University of Sistan and

Baluchestan

Department of Mechanical Engineering

Fluid mechanics II

Hamed Farzaneh – 1398 (2020)

COURSE OUTLINE

This is a course in Fluid Mechanics. The subject Fluid Mechanics has a wide scope and is of prime importance in several fields of engineering and science. Present course emphasizes the fundamental underlying fluid mechanical principles and application of those principles to solve real life problems. Special attention is given towards deriving all the governing equations starting from the fundamental principle. There is a well balanced coverage of physical concepts, mathematical operations along with examples and exercise problems of practical importance. After completion of the course, the students will have a strong fundamental understanding of the basic principles of Fluid Mechanics and will be able to apply the basic principles to analyze fluid mechanical systems

COURSE DETAIL

Module No.	Topic/s	Lectures
1	**Review of Fundamental Concepts of Fluid mechanics** • Conservation of Mass, Momentum, and Energy • Bernoulli Equation • Control Volume Analysis	2

2	**Differential Analysis of Fluid Motion** • Continuity Equation • Momentum Equations • Energy Equation • Equations for Turbulent Flows	5
	Ideal (Inviscid) Flows • Stream Function and Velocity Potential • Plane Flow Solutions • Superposition of Plane Flow Solutions • Plane Flow Past Closed Body Shapes • Basic Airfoil Theory • Flow Through Porous Media	4
3	**Internal Viscous Flows** • General Considerations and Mixtures of Ideal Gases • A Simplified Model of a Mixture Involving Gases and a Vapor • The Energy Equation Applied to Gas–Vapor Mixtures • The Adiabatic Saturation Process • Engineering Applications—Wet-Bulb and Dry-Bulb Temperatures and the Psychrometric Chart	8
4	**External Viscous Flows** • Impulsively Started Motion • Boundary Layer Analysis • Laminar Flow Past a Flat Plate • Transition to Turbulence • Turbulent Flow Past a Flat Plate • Boundary Layer Separation • Fluid Drag • Friction (Viscous) Drag • Profile (Pressure) Drag • Drag Coefficients for Various Bodies • Lift and Drag on Airfoils • Flow Structure Interactions	8

PREREQUISITES

Fluid mechanics I

REFERENCES

Introduction to Fluid Mechanics / Robert W. Fox, Philip J. Pritchard, Alan T. McDonald.