Al-Hussein Bin Talal University  Faculty of Engineering

Department of Mechanical Engineering.

Course Syllabus

Course title: Fluid Mechanics (1)	**Course No. /Code:** 0507321
Course pre-requisite: 0504102	**Course teaching language:** English
Course level: Third year	**Credit hours:** 3 hours

Course Description:

Introduction, Fluid properties, Basic units. Fluid statics, Pressure and its measurements, Forces on plane and curved submerged surfaces, buoyancy & floatation, Fluids in motion, Flow kinematics and visualization, Basic control volume approach, Differential and integral continuity equation. Pressure variation in flowing fluids, Euler's and Bernoulli's equations, Applications of Bernoulli equation. Momentum principle and its applications, Navier-Stokes equations. Energy equation, Hydraulic and energy grade lines. Dimensional analysis and similitude. Surface resistance and introduction to boundary layer theory. Flow in conduits, laminar and turbulent flows, Frictional and minor losses, Piping systems.

Course objectives:

1. To define density, specific gravity, viscosity, surface tension, viscosity and kinematic viscosity.
2. To apply the hydrostatic equation and the manometer equations to predict pressure, forces and moments.
3. To distinguish different between the types of flow and between convective and local acceleration.
4. To describe the steps to derive the Bernoulli and Euler's equations.
5. To explain the meaning of volume flow rate and mass flow rate and what is meant by a system, control volume and control surface.
6. To identify the accumulation and momentum flux terms in the momentum equation and the steps in deriving the moment-of-momentum equation.
7. To describe laminar flow, turbulent flow, developing flow, and fully developed flow in a conduit.
8. To describe how to characterize total head loss by using component and pipe head loss.

Learning outcomes (understanding, knowledge and practical skills):

Upon completing this course, the student is expected to be able to:

1. Define density, specific gravity, viscosity, surface tension, viscosity and kinematic viscosity.
2. Predict pressure, forces and moments.
3. Distinguish different between the types of flow and between convective and local acceleration.
4. Calculate the pressure and velocity by applying the Bernoulli and Euler's equations.
5. Predict the volume flow rate and mass flow rate and what is meant by a system, control volume and control surface.
6. Identify the accumulation and momentum flux terms in the momentum equation and the steps in deriving the moment-of-momentum equation.
7. Describe laminar flow, turbulent flow, developing flow, and fully developed flow in a conduit.
8. Calculate the total head loss by using component and pipe head loss.

Textbook & references:

Book title	Author (s)	Publisher	Edition
Engineering Fluid Mechanics	Roberson / Crowe	Wiley & Sons	09th
Engineering Mechanics Fundamentas	Yunus A / Cengel	Wiley & Sons	07th

Assessment Methods:

Assessment no.	Assessment Method	Week Due	Allocated Mark
1	First exam	6^{th} week	25
2	Second exam	12^{th} week	25
3	Final exam	17^{th} week	50