Add. 3	**Course program for the first, second and third level (cycle) of studies**

1.	Course title	Gas Systems				
2.	Code	118				
3.	Study group(s)	EE, 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	Assoc. prof. Zoran Markov				
9.	Prerequisites	Fluid Mechanics – passed				
10.	Course objectives (competences): Learning about gases (natural gas, LPG) as an energy source, technologies for its production, transportation and safe storage. Classification of gas systems, measuring devices, their composition, mathematical models and calculation. Use of up-to-date software programs for solving complex gas transport systems. Necessary measures for environment protection, maintenance and reliability of gas transport systems and equipment.					
11.	Course content: Basic definitions and properties of gases. Units, definitions and terminology for gas systems. Production, storage, distribution of city and natural gas. Liquid petroleum gas - production, storage and distribution. Pressure regulation. Gas pipelines – types, classification, elements. Construction of natural gas pipelines. Hydraulic calculation during isothermal and adiabatic processes. Calculation of operating condition of the compressors. Urban and industrial systems for gas distribution. Example for calculation of the annual gas consumption for a defined urban area. Protection measures during operation with gas pipeline systems.					
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 + 30 + 30 + 0 + 90 = 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	0 hours
		16.3.	Self-study	90 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	Fulfilled activity 17.2
20.	Language of Instruction	Macedonian
21.	Course evaluation	Student questionnaire

22.	Textbooks					
	22.1.	Instruction materials				
		No.	Author	Title	Publisher	Year

		1.	Мирчевски М.	Гасификациски системи	Интерна скрипта - МФС	2005
		2.	Strelec V.	Plinarski prirucnik	Zavod za produktivnost-Zagreb	2000
		3.				
	22.2.	Supplemental Instruction Materials				
		No.	Author	Title	Publisher	Year
		1.	Wang X., Economides M.	Advanced Natural Gas Engineering	Gulf Publishing Company Houston, Texas	2009
		2.	Speight J.G.	Natural Gas A Basic Handbook	Gulf Publishing Company Houston, Texas	2007