

Specification for the book of courses

Study program		Electrical Engineering and Computer Science		
Module		Control Systems		
Type and level of studies		Undergraduate Academic Studies		
The name of the course		Computer Based Industrial Measurement Systems		
Lecturer (for lectures)		Denić B. Dragan, Radenković N. Dragan		
Lecturer/associate (for exercises)		Dinčić R. Milan		
Lecturer/associate (for OFE)		Miljković S. Goran, Jocić V. Aleksandar		
Number of ECTS	5	Course status (obligatory/elective)	Elective	
Prerequisites				
Course objectives				
The goal of the course is introduction with modern industrial computer based systems. Also, covering of needed knowledge about connection methods of classical and intelligent sensors with computer, and the realisation of virtual instruments and possibility of connection of such measurement systems to the Internet.				
Course outcomes				
The student will be trained to realize and apply electronic circuits for measurement signal processing and sensors connection to the computer. Based on learning of programming language LabVIEW basics, the students will be trained to connect sensors using modern interface circuits and to realise some simpler examples of virtual instruments. The students will be capable to define basic characteristics and to work with modern industrial computer based measurement systems.				
Course outline				
Theoretical teaching				
Introduction to computer based measurement systems; basic block diagrams of one- and multi-channel measurement systems; measurements signals multiplexing; transducers and sensors in modern industrial measurement systems; development trends of sensors; integrated and smart sensors; intelligent measurement modules; measurement signal and data transmission; signal conditioning circuits; two-wire transmitters; methods and systems for signal-to-noise ratio improvement; standard communication interfaces; explosion-proof instruments; grounding and shielding in automotive measurement systems, distributed measurement systems and connection to the Internet; automotive applications of telemetry systems; virtual instrumentation and LabVIEW software; industrial telemetry systems; test engineering; display, recording and presentation of measurement data.				
Practical teaching (exercises, OFE, study and research)				
Introduction with programming language LabVIEW basics. Realisation of laboratory excersises in form of concrete virtual instruments realisation for measurement of temperature, impedance parameters, AD converters characteristics.				
Textbooks/references				
1	D. Denić, I. Ranđelović, D. Živanović, „Computer based industrial measurement systems“, Faculty of Electronic Engineering and WUS Austria, script, 2005.			
2	V. Drndarević, „Acquisition of measurement data using personal computer“, Institute of Nuclear Science „Vinča“, Belgrade, 1999.			
3	W. Nawrocki, „Measurement systems and sensors“, Artech House, 2005.			
4	D. Živanović, D. Denić, G. Miljković. "Computer based industrial measurement systems - laboratory exercises", Faculty of Electronic Engineering, Niš, 2011.			
5	M. Bhuyan, "Intelligent instrumentation, principles and applications", CRC Press, 2011.			
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				
Theoretical teaching is performed with modern presentation devices and with using of free script material. Practical training is performed in computer equipped laboratory.				
Grade (maximum number of points 100)				
Pre-exam duties		Points	Final exam	Points
Activity during lectures		5	Written exam	20
Exercises		30	Oral exam	15
Colloquia		30		
Projects				