CIV 364 - Fluid Mechanic for Civil Engineers

Current Catalog Description: Fluid statics and dynamics, including pressurized flow in pipe systems and open channel flows. Partial differential equation formulations of the conservation laws are solved to obtain solutions to special cases such as boundary layers and pipe flow. Empirical equations and statistical analysis are introduced for turbulent flows, drag, lift, and open channels. May not be taken for credit in addition to MEC 364.

Prerequisite: MEC 262; CIV major

Corequisite: None

Textbooks and/or Other Required Material: Required Texts:
Fluid Mechanics for Civil and Environmental Engineers, A. I. Shalaby

This course is: Required

Topics Covered:

1. System of units and general fluid characteristics
2. Pressure distribution and buoyancy under Hydrostatics conditions
3. Control volume analysis: mass and momentum conservation for moving fluids
4. Energy: Bernoulli equation and it applications
5. Pipe flow: Head loos, Pumps, and Turbines
6. Lift and Drag: an introduction to forces on immersed bodies
7. Flow through porous media
8. Open-Channel flows

Course Learning and Student Outcomes:

Course Learning Objectives	ABET Student Outcomes
Understand the system of units and general fluid characteristics and identify various types of fluid flows.	7
Determine pressure in connected pipes and U-tubes under hydro-static conditions	1
Determine pressure forces and their distribution on immersed and buoyant objects under hydro-static conditions	1,2
Apply control volume analysis including mass and momentum conservation laws for fluids in motion	1
Understand and apply energy (Bernoulli) equation for common problems in civil engineering: viscous pipe flow	1, 6
Apply energy equation to compute major and minor head loss in pipe(s) connecting two reservoirs	1, 6
Apply energy and continuity equations to analyze networks of pipes and multiple reservoirs	1, 2
Quantify lift and drag forces on solid bodies to determine wind forces on infrastructures	1, 2, 6
Understand and apply the specific energy and hydraulic jump equations to solve open-channel flows problems.	1
Analyze flow through porous media and design of deep wells in confined and unconfined aquifers	1, 2, 3

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