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

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|---|---|---|
| **Course Title:** | **Fluid Mechanics 3 (3,0, 0)** | **Course Number:110402310** |
| **Designation:** | Compulsory | **Prerequisite(s): 110101203** |
| **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):** Flow classification, fluid properties, viscosity, vapor pressure, fluid statics, pressure measurements, buoyancy, fluids in motion, continuity equation, pressure gradient in fluid flow, Bernolli's, momentum and energy equations, dimensional analysis and similitude, and flow in conduits.

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

Engineering Fluid Mechanics, C.T. Crowe et al., 9th International Edition, Wiley, USA, 2009, ISBN: 978-0-470-40943-5**.**

**References:**

1. 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.
2. Fluid Mechanics, 2nd Edition, Yunus A. Cengel, and John M. Cimbala, McGraw-Hill, USA, 2010, ISBN: 13-9780073529264.
3. 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:**

| Topics | No. of Weeks | Contact hours* |
|---|---|---|
| Introduction to Fluid Mechanics | 1 | 3 |
| Fluid Properties | 1 | 3 |
| Fluid in Statics | 2 | 6 |
| Fluid in Motion: Pressure Variation in a Moving Fluid | 2 | 6 |
| Control Volume Approach: The Continuity Equation | 2 | 6 |
| Momentum Equation | 2 | 6 |
| The Energy Equation | 2 | 6 |
| Dimensional Analysis and Similitude | 1 | 3 |
| Surface Resistance: Boundary Layer | 1 | 3 |
| Flow in Conduits | 1 | 3 |
| **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. Understand fluid properties. (a)
2. Understand fluids in statics. (a, e)
3. Understand pressure variation in flowing fluids (a, e)
4. Develop the control volume formulation on conservation of mass, momentum, and energy. (a, e)
5. Apply control volume approach to different problems in fluid mechanics (a, e)
6. Perform dimensional analysis for problems in fluid mechanics (a, e)
7. Understand the differential forms of the conservation of mass, momentum, and energy (a, e)
8. Understand the principles of the boundary layer theory(a)
9. Enhance systematic problem solving and critical thinking skills (a, e)

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

| # | Outcome Description | Contribution |
|---|---|---|
| | **General Engineering Student Outcomes** | |
| (a) | an ability to apply knowledge of mathematics, science, and engineering | M (30) |
| (b) | an ability to design and conduct experiments, as well as to analyze and interpret data | |
| (c) | an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability | |
| (d) | an ability to function on multidisciplinary teams | |

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|---|---|---|
| (e) | an ability to identify, formulate, and solve engineering problems | H(70) |
| (f) | an understanding of professional and ethical responsibility | |
| (g) | an ability to communicate effectively | |
| (h) | the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context | |
| (i) | a recognition of the need for, and an ability to engage in life-long learning | |
| (j) | a knowledge of contemporary issues | |
| (k) | an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. | |
| **H**=High, **M**= Medium, **L**=Low | | |

**Grading Plan:**

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|---|---|---|
| 1st Exam | 25 Points | **Mon. 07/10/2016 [ 14:00 ~ 15:45]** |
| 2nd Exam | 25 Points | **Th. 12/12/2016 [ 14:00 ~ 15:45]** |
| HWs. & Qs | 10 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