Add. 3	**Course program for the first, second and third level (cycle) of studies**					
1.	Course title	Fluid components				
2.	Code	322				
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 Laze Trajkovski				
9.	Prerequisites	Fluid Mechanics - signature				
10.	Course objectives (competences): Introduction to basic types of fluid components and their symbols. Classification, function, construction and implementation of fluid components. Pneumatic sensors. Dimensioning and selection of components in automation. Analysis of complex pneumatic and hydraulic systems. Maintenance of hydraulic and pneumatic components and systems.					
11.	Course content: Introduction. Historic development. Selection of energy sources. Modern development of fluid technics. Work fluids. Hydraulic pumps and motors, compressors and pneumatic motors. Hydraulic and pneumatic cylinders. Hydraulic and pneumatic distribution valves. Electro-hydraulic distribution valves. Proportional and servo controlled valves. Types, construction and functioning modes. Pressure valves, Types, construction and functioning modes. Regulation of speed. Hydraulic accumulators,2/2 logic valves, logic components, multiplicators. Other equipment: reservoirs, coolers, filters, connectors. Circuits with fluid components. Symbols, Functioning modes. Selection of components. Analysis of practical implementation of pneumatic and hydraulic systems. Maintenance of hydraulic and pneumatic components and 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 + 25 + 20 + 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	25 hours		
		16.2.	Individual assignments	20 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	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	Fluid technics - hydraulics (internal script)	Faculty of Mechanical Engineering - Skopje	2007
		2.	Z. Kostic	Hydraulic machines and equipment (internal script)	Faculty of Mechanical Engineering - Skopje	1989
		3.	FESTO	Fundamentals of pneumatics (translation)	Novi Sad	1987
	22.2.	Supplemental Instruction Materials				
		No.	Author	Title	Publisher	Year
		1.	T. M. Basta	Machine hydraulics	Faculty of Mechanical Engineering, Belgrade	1980