# Jordan University of Science and Technology

## Faculty of Engineering

## Aeronautical Engineering Department

AE341 Fluid Mechanics - JNQF Level: 7

First Semester 2023-2024

| Course Catalog |
|---|
| 3 Credit Hours. Fluids and their properties, Conservation equations and their applications, Dimensional analysis and similarity, Two-dimensional inviscid flow, stream function, and velocity potential, Superposition of elementary flow, Incompressible laminar and turbulent flow in pipes, friction factor, Laminar flow between parallel plates and in ducts, Elementary boundary layer flow, skin friction and drag, Pump and pipeline system characteristics. |

| Text Book | |
|---|---|
| **Title** | Introduction to Fluid Mechanics |
| **Author(s)** | R.W. Fox, A.T. McDonalds, and P. J. Pritchard |
| **Edition** | 8th Edition |
| **Short Name** | Textbook |
| **Other Information** | |

| Instructor | |
|---|---|
| Name | **Dr. MUATH BANI HANI** |
| Office Location | - |
| Office Hours | Sun : 10:30 - 11:30<br>Mon : 09:30 - 11:30<br>Tue : 10:30 - 11:30<br>Wed : 09:30 - 10:30<br>Thu : 10:30 - 11:30 |
| Email | mabanihani@just.edu.jo |

| Class Schedule & Room |
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Section 1:
Lecture Time: Sun, Tue, Thu : 09:30 - 10:30
Room: A3130

| Prerequisites | | |
|---|---|---|
| **Line Number** | **Course Name** | **Prerequisite Type** |
| 921010 | PHY101 General Physics (1) | Prerequisite / Pass |
| 902030 | MATH203 Ordinary Differential Equations | Prerequisite / Pass |

| Tentative List of Topics Covered | | |
|---|---|---|
| **Weeks** | **Topic** | **References** |
| Week 1 | Introducion | **chapter 1** From **Textbook** |
| Week 2 | Fundamental Concepts | **Chapter 2** From **Textbook** |
| Week 3 | Fluid Statics | **Chapter 3** From **Textbook** |
| Weeks 4, 7 | Basic Equations in Integral Form for a Control Volume. | **Chapter 4** From **Textbook** |
| Weeks 8, 9 | Introduction to Differential analysis of fluid motion | **Chapter 5** From **Textbook** |
| Weeks 10, 12 | Incompressible inviscid Flow | **Chapter 6** From **Textbook** |
| Weeks 13, 14 | Dimensional AnalysiS and Similitude | **Chapter 7** From **Textbook** |
| Weeks 15, 16 | Internal Incompressible Viscous Flow | **Chapter 8** From **Textbook** |

| **Mapping of Course Outcomes to Program Outcomes and NQF Outcomes** | **Course Outcome Weight (Out of 100%)** | **Assessment method** |
|---|---|---|
| Identify the fluid properties where the students will be able to demonstrate a comprehensive understanding of fundamental fluid properties, including viscosity, density, and pressure, and their role in fluid mechanics. [100SO1] [100L7K1] | 10% | |
| Analyze fluid problems in motion; where the students will be able to apply the principles of mass, momentum, and energy conservation equations to analyze and solve practical problems in fluid dynamics. [100SO1] [100L7K1] | 20% | |
| Perform dimensional analysis and similitude where the students will proficiently employ dimensional analysis and similarity techniques to model and predict fluid flow behavior in different engineering scenarios. [100SO1] [100L7K1] | 15% | |

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|---|---|---|
| Analyze two-dimensional inviscid flow; where the students will gain the ability to analyze and describe two-dimensional inviscid flow using stream functions and velocity potentials and apply superposition principles to determine the combined effect of elementary flows. [100SO1] [100L7K1] | 20% | |
| Analyze and comprehend the elementary boundary layer flow, skin friction, and drag forces. [100SO1] [100L7K1] | 15% | |
| Analyze pump and pipeline systems; while considering characteristics such as head losses, pump performance, and pipeline design, thereby demonstrating competence in designing and evaluating fluid transport systems. [100SO2] [100L7S1] | 20% | |

| Relationship to Program Student Outcomes (Out of 100%) | | | | | | |
|---|---|---|---|---|---|---|
| SO1 | SO2 | SO3 | SO4 | SO5 | SO6 | SO7 |
| 80 | 20 | | | | | |

| Relationship to NQF Outcomes (Out of 100%) | |
|---|---|
| L7K1 | L7S1 |
| 80 | 20 |

| Evaluation | |
|---|---|
| **Assessment Tool** | **Weight** |
| First | 30% |
| Second | 30% |
| Final | 40% |

| Policy | |
|---|---|
| Course Policy | Attendance<br>The student is required to attend all the registered courses. The instructor shall register student attendance or absence electronically.<br>JUST policy requires the faculty member to assign ZERO grade (35) if a student misses 20% of the classes.<br>If you miss a class, it is your responsibility to find out about any announcements or assignments you may have missed<br><br>Exam/Homework<br>Makeup exams should not be given unless there is a valid excuse according to JUST policies.<br>Arrangements to take an exam at a time other than the one scheduled MUST be made prior to the scheduled exam time.<br>Cheating or copying from a neighbor on exam, quiz, or homework is an illegal and unethical activity.<br>The standard JUST policy will be applied.<br>All assignments must be your own work (your own words)<br>Students are responsible for all the information provided in the lecture. Information presented in class supersedes any information posted elsewhere. |