


College of Engineering Department of Civil Engineering		
CE 520 Advanced Hydraulics		
Credit and Contact hours	3 / 3 (Lectures), 0 (Tutorials), 0 (Laboratory)	
Required, or Elective	Required	
Course Description	Steady pipe flow theory and computations. Design and analysis of sewer network system. Design and analysis of transmission lines. Design and analysis of distribution networks. Unsteady flow; Gradually varied unsteady flow and Rapidly varied unsteady flow, Transient flow equations and methods of solution.	
Prerequisites or Co-requisites	None	
Course Learning Outcomes	Students completing this course successfully will be able to:	
	Course Learning Outcomes (CLOs)	Related Student Outcomes (SO)
	CLO1. Explain and recognize characteristics of pipe flow in pipelines, water distribution system, and sewer networks. K1	SO1
	CLO2. Use math and software to analyze and design hydraulics systems with Civil Engineering applications. S1	SO2
	CLO3. Criticize and discuss scientific research papers related to hydraulics systems issues with a high level of ethics and proficiency, independently, or as a teamwork. S3	SO4
	CLO4. Perform and manage appropriate qualitative and quantitative methods commonly used in the literature of hydraulics (e.g. branching system, analytical solutions for water hammering, numerical models of water distribution, analytical solutions for pipelines). V1	SO6
Student Outcomes related to this Course	SO 1 Recognize advanced engineering knowledge, concepts, and techniques to identify, interpret, and analyze complex and real-life engineering problems. SO 2 Provide solutions for complex and real-life engineering problems through critical thinking and the use of modern engineering tools, and identify their impact on social, global, cultural, environmental, safety, and economic factors. SO 4 Criticize and discuss scientific research reports /papers related to Civil Engineering issues with a high level of ethics proficiency and communication skills, independently, or as a teamwork. SO 6 Demonstrate scientific integrity, ethical responsibility, and academic values in scientific publications, research projects, and thesis work.	

Topics Covered	List of Topics		Related CLOs
	1. Introduction		CLO 1,2,3,4
	2. Sewer network system		CLO 1
	3. Branching flow in pipes		CLO 1,2
	4. Water hammering in pipes		CLO 1,2,3
	5. Pipeline transmission system		CLO 1,4
	6. Water distribution system		CLO 2,4
Textbook(s) and Other Required Material	<ul style="list-style-type: none"> • Mays, L. W.. Water Resources Engineering (2nd ed.). Wiley. Todd D.K., Ground Water Hydrology, John Wiley and Sons, 2000. • Haestad Methods, Donald V. Chase, Dragan A. Savic, Thomas M. Walski., Water Distribution Modeling, Haestad; 1st edition (April 1, 2001). • Nazih K. Shammass, Water Supply and Wastewater Removal, Wiley., Third edition, 2011. 		
Grading System	Assignments	10%	
	Lecture attendance	--	
	Seminar presentation	5%	
	Case/ Field Study	5%	
	Overview (literature review) paper	5%	
	Project - report and oral presentation	10%	
	Mid-term exam	25%	
	Final Exam	40%	
Instructors	Dr. Faisal M. Alfaisal		
Date of Review	March, 2025		