



Course Specification

DIPLOMA

Course Title: Fluid Mechanics

Course Code: APRT1204

Program: Renewable energy technologies

Department: Diploma Department

College: The Applied College

Institution: Umm Al-Qura University

Version: 1

Last Revision Date: 10 February 2025



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A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

A. ☐ University ☐ College ☒ Department ☐ Track ☐ Others
B. ☒ Required ☐ Elective

3. Level/year at which this course is offered: (2nd Level / 1st Year)

4. Course General Description:

1. Course Description

Introduction and basic concepts. Properties of fluids. Pressure and fluid statics. Fluid kinematics. Continuity equation. Bernoulli and energy equations. Momentum analysis of flow systems.

5. Pre-requirements for this course (if any):

6. Co-requisites for this course (if any):

7. Course Main Objective(s):

Course Main Objective

Understanding and learning the basics of fluid mechanics, fluid properties, the fundamentals of fluid statics and meaning of hydrostatic pressure, the methods of pressure measurement, forces on submerged surfaces, the conditions of stability of submerged and floating bodies. Learning the fundamentals of fluid dynamics, the concepts of continuity, momentum and energy equations, Bernoulli equation and its applications analysis of fluid flow using the energy equation.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	5	100%
2	E-learning		
3	Hybrid <ul style="list-style-type: none"> Traditional classroom E-learning 		
4	Distance learning		



3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	45
3.	Field	
4.	Tutorial	
5.	Others (specify)	
Total		75

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Able to describe the fundamentals of fluid statics	K1	Lectures, tutorials and independent study assignments	Homework, Quizzes, Midterm and Exam
1.2	Able to describe the fluid kinematics	K2	Lectures, tutorials and independent study assignments	Homework, Quizzes, Midterm and Exam
1.3	Able to apply the different types of conservation equations (Mass, Bernoulli, Momentum and Energy equation in fluid flow)	K3	Lectures, tutorials and independent study assignments	Homework, Quizzes, Midterm and Exam
1.4	Able to apply the momentum analysis of flow systems	K4	Lectures, tutorials and independent study assignments	Homework, Quizzes, Midterm and Exam
2.0	Skills			



Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.1	Ability to apply knowledge of mathematics, science, and engineering to fluid mechanics.	S1	Lectures, tutorials and independent study assignments	Homework, Quizzes, Midterm and Exam
2.2	Ability to identify, formulate, and solve engineering problems in fluid mechanics	S2	Lectures, tutorials and independent study assignments	Homework, Quizzes, Midterm and Exam
3.0	Values, autonomy, and responsibility			
3.1	Ability to self-learning about engineering problems in fluid mechanics	V3	Lectures, tutorials and independent study assignments	Homework, Quizzes, Midterm and Exam

C. Course Content

No	List of Topics	Contact Hours
1. 1	1. INTRODUCTION 1.1 Basic Definitions 1.2 The No-Slip Condition 1.3 Classification of Fluid Flows 1.4 System and Control Volume 1.5 Importance of Dimensions and Units	3
2. 2	2. PROPERTIES OF FLUIDS 2.1 Introduction 2.2 Density and Specific Gravity 2.3 Vapor Pressure and Cavitation 2.4 Viscosity Surface Tension and Capillary Effect	3





3	3. FLUID STATICS 3.1 Absolute and Gauge Pressure 3.2 Basic Equation of Fluid Statics 3.3 Pressure - Depth Relationships 3.4 Pressure measurement devices 3.5 Hydrostatic forces on submerged plane surfaces 3.6 Hydrostatic forces on submerged curved surfaces Buoyancy and stability	6
4	4. FLUID KINAMTICS 4.1 Lagrangian and Eulerian Descriptions 4.2 Flow Patterns and Flow Visualization 4.3 Plots Equation of Fluid Flow Data 4.4 Types of Motion or Deformation of Fluid Elements 4.5 Vorticity and Rotationality 3.6 The Reynolds Transport Theorem	6
5	5. CONTINUITY, BERNOULLI AND ENERGY EQUATIONS 5.1 Conservation of Mass 5.2 Mechanical Energy and Efficiency 5.3 The Bernoulli Equation 5.4 General Energy Equation Energy Analysis of Steady Flows	6
6	6. MOMENTUM ANALYSIS OF FLOW SYSTEMS 6.1 Newton's Laws 6.2 Choosing a Control Volume 6.3 Forces Acting on a Control Volume 6.4 The Linear Momentum Equation The Angular Momentum Equation	6
7	<i>Lab Work</i>	45
Total		75

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.1	Quizzes and Exercise	3-8	%10
2.2	Report & Presentation	3-8	%20
3.3	Mid-term	9	%20
4	Final exam	17/18	50%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources





Essential References	Fluid Mechanics: Fundamentals and Applications, 4th edition, Yunus A. Cengel, John M. Cimbala " "Fluid Mechanics", Frank M. White, McGraw-Hill Publishers, 7th Edition.
Supportive References	1. FLUID MECHANICS NOTES, Peter E. Clark, USA, 2007. 2. An Introduction to Fluid Mechanics, P. A. Sleight and C. J. Noakes, UK, 2008, 3. An Introduction to Fluid Mechanics-Notes, A. Sleight, School of Civil Engineering, University of Leeds, UK, 2001.
Electronic Materials	All the lecture notes •
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Data show
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Faculty	Direct (project, HW, Quiz, midterm and final exam)
Effectiveness of Students assessment	Students	Indirect (Student Survey)
Quality of learning resources	Program Coordinator	Direct analysis
The extent to which CLOs have been achieved	Program Coordinator	Direct analysis
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify))

Assessment Methods (Direct, Indirect)





G. Specification Approval

COUNCIL /COMMITTEE	Umm Al-Qura University Council
REFERENCE NO.	851141114462/190394
DATE	22/11/1446

