


College of Engineering Department of Civil Engineering															
<h2>CE 325 Hydraulics Laboratory</h2>															
Credit and Contact hours	1/ 0 (Lectures), 0 (Tutorials), 2 (Laboratory)														
Required, or Elective	Required for a BSCE degree														
Course Description	Determination of dynamic viscosity. Verification of Bernoulli's equation. Flow through small orifices, venture-meters. Impact of water jets on plates. Flow over weirs (rectangular & v-notch). Stability of floating bodies. Losses in pipes and pipe fittings. Velocity measurements in open channels. Uniform open channel flow. Applications of specific energy and specific force principles in hydraulic jumps.														
Prerequisites or Co-requisites	Prerequisite: Fluid Mechanics (CE 320) Co-requisite: Hydraulics (CE 324)														
Course Learning Outcomes	Students completing this course successfully will be able to <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Course Learning Outcomes</th> <th style="text-align: center;"><i>Related Student Outcomes (SO)</i></th> </tr> </thead> <tbody> <tr> <td>CLO1. Apply routing methods to calculate a surface runoff hydrograph from rainfall.</td> <td style="text-align: center;">SO1</td> </tr> <tr> <td>CLO2. Conduct frequency analysis to develop IDF curves.</td> <td style="text-align: center;">SO6</td> </tr> <tr> <td>CLO3. Identify of principles of Groundwater.</td> <td style="text-align: center;">SO1</td> </tr> <tr> <td>CLO4. Calculate Groundwater movement.</td> <td style="text-align: center;">SO1</td> </tr> <tr> <td>CLO5. Calculate well hydraulics.</td> <td style="text-align: center;">SO1</td> </tr> </tbody> </table>			Course Learning Outcomes	<i>Related Student Outcomes (SO)</i>	CLO1. Apply routing methods to calculate a surface runoff hydrograph from rainfall.	SO1	CLO2. Conduct frequency analysis to develop IDF curves.	SO6	CLO3. Identify of principles of Groundwater.	SO1	CLO4. Calculate Groundwater movement.	SO1	CLO5. Calculate well hydraulics.	SO1
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Student Outcomes related to this Course	SO1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. [ABET 1] and using modern engineering tools. SO6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. [ABET 6]														

Topics Covered	List of Topics	Related CLOs
	1. Verification of Bernoulli equation	CLO1
	2. Losses in pipes and pipe fittings	CLO1
	3. Flow through small orifices	CLO2 & CLO3
	4. Flow thorough venture meters	CLO2 & CLO3
	5. Impact of water jets on plates (flat and hemispherical)	CLO2
	6. Water Hammer phenomenon	CLO1
	7. Flow over weirs (rectangular and v- notch)	CLO2
	8. Velocity measurements in open channels	CLO3
	9. Uniform open channel flow	CLO2
	10. Applications of specific energy and specific force principles in hydraulic jumps	CLO1 & CLO3
Textbook(s) and Other Required Material	Mechanics of Fluids by Merle C. Potter and David C. Wiggert, Published by Prentice Hall, New Jersey, U.S.A., 1997.	
Grading System	Mid-term Exam 30 % Lab Reports 30% Final Exam: 40%	
Instructors	Eng. Shamshad Alam (2A73), email; salam@ksu.edu.sa	
Date of Review	October, 2020	