Jordan University of Science and Technology
Faculty of Engineering
Aeronautical Engineering Department

AE443 Gas Dynamics
First Semester 2023-2024

Course Catalog
3 Credit Hours. One-dimensional Compressible flow, normal and oblique shock waves, Prandtl-Meyer flows, Rayleigh and Fanno flow, linearized supersonic theory, shock expansion theory and its applications in designing supersonic airfoils, shock wave interactions, and reflections.

Text Book	
Title	Fundamentals of Aerodynamics
Author(s)	J. D. Anderson
Edition	6th Edition
Short Name	Textbook
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref#1	Modern Compressible Flow: With Historical Perspective	J. D. Anderson	2nd Edition	
Ref#2	Compressible Fluid Flow	Michel A. Saad	2nd Edition	
Ref#3	NASA Compressible Aerodynamics Index, http://www.grc.nasa.gov/WWW/K-12/airplane/shortc.html	NASA Web Resources	1st Edition	

Instructor	
Name	**Dr. Montasir Hader**
Office Location	N1L2

Office Hours	Sun : 09:30 - 10:30 Sun : 11:30 - 12:30 Mon : 13:30 - 14:30 Tue : 09:30 - 10:30 Tue : 11:30 - 12:30 Thu : 09:30 - 10:30
Email	hader@just.edu.jo

Class Schedule & Room

Section 1:
  Lecture Time: Sun, Tue, Thu : 12:30 - 13:30
  Room: C3017

Prerequisites

Line Number	Course Name	Prerequisite Type
713440	AE344 Aerodynamics (1)	Prerequisite / Pass

Tentative List of Topics Covered

Weeks	Topic	References
Weeks 1, 2	Principles of thermodynamics, Compressible Flow: Some Preliminary Aspects	**Chapter 7** From **Textbook**
Weeks 3, 4, 5	Normal Shock Waves and Related Topics	**Chapter 8** From **Textbook**
Weeks 6, 7, 8	Oblique Shock and Expansion Waves	**Chapter 9** From **Textbook**
Weeks 9, 10, 11	Compressible Flow through Nozzles, Diffusers, and Wind Tunnels	**Chapter 10** From **Textbook**
Weeks 11, 12	Analysis of Fanno and Rayleigh flow	**Class notes +(Ch. 3)** From **Ref#1**
Weeks 12, 13, 14	Subsonic Compressible Flow over Airfoils: Linear Theory	**Chapters 11** From **Textbook**
Weeks 15, 16	Linearized Supersonic Flow	**Chapter 12** From **Textbook**

Mapping of Course Outcomes to Program Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
Understand definition and fundamental aspects of compressible flow [1SO1]	20%	
Apply thermodynamics concepts to gas dynamics. [1SO1]	20%	
Explain the features of inviscid compressible flows, including shock waves and expansion fans. [1SO1, 1SO6]	20%	
Analyze and compute one-dimensional and quasi-onedimensional flows in typical applications such as supersonic windtunnels, and rocket nozzles. [1SO1, 1SO2]	20%	

Apply gas dynamics to aircraft aerodynamics and supersonic flight performance. [1SO1, 1SO7]	20%	

Relationship to Program Student Outcomes (Out of 100%)						
SO1	SO2	SO3	SO4	SO5	SO6	SO7
70	10				10	10

Evaluation	
Assessment Tool	**Weight**
First Exam	20%
Second Exam	20%
HomeWork/Project	20%
Final Exam	40%

Policy	
Atendance	The student is required to attend all the registered courses. The instructor shall register student attendance or absence electronically. JUST policy requires the faculty member to assign ZERO grade (35) if a student misses 20% of the classes. If you miss a class, it is your responsibility to find out about any announcements or assignments you may have missed
Exam/Homework	Makeup exam should not be given unless there is a valid excuse according to JUST policies. Arrangements to take an exam at a time other than the one scheduled MUST be made prior to the scheduled exam time. Cheating or copying from neighbor on exam, quiz, or homework is an illegal and unethical activity. Standard JUST policy will be applied. All assignments must be your own work (your own words) Students are responsible for all information provided in lecture. Information presented in class supersedes any information posted elsewhere.

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