

College of Engineering

Department of Civil Engineering



## CE 428 Hydraulics of Open Channel Flow

<b>Credit and Contact hours</b>	3 / 3 (Lectures), 1 (Tutorials), 0 (Laboratory)	
<b>Required, or Elective</b>	Elective for a BSCE degree	
<b>Course Description</b>	Application of mass, energy and momentum conservation principles to open channel flows; types of open channel flows (steady versus unsteady flows with examples); flow hydraulic controls (critical flow locations), specific discharge and flows over hump, sump and in variable-width channels; non-uniform flows (rapidly varied and gradually varied); design of open channel sections (rigid and loose boundary channels).	
<b>Prerequisites or Co-requisites</b>	CE324 (Hydraulics)	
<b>Course Learning Outcomes</b>	Students completing this course successfully will be able to	
	<b>Course Learning Outcomes</b>	<i>Related Student Outcomes (SO)</i>
	<b>CLO1:</b> Design of open channel rigid and loose boundary sections considering safety, environmental and economic factors.	<b>SO2</b>
	<b>CLO2:</b> Apply the principles of conservation of mass, energy and momentum to open channel flows and determine the types and states of flow.	<b>SO1</b>
	<b>CLO3:</b> Analysis and computation of gradually and rapidly varied flows in open channels.	<b>SO1</b>
<b>Student Outcomes related to this Course</b>	<p><b>SO 1.</b> an ability to <u>identify, formulate</u>, and <b>solve complex engineering</b> problems by applying principles of engineering, science, and mathematics, and using <u>modern engineering tools</u>. [ ABET 1]</p> <p><b>SO 2.</b> an ability to apply <u>engineering design</u> to produce solutions that meet specified needs with consideration of <b>public health, safety, and welfare</b>, as well as <b>global, cultural, social, environmental, and economic factors</b>. [ABET 2]</p>	

<b>Topics Covered</b>	<b>List of Topics</b>	<b>Related CLOs</b>						
	1. Application of mass, energy and momentum conservation principles to open channel flows	CLO2						
	2. types of open channel flows (steady versus unsteady flows with examples)	CLO2						
	3. flow hydraulic controls (critical flow locations); examples of sharp crested and broad-crested weirs, drop structure, and spillway	CLO2						
	4. specific discharge and flows over hump, sump and in variable-width channels (contractions)	CLO1						
	5. non-uniform flows (rapidly varied and gradually varied); examples of hydraulic jump and impounding reservoirs upstream of dams.	CLO3						
	6. design of open channel sections (rigid and loose boundary channels).	CLO2						
<b>Textbook(s) and Other Required Material</b>	<ol style="list-style-type: none"> <li>1. Gupta, R. S. (2016). Hydrology and hydraulic systems. Waveland Press.</li> <li>2. French, R. H., &amp; French, R. H. (1985). Open-channel hydraulics (p. 705). New York: McGraw-Hill.</li> <li>3. Mays, L. W. (2019). Water resources engineering. John Wiley &amp; Sons.</li> </ol>							
<b>Grading System</b>	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Homeworks</td> <td style="width: 50%;">20%</td> </tr> <tr> <td>Two Midterm Exams</td> <td>40%</td> </tr> <tr> <td>Final Examination</td> <td>40%</td> </tr> </table>		Homeworks	20%	Two Midterm Exams	40%	Final Examination	40%
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<b>Instructors</b>	Dr.Faisal M. Alfaisal (2A93), email; falfaisal@ksu.edu.sa							
<b>Date of Review</b>	September 2020							