

Add. 3		Course program for the first, second and third level (cycle) of studies			
1.	Course title	Proportional technic			
2.	Code	281			
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	no			
10.	Course objectives (competences): Training of candidates for practical use of proportional/servo hydraulic technic with associated electronic and design of open-loop as well as closed-loop feedback using a proportional / servo valves				
11.	Course content: <ul style="list-style-type: none"> - Introduction to proportional / servo technique, its constituent parts and comparisons with classical power hydraulics. - Proportional / servo valves, types, modes of operation, installation and maintaining. - Characteristic curves, parameters and dynamic properties of proportional / servo valves. - Control electronic (amplifiers) for proportional / servo technique. - Basics, features and comparisons of control using open and close loop. - Design of control with open loop using proportional / servo technique. - Design of control with close loop using proportional / servo technique. - Examples of applications with proportional / servo hydraulic technique. 				
12.	Study methods: Interactive lectures with presentations, laboratory exercises, exercises, practical classes, tutorials (seminar work), preparation and presentation of project work, preparation of essays				
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			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	Project work			
20.	Language of Instruction	Macedonian			
21.	Course evaluation	Student questionnaire			
22.	Textbooks				
	22.1.	Instruction materials			
		No.	Author	Title	Publisher
	1.	Л. Трајковски, Е.	Пропорционална и	MFS	2010

		Заев	серво технологија (интерна скрипта)			
		2. Mannesmann Rexroth AG	Proportional and servo valve technology	Mannesmann Rexroth AG	1989	
		3. D. Scholz	Proportional hydraulics	FestoDidacticK G	1996	
		Supplemental Instruction Materials				
	22.2.	No.	Author	Title	Publisher	Year
		1.				