

Course Information, Textbook and Supplementary Materials

Course Description:

Equation of motion; continuity, momentum, energy principles; dimensional analysis, similitudes; groundwater flows; transports in conduits and channels; mixing, dispersion in environments (and between environments); manifold diffusers; and hydraulic transients. (Duplicates credit in CE 309 and AME 309.)

Required for: BSCE Environmental, and BSENE

Prerequisite: Math 245 Mathematics of Physics and Engineering I

Co-Requisite: None

Required Textbook: *Fundamentals of Fluid Mechanics*, 7th Edith, by *Munson, Rothmayer, Okiishi, Huebsch*, Wiley

Reference:

Mixing in Inland and Coastal Waters, Academic Press; 1st edition (December 12, 1979); Authors: Fischer, List, Koh, Imberger & Brooks

Hydraulics of Groundwater (Dover Books on Engineering), Dover Publications (2007); Author: Bear

Topics Covered	Learning Outcomes
Fluid Properties	Students will learn about fluids, how to analyze and apply the principles and equations to solve fluid flow problems. 1. Introduction and Properties of Fluids. Description of Environmental Flows and Driving Forces.
Analyzing fluid problems in static condition	2. Kinematics and The Basic Equations: Continuity equation, Equation of motion with or without viscosity, Hydro & Aerostatics, Boundary conditions.
	3. The Bernoulli Equation and Its Application to Fluid Flow problems
Analyzing fluid problems in motion	4. Momentum Theorems
	5. Dimensional Analysis and Similitude
	6. Element of Potential Flow and Boundary Layer Concepts
	7. Analysis of Flows in Pipes
	8. Analysis of Flow in Channels
	9. Ground Water Flow, Pumping tests

Application of the governing principles and equations for different fluid flow problems involving real fluids	10. Mixing and Dispersion in Environments (turbulent flow and groundwater flow), Multi-port Diffusers, Hydraulic Transients
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ENE 410

Environmental Fluid Mechanics

3 Units

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Lecture and Lab Schedule			
Lecture		Lab	
Sessions per Week	Duration per Session	Sessions per Week	Duration per Session
3	1 hour	n/a	

Relation of Course Objectives to Program Outcomes

The Civil Engineering program is designed to teach beyond the technical content of the curriculum and prepare the students to utilize what they learn in a professional setting.

This course contributes to the program outcomes as outlined in the adjacent table.

Course Contribution to Program Outcomes (a-k)	✓ Key
a. An ability to apply knowledge of mathematics, science, and engineering.	
e. An ability to identify, formulate and solve engineering problems.	
i. Recognition of the need for, and an ability to engage in life-long learning.	
j. Knowledge of contemporary issues.	
k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

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