



## Course Specifications

<b>Course Title:</b>	Engineering Fluid Mechanics
<b>Course Code:</b>	CE 205
<b>Program:</b>	B.Sc. in Civil Engineering
<b>Department:</b>	Civil Engineering
<b>College:</b>	Jubail University College
<b>Institution:</b>	Jubail University College

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## A. Course Identification

<b>1. Credit hours:</b>	3
<b>2. Course type</b>	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
<b>3. Level/year at which this course is offered:</b>	Level 3, Second Year
<b>4. Pre-requisites for this course (if any):</b> CE 201 Statics MATH 112 Calculus II	
<b>5. Co-requisites for this course (if any):</b> None	

### 6. Mode of Instruction (mark all that apply)

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

### 7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	<b>Total</b>	<b>45</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

*CE 205 Engineering Fluid Mechanics (3-0-3)*

*Prerequisite: CE 201 & MATH 112*

Properties of fluids, hydrostatics with applications to manometers, forces on plane and curved surfaces, buoyancy, equations of continuity, energy and linear momentum with applications, dimensional analysis, dynamic similarity, open channel flow, conduit flow.

### 2. Course Main Objective

The main purpose for this course is to prepare the student to recognize and define various engineering properties of fluids and apply them to calculate the flow properties in a fluid system.

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge and Understanding</b>	
1.1	Describe the various fluid and fluid flow properties	8
2	<b>Skills :</b>	
2.1	Measure the pressure in the pipes and hydrostatic pressure on curved and plane surfaces and stability of floating bodies.	1
2.2	Solve problems related to conduit flow and open channel flow.	1
2.3	Measure fluid properties using energy and momentum equations	1
2.4	Use the principles of dimensional analysis and similarity studies and its application to fluid systems	1
3	<b>Values:</b>	
	N/A	

### C. Course Content

No	List of Topics	Contact Hours
1	<b>Unit 1.</b> Fluids and Their Properties: 1.1 Introduction to Fluids and Fluid Mechanics 1.2 Fluid properties – Density, Viscosity, Surface Tension, Capillarity Compressibility and Bulk Modulus, Vapor Pressure and cavitation, 1.3 Measuring units	6
2	<b>Unit 2.</b> Hydrostatics 2.1 Pressure and Pressure Head 2.2 Pressure Measurement by Manometer 2.3 Hydrostatic forces on immersed surfaces (Plane and curved) 2.4 Buoyancy	9
3	<b>Unit 3.</b> Concepts of Fluid Flow 3.1 Types of fluid flow – Uniform flow and steady flow; Compressible and incompressible flow; One, two and three dimensional flow 3.2 Equations of continuity 3.3 Energy and linear momentum equations 3.4 Practical applications of the above theories	9
4	<b>Unit 4.</b> Conduit Flow 4.1 Incompressible flow through ducts and pipes 4.2 Losses in pipe flow 4.3 Incompressible flow through pipes in series and parallel 4.4 Incompressible flow through branching pipes	9
5	<b>Unit 5.</b> Open Channel Flow 5.1 Introduction to uniform flow in open channel, 5.2 Optimum shape of cross section for uniform flow in channels 5.3 Introduction to non-uniform flow in open channel 5.4 Specific energy and alternative depth of flow	6
6	<b>Unit 6.</b> Dimensional Analysis and Similarity 6.1 Dimensions and units 6.2 Fundamental and derived units and dimensions 6.3 Law of dimensional homogeneity 6.4 Dimensional Analysis by the indicial method	6

	6.5 Geometric and Dynamic similarities	
	6.6 Model studies using similarity laws	
<b>Total</b>		45

## 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	<b>Knowledge and Understanding</b>		
1.1	Describe the various fluid and fluid flow properties	Interactive and independent learning	Quiz 1, midterm, assignment 1 & final
2.0	<b>Skills</b>		
2.1	Measure the pressure in the pipes and hydrostatic pressure on curved and plane surfaces and stability of floating bodies.	Interactive learning Self-directed and independent learning	Quiz 2, assignment 2, midterm & final
2.2	Solve problems related to conduit flow and open channel flow.		Quiz 2, assignment 2, midterm & final
2.3	Measure fluid properties using energy and momentum equations		Quiz 2, assignment 2, midterm & final
2.4	Use the principles of dimensional analysis and similarity studies and its application to fluid systems		Quiz 2, assignment 2, midterm & final
3.0	<b>Values</b>		
	N/A		

### 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1	4	10%
2	Assignment 1	6	10%
3	Mid-term LT	8	20%
4	Quiz 2	12	10%
5	Assignment 2	14	10%
6	Final Exam LT	17-19	40%

\*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 :

- Office hours 5 hr/week; students can go in times of office hours for teacher to explain what could not be understood from the lesson.
- Students can communicate with a staff member outside the official working hours by email.
- Students are also encouraged to visit their academic advisors.

## F. Learning Resources and Facilities

## 1. Learning Resources

<b>Required Textbooks</b>	<a href="#">Crowe, C. T.</a> , <a href="#">Donald, F. E.</a> and <a href="#">John, A. R.</a> (2014). <i>Engineering Fluid Mechanics</i> . USA: John Wiley & Sons
<b>Essential References Materials</b>	<a href="#">Okiishi, M.Y.</a> (2006). <i>Fundamentals of fluid mechanics</i> .USA : Wiley <a href="#">Fox, R.W.</a> , <a href="#">Prichard, P. J.</a> and <a href="#">McDonald, A. T.</a> (2008). <i>Introduction to Fluid Mechanics</i> . USA :Wiley
<b>Electronic Materials</b>	N/A
<b>Other Learning Materials</b>	N/A

## 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture rooms with a capacity of at least 25 students and fitted with multimedia projector and a computer.
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	None
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment as per QMS-Policy-006 Feedback Survey, QMS-QAP-116 Monitoring Students' Satisfaction	Students	Indirect: Analyzing the results of the following surveys Course Evaluation Survey(CES), Program Evaluation Survey (PES), Student Experience Survey (SES)
Quality of Exam papers and Verifying Standards of Student Achievement as per QMS-Policy-004 Policy for Examinations and Marking, QMS-ACP-102 Procedure for Marking Examinations	Examination Committee	Direct: Peer review of examination papers and review or double check a minimum of three or 10% of answer papers. Verifying the entries in the Activity Mark Sheet.
Achievement of learning outcomes as per QMS-Policy-001 Course Review, QMS-CDP-106, QMS-CDP-112 Curriculum Review	Faculty	Direct: Course Report (Section B-3)

<b>Evaluation Areas/Issues</b>	<b>Evaluators</b>	<b>Evaluation Methods</b>
Implementation of the action plans based on previous semester as per QMS-Policy-001 Course Review, QMS-CDP-106 Procedure for Course Review, QMS-CDP-112 Procedure for Curriculum Review	Faculty	Direct and Indirect: Course report (Section G-1, G-2)
Monitoring Teaching and Learning as per QMS-Policy-005 Monitoring of Teaching and Learning	Chairperson/Program Director/Course Director	Indirect: Feedback by Chairperson/Program director/Course director. Program Delivery Record.
Effectiveness of planned Teaching Strategies QMS-Policy-001 Course Review	Faculty	Indirect: Course Report (Section B-4)
Course effectiveness and planning for improvement as per QMS-Policy-001 Course Review, QMS-CDP-106 Procedure for Course Review, QMS- CDP-112 Procedure for Curriculum Review	Faculty	Direct and Indirect: Course report (Section G-3)
Verifying Standards of Student Achievement and Quality of Exam papers as per QMS-ACP-119 External Assessment Review	Assessment External Reviewer	Direct: Report of assessment external reviewer. Review of sample of ten or 10% of student's assessments and coursework scripts.

**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

<b>Council / Committee</b>	Civil Engineering Department Council
<b>Reference No.</b>	REG MIN-CED-009
<b>Date</b>	20-04-2020

## Appendix A Revision Details

Revision no.	DESCRIPTION	Reference MoMs			
		DC		CDC	
		Sem	#	Sem	#
1	Revision of Course Teaching Strategies and action verbs based on the comments of NCAAA reviewer	392	4	392	4
2	Course Specification Template 2018	402			