

Add. 3		Course program for the first, second and third level (cycle) of studies			
1.	Course title	Thermal technologies for cleaner production			
2.	Code	307			
3.	Study group(s)	TI, EE			
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.	Number of ECTS credits	6
8.	Instructor	Prof. Milan Šarevski Ph.D			
9.	Prerequisites	none			
10.	Course objectives (competences): Introduction in the concept for cleaner production. Energy efficiency of thermal systems, thermal characteristics of the technology processes and systems. Thermocompression, heat pumps, ecological thermal systems, passive buildings and systems.				
11.	Course content: Characteristics of the concept of cleaner production. Energy efficiency of the buildings, devices, plants, systems; Methods for assessment of energy characteristics; Thermal characteristics of technology processes and systems; Thermocompression, Turbocompression, screw compression, ejector compression. Thermal characteristics of industrial buildings and systems, steam- condensate systems, systems for heating, ventilation, and air conditioning heat recuperation. Heat pumps: renewable energy and natural refrigerants, COP, energy efficiency. Compressor systems: modern energy efficient and ecological compressor system. Energy and ecological characteristics. Ecological thermal systems. Energy efficient buildings, passive building and systems.				
12.	Study methods: Teaching lectures, auditory/laboratory practice, self/team work, home studying				
13.	Total hours	6 ECTS x 30 hours = 180 hours			
14.	Hours allocation per activity:	30 + 30 +10 +10 +100 = 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	None			
20.	Language of Instruction	Macedonian			
21.	Course evaluation	Student questionnaire			
22.	Textbooks				
	22.1.	Instruction materials			
No.		Author	Title	Publisher	Year

		1.	В. Шаревски	Греење и климатизација	УКИМ	2010
		2.	М. Шаревски, В. Шаревски	Експлоатација и менаџмент на објекти и системи	УКИМ	2010
		3.	М.Šarevski, V. Šarevski	Characteristics of the water steam Turbocompressors applied in the Concentrator systems	JCCE	2012
		Supplemental Instruction Materials				
		No.	Author	Title	Publisher	Year
	22.2.	1.	V.Šarevski, M. Šarevski	Energy efficiency of the thermocompression refrigerating and heat pump systems	IJR	2012
		2.				
		3.				