

Add. 3		Course program for the first, second and third level (cycle) of studies			
1.	Course title	Control Systems in Mechatronics			
2.	Code	319			
3.	Study group(s)	ACS, Mech			
4.	The organizer of the study program (unit, institute, department)	Faculty of Mechanical Engineering - Skopje, Ss. Cyril and Methodius University in Skopje			
5.	Level (first, second, third)	First			
6.	Academic year / semester	summer	7.	ECTS credits	6
8.	Instructor	prof. d-r Laze Trajkovski			
9.	Prerequisites	No preconditions			
10.	Course objectives (competences): Introduction with tasks and conditions for introduction of automation. Genesis: analysis and synthesis of logical functions and logical circuits. Classification and synthesis of finite automates. Technical construction of basic logic functions with: electric, electronic, pneumatic and fluid components. Definition of signals and standards. Sensors for signals. Engineering methods for design of control circuits. Peripherals and communications: man-machine (system)				
11.	Course content: Introduction and tasks of automation. Classification of systems for automation. Fundamentals of number systems. Types of signals and processing. Boolean algebra. Logic functions. Fundamental laws and theorems of Boolean algebra. Genesis of logic functions. Analysis and synthesis of logic circuits. Minimization. Technical construction of logic functions. Pneumatic components. Pneumatic logic elements: with piston (3/2 valves) , with ball, with two membranes. Fluidic components: Coanda effect, discrete effect. Components in modern control systems. Peripherals of control systems and communication man - machine (system). Sensors for signals. Finite automates. Combinational and sequential automates and their synthesis. Logic schemes and realization. Synthesis of automates with bi-stable memory elements. Engineering methods for design: Method of cascades, Step by step method. Introduction of Programmable logic control. Examples of modern control systems.				
12.	Study methods: Interactive teaching, laboratory and/or auditory exercises, standalone and/or team project work, standalone learning.				
13.	Total hours	6ECTSx30 classes = 180 hours			
14.	Hours allocation per activity:	30 + 30 + 20 + 25 + 75 = 180 hours			
15.	Lectures/Lab	15.1.	Lectures	30 hours	
		15.2.	Lab (student work)	30 hours	
16.	Project Work/Assignments	16.1.	Project assignments	20 hours	
		16.2.	Individual assignments	25 hours	
		16.3.	Self-study	75 hours	
17.	Points/Marks:				
	17.1.	Tests			80 points
	17.2.	Projects			10 points
	17.3.	Attendance			10 points
18.	Grading scale	Under 50		5 (five) (F)	
		51 - 60 points		6 (six) (E)	
		61 - 70 points		7 (seven) (D)	
		71 - 80 points		8 (eight) (C)	
		81 - 90 points		9 (nine) (B)	
		91 - 100 points		10 (ten) (A)	
19.	Prerequisites for taking the final exam	Classes attendance (min. 25%) and finished seminar assignments			
20.	Language of Instruction	Macedonian			
21.	Course evaluation	Student questionnaire			
22.	Textbooks				

	22.1.	Instruction materials				
		No.	Author	Title	Publisher	Year
		1.	Laze Trajkovski	Control techniques (internal script)	Faculty of Mechanical Engineering - Skopje	2008
		2.	T. Bundalevski, L. Trajkovski	Pneumatic sequential control, method of cascades (internal script)	Faculty of Mechanical Engineering - Skopje	1983
	3.					
	22.2.	Supplemental Instruction Materials				
		No.	Author	Title	Publisher	Year
		1.	S. Zaric	Production Automatization	Faculty of Mechanical Engineering, Belgrade	1981