

MODULE DESCRIPTION

وصف المادة الدراسية

Module Information					
معلومات المادة الدراسية					
Module Title	Production Eng. I		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar		
Module Code	PE215				
ECTS Credits	4				
SWL (hr/sem)					
Module Level		3	Semester of Delivery		5
Administering Department		Petroleum Engineering	College	College of Engineering	
Module Leader	Raed H. Allawi		e-mail	raed.Allawi@alayen.edu.iq	
Module Leader's Acad. Title			Module Leader's Qualification		Ph.D.
Module Tutor	Raed H. Allawi		e-mail	raed.Allawi@alayen.edu.iq	
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Scientific Committee Approval Date		2025/10/5	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	By completing this module, learners will: - Understand well completion operations, methods, equipment, and fluids. - Analyze perforation techniques and optimal interval selection. - Conduct Drill Stem Tests (DST) and interpret pressure buildup curves. - Characterize near-wellbore conditions and assess skin effects. - Optimize separation processes for oil, gas, and water. - Manage oil storage and measurement using calibration techniques.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Knowledge	A2	A2.1 Define well completion, Well Perforation, Drill Stem Test, Skin Effect and Productivity Index. A2.2 Classify well completion, Well Perforation, Drill Stem Test, Skin Effect and Productivity Index A2.3 Illustrate well completion, Well Perforation, Drill Stem Test, Skin Effect and Productivity Index
	Skills	B1	B1.1 Function efficiently as an individual B1.2 Function as a member of multidisciplinary and multicultural teams
		B2	B2.1 Communicate effectively – graphically with a range of audiences using contemporary tools. B2.2 Communicate verbally and in writing with a range of audiences using contemporary tools.
	Ethics	C2	C2.1 Recognize professional and ethical responsibility. C2.2 Adhere and respect diversity.
Indicative Contents المحتويات الإرشادية	- Well completion operations: design parameters, methods, equipment, and completion fluids - Perforation techniques and selection of perforation intervals. - Drill Stem Test (DST): methods, equipment, pressure analysis, and reservoir evaluation - Near-wellbore damage and skin effect characterization - Oil, gas, and water separation: types and functions of separators - Oil storage tanks: design, accessories, and level measurement.		

Learning and Teaching Strategies	
استراتيجيات التعلم والتعليم	
Strategies	Teaching and Learning Strategies: Presentation

	• Interactive learning • Discussions • Brainstorming • Group Solving Problems • Problem-Based Learning • Self-learning
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Student Workload (SWL)			
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	A2
	Assignments	2	10% (10)	2 and 12	A2
	Projects	1	10% (10)	Continuous	B2
	Report	1	10% (10)	13	A2
Summative assessment	Midterm Exam	2hr	10% (10)	7	A2
	Final Exam	3hr	50% (50)	16	A2
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)		
المنهاج الاسبوعي النظري		
	Material Covered	LOs
Week 1	Introduction to Production Engineering • Overview of production systems (wellbore to surface facilities)	A2, B1, B2, C2

	Objectives: Maximize recovery, ensure flow assurance, minimize skin & damage	
Week 2	Overview of Well Completion - Types: Open hole, cased hole, horizontal, multilateral completions - Completion objectives and life-cycle considerations - Case study: Selection of completion type based on reservoir properties	A2, B1, B2, C2
Week 3	Well Completion Equipment & Design (Part 1) - Tubing, packers, safety valves, subsurface control equipment - Design principles and material selection - Design practice: Basic tubing sizing calculations	A2, B1, B2, C2
Week 4	Well Completion Equipment & Design (Part 2) - Intelligent completions and sand control systems - ICDs, inflow control valves, gravel packing	A2, B1, B2, C2
Week 5	Well Perforation Fundamentals - Purpose and importance of perforation in cased hole wells - Types of perforation: Underbalanced, overbalanced, dynamic - Demo/Video: Perforation gun and charges	A2, B1, B2, C2
Week 6	Perforation Techniques and Design - Shot density, phasing, penetration depth, performance evaluation - Perforation skin and productivity - Exercise: Perforation design for a target zone	A2, B1, B2, C2
Week 7	Drill Stem Test (DST) Basics - Purpose and principles of DST - Test tools and sequences: Packers, valves, recorders - Case study: DST interpretation from a historical field	A2, B1, B2, C2
Week 8	DST Data Analysis & Interpretation - Pressure transient behavior, flow periods, buildup - Estimation of permeability, skin, reservoir pressure - Lab: Analysis of sample DST data using spreadsheet tools	A2, B1, B2, C2
Week 9	Near-Wellbore Conditions - Formation damage mechanisms (mud, scale, fines) - Stimulations: Acidizing and fracturing Video/Demo: Acidizing procedure and effect on productivity	A2, B1, B2, C2
Week 10	Skin Effect and Productivity Index - Skin factor concept, causes, and evaluation - Productivity Index (PI) and IPR curves - Exercise: Calculate PI before and after stimulation	A2, B1, B2, C2
Week 11	Surface Separation of Oil, Gas, and Water - Principles of separation: gravity, centrifugal, and coalescence - Types of separators: 2-phase, 3-phase, horizontal/vertical	A2, B1, B2, C2
Week 12	Separator Equipment and Operations Internals: Baffles, weirs, mist extractors	A2, B1, B2, C2

	Separator efficiency and troubleshooting	
Week 13	Oil Storage and Measurement - Surface storage types (tanks, floating roof) - Flow measurement techniques (orifice, turbine, Coriolis meters)	A2, B1, B2, C2
Week 14	Production System Integration & Troubleshooting - Linking subsurface and surface: Nodal analysis introduction - Common production issues: Paraffin, scaling, gas locking	A2, B1, B2, C2
Week 15	Final Review and Project Presentations	A2, B1, B2, C2

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1. Production Operations: Well Completions, Workover, and Stimulation by Boyun Guo 2. Petroleum Production Systems by Michael J. Economides, A. Daniel Hill, Christine Ehlig-Economides	No
Recommended Texts	1. Well Completion Design by Michael J. Economides and A. Daniel Hill 2. Fundamentals of Reservoir Engineering by L.P. Dake	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.