

MM 488 Natural Gas Engineering				DEPARTMENT OF MECHANICAL ENGINEERING					
Semester	Methods of Education							Credits	
	Lecture	Recit.	Lab.	Project /Field Study	Homework	Other	Total	Credit	ECTS Credit
8	42	0	10	10	13	-	75	3	3.0
Language	Turkish								
Compulsory / Elective	Elective								
Prerequisites	None								
Course Contents	Introduction to natural gas engineering. Combustion of natural gas. Fuel preperation and combustion systems. Installation of natural gas systems and its dimensioning. Conversion to natural gas systems and conversion problems.								
Course Objectives	To introduce the importance and applications of natural gas engineering in different economical sectors. To teach and apply engineering methods for the analysis, design, operation and optimization of natural gas systems.								
Learning Outcomes and Competences	Understanding of technical, economical, and environmental properties of natural gas combustion systems and installations, their design and applications in economical sectors. Applications of engineering analyses, design and optimization methods to research, system development, design, operation and optimization of natural gas systems.								
Textbook and /or Reference	1) M.L.NAYYAR, Piping Handbook, Mc Graw-Hill Inc, C.Edition, 1992. 2) R.H.P.PERRY, C.H.CHILTON, Chemical Engineers, Handbook. 3) Doğalgaz Standartları, TS7363, TS6565 4) Doğalgaz Tesisatı, Isısan Çalışmaları No.43								
Assessment Criteria						If any, mark as (x)		Percentage (%)	
	Midterm Exams					2		40	
	Quizzes					5		10	
	Homeworks					1		10	
	Projects								
	Term Paper								
	Laboratory Work								
	Other								
	Final Exam					1		40	
Instructors	Assist.Prof. Huseyin TOPAL								
Week	Subject								
1	Introduction: Scope of natural gas engineering, status of natural gas in fossil fuels, comparasion of natural gas with other technical gaseous fuels. Production of technical gaseous fuels. Fuel conversion from one gaseous fuel to another.								
2	Formation and reserves of natural gas. Production of rough natural gas and processing. Transportation of natural gas in gaseous and liquid form, its storage, distribution and utilization.								
3	Utilization of natural gas in domestic, industrial, transportation, energy-conversion and agricultural sectors and the related thermal and natural gas loads.								
4	Engineering approach in design of exterior and interior natural gas piping installations. High, medium and low pressure natural gas distribution networks. Classification of interior natural gas piping installations, heat loads, natural gas utilization, heating alternatives, heat generators, isochronal factors, overall natural gas volumetric load of interior installations.								
5	Design calculations of low pressure natural gas interior piping installations, piping calculations, design, applications and optimization.								
6	Design calculations of medium pressure natural gas interior piping installations, boiler house, boilercomponents and auxiliaries.								
7	Physical, combustion and emission properties of natural gas and their effects on system design. Combustion of natural gas and combustion calculations.								
8	Midterm I. Solution of sample problems on natural gas interior piping installations.								
9	Classification of natural gas flames, their formation, radiation and emission properties. Calculation of flame emissivities and condensation temperature of chimney gas.								
10	Heat transfer properties of natural gas fired boilers, shaping and dimensioning of the combustion chambers and the convective heat transfer surfaces.								
11	Fuel preparation and combustion systems for natural gas. Pressure and flow rate control of naturalgas, applications of critical nozzles and gas control lines. Natural gas burners.								
12	Midterm II. Solutions of sample problems.								
13	Natural gas fired boilers, waste heat boilers for gas turbines and combined cycle power plants.								
14	Engineering approaches used in the design of the natural gas fired boilers. Experimental determination of the thermal performance and emissions properties of natural fired boilers. Emission parameters and emission calculations. Fuel conversion to natural gas and conversion problems.								