



Course Specifications

Course Title:	Fluid Physics
Course Code:	PHY4510
Program:	Physics
Department:	Physics
College:	Applied Sciences
Institution:	Umm Al-Qura University

Table of Contents

A. Course Identification	3	
6. Mode of Instruction (mark all that apply)		3
B. Course Objectives and Learning Outcomes	3	
1. Course Description		3
2. Course Main Objective		3
3. Course Learning Outcomes		3
C. Course Content	4	
D. Teaching and Assessment	4	
1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods		4
2. Assessment Tasks for Students		4
E. Student Academic Counseling and Support	5	
F. Learning Resources and Facilities	5	
1. Learning Resources		5
2. Facilities Required		5
G. Course Quality Evaluation	5	
H. Specification Approval Data	6	



A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered: Year 4
4. Pre-requisites for this course (if any):
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	Total	30

B. Course Objectives and Learning Outcomes

1. Course Description

This course gives physical and mathematical treatment towards the study of fluid behavior under different physical conditions like the increase in pressure, temperature, and velocity. It describes the different approaches to treating the fluid problems and describes the fluid properties in terms of its flow, compressibility, viscosity, etc.

2. Course Main Objective

By the end of this course, the student will be able to

- 1- Discuss the physical properties of a fluid in terms of viscosity, thermal conductivity, and mass diffusivity.
- 2- Differentiate between the different types of fluid flow.
- 3- Use Lagrangian and Eulerian viewpoints and the continuity equation for writing the equations of the flow.
- 4- Discusses the analysis of the Navier-Stokes equations and their applications.



3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Differentiate between the different types of Fluids	K1 (P)
1.2	Describe the physics of the fluid in terms of motion flow, compressibility, and viscosity.	K2 (P)
2	Skills :	
2.1	Solve Fluid flow problems and interpret the experimental results.	S1 (P)
2.2	Apply the physical conditions of the fluids in terms of transport and continuity equations.	S2 (P)
3	Values:	
3.1	The ability to deliver, orally or in writing, the different physics concepts and processes in an effective manner.	V2 (P)

C. Course Content

No	List of Topics	Contact Hours
1	Fundamental Concepts <ul style="list-style-type: none"> • The characteristics of fluids • Notation, dimensions, units and related matters • Properties of fluids • The perfect gas: equation of state • Compressibility; Viscosity; Surface tension • Basic characteristics of fluids in motion • Classification and description of fluid flow 	6
2	Fluid Statics <ul style="list-style-type: none"> • Variation of pressure with position in a fluid • The measurement of pressure • First and second moments of area • Buoyancy • The stability of bodies in fluids • Equilibrium of moving fluids 	8
3	The Principles Governing Fluids in Motion <ul style="list-style-type: none"> • Acceleration of a fluid particle • The continuity equation • Bernoulli's equation • General energy equation for steady flow of any fluid • Pressure variation perpendicular to streamlines • Simple applications of Bernoulli's equation • The momentum equation for steady flow 	8
4	Flow Between Solid Boundaries and Losses <ul style="list-style-type: none"> • Steady laminar flow between parallel planes and circular pipes • the Hagen–Poiseuille law • The measurement of viscosity • Variation of friction factor • The Flow of an Inviscid Fluid • Compressible Flow of Gasses • Unsteady Flow 	8
Total		30



D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
1.1	Differentiate between the different types of Fluids	Demonstrating the basic information and principles through lectures and discussions.	Homework and periodic and final exams.
1.2	Describe the physics of the fluid in terms of motion flow, compressibility, and viscosity.		
2.0	Skills		
2.1	Solve Fluid flow problems and interpret the experimental results.	Lecturing, discussion, and problem-solving.	Homework and periodic and final exams
2.2	Apply the physical conditions of the fluids in terms of transport and continuity equations.		
3.0	Values		
3.1	The ability to deliver, orally or in writing, the different physics concepts and processes in an effective manner.	Presentations and discussion groups	Quizzes and seminars

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Mid-Term Exam	11	30%
3	Homework and Quizzes	Through term	20%
4	Final Exam	at the end of the term	50%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

Consultation and/or academic advice will be available during the teaching staff office hours

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Mechanics of Fluids, 8 th ed. Bernard Massey
Essential References Materials	Fluid Mechanics, 7 th ed. Frank M White McGraw-Hill Series
Electronic Materials	
Other Learning Materials	



2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom
Technology Resources (AV, data show, Smart Board, software, etc.)	data show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of Teaching	Students	Questionnaires
Achievement of course learning outcomes	Program Leader	Course Report

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

