

Add. 3		Course program for the first, second and third level (cycle) of studies			
1.	Course title	Hydraulic turbines			
2.	Code	326			
3.	Study group(s)	HEWM			
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 Predrag Popovski			
9.	Prerequisites	Turbo machines basics – signature			
10.	Course objectives (competences): Study of the principles and basics of the design and operational characteristics of the hydraulic turbines (water turbines and wind turbines). Introduction to methods for the design and selection of types and their working performances. Working conditions in the energy systems. Ability to solve practical problems in the selection of the type and characteristics of hydraulic turbines. Theoretical knowledge for introducing and attending of higher courses.				
11.	Course content: Basics and types of the hydraulic turbines. Classification of the types of turbines based on the conditions of operation. Impulse turbines (Pelton and Banki), design and operating characteristics and conditions of operation. Reaction turbines (Francis, Kaplan and Bulb), design and operating characteristics and conditions of application. Wind turbines, selection conditions and dimensioning, variables operating regimes and characteristics. Turbines regulation and control. Auxiliary equipment. Design and installation conditions in the hydropower plants. Turbines for small hydropower plants.				
12.	Study methods: interactive lectures, auditory practice and/or laboratory practice, self running and/or team work projects, self learning				
13.	Total hours	6 ECTS x 30 hours = 180 hours			
14.	Hours allocation per activity:	30 + 45 + 30 + 15 + 60 = 180 hours			
15.	Lectures/Lab	15.1.	Lectures	30 hours	
		15.2.	Lab (student work)	45 hours	
16.	Project Work/Assignments	16.1.	Project assignments	30 hours	
		16.2.	Individual assignments	15 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				
20.	Language of Instruction		Macedonian		
21.	Course evaluation		Student questionnaire		
22.	Textbooks				

		Instruction materials				
		No.	Author	Title	Publisher	Year
22.1.	1.	Поповски П.	Хидраулични турбини	Печатени предавања	2009	
	2.	Бенишек М.	Хидрауличне турбине	Научна књига Белград	2006	
	3.	Pilic-Rabadan Lj.	Vodne turbine i pumpe, vjetroturbine	FBS - Split	2000	
		Supplemental Instruction Materials				
		No.	Author	Title	Publisher	Year
22.2.	1.	Ристиќ М.	Водне турбине	Научна књига Белград	2006	
	2.	Геров В.	Водни турбини	ТУ - Софија	1996	