

**KING SAUD UNIVERSITY
COLLEGE OF ENGINEERING
CIVIL ENGINEERING DEPARTMENT**

COURSE:- CE 321 FLUID MECHANICS

**INSTRUCTOR:- Prof. ABDULAZIZ A ALHAMID
BSc MSc PhD CEng MIAHR MSSCE**

REFERENCES

TEXTBOOK:

Streeter, V.L. and Wylie, E.B., 'Fluid Mechanics', McGraw-Hill Book Company.

OTHER TEXTBOOKS:

Vennard, J.K. and Street, R.L., 'Elementary Fluid Mechanics', John Wiley & Sons, Inc.

Massey, B.S., 'Mechanics of Fluids', Van Nostrand Reinhold.

Douglas, J.F., Gasiorek, J.M. and Swaffield, J.A., 'Fluid Mechanics', Longman Scientific and Technical.

Fox, R.W. and McDonald, A.T., 'Introduction to fluid mechanics', John Wiley & Sons, Inc.

CONTENTS

CHAPTER ONE INTRODUCTION

- 1.1 What is a Fluid
- 1.2 Why studying Fluid Mechanics
- 1.3 Fields of study in Fluid Mechanics
- 1.4 Dimensions and Units
 - 1.4.1 systems of dimensions
 - 1.4.2 systems of units

CHAPTER TWO PROPERTIES OF FLUIDS

- 2.1 Density, Relative, density, Specific weight and Specific Volume
- 2.2 Continuum
- 2.3 Viscosity
- 2.4 Compressibility
- 2.5 Perfect Gas
- 2.6 Surface Tension
- 2.7 Vapor Pressure

CHAPTER THREE HYDROSTATICS

- 3.1 Pressure at a Point
- 3.2 Variation of Pressure in a Fluid
- 3.3 Equality of Pressure at the Same Level
- 3.4 Pressure Measurements
 - 3.4.1 Barometer
 - 3.4.2 Manometers
 - 3.4.3 mechanical devices
- 3.5 Hydrostatic Forces on Surfaces
 - 3.5.1 forces on plane surfaces
 - 3.5.2 forces on curved surfaces
- 3.6 Buoyancy and Stability of Submerged and Floating Bodies

CHAPTER FOUR HYDRODYNAMICS

4.1 Fluid Kinematics

4.1.1 velocity and acceleration

4.1.2 streamlines, streaklines and pathlines

4.2.3 types of flow

4.2 Control Volume Approach

4.3 Basic Equations of Motion

CHAPTER FIVE CONTINUITY PRINCIPLES

5.1 Conservation of Mass

5.2 One-Dimensional Steady Flow

5.3 Three-Dimensional Steady Flow

CHAPTER SIX ENERGY PRINCIPLES

6.1 Conservation of Energy

6.2 Conservation of Linear Momentum

6.3 Derivation of Euler's Equation of Motion

6.4 Bernoulli Equation

6.5 Application of Energy Principle

6.5.1 hydraulic grade line

6.5.2 flow in pipes

6.5.3 Pitot tube

6.5.4 siphons

6.5.5 Venture meter

6.5.6 orifices

6.5.7 weirs

6.6 Kinetic Energy Correction Coefficient

CHAPTER SEVEN MOMENTUM PRINCIPLE

7.1 Linear Momentum Equation

7.2 Application of Momentum Equation

7.2.1 forces on stationary vanes

7.2.2 forces on moving vanes

7.2.3 forces on pipe bends

7.2.4 forces on nozzles

7.2.5 forces on solid bodies

7.2.6 forces on propellers and windmills

7.3 Momentum Correction Coefficient

VISUAL AIDS

Laboratory fluid flow visualization

Video presentation

GRADES

30 % Midterms Exams

5 % Quizzes

5 % Attendance

10 % Homework

50 % Final Exam