

Add. 3		Course program for the first, second and third level (cycle) of studies				
1.	Course title	Monitoring and control				
2.	Code	217				
3.	Study group(s)	ACS				
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	winter	7.	ECTS credits	6	
8.	Instructor	prof. d-r Atanasko Tuneski				
9.	Prerequisites	Systems and control - passed				
10.	Course objectives (competences): Study of the characteristics of the Supervisory Control And Data Acquisition Systems (SCADA) and their practical application.					
11.	Course content: Introduction to digital control systems and the most commonly used types of control algorithms. Advanced control algorithms: adaptive, nonlinear, model control). Examples of implementation of control algorithms (in hydro power plants and in water treatment plants). Characteristics of modern systems for supervisory control and data acquisition (SCADA) and their constituents (Central Monitoring Station (CMS), Communication network (Types and architecture. Protocols. Communication devices (modems and routers). Communicating through OPS.) Local digital controllers (PLC or RTU), field instrumentation (sensors and actuators)). SCADA and PLC programming. Examples of implementation of SCADA in hydro power plants, in water treatment plants and in systems for monitoring of the water quality.					
12.	Study methods: Interactive lectures, laboratory exercises, exercises, independent and/or team work on project tasks, independent learning					
13.	Total hours	6ECTSx30 classes = 180 hours				
14.	Hours allocation per activity:	30 + 30 + 30 + 30 + 60 = 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	30 hours		
		16.2.	Individual assignments	30 hours		
		16.3.	Self-study	60 hours		
17.	Points/Marks:					
	17.1.	Tests			70 points	
	17.2.	Projects			20 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	Project assignments				
20.	Language of Instruction	Macedonian				
21.	Course evaluation	Student questionnaire				
22.	Textbooks					
	22.1.	Instruction materials				
		No.	Author	Title	Publisher	Year
		1.	A. Tuneski, Emil Zaev, D. Babunski	Monitoring and control	MFS Skopje	2002
2.	S.A.Boyer	SCADA: Supervisory Control and Data Acquisition	ISA	1999		

		3.	E.O.Debelin	Measurement Systems Application and Design	McGraw Hil	1990
		Supplemental Instruction Materials				
	22.2.	No.	Author	Title	Publisher	Year
		1.	American Water Works Association	Water Treatment Plant Design	McGraw-Hill	1990