

MM 430 Internal Combustion Engines				DEPARTMENT OF MECHANICAL ENGINEERING					
Semester	Methods of Education							Credits	
	Lecture	Recit.	Lab.	Project / Field Study	Homework	Other	Total	Credit	ECTS Credit
8	42	0	20-	7	6	-	75	3	3.0
Language	Turkish								
Compulsory / Elective	Elective								
Prerequisites	MM 203 E								
Course Contents	Thermodynamic cycles, ideal-cycle analysis of internal combustion engines, actual cycle differences from ideal cycle, fuels, detonation. Fuel-air-ratio requirements, fuel injection, mixture control, valves and valve operating mechanisms, ignition systems, combustion. Performance piston and engine mechanisms, balance.								
Course Objectives	To introduce basic principles and main components of internal combustion engines. To teach basic methods employed for analysis of engines, analyze effects of various parameters on performance.								
Learning Outcomes and Competences	After completion of this course, the students are expected to understand the basic principles of internal combustion engines and learn the methods used for analysis of engine cycles and main parameters affecting the engine performance. Also the students will be able to apply the basic principles and equations for mechanical analysis of main engine parts.								
Textbook and / or Reference	1. Engineering Fundamentals of the Internal Combustion Engine, W. W. Pulkrabek, Prentice Hall, 1997. 2. Internal Combustion Engine Fundamentals, J. P. Heywood, McGraw Hill Book Company, New York, 1988. 3. Internal Combustion Engines, B. Safgönül, M. Erganeman, H. E. Arslan ve C. Soruşbay, Birsen Yayınevi, 1995.								
Assessment Criteria						If any, mark as (x)		Percentage (%)	
	Midterm Exams					X		40	
	Quizzes					-			
	Homeworks					-			
	Projects					-			
	Term Paper					X		10	
	Laboratory Work					X		10	
	Other					-			
Final Exam					X		40		
Instructors	Prof. Nuri YUCEL, Assist.Prof. Nureddin DINLER								
Week	Subject								
1	INTRODUCTION: Classification of machines, internal combustion engines and principle of internal combustion engines.								
2	IDEAL CYCLES: Analysis of Otto and diesel cycles. EXPERIMENT I.								
3	IDEAL CYCLES: Analysis of dual cycles and comparison of ideal cycles. Deviations of real engine cycles from ideal cycles.								
4	COMBUSTION and ENERGY OF FUEL-AIR MIXTURE: Fuels and chemical properties of fuels. Combustion chemistry and energy of mixture.								
5	IDEAL AIR-FUEL CYCLES: Analysis of air-fuel cycles using thermodynamic charts.								
6	REAL ENGINE CYCLES: Description of real engine cycles. Combustion speed. Analysis of real cycles, specific fuel consumption.								
7	REAL ENGINE CYCLES: Air capacity and volumetric efficiency. Flame propagation and factors affecting the flame propagation.								
8	MIDTERM EXAM I, EXPERIMENT II.								
9	REAL ENGINE CYCLES: Knock in spark ignition and compression ignition engines. Ignition delay and factors affecting the ignition delay.								
10	Air and fuel induction: Description and fundamentals of carburetors. Analysis of fuel and air flow in carburetors. Description of different types of carburetors and their features.								
11	Air and fuel induction: Description and classification of injection systems. Advantages and disadvantages of injection systems.								
12	ENGINE MECHANICS: Piston- crank relationship. Forces acting on engine parts and their analysis. Calculation of mass of flywheels.								
13	MIDTERM EXAM II and problem solving.								
14	ENGINE BALANCE: Balance of single cylinder engines. Balance of multi cylinder engines.								