



## مواصفات مقرر: خواص صخور وموائع المكنن

### Course Specification of: Reservoir Rock and Fluids Properties

المعلومات العامة عن المقرر						
1.	اسم المقرر Course Title	خواص صخور وموائع المكنن Reservoir Rock and Fluids Properties				
2.	رمز المقرر ورقمه Course Code and Number	PNGE 226				
3.	الساعات المعتمدة للمقرر Credit Hours	الساعات المعتمدة			الإجمالي Total	
		محاضرات Lecture	عملي Practical	سمنار/تمارين Seminar/Tutorial		تدريب Training
		2	1	0	0	3
4.	المستوى والفصل الدراسي Study Level and Semester	Second year/Second Semester				
5.	المتطلبات السابقة المقرر (إن وجدت) Pre-requisites (if any)	PNR 212				
6.	المتطلبات المصاحبة (إن وجدت) Co-requisites (if any)					
7.	البرنامج الذي يدرس له المقرر Program (s) in which the course is offered	PETROLEUM AND NATURAL GAS ENGINEERING				
8.	لغة تدريس المقرر Language of teaching the course	ENGLISH/ARABIC				
9.	نظام الدراسة Study System	SEMESTERS				
10.	مكان تدريس المقرر Location of teaching the course	FACULTY OF PETROLEUM AND NATURAL RESOURCES				
11.	اسم معد (و) مواصفات المقرر Prepared by	Assoc. Prof. Mahyoub A. Saeed				
12.	تاريخ اعتماد مجلس الجامعة Date of Approval	2020				

وصف المقرر	
وصف المقرر بالإنجليزية	وصف المقرر بالعربية
<p><i>This course will introduce students to the basic petro physical properties of petroleum reservoir rocks as well as Physical and chemical properties of reservoir rock fluids. Laboratory experiments to measure reservoir rock and fluid properties will be conducted.</i></p>	

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### مخرجات تعلم المقرر (CILOs) Course Intended Learning Outcomes

After completing the course, the student will be able to:		بعد الانتهاء من دراسة المقرر سوف يكون الطالب قادرا على أن:	
a1	Identify between reservoir rock types		
a2	Differentiate between porosity types		
a3	Differentiate between permeability types.		
a4	Differentiate between saturation for different fluids		
a5	Explain capillary pressure, compressibility, and conductivity of the reservoir rock		
b1	Analyze the different phase behaviors of the petroleum fluids		
b2	Solve the problem of unknown reservoir rock physical properties.		
b3	Solve the problem of unknown reservoir fluid and its physical properties and composition		
c1	Carry out experiments to Measure reservoir rock and fluids properties.		
d1.	work in team		

### مواءمة مخرجات تعلم المقرر مع مخرجات التعلم للبرنامج:

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

مخرجات التعلم المقصودة من المقرر (Course Intended Learning Outcomes)		مخرجات التعلم المقصودة من البرنامج (Program Intended Learning Outcomes) (تكتب جميع مخرجات البرنامج كما هي رمزا ونصا)	
a1	Identify between reservoir rock types		
a2	Differentiate between porosity types		
a3	Differentiate between permeability types.		
a4	Differentiate between saturation for different fluids		
a5	Explain capillary pressure, compressibility, and conductivity of the reservoir rock		
b1	Analyze the different phase behaviors of the		

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	<i>petroleum fluids</i>		
b2	<i>Solve the problem of unknown reservoir rock physical properties.</i>		
b3	<i>Solve the problem of unknown reservoir fluid and its physical properties and composition</i>		
c1	<i>Carry out experiments to Measure reservoir rock and fluids properties.</i>		
d1.	<i>work in team</i>		

### مواصلة مخرجات التعلم باستراتيجيات التعليم والتعلم والتقويم

#### Alignment of CILOs to Teaching and Assessment Strategies

أولاً: مواصلة مخرجات تعلم المقرر (المعارف والفهم) باستراتيجيات التعليم والتعلم والتقويم:

#### First: Alignment of Knowledge and Understanding CILOs

مخرجات المقرر / المعرفة والفهم Knowledge and Understanding CILOs	استراتيجيات التعليم والتعلم Teaching Strategies	استراتيجية التقويم Assessment Strategies
a1- Identify between reservoir rock types	Lectures discussion	Written exam assignment
a2 - Differentiate between porosity types		
a3- Differentiate between permeability types.		
a4- Differentiate between saturation for different fluids		
a5- Explain capillary pressure, compressibility, and conductivity of the reservoir rock		

ثانياً: مواصلة مخرجات تعلم المقرر (المهارات الذهنية) باستراتيجيات التدريس والتقويم:

#### Second: Alignment of Intellectual Skills CILOs

مخرجات المقرر / المهارات الذهنية Intellectual Skills CILOs	استراتيجيات التعليم والتعلم Teaching Strategies	استراتيجية التقويم Assessment Strategies
b1 - Analyze the different phase behaviors of the petroleum fluids	Lecture Discussion Class contribution reports	Oral exam Oral presentation In class exercise Achievement tests
b2 - Solve the problem of unknown reservoir rock physical properties.		
b3 - Solve the problem of unknown reservoir fluid and its physical properties and composition		



**ثالثاً: موازنة مخرجات تعلم المقرر (المهارات المهنية والعملية) باستراتيجية التدريس والتقييم:**

**Third: Alignment of Professional and Practical Skills CILOs**

مخرجات المقرر / المهارات المهنية والعملية Professional and Practical Skills CILOs	استراتيجية التعليم والتعلم Teaching Strategies	استراتيجية التقييم Assessment Strategies
<b>c1-</b> Carry out experiments to Measure reservoir rock and fluids properties	Lectures Discussion	Oral presentation In class exercise Practical exam
<b>c2-</b> Carry out experiments to Measure reservoir fluids properties	Class contribution Lab reports	

**رابعاً: موازنة مخرجات تعلم المقرر (المهارات العامة) باستراتيجية التدريس والتقييم:**

**Fourth: Alignment of Transferable (General) Skills CILOs**

مخرجات المقرر Transferable (General) Skills CILOs	استراتيجية التعليم والتعلم Teaching Strategies	استراتيجية التقييم Assessment Strategies
<b>d1-</b> work in team	Small group working Class contribution Reports	Oral presentation

**محتوى المقرر Course Content**

**Theoretical Aspect** موضوعات الجانب النظري

الرقم Order	الموضوعات الرئيسية/ الوحدات Topic List / Units	الموضوعات الفرعية Sub Topics List	عدد الأسابيع Number of Weeks	الساعات الفعلية Contact Hours	رموز مخرجات التعلم للمقرر (CILOs)
1	<i>Introduction</i>	Reservoir rock definition Reservoir rock types Carbonate reservoirs Sandstone reservoirs Fractured reservoirs Reservoir fluids definition and types	1	2	a1
2	<i>Reservoir Rock Porosity</i>	Definition Types Absolute porosity Effective porosity Factors affecting porosity Methods of determining porosity averaging porosity	2	4	a2,b2,c1
3	<i>Rock Permeability</i>	Definition Darcy law Types Absolute Effective Relative Permeability Methods of determining permeability	2	4	a3,b2,c1

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4	<i>Rock compressibility</i>	Definition Types Methods of determining compressibility	1	2	a5,b2,c1
5	<i>Capillary pressure and wettability</i>	Definition Types Methods of determining compressibility Oil Wet and Water Wet Reservoirs.	1	2	a5,b2,c1
6	<i>Fluid saturation</i>	Definition Methods of determining saturation of reservoir rock Importance of fluid saturation	1	2	a4,b2,c1
7	<i>Reservoir rock resistivity</i>	Resistivity definition Importance of fluid saturation measurement of electrical properties of reservoir rocks	1	2	a5,b2,c1
8	<i>Physical properties of petroleum fluids</i>	Oil physical properties Gas physical properties Water physical properties	1	2	a1,b3,c2,d1
9	<i>Chemical properties of petroleum fluids</i>	Oil Chemical Properties Gas Chemical Properties Formation Water Properties	2	4	a1,b3,c2,d1
10	<i>Hydrocarbon phase behavior</i>	Multi Component System Pvt Diagrams	2	4	a1,b1,c2,d1
عدد الأسابيع والساعات الفعلية Number of Weeks /and Contact Hours Per Semester			14	28	

### الموضوعات العملية (إن وجدت) (Practical Aspect (if any))

الرقم Order	التجارب العملية/ التمارين / تدريبات Practical / Exercises/Tutorials topics	عدد الأسابيع Number of Weeks	الساعات الفعلية Contact Hours	رموز مخرجات التعلم Course ILOs
1	Reservoir rocks identification	1	2	a1,b2,c1,d1
2	Porosity lab measurements	2	4	a2,b2,c1,d1
3	Permeability lab measurements	2	4	a3,b2,c1,d1
4	Capillary pressure and Wettability lab measurements	1	2	a5,b2,c1,d1
5	Saturation measurement	1	2	a4,b2,c1,d1
6	Oil properties	2	4	a1,b3,c2,d1
7	gas properties	2	4	a1,b3,c2,d1
8	Formation Water Properties	1	2	a1,b3,c2,d1
9	Laboratory PVT calculation	1	2	b1,b3,c2,d1

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اجمالي الأسابيع والساعات الفعلية Number of Weeks /and Contact Hours Per Semester	13	26	
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استراتيجيات التعليم والتعلم Teaching Strategies
Lectures
Class contribution
Assignments
In class exercise
Reports

الأنشطة والتكليفات Tasks and Assignments					
م No	التكليف/ الواجب Assignments/ Tasks	exercise	الدرجة المستحقة Mark	أسبوع التنفيذ Week Due	خرجات التعلم CILOs (symbols)
1	Reservoir rock Porosity calculation	Exercise	3	3	a2
2	Reservoir rock Permeability calculation	Exercise	4	5	a3
3	Reservoir rock Saturation calculation	Exercise	4	8	a4
4	Hydrocarbon phase behavior	Exercise	4	13	b1
Total Score إجمالي الدرجة			15		

تقييم التعلم Learning Assessment					
الرقم No.	أنشطة التقييم Assessment Tasks	أسبوع التقييم Week due	الدرجة Mark	نسبة الدرجة إلى الدرجة Proportion النهائية of Final Assessment	مخرجات التعلم CILOs (symbols)
1	الأنشطة والتكليفات Tasks and Assignments	3,6,8	15	10%	a2,a3,a4,a5,b1
2	كوز (1) Quiz (1)	3	5	3.3%	a1,a2,a3
3	اختبار نصف الفصل Midterm Exam	W8	25	16.7%	a2,a3,a4,a5
4	كوز (2) Quiz (2)	W12	5	3.3%	a4,a5,b2,b3
5	اختبار نهاية الفصل (عملي) Final Exam (practical)	W 15	30	20%	b1,c1,c2
6	اختبار نهاية الفصل (نظري) Final Exam (theoretical)	W16	70	46.7%	all CILOs
Total الإجمالي			150	%100	

مصادر التعلم Learning Resources			
توثق المراجع حسب نظام APA (اسم المؤلف، سنة النشر، اسم الكتاب، دار النشر، بلد النشر).			
المراجع الرئيسية (لا تزيد عن مرجعين) Required Textbook(s)			
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1. "Petro physics: Theory and Practice of Measuring Reservoir Rock and Fluid Transport Properties", Third edition, Gulf Professional Publishing, 2012. "Basic Engineering Circuit Analysis", J. D. Irwin, Fourth edition, Macmillan, most recent edition

2. Burck, Emily. Properties of Petroleum Reservoir Fluids, Internaional Development Corporation, 1975

#### المراجع المساندة Essential References

3. Calhoun, jr., J..C., Fundamentals of Reservoir Engineering. University of Oklahoma Press., Norman, Ok. 1976.

4. Ahmed T. Hydrocarbon Phase Behaviour. Gulf Publishing Co. London, 1989.

#### المراجع المساندة Essential References

### الضوابط والسياسات المتبعة في المقرر Course Policies

1	<p><b>Class Attendance</b> حضور الفعاليات التعليمية</p> <ul style="list-style-type: none"> <li>- Students are expected to attend classes regularly and promptly.</li> <li>- The attendance should not be less than 80%.</li> <li>- If the student has been absent, he is responsible for finding out any missed material by consulting other students or going to the professor's office hours.</li> </ul>
2	<p><b>Tardy</b> الحضور المتأخر</p> <ul style="list-style-type: none"> <li>- Attendance and arriving on time for the class are necessary. If the student is late, he will be prevented from class.</li> </ul>
3	<p><b>Exam Attendance/Punctuality</b> ضوابط الامتحان</p> <ul style="list-style-type: none"> <li>- According to the rules the student gets absent in the exam of the course.</li> </ul>
4	<p><b>Assignments &amp; Projects</b> التعيينات والمشاريع</p> <ul style="list-style-type: none"> <li>- Papers survey or projects should be submitted by the time detriment by the professor.</li> </ul>
5	<p><b>Cheating</b> الغش</p> <ul style="list-style-type: none"> <li>- According to the rules, cheating is a serious offense and will always result in an imposition of a penalty. The penalties that can be started from the range of canceling the result of the course to canceling the student's admission.</li> </ul>
6	<p><b>Plagiarism</b> الانتحال</p> <ul style="list-style-type: none"> <li>- Plagiarism is a serious offense and will always result in an imposition of a penalty. The penalties that can be started by making a zero mark for the work.</li> </ul>
7	<p><b>Other policies</b> سياسات أخرى</p> <ul style="list-style-type: none"> <li>- The student should by a commitment by the rules inside class and university. Therefore, he is expected to show respect for his classmate, instructors &amp; others.</li> </ul>