimizing noise. Basic types of loops on printed boards. Design of PCBs for electromagnetic compatibility. Testing electronic systems.			
Practical teaching (exercises, OFE, study and research work)	Knowledge gained in lectures students deepen during the laboratory exercises, using the system design tools: Altium Designer, Microchip's development system, oscilloscope, general instrumentation. Programming language C, applied to PIC microcontrollers. Practical use of PIC microcontroller when designing the system; Practical use of communication protocols: RS 232/485, SPI, I2C, Ethernet, Bluetooth. In projects students use development systems based on PIC microcontrollers, solve the problem of data collection, data transfer between different parts of the system and between the implemented system and the Internet. Design of printed circuit boards.			
Textbooks/references				
1	M. Damjanovic, B. Jovanovic, The Electronic Systems Design (in Serbian), script			
2	Tocci R., Widmer N. and Moss G. Principles and applications (10th edition), Prentice Hall 2006			
3	Litovski V, Basics of electronic circuit testing, University of Nis, Faculty of Electronic Engineering, 2009.			
4				
5				
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
2	1	1	0	0
Teaching methods	Lectures supported by usage of projectors, auditory exercises, laboratory exercises on computer, consultations, individual projects.			
Grade (maximum number of points 100)				
Pre-exam duties	Points	Final exam	Points	
Activity during lectures	10	Written exam		
Exercises	10	Oral exam	30	
Colloquia				
Projects	50			