MM 481 Gas Dynamics	DEPARTMENT of MECHANICAL ENGINEERING

Semester	Methods of Education							Credits	
	Lecture	Recit.	Lab.	Project/Field Study	Homework	Other	Total	Credit	ECTS Credit
7	42	0	-		23	10	75	3	3.0

Language	Turkish
Compulsory / Elective	Elective
Prerequisites	None
Course Contents	Sound Waves, general features of the steady one-dimensional flow of a compressible fluid, isentropic flow with area change, flow with friction in constant area duct, flow with heat transfer in frictionless constant area duct, normal shock waves, oblique shock waves (reflection and interaction of oblique shock waves), expansion waves, flow through the nozzles and diffusers, mass addition, combustion waves, generalized one dimensional flow, introduction flow with small perturbations, introduction to the method of characteristics.
Course Objectives	To introduce basic properties of compressible flows, fundamental laws and principles those are important in the analysis of the compressible flows. To render the students thoroughly capable of applying these laws and principles for the analysis of compressible flows.
Learning Outcomes and Competences	After the completion of the course, the students are expected to understand basic properties, fundamental laws and principles relevant to the subject and to be able to apply them to a variety of compressible flow problems.
Textbook and /or Reference	1. Compressible Fluid Flow, P. H. Oosthuizen and W. E. Carscallen Mc Graw-Hill, 1997. 2. Compressible Fluid Dynamics with PC Applications, B. K. Hodge and K. Koenig Prentice Hall, 1995. 3. Modern Compressible Flow, J. D. Anderson, Mc-Graw Hill, 1990. 4. Gas Dynamics, M. J. Zucrow and J. D. Hoffman, John Willey & Sons, Inc., 1977.

Assessment Criteria		If any, mark as (x)	Percentage (%)
	Midterm Exams	X	50
	Quizzes	X	5
	Homeworks	X	5
	Projects		
	Term Paper		
	Laboratory Work		
	Other		
	Final Exam	X	40

Instructors	Assist.Prof. Ibrahim ATILGAN
Week	**Subject**
1	Fundamental Concepts and Laws: Definitions, classification of the flows. Conservation of mass and second law of Newton.
2	Fundamental Concepts and Laws: First and second laws of thermodynamics. The concept and equations of stagnation. Speed of sound and Mach number.
3	Basic properties of steady one dimensional compressible flows: Derivation of fundamental equations as a function of the Mach number for the ideal gases. Total equations as a function of the Mach number.
4	ADIABATIC FLOW IN VARIABLE AREA CROSS SECTIONS: Frictionless general flows. Flows of the ideal fluids. The concept of reference and the use of the isentropic tables.
5	ADIABATIC FLOW IN VARIABLE AREA CROSS SECTIONS:Flows in the nozzles and diffusors.
6	STATIONARY NORMAL SHOCK WAVES: The analysis of the stationary shock waves for any fluid and ideal gas.The tables and uses of the normal shock waves.
7	STATIONARY NORMAL SHOCK WAVES:Stationary shock waves in the nozzles.Wind tunnels
8	MIDTERM EXAM I and solutions of exam problems.
9	MOVING NORMAL SHOCK WAVES: Analysis of the moving normal shock waves.
10	OBLIQUE SHOCK WAVES: Analysis of the oblique shocks. The use of the tables and the charts of the oblique shock waves for the ideal gases.
11	STEADY ONE DIMENSIONAL FRICTIONAL FLOWS (FANNO FLOWS): Derivation of the thermodynamic equations. The use of the Fanno curves and the tables for the ideal gases.
12	NONADIABATIC FLOWS (RAYLEIGH FLOWS): Derivations of the thermodynamic equations. The use of the Rayleigh curves and the tables for the ideal gases.
13	MIDTERM EXAM II and solutions of exam problems.
14	JET SYSTEMS: Rocket engines and jet engines.