King Fahd University of Petroleum & Minerals
MECHANICAL ENGINEERING DEPARTMENT

ME 311 : FLUID MECHANICS

Fall Semester 2007-2008 (071)

Instructor: **Dr. S. Z. Shuja** ***Office:*** **22-216;** ***Phone:*** **4465**

Catalog Data: Definition and properties of fluids. Fluid statics with applications. Basic fluid dynamic equations of continuity, energy and momentum with applications to different flow situations and flow measurement. Viscous effects, boundary-layer concepts, laminar and turbulent flow in pipes, open channel flow, fluid dynamics forces on immersed bodies. Modeling and dimensional similarity. Introduction to turbomachinery. **Prereqs:** MATH 201, ME 203, ME 201.

Textbook: Crowe, Elger and Roberson, **ENGINEERING FLUID MECHANICS**, 8th Ed. 2005.

References: 1) Potter. and Wiggert, **Mechanics Of Fluids**.
2) Fox and McDonald, **Introduction to Fluid Mechanics**.
3) White, **Fluid Mechanics**.

Objectives:	***Outcomes***
To provide students with the basic principles required for understanding the main concepts in both areas of fluid statics and fluid dynamics.	Basic understanding of fluid properties and the main concepts of fluid statics.
	Basic understanding of fluid kinematics and the equations governing the pressure variation in flowing and rotating fluids.
	Introducing the momentum and energy conservation principles and the main concepts in dimensional analysis and similitude.
	Basic understanding of surface resistance and the boundary-layer concepts.
	Understanding laminar and turbulent flows in conduits of various shapes.
To develop the ability to apply the main concepts of fluid statics and fluid dynamics in solving a wide range of problems that are normally encountered in engineering practice.	Demonstrating the ability to apply the main concepts of fluid statics in solving problems related to pressure measurements, forces on plane and curved surfaces, buoyancy and stability of submerged and floating bodies.
	Ability to use the basics of fluid kinematics together with the momentum and energy conservation principles for solving a wide variety of problems that are encountered in engineering applications.
	Demonstrating the ability to use the main concepts of dimensional analysis and similitude to obtain the dimensionless parameters for a given flow problem and also to solve various problems related to modeling.
	Applying the basic understanding of flow in conduits for solving problems related to fluid transportation including heating and ventilating systems and oil and water piping systems.

Course Breakdown:

Classes	Chp.	Topics
3	2	Introduction and properties.
6	3	Fluid statics.
9	4-5	Kinematics and Control Volume approach.
12	6-7	Momentum and energy principles and application.
6	8	Dimensional analysis and similitude
6	10	Flow in conduits
3	9	External flows and turbomachinery (self-study)

Attendance: Attendance will be strictly observed and each absence will result in a deduction of 0.5 point of the final grade.

Homework: A homework will be assigned at the beginning of each week and is due a week later. Late homework will not be accepted.

Evaluation:

Exam 1	**Oct. 29, 2007**	**7 - 9 pm**	15%
Exam 2	**Dec. 9, 2007**	**7 - 9 pm**	20%
Quizzes			10%
Homework			10%
Project			5%
Attendance			5%
Final Exam			35%

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