



**The Hashemite University**  
**Faculty of Engineering**  
**Course Syllabus**  
**Department of Mechanical Engineering**

**Course Title:** Fluid Mechanics Lab 1 (0-3-0)      **Course Number:** 110402313  
**Designation:** Compulsory      **Prerequisite(s):** 110402310  
**Instructor:** Dr. Ali Jawarneh      **Instructor's e-mail:** jawarneh@hu.edu.o  
**Office Hours:** 10:00 – 12:00: Sun. & Tue., 11:00 – 12:30: Mon. & Wed.

**Course Description (catalog):** Experimental methods and measurements: fluid properties, orifice and jet flow, Bernoulli's theorem-flow through a venture tube, impact of water jet, losses in pipes and fittings, comparative fluid measurements, hydrostatic pressure, flow visualizations and turbulent pipe flow, performance of pumps.

**Textbook(s) and/or Other Supplementary Materials:**

Fluid Mechanics laboratory Manual.

**References:**

1. Engineering Fluid Mechanics, C.T. Crowe, 9th International Edition, Wiley, USA, 2009, ISBN: 978-0-470-40943-5
2. A Brief Introduction to Fluid Mechanics, 3rd Edition, D. F. Young, B. R. Munson, and T. H. Okiishi, Wiley, USA, 2004. ISBN: 978-0-470-09928-5
3. Fluid Mechanics, 2nd Edition, Yunus A. Cengel, and John M. Cimbala, McGraw-Hill, USA, 2010, ISBN: 13-9780073529264
4. Introduction to Fluid Mechanics, 7th Edition, R.W. Fox, P.J. Pritchard, A.T. McDonald, Wiley, USA, 2008, ISBN: 978-0-471-74299-9.

**Major Topics Covered:**

Topic	# Weeks	# Contact hours*
<b>Experiment 1:</b> - Measurement of density and specific gravity - Calibration of Bourdon gauge	1	3
<b>Experiment 2:</b> - Measurement of viscosity using falling ball viscometer - Saybolt viscometer	1	3
<b>Experiment 3:</b> Center of pressure on a plane surface	1	3
<b>Experiment 4:</b> Orifice and Jet flow	1	3
<b>Experiment 5:</b> - Laminar and Turbulent flow visualization using Osborne Reynolds apparatus - Flow field Diagnosis with flow visualization technique	1	3
<b>MID EXAM</b> Material included[Exp. 1, 2, 3, 4 and 5]	1	3
<b>Experiment 6:</b> Bernoulli's theorem application	1	3
<b>Experiment 7:</b> Impact of water jet	1	3
<b>Experiment 8:</b> Fluid friction in pipes and losses from fittings	1	3
<b>Experiment 9:</b> Pumps in series and parallel	1	3
<b>Experiment 10:</b> Lift and Drag measurement of aerofoil and velocity distribution in wind tunnel	1	3
<b>Experiment 11:</b> Pump test set	1	3

<b><u>Design of an experiment</u></b>	3	9
<b>Total</b>	<b>15</b>	<b>45</b>

\*Contact hours include lectures, quizzes and exams

**Specific Outcomes of Instruction (Course Learning Outcomes):**

After completing the course, the student will be able to:

1. Be familiar and measure experimentally some properties of fluids. [a,b,d, e,g,k]
2. Determine the position of the center of pressure on partially or entirely submerged object in the water. [a,b,d, e,g,k]
3. Investigate the characteristics of flow through different obstacles such as: orifice and venturi meter. [a,b,d, e,g,k]
4. Measure force resulted by a water jet when it strikes a target and compares the results with the theoretical values that calculated from the momentum equation. [a,b,d, e,g,k]
5. Demonstrate the pressure loss due to friction in pipes, valves and other fittings and to determine experimentally the relationship between friction factor and Reynolds number. [a,b,d, e,g,k]
6. Study the performance of parallel and series pump. [a,b,d, e,g,k]
7. Study Lift and drag of an airfoil and velocity distribution in wind tunnel. [a,b,d, e,g,k]
8. Design and build a device to run an experiment in fluid mechanics field. [a,b,d,e,g,k]
9. Write and present reports. [d,g,k]

**Student Outcomes (SO) Addressed by the Course:**

#	Outcome Description	Contribution
<b>General Engineering Student Outcomes</b>		
(a)	Ability to apply mathematics, science and engineering principles.	L
(b)	Ability to design and conduct experiments, analyze and interpret data.	H
(c)	Ability to design a system, component, or process to meet desired needs.	
(d)	Ability to function on multidisciplinary teams.	L
(e)	Ability to identify, formulate and solve engineering problems.	H
(f)	Understanding of professional and ethical responsibility.	
(g)	Ability to communicate effectively.	M
(h)	The broad education necessary to understand the impact of engineering solutions in a global and societal context.	
(i)	Recognition of the need for and an ability to engage in life-long learning.	
(j)	Knowledge of contemporary issues.	
(k)	Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.	L

<b>Grading Plan:</b>	Mid Exam	25 Points	<b>Sun. 19/03/2017 [ 14:00 ~ 15:45]</b>
	DOE	15 Points	
	Reports	25 points	
	Final exam	40 points	

**General Notes:** Beware of Plagiarism: copying and handing in for credit someone else's work  
Any plagiarism case will result in an automatic 'F' for the course

**Prepared by:** *Dr. Ali Jawarneh*

**Date:** 30 Sep 2020