



The University of Jordan
Faculty of Engineering & Technology
Civil Engineering Department

0901361 Fluid Mechanics
 Spring 2013/2014

2010 Course Catalog

3 Credit hours (3 h lectures). Introduction, Fluid properties, Basic units. Fluid statics. Pressure and its measurements. Forces on plane and curved submerged surfaces, buoyancy & floatation. Fluids in motion. Flow kinematics and visualization. Basic control volume approach. Differential and integral continuity equation. Pressure variation in flowing fluids. Euler's and Bernoulli's equations. Applications of Bernoulli equation. Momentum principle and its applications. Navier-Stokes equations. Energy equation, Hydraulic and energy grade lines dimensional analysis and similitude. Surface resistance and introduction to boundary layer theory. Flow in conduits, laminar and turbulent flows, frictional and minor losses, piping systems.

Text Books

	Text book 1	Text book 2
Title	Engineering Fluid Mechanics	-
Author(s)	Donald F. Elger, Barbara C. Williams, Clayton T. Crowe, John A. Roberson	-
Publisher	Wiley	-
Year	2012	-
Edition	10 th edition	-

References

Books	1) Houghtalen R., N. Hwang, A. Akan, Fundamentals of Hydraulic Engineering Systems, 4th edition, Pearson. (ISBN 978-0-13-507064-2) 2) Street R., Watters G., Vennard J., <i>Elementary Fluid Mechanics</i> , 7 th edition, Wiley.
Journals	-
Internet links	http://www.youtube.com/watch?v=lpWjR8r_Uvc&feature=Playlist&p=910CE84079CCFC70&playnext=1&playnext_from=PL&index=43 http://www.youtube.com/watch?v=vCeAfKCC2ng&feature=related http://www.youtube.com/watch?v=eQsmq3Hu9HA http://home.earthlink.net/~mmc1919/venturi.html

Instructor

Instructor	Dr. Khaldoun Shatanawi , E-mail: kshatanawi@ju.edu.jo
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Prerequisites

Prerequisites by topic	Calculus
Prerequisites by course	0301201 Calculus (III)
Co-requisites by course	0301201 Calculus (III)
Prerequisite for	0901362 Hydraulics, 0901371 Water Supply Engineering

Objectives and Outcomes¹

Objectives	Outcomes
1. Teach students the basic fundamentals of fluid mechanics [a]	1.1. Recognize the difference properties of fluids and their importance.

¹ Letters in brackets refer to the Program outcomes

2. Analyze fluid problems in static and motion conditions. [a, b, c, e, k].	2.1. Determine the hydrostatic force and its location for plane and curved surfaces. 2.2. Determine the pressure variation in incompressible and compressible fluids 2.3. Determine the buoyant force 2.4. Determine the pressure or pressure differences through the use of manometers
3. Apply the governing principles and equations to different fluid flow problems involving real fluids. [a, b, c, e, k].	3.1. Compute the average velocity at various sections by use of the continuity equation 3.2. Determine velocity, pressure or elevation through the use of the Bernoulli equation 3.3. Use the momentum control volume equation to solve for forces due to a moving fluid
4. 2. Develop student's analytic ability to apply knowledge to basic engineering fluid mechanics problems. [a, b, c, e, k].	4.1. Solve the 3 pipe flow problems (i.e. 1] unknown headloss, 2] unknown discharge, 3] unknown pipe diameter) 4.2. Determine the head of pumps and turbines through the use of the energy equation 4.3. Determine flow rates with orifice and venturi meters

Topics Covered		
Week	Topics	Chapters in Text
1	Introduction to Fluid Mechanics Engineering	Chapter 1
2-3	Properties of fluid	Chapter 2
4	Fluid statics	Chapter 3
5-6	Fluid in motion	Chapter 4
7	Conservation of mass	Chapter 5
8	Conservation of momentum	Chapter 6
9-10	Conservation of energy	Chapter 7
11	Dimensional analysis and similitude	Chapter 8
12-15	Flow in closed conduits	Chapter 10

Evaluation		
Assessment Tool	Expected Due Date	Weight
Homework & Quizzes	One week after homework problems are assigned	20%
Midterm Exam	According to the department schedule	30 %
Final Exam	According to the universityfinal examination schedule	50 %

Contribution of Course to Meeting the Professional Component
The course contributes to building the fundamental basic concepts, applications, and design of Fluid Mechanics Engineering

Relationship to Program Outcomes (%)

A	b	c	d	e	f	g	h	i	j	K
25	10	10		50						5

Relationship to the Civil Engineering Program Objectives

PEO1	PEO2	PEO3	PEO 4
√	√		

Prepared by:
Last Modified:

Dr. Khaldoun Shatanawi
Feburary 15, 2014