MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fluid Mechanics**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**PE225**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		2	**Semester of Delivery**		1
Administering Department		Petroleum Engineering Department	**College**	College of Engineering	
Module Leader	Assist. Lect. Amjed Rasool		**e-mail**	amjed.rassoul@gmail.com	
Module Leader's Acad. Title		Assistant Lecturer	**Module Leader's Qualification**		MSc
Module Tutor	Assist. Lect. Amjed Rasool		**e-mail**	amjed.rassoul@gmail.com	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1. Define the fundamental principles of fluid mechanics, including fluid properties, fluid statics, and fluid dynamics, as applied in engineering systems. 2. Define the principles of fluid statics to determine pressure distributions, hydrostatic forces, and buoyancy in engineering systems. 3. Recognize the continuity, momentum, and energy equations (e.g., Bernoulli's equation) to analyze fluid flow in various engineering systems.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Knowledge	A2	A.2.1 Define the physical properties: density, viscosity, surface tension, compressibility, specific weight, specific gravity, and pressure effects on fluid properties. A.2.2 Define the main standard unit systems and dimensional analysis. A.2.3 Describe the fluid motion: streamlines, pathlines, streaklines, and flow patterns (Laminar or Turbulent). A.2.4 Recognize the Bernoulli's equation, Darcy-Weisbach equation, and the Friction factors with the Moody diagram.
		A3	A.3.1 Define the Reynolds number, Viscosity of fluid, Pressure drop in piping systems, Pumps characterization, Orifice meter units, Venturi meter units, etc. A.3.2 Recognize laboratory experiments of fluid behavior at different conditions. A.3.3 Classify the patterns of fluid flow at different velocities (steady vs. unsteady, uniform vs. non-uniform, laminar vs. turbulent). A.3.4 Apply the experiments to fluid dynamics and measurements of flow.
	Skills	B1	B.1.1 Function efficiently as an individual B.1.2 Function as a member of multidisciplinary and multicultural teams.
		B2	B.2.1 Communicate effectively – graphically with a range of audiences using contemporary tools. B.2.2 Communicate verbally and in writing with a range of audiences using contemporary tools.
	Ethics	C3	C.3.1 Utilize contemporary technologies. C.3.2 Make use of codes of practice and standards, quality guidelines, C.3.3 Utilize health and safety requirements C.3.4 Show environmental issues and risk management principles.
Indicative Contents المحتويات الإرشادية	1. Unit 1: **Introduction, Fluid Properties, Unit Systems and Dimensional Analysis** (6 hr). 2. Unit 2: **Fluid Statics, Fluid Kinematics, Fundamentals of Fluid Dynamics** (10 hr). 3. Unit 3: **Internal Flows, External Flows** (8 hr). 4. Unit 4: **Flow Networks** (4 hr).		

	5. Unit 5: **Pumps and Turbomachinery** (2 hr).

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	• Presentation • Interactive Learning • Discussions • Brainstorming • Group Solving Problems • Problem-Based Learning • Self-Learning

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	3 and 9	A2
	Assignments	2	10% (10)	2 and 10	A2
	Lab.	1	10% (10)	Continuous	A3
	Report	1	10% (10)	12	A2, A3
Summative assessment	**Midterm Exam**	1hr	10% (10)	7	A2
	Final Exam	3hr	50% (50)	16	A2, A3
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري		
	Material Covered	**LOs**
Week 1	**Introduction of Fluid Mechanics**	
Week 2	**Fluid Properties:** Density, viscosity, surface tension, and compressibility, specific weight, and specific gravity.	A2, B1, B2, C3
Week 3	**Unit Systems and Dimensional Analysis**	A2, B1, B2, C3
Week 4	**Fluid Statics:** • Pressure distribution in static fluids.	A2, B1, B2, C3
Week 5	**Fluid Statics:** • Hydrostatic forces on submerged and curved surfaces. • Center of pressure and buoyancy.	A2, B1, B2, C3
Week 6	**Fluid Kinematics** • Streamlines, pathlines, and streaklines. • Classification of flows: steady vs. unsteady, laminar vs. turbulent.	A2, B1, B2, C3
Week 7	**Fundamentals of Fluid Dynamics** • Conservation laws: mass, momentum, and energy.	A2, B1, B2, C3
Week 8	**Fundamentals of Fluid Dynamics** • Bernoulli's equation and its applications. • Energy grade line and hydraulic grade line.	A2, B1, B2, C3
Week 9	**Internal Flows** • Laminar and turbulent flow in pipes.	A2, B1, B2, C3
Week 10	**Internal Flows** • Darcy-Weisbach equation and friction factor. • Head losses in pipe systems, including minor losses.	A2, B1, B2, C3
Week 11	**External Flows** • Reynolds number and its engineering applications.	A2, B1, B2, C3
Week 12	**External Flows** • Boundary layer theory. • Drag and lift forces in external flow.	A2, B1, B2, C3
Week 13	**Flow Networks** • Analysis of interconnected flow systems (pipe networks). • Conservation of mass and energy in flow networks.	A2, B1, B2, C3
Week 14	**Flow Networks** • Hardy Cross method for solving pipe networks.	A2, B1, B2, C3
Week 15	**Pumps and Turbomachinery**	A2, B1, B2, C3
Week 16	**Preparatory week before the final Exam**	

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر

	Material Covered	LOs
Week 1	Introduction	
Week 2	Lab 1: Fluid Motion: streamlines, pathlines, streaklines, and flow patterns (Laminar or Turbulent).	A3
Week 3	Lab 2: Reynold's Number Determination	A3
Week 4	Lab 3: Viscosity Measurement Using Stokes' Law (Falling Sphere Method)	A3
Week 5	Lab 4: Bernoulli's Principle Demonstration	A3
Week 6	Lab 5: Pressure drop in piping systems	A3
Week 7	Lab 6: Orifice meter Unit	A3
Week 8	Lab 7: Venturi meter Unit	A3
Week 9	Lab 8: Pump Characteristics	A3
Week 10	Lab 9: Centrifugal Pump	A3
Week 11	Lab 10: Pumps in Series	A3
Week 12	Lab 11: Pumps in Parallel	A3
Week 13	Lab 12: Determination of Friction Factor in Pipes	A3

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. Munson, Bruce Roy, Donald F. Young, and Theodore Hisao Okiishi. "Fundamentals of fluid mechanics" Oceanographic Literature Review 10.42 (2009): 831. 2. White, F. M. "Fluid mechanics " (8th ed.). McGraw-Hill Education (2016).	No
Recommended Texts	Munson, Bruce Roy, Donald F. Young, and Theodore Hisao Okiishi. "Fundamentals of fluid mechanics"	No
Websites	https://eng.alayen.edu.iq//colleges/e/42	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** – Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.