

## CE322 Hydraulics

### Department of Civil Engineering King Saud University

<b>Course Description:</b> <b>CE322 Hydraulics</b> (Required for a BSCE degree)	Friction and minor losses in closed conduits, Analysis of flow in a single pipe and in pipes connected in series and in parallel, Transient flow in pipes, Centrifugal pumps, Elements of open channel sections and classification of flow in an open channel, Analysis and computation of critical and uniform flow in open channels, Design of rigid-boundary channels, Analysis and computation of rapidly and gradually varied flow in open channels. 4 (3, 0, 2)
<b>Prerequisite</b>	CE321 Fluid Mechanics 3 (3, 1, 0)  <b>Topics:</b> Fluid properties, Fluid pressure at a point, Fluid pressure on plane and curved surfaces, Buoyancy, Stability of floating and submerged objects, Types of flow, Continuity equation, Momentum equation, Energy equation, Pressure, velocity, and discharge measurements, Flow resistance.
<b>Course learning Objectives</b>	The main objectives of this course are:-  <ol style="list-style-type: none"> <li>1. Evaluation of friction and minor losses in closed conduits.</li> <li>2. Analysis of flow in a single pipe and in pipes connected in series and in parallel.</li> <li>3. Analysis and computation of transient flow in pipes (Water Hammer).</li> <li>4. Analysis, evaluation and selection of centrifugal pumps.</li> <li>5. Learn basic elements of open channel sections and classify the flow in an open channel.</li> <li>6. Analysis and computation of critical and uniform flow in open channels.</li> <li>7. Design of rigid-boundary channels.</li> <li>8. Analysis and computation of rapidly and gradually varied flow in open channels.</li> </ol>
<b>Topics Covered</b>	<ol style="list-style-type: none"> <li>1. Steady Flow in Closed Conduits</li> <li>2. Introduction to Unsteady Flow in Closed Conduits</li> <li>3. Centrifugal Pumps</li> <li>4. Open Channel Flow</li> </ol>
<b>Class/ tutorial Schedule</b>	Three lecture sessions a week (50 minutes each session) and one tutorial session and one lab session every other week (110 minutes each session)
<b>Project</b>	None
<b>Contribution of Course to Meeting the Professional Component</b>	<ol style="list-style-type: none"> <li>1. Students recognize the importance of applying acquired engineering knowledge to a practical engineering problem.</li> <li>2. Students identify, formulate and solve engineering problems.</li> <li>3. Students are able to evaluate and synthesize information and develop alternative solutions.</li> </ol>
<b>Relationship of Course to Program Outcomes</b>	This course will enhance the student's  <ol style="list-style-type: none"> <li>1. Ability to apply knowledge of mathematics, science, and engineering.</li> <li>2. Ability to design and conduct experiments, as well as to analyze and interpret data.</li> <li>3. Ability to identify, formulate, and solve engineering problems.</li> </ol>
<b>Textbook(s) and/or Other Required Material</b>	<ol style="list-style-type: none"> <li>1. Hydrology &amp; Hydraulic Systems by Ram S. Gupta, Published by Prentice-Hall, New Jersey, U.S.A., 1989.</li> <li>2. Mechanics of Fluids by Merle C. Potter and David C. Wiggert, Published by Prentice Hall, New Jersey, U.S.A., 1997.</li> <li>3. Open Channel Hydraulics by Ven Te Chow, Published by McGraw-Hill,</li> </ol>

	Inc., U.S.A., 1959.
<b>Date of Preparation</b>	May, 2006
<b>Grade distribution</b>	10% Attendance, quizzes, tutorial home-work 10% Laboratory Reports and Laboratory Exams 30% Two Midterm Exams 50% Final Examination
<b>Prepared and modified by</b>	Dr. Samir Ali Ead & Dr. Ibrahim Elsebaie
<b>Reviewed</b>	June 2009