



AL IMAM MOHAMMAD IBN SAUD ISLAMIC UNIVERSITY
COLLEGE OF ENGINEERING
Department of Mechanical Engineering

Course Information

Course Code and Name:	ME446 Gas Dynamics
Credit Hours:	3 (3 Lecture + 1 Tutorial)
Prerequisites:	ME222 Fluid Mechanics, ME323 Thermodynamics-II

Course Description

Sonic wave propagation and Mach number, flow in converging and converging-diverging nozzles, normal and oblique shocks, Prandtl-Meyer, Fanno and Rayleigh flows, semi-perfect and real gas behavior, air-breathing and rocket propulsion systems, supersonic diffusers.

Textbook

Title	Compressible Fluid Flow		
Authors	Michel A. Saad		
Publisher	Prentice Hall	Year and Edition	1985

Course Contents

Introduction: Speed of sound, Mach number, Mach angle, Reynolds & Knudsen numbers
Isentropic Flow: Derivation of property relations for isentropic flow, isentropic flow through convergent & convergent-divergent nozzles, the impulse function, use of isentropic tables and problem solving.
Normal Shock Waves: Formation of compression & expansion waves, introduction to shock theory, difference between normal and oblique shock waves, Prandtl & Rankine-Hugoniot relations, Fanno & Rayleigh lines, normal shock in a C-D diffuser, supersonic diffusers, supersonic wind tunnels, moving shock waves, the shock tube, Use of normal shock tables & problem solving.
Adiabatic frictional flow in a constant area duct: Derivation of governing equations, the Fanno line flow, frictional flow in a constant area duct preceded by an isentropic nozzle, adiabatic flow with friction in a variable area duct, use of Fanno line flow tables and problem solving.

Academic Coordinator	Signature
Dr. Syed Muhammad Fakhir Hasani	

Official Stamp

