



AL IMAM MOHAMMAD IBN SAUD ISLAMIC UNIVERSITY
COLLEGE OF ENGINEERING
Department of Mechanical Engineering

Course Information	
Course Code and Name:	ME222: Fluid Mechanics
Credit Hours:	3 (3 Lecture + 1 Tutorial)
Prerequisites:	ME 201 Statics, ME 221 Thermodynamics-I, MATH 235 Differential Equations

Course Description
Fluid statics, conservation of mass, momentum and energy in fixed and moving control volumes, steady and unsteady Bernoulli's equation. Differential analysis of fluid flow, dimensional analysis and similitude, laminar and turbulent flow. Boundary layers, lift and drag.

Textbook			
Title	Engineering Fluid Mechanics		
Authors	D.F. Elgar, B.C. Williams, C.T. Crowe, J.A. Roberson		
Publisher	John Wiley & Sons, Inc.	Year and Edition	2014, 10 th edition

Course Contents
1. Basic definitions, units and fluid properties
2. Hydrostatic forces on plane and curved surfaces. Buoyancy and stability of floating bodies
3. Velocity and flow description, fluid acceleration, the Euler's equation, pressure distribution in rotating flows. The Bernoulli Equation, rotation and vorticity, the Bernoulli equation in irrotational flow.
4. The rate of flow, the control volume approach, continuity equation, differential form of continuity equation, cavitation.
5. The momentum equation and its applications, water hammer. Moment of momentum equation and its applications. Navier-Stokes Equation.
6. Energy, Work & Power, Energy Equation, Energy equation for pipe flow, power equation, hydraulic and energy grade lines.
7. Dimensional analysis and its need, Buckingham-Pi theorem, common groups, similitude
8. Surface resistance and boundary layer flow. Laminar, transition and turbulent boundary layers. Pressure gradient effects in boundary layer flow.
9. Shear stress distribution, laminar and turbulent flow in pipes, pumps and piping systems.
10. Theory of lift & drag and its relationship to stress distribution. Lift & drag on airfoils and automobiles.

Academic Coordinator Dr. Syed Muhammad Fakhir Hasani	Signature
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