



Ministry of Higher Education and  
Scientific Research - Iraq

University of Warith Al\_Anbiyaa....  
College of Engineering  
Oil and Gas Department



## MODULE DESCRIPTOR FORM

### نموذج وصف المادة الدراسية

#### Module Information

معلومات المادة الدراسية

Module Title	Petro physics of Reservoir Engineering			Module Delivery
Module Type	Core			<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	OGE224			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	UGII	Semester of Delivery	4	
Administering Department	PE	College	OGE	
Module Leader	Sudad Hameed Hamza Saleh	e-mail	DRSUDAD@GMAIL.COM	
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph.D	
Module Tutor		e-mail		
Peer Reviewer Name	Name	e-mail		
Scientific Committee Approval Date	01/06/2023	Version Number	1.0	

## Relation with other Modules

## العلاقة مع المواد الدراسية الأخرى

Prerequisite module	OGE112	Semester	1
Prerequisite module	OGE215	Semester	3
Co-requisites module		Semester	

## Module Aims, Learning Outcomes and Indicative Contents

## أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<p>This module is aiming to:</p> <ol style="list-style-type: none"> <li>1- Know the fundamentals of reservoir engineering.</li> <li>2- Know the types of rocks properties.</li> <li>3- Deal with intervention of rock properties on initial fluid in place estimation and interpretation.</li> <li>4- How to deal with Darcy law output and interpretation.</li> </ol>
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>To know the rocks Petrophysics properties and related reservoir properties and calculations, which comprised:</p> <ol style="list-style-type: none"> <li>1. Reservoirs types and classifications</li> <li>2. Porosity definition and types</li> <li>3. Darcy law derivation</li> <li>4. Permeability classifications, definition and types</li> <li>5. Water saturation determination and types</li> <li>6. Compressibility types.</li> <li>7. Capillary pressure, wettability and surface tension.</li> <li>8. J-function determination and plot.</li> <li>9. Determination of hydrocarbon in place.</li> <li>10. Fluid flow regimes in porous media.</li> <li>11. Determination of fluid contacts from pressure test data.</li> </ol>
Indicative Contents	Indicative content includes the following:

المحتويات الإرشادية	<p><b>Part I: Reservoirs classification and Rocks Petrophysics properties:</b></p> <p>In this part, the students will provide by the reservoirs classifications and rocks petrophysics properties such as porosity, permeability, water saturation, J- function, capillary pressure, surface tension, wettability, and compressibility.</p> <p><b>Part II: Estimation of hydrocarbon in place and fluid flow regimes.</b></p> <p>In this part, the students will provide by the volumetric method for calculating hydrocarbon in place and three steady state fluid flow regimes for compressible, slightly compressible and incompressible fluids in radial and liner geometries.</p> <p><b>Part III: Determination of fluid contacts from pressure test data.</b></p> <p>In this part, the students will provide by the pore pressure types and graphical method for determination fluid contacts.</p>
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### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to Encourage students to ask and answer questions, as well as presenting many explanatory videos to increase students' knowledge, and also to introduce the student to the most important petroleum terms, abbreviations and symbols that he will need to complete the rest of the academic stages Or to work in the future as an oil engineer.
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### Student Workload (SWL)

#### الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعاً

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	75	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعياً	5
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعياً	3
<b>Total SWL (h/sem)</b>	125		

**Module Evaluation****تقييم المادة الدراسية**

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2,3 10 and 11
	Assignments	2	10% (10)	4, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
<b>Total assessment</b>			<b>100% (100 Marks)</b>		

**Delivery Plan (Weekly Syllabus)****المنهاج الأسبوعي النظري**

	Material Covered
Week 1	Introduction
Week 2	Reservoirs Classification
Week 3	Porosity
Week 4	Permeability
Week 5	Average and absolute permeability
Week 6	Fluid Saturation Determination and Initial Saturation Distribution in a Reservoir

Week 7	Rock compressibility, wettability, Surface tension and capillary pressure
Week 8	J- Function, and Formation Resistivity
Week 9	Hydrocarbon In place Calculations
Week 10	Fluid Flow Regimes in Porous media
Week 11	Compressible fluid flow in radial and linear Geometry
Week 12	Incompressible fluid flow in radial and linear Geometry
Week 13	Slightly Compressible fluid flow in radial and linear Geometry
Week 14	Fluids Contact Identification
Week 15	Preparatory week before the final Exam
Week 16	Preparatory week before the final Exam

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Core analysis, cutting and preparation
Week 2	Core Cleaning and Drying
Week 3	Calibration of Pressure Gauge
Week 4	Bulk Volume Measurement for Regular Cores
Week 5	Bulk Volume Measurement for Regular Cores
Week 6	Bulk Volume Measurement for Irregular Cores
Week 7	Porosity Measurement by Mercury Injection
Week 8	Porosity Measurement by Air Injection

Week 9	Porosity Measurement by Water Injection
Week 10	Fluid Saturation Measurement
Week 11	Permeability Measurement by Water Flowing
Week 12	Permeability Measurement by Gas Flowing
Week 13	Capillary Pressure Measurement
Week 14	Grain volume Measurement
Week 15	Density Measurement
Week 16	Final Exam

### Learning and Teaching Resources

#### مصادر التعلم والتدریس

	Text	Available in the Library?
Required Texts	<p>1. J.H. Schon , (Physical Properties of Rocks), Elsevier, Oxford, UK. 2011</p> <p>2. Kadhim F.S., and Samsuri A. Cementation Factor Relationships to Carbonate Rock Properties, Lambert Academic Publication, Germany, 2015.</p> <p>3. Amyx, J.W., Bass, D.M., Jr., and Whiting, R.L.: Petroleum Reservoir Engineering, Physical Properties, McGraw-Hill, New York, 1960.</p> <p>4. Towler, B.F.: Fundamental Principles of Reservoir Engineering, SPE Textbook Series Vol. 8 (2020)</p>	No
Recommended Texts	1. Ahmed T. Reservoir Engineering Handbook, 2010.	Yes

Websites	
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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.				

كلية الهندسة