

Specification for the book of courses

Study program		Electrical Engineering and Computer Science		
Module		Communications and Information Technologies - System Engineering and Radio-Communications		
Type and level of studies		Undergraduate Academic Studies		
The name of the course		Microcontrollers and Applications in Communications		
Lecturer (for lectures)		Stanković Ž. Zoran, Pronić-Rančić R. Olivera		
Lecturer/associate (for exercises)		Atanasković S. Aleksandar		
Lecturer/associate (for OFE)		Eferica M. Predrag		
Number of ECTS	5	Course status (obligatory/elective)	Elective	
Prerequisites				
Course objectives	Acquiring theoretical and practical knowledge in the field of application of open-source microcontroller development systems in the digital data transmission.			
Course outcomes	Knowledge of architecture, operation and programming of open-source microcontroller platforms. Knowledge of different types of communication protocols at the physical level and the ability to realize and implement them in a microcontroller environment. Ability to integrate the wireless communication module and microcontroller in order to realize wireless sensor nodes.			
Course outline				
Theoretical teaching	Open-source microcontroller platforms (Arduino, Raspberry Pi, ...). Arduino IDE. Sensors, actuators. Communication protocols: RS232, UART, SPI, I2C, CAN Bus, ZigBee, Bluetooth, MQTT. Wireless communication modules: LoRa (Long Range) HC-12, HC-05, nRF24101, ESP8266. GSM shield. Using the Arduino platform for creating a sensor node. Using the Raspberry Pi platform as a gateway and communication between sensor nodes.			
Practical teaching (exercises, OFE, study and research)	Auditory exercises: Solving practical problems in the field of application of open-source microcontroller development systems in the digital data transmission. Laboratory exercises: Practical work with microcontroller open source platforms (program realization of communication protocols, realization of sensor nodes).			
Textbooks/references				
1	S. Monk, Arduino: introduction to programming, Mikro knjiga, 2017.			
2	J. Oser, H. Blemings, Practical Arduino: Cool Projects for Open Source Hardware, Apress, 2011.			
3	D. Ibrahim, Raspberry Pi 3 - from basic to advanced projects, InfoElektronika, 2018.			
4	S. Rizvi, Microcontroller Programming: An Introduction, CRC Press, 2016.			
5				
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
2	1	2	0	0
Teaching methods	Lectures, auditory exercises, practical laboratory work, homework, consultations			
Grade (maximum number of points 100)				
Pre-exam duties	Points	Final exam	Points	
Activity during lectures	5	Written exam	20	
Exercises	35	Oral exam	20	
Colloquia	20			
Projects				