The University of Jordan
School of Engineering

Department	Course Name	Course Number	Semester
Mechanical Engineering	Gas Dynamics	0994461	Summer

2025 Course Catalog Description

One-dimensional gas dynamics, normal and oblique shock waves, Prandtl-Meyer flows, Rayleigh and Fanno-line flow, airfoils in supersonic flow, thin airfoil theory.

Instructors

Name	E-mail	Section	Office Hours	Lecture Time

Text Books

	Text book 1	Text book 2
Title	Fundamentals of Aerodynamics	
Author(s)	J. D. Anderson	
Publisher, Year, Edition	6th Edition, McGraw-Hill's	

References

Books	Modern Compressible Flow: With Historical Perspective, J. D. Anderson, 2nd Edition, McGraw-Hill's.
Journals	
Internet links	

Prerequisites

Prerequisites by topic	
Prerequisites by course	0904361 Fluid Mechanics
Co-requisites by course	Maintenance Practice VI: Work Experience
Prerequisite for	Boundary Layer Theory

Topics Covered

Week	Topics	Chapter in Text
1-2	Principles of thermodynamics, Compressible Flow: Some Preliminary Aspects	
3-5	Normal Shock Waves and Related Topics	
6-8	Oblique Shock and Expansion Waves	
9-11	Compressible Flow through Nozzles, Diffusers, and Wind Tunnels	
12-13	Analysis of Fanno and Rayleigh flow	
14-15	Subsonic Compressible Flow over Airfoils: Linear Theory	
16	Linearized Supersonic Flow	

Mapping of Course Outcomes to ABET Student Outcomes	
SOs	**Course Outcomes**
1,2	Understand definition and fundamental aspects of compressible flow To teach students how thermos-dynamical concepts apply to gas dynamics. To teach students to analyze or compute one-dimensional and quasi one dimensional flows in typical applications such as supersonic wind tunnels, and rocket nozzles. To relate gas dynamics to aircraft aerodynamics and supersonic flight performance To familiarize students with the features of inviscid compressible flows, including shock waves, expansion fans.

Evaluation		
Assessment Tools	**Expected Due Date**	**Weight**
First Exam		25
Second Exam		25
Final Exam		50

Contribution of Course to Meet the Professional Components
This course is one of the first opportunities for engineering students to encounter the fundamental principles of design problem solving. It is an important prerequisite course for number of designs related-courses, which occur later in the programs of engineering students.

Relationship to Student Outcomes							
SOs	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Availability	X	X					

Relationship to Aeronautical Engineering Program Objectives (MEPOs)				
AEPO1	**AEPO2**	**AEPO3**	**AEPO4**	**AEPO5**

ABET Student Outcomes (SOs)	
1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3	An ability to communicate effectively with a range of audiences
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Updated by ABET Committee, 2025