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

Design of an experiment	3	9
Total	**15**	**45**

*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
	General Engineering Student Outcomes	
(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

Grading Plan:

Mid Exam	25 Points	**Sun. 19/03/2017 [14:00 ~ 15:45]**
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