CE322

Hydraulics

Department of Civil Engineering

King Saud University

Course Description: CE322 Hydraulics (Required for a BSCE degree)	Basic Equations of Motion, Laminar and Turbulent Flow, Pipe Flow, Pipe Networks, Dimensional Analysis and Dynamic Similitude, Pumps, Basic Conservation Principles of Continuity, Energy and Momentum in Open Channel Flow, Steady Uniform Flow, Rapidly Varied Flow, and Gradually Varied Flow. Laboratory experiments covering fluid measurements, flow through pipes, open channel. 4 (3, 0, 2)
Prerequisite	CE321 Fluid Mechanics 3 (3, 1, 0) **Topics:** 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 measurements, Velocity measurements, Discharge measurements, Flow resistance.
Course learning Objectives	The main objectives of this course are:- 1. Understanding of the basic hydraulic engineering concepts with emphasis on problem solving skills. 2. Designing of pipelines for steady and unsteady flows. 3. Designing of pumps connected in parallel and series and the determination of the operating point of pumps installed on a piping systems. 4. Designing of open channel sections based on an understanding of the flow characteristics and the relevant equations of motions. 5. Designing of physical models with similarity considerations.
Topics Covered **<u>(15 weeks)</u>**	1. Steady Flow in Closed Conduits (**5 weeks**) 2. Introduction to Unsteady Flow in Closed Conduits (**1 week**). 3. Centrifugal Pumps (**4 weeks**) 4. Open Channel Flow (**4 weeks**) 5. Dimensional Analysis and Similitude (**1 week**)
Class/ tutorial Schedule	Three lecture sessions a week (50 minutes each session) and one tutorial session and one lab session

	every other week (110 minutes each session)
Project	None
Contribution of Course to Meeting the Professional Component	1. Students learn the analysis process to be involved in designing of pipelines for steady and unsteady flows. 2. Students improve their writing, communication and presentation skills. 3. Students recognize the role of professional societies in developing codes and standards and updating current knowledge.
Relationship of Course to Program Outcomes	This course will enhance the student's 1. Ability to apply knowledge in mathematics, physics, and engineering science to civil and engineering problems, 2. Ability to identify and formulate an engineering problem, and to develop a solution, 3. Proficiency in hydraulic engineering. 4. Ability to design a system to meet desired needs. 5. Ability to design and conduct experiments as well as to analyze and interpret data.
Textbook(s) and/or Other Required Material	Hydrology & Hydraulic Systems by Ram S. Gupta, Published by Prentice-Hall, New Jersy, U.S.A., 1989. Mechanics of Fluids by Merle C. Potter and David C. Wiggert, Published by Prentice Hall, New Jersy, U.S.A., 1997. Fluid Mechanics by Victor L. Streeter, E. Benjamin Wylie, and Keith W. Bedford, Published by WCB/McGraw-Hill, Inc., U.S.A., 1998. Open Channel Hydraulics by Ven Te Chow, Published by McGraw-Hill, Inc., U.S.A., 1959. Open-Channel Hydraulics by Richard H. French, Published by McGraw-Hill, Inc., U.S.A., 1985.
Instructor **Office** **Phone**	Dr. Abdulrahman M. Al-Khomairi 2A/22 46-78826
Grading: One Midterm Exam Lab. Exams	 20% 10%

Reports, Tutorial, Quizzes, etc.	10%
Course Project	20%
Final Exam	40%