



مواصفات مقرر: هندسة مكامن (1)

Course Specification of: Reservoir Engineering (1)

المعلومات العامة عن المقرر						
1.	اسم المقرر Course Title	Reservoir Engineering (1) هندسة مكامن (1)				
2.	رمز المقرر ورقمه Course Code and Number	PNGE 341				
3.	الساعات المعتمدة للمقرر Credit Hours	الساعات المعتمدة			الإجمالي Total	
		محاضرات Lecture	عملي Practical	سمنار/تمارين Seminar/Tutorial		تدريب Training
		2	1	-		-
4.	المستوى والفصل الدراسي Study Level and Semester	3 rd level, 1 st semester				
5.	المتطلبات السابقة للمقرر (إن وجدت) Pre-requisites (if any)	PNGE 209				
6.	المتطلبات المصاحبة (إن وجدت) Co-requisites (if any)	-				
7.	البرنامج الذي يدرس له المقرر Program (s) in which the course is offered	BSc in 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	Class				
11.	اسم معد (و) مواصفات المقرر Prepared by	Assoc.Prof. Adel Al-Matary Eng. Abdulsalam Al Kamel				
12.	تاريخ اعتماد مجلس الجامعة Date of Approval	2020				

وصف المقرر	
وصف المقرر بالإنجليزية	وصف المقرر بالعربية
<p>This course aims to enrich students' knowledge about the basic, critical properties of reservoir rock and fluid. The main subjects are properties of reservoir formations and fluids; reservoir volumetric, reservoir statics, reservoir dynamics. Darcy's law and the mechanics of single and multiphase fluid flow through reservoir rock, material balance, and reservoir drive mechanisms.</p>	

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Rector of Sana'a University
Prof. Dr. Al Qaseem Mohammed Abas



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.	Review mathematics, physics, and chemistry related to reservoir characteristics		- a1
a2.	Define properties of reservoir rock and fluid in oil and gas bearing formation		- a2
a3.	Describe the basics of material balance and fluid flow equations.		
b1.	Evaluate design, operations, equipment and machinery.		-b1
b2.	Identify maps and reservoir traps.		- b2
b3.	Solve problems to determine the parameters that impact well/reservoir performance over time.		
c1.	Calculate the original oil in place by volumetric and MBE method		- c1
c2.	Deal with the high level of uncertainty in definition and solution of petroleum reservoir problems		- c2
d1.	Collaborate effectively within multidisciplinary teams.		- d1
d2.	Present Technical report for the group work		- d2

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.	Review mathematics, physics, and chemistry related to reservoir characteristics	A1	
a2.	Define properties of reservoir rock and fluid in oil and gas bearing formation	A2	
a3.	Describe the basics of material balance and fluid flow equations.	A3	
b1.	Evaluate design, operations, equipment and machinery.	B1	
b2.	Identify maps and reservoir traps.	B2	
b3.	Solve problems to determine the parameters that impact well/reservoir performance over time.	B2	
c1.	Calculate the original oil in place by volumetric and MBE method	C2	



c2.	Deal with the high level of uncertainty in definition and solution of petroleum reservoir problems	C3	
d1.	Collaborate effectively within multidisciplinary teams.	D1	
d2.	Present Technical report for the group work	D3	

مواصلة مخرجات التعلم باستراتيجيات التعليم والتعلم والتقييم Alignment of CILOs to Teaching and Assessment Strategies			
أولاً: مواصلة مخرجات تعلم المقرر (المعارف والفهم) باستراتيجية التعليم والتعلم والتقييم:			
First: Alignment of Knowledge and Understanding CILOs			
مخرجات المقرر / المعرفة والفهم Knowledge and Understanding CILOs	استراتيجية التعليم والتعلم Teaching Strategies	استراتيجية التقييم Assessment Strategies	
a1 - Review mathematics, physics, and chemistry related to reservoir characteristics	- Lectures - Discussion - Demonstration	Examinations, Assignments Oral presentation	
a2 - Define properties of reservoir rock and fluid in oil and gas bearing formation			
a3 - Describe the basics of material balance and fluid flow equations.			
ثانياً: مواصلة مخرجات تعلم المقرر (المهارات الذهنية) باستراتيجية التدريس والتقييم:			
Second: Alignment of Intellectual Skills CILOs			
مخرجات المقرر / المهارات الذهنية Intellectual Skills CILOs	استراتيجية التعليم والتعلم Teaching Strategies	استراتيجية التقييم Assessment Strategies	
b1 - Evaluate design, operations, equipment and machinery.	Discussion Demonstration Brain storming Problem solving	Essay test, Assignments, Laboratory Performance	
b2 - Identify maps and reservoir traps.			
ثالثاً: مواصلة 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	
c1- Calculate the original oil in place by volumetric and MBE method	Self and independent learning Tutorials & practical classes, Case study, Computer based teaching	Achievement tests Chart Drawing practical exams	
c2- Deal with the high level of uncertainty in definition and solution of petroleum reservoir problems			
رابعاً: مواصلة 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
d1- Collaborate effectively within multidisciplinary teams.	Small group working Case Study Method	Team working Interviews
d2- Present Technical report for the group work		

Course Content محتوى المقرر					
Theoretical Aspect الموضوعات 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	Basics of Reservoir Engineering	(Porosity (ϕ) and Saturation (S).	2	4	a1, a2 c1
2	Basics of Reservoir Engineering:	Permeability and relative permeability curves	2	4	a1, a2 c1 c3 d1 d2
3	Reservoir Rock Properties	Wettability and Capillary Pressure	2	4	a2 b1 b2 c1
4	Reservoir Fluid Properties		2	4	a2 b1 b2 c1 d1 d2
5	Classification of Oil and Gas Reservoirs.		1	2	a1, a2
6	Reservoir Drive Mechanisms and their Characteristics		1	2	a1, a2, a3
7	Diffusivity Equation		1	2	a1c2c3
8	Calculation of Oil in Place		1	2	a1, a3 b1 b2 c1 c3d1 d2
9	Material Balance Equation (MBE)	Calculation of Hydrocarbon Volumes	2	4	a3 b1 b2 c1 c2 c3d1 d2
عدد الأسابيع والساعات الفعلية Number of Weeks /and Contact Hours Per Semester			14	28	

Practical Aspect (if any) الموضوعات العملية (إن وجدت)				
الرقم Order	التجارب العملية/ التمارين / تدريبات Practical / Exercises/ Tutorials topics	عدد الأسابيع Number of Weeks	الساعات الفعلية Contact Hours	رموز مخرجات التعلم Course ILOs

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1	(Porosity (ϕ) and Saturation (S).	1	2	a1, a2, c1
2	Permeability and relative permeability curves	2	4	a1, a2, c1 c2 c3 d1 d2
3	Wettability and Capillary Pressure	1	2	a2 b1 b2
4	Reservoir Fluid Properties	2	4	a2 b1 b2 c3 d1 d2
5	Classification of Oil and Gas Reservoirs.	1	2	a1, a2, b2
6	Reservoir Drive Mechanisms and their Characteristics	1	2	a2, b2
7	Diffusivity Equation	2	4	a2, c2 c3
8	Calculation of Oil in Place	1	2	a2, a3 b1 b2 c1 c3 d1 d2
9	Material Balance Equation (MBE) Calculation of Hydrocarbon Volumes	1	2	a3 b1 b2 c2 c3 d1 d2
اجمالي الأسابيع والساعات الفعلية Number of Weeks /and Contact Hours Per Semester		12	24	

استراتيجيات التعليم والتعلم Teaching Strategies

- Lectures
- Discussion
- Demonstration
- Brain storm
- Problem solving
- Tutorials & practical classes,
- Case study,
- Computer based teaching
- Small group working

الأنشطة والتكليفات Tasks and Assignments

م No	التكليف/ الواجب Assignments/ Tasks	نوع التكليف (فردى/ تعاونى)	الدرجة المستحقة Mark	أسبوع التنفيذ Week Due	مخرجات التعلم CILOs (symbols)
1					
إجمالي الدرجة Total Score					

تقييم التعلم Learning Assessment

الرقم No.	أنشطة التقييم Assessment Tasks	أسبوع التقييم Week due	الدرجة Mark	نسبة الدرجة إلى الدرجة النهائية Proportion of Final Assessment	مخرجات التعلم CILOs (symbols)
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1	Report	Quarter	5	3.4%	a1 a2 a3
2	Participation	Weekly	10	6.6%	a1 a2 a3 c1 d2
3	Quizzes	End of a topic	10	6.6%	a1, a2, a3 b1 b2 b3
4	Mid-Term (theoretical)	Week 9	15	10%	All
5	Mid-Term (practical)	Week 7	15	10%	b1 b2 c1 c2 c3
6	Final Exam (practical)	Week 14	25	16.7%	b1 b2 c1 c2
7	Final Exam (theoretical)	Week 16	70	46.7%	All
Total الإجمالي			150	%100	

Learning Resources مصادر التعلم	
توثق المراجع حسب نظام APA (اسم المؤلف، سنة النشر، اسم الكتاب، دار النشر، بلد النشر).	
Required Textbook(s) المراجع الرئيسية (لا تزيد عن مرجعين)	
1. Tarek Ahmed: 2010 "Reservoir Engineering Handbook" 4th Edition, Gulf Professional Publishing; 2. Nnaemeka Ezekwe: 2010 "Petroleum Reservoir Engineering Practice," Pearson Education, Technology & Engineering - 816 pages	
Essential References المراجع المساندة	
3. Tarek Ahmed 2006 Reservoir Engineering Handbook, 3rd Edition, Gulf Professional Publishing, ISBN 0-7506-7972-7. 4. B.C. Craft and M.F. Hawkins 1991 Applied Petroleum Reservoir Engineering, 2nd Edition, Revised by R. Terry, Prentice Hall PTR, , ISBN 0-13-039884-5. 5. L.P. Dake 1998 Fundamentals of Reservoir Engineering, Elsevier Science B.V., ISBN 0-444-41830-X. 6. Handouts, lecture notes, assigned specific chapters from other books and journal papers	
Electronic Materials and Web Sites etc. المصادر الإلكترونية ومواقع الإنترنت	
1-www.spe.com 2- www.schlumberger.com 3-www.aapg.com	

Course Policies:	
1	Class Attendance: - Students are expected to attend classes regularly and promptly. - The attendance should not be less than 80%. - 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.
2	Tardy: - Attendance and arriving on time for the class are necessary. If the student is late, he will be prevented from class.
3	Exam Attendance/Punctuality: - According to the rules the student gets absent in the exam of the course.
4	Assignments & Projects: - Papers survey or projects should be submitted by the time detriment by the professor.

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5	Cheating: <ul style="list-style-type: none">- 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.
6	Plagiarism: <ul style="list-style-type: none">- 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.
7	Other policies: <ul style="list-style-type: none">- The student should by a commitment by the rules inside class and university. Therefore, he is expected to show respect for his classmate, instructors & others.

قسم/ برنامج: هندسة النفط والغاز الطبيعي
العام الجامعي: 2019-2020م

خطة مقرر: هندسة مكامن (1)

Course Plan (Syllabus): Reservoir Engineering (1)

معلومات عن أستاذ المقرر						
الاسم Name	الساعات المكتبية (أسبوعياً) Office Hours					
المكان ورقم الهاتف Location & Telephone No.	السبت SAT	الأحد SUN	الاثنين MON	الثلاثاء TUE	الأربعاء WED	الخميس THU
البريد الإلكتروني E-mail						

معلومات عامة عن المقرر						
1.	اسم المقرر Course Title	Reservoir Engineering (1) هندسة مكامن (1)				
2.	رمز المقرر ورقمه Course Code and Number	PNGE 341				
3.	الساعات المعتمدة للمقرر Credit Hours	الساعات المعتمدة				الإجمالي Total
		محاضرات Lecture	عملي Practical	سمنار/تمارين Seminar/Tutorial	تدريب Training	
		2	1	-	-	3
4.	المستوى والفصل الدراسي Study Level and Semester	3 rd level, 1 st semester				
5.	المتطلبات السابقة للمقرر Pre-requisites	PNGE 209				
6.	المتطلبات المصاحبة (إن وجدت) Co-requisite	-				
7.	البرنامج الذي يدرس له المقرر Program (s) in which the course is offered	BSc in Petroleum and Natural Gas Engineering				
8.	لغة تدريس المقرر Language of teaching the course	English/ Arabic				
9.	مكان تدريس المقرر Location of teaching the course	Campus				

وصف المقرر Course Description

This course aims to enrich students' knowledge about the basic, critical properties of reservoir rock and fluid. The main subjects are properties of reservoir formations and fluids; reservoir volumetric, reservoir statics, reservoir dynamics. Darcy's law and the mechanics of single and multiphase fluid flow through reservoir rock, material balance, and reservoir drive mechanisms.

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 قادراً

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	على أن:
a1 Review mathematics, physics, and chemistry related to reservoir characteristics	- a1
a2 Define properties of reservoir rock and fluid in oil and gas bearing formation	- a2
a3 Describe the basics of material balance and fluid flow equations.	- a3
b1 Evaluate design, operations, equipment and machinery.	-b1
b2 Identify maps and reservoir traps.	- b2
c1 Solve problems to determine the parameters that impact well/reservoir performance over time.	- c1
c2 Calculate the original oil in place by volumetric and MBE method	- c2
c3 Deal with the high level of uncertainty in definition and solution of petroleum reservoir problems	- c3
d1 Collaborate effectively within multidisciplinary teams.	- d1
d2 Present Technical report for the group work	- d2

Course Content محتوى المقرر

Theoretical Aspect خطة تنفيذ الموضوعات النظرية

الرقم Order	الوحدات (الموضوعات الرئيسية) Units	الموضوعات التفصيلية Sub Topics	الأسبوع Week Due	الساعات الفعلية Con. H
1	Basics of Reservoir Engineering	(Porosity (ϕ) and Saturation (S).	Week 1-2	4
2	Basics of Reservoir Engineering:	Permeability and relative permeability curves	Week 3-4	4
3	Reservoir Rock Properties	Wettability and Capillary Pressure	Week 5-6	4
4	Reservoir Fluid Properties		Week 7-8	4
	Mid Term Exam		Week 9	2
5	Classification of Oil and Gas Reservoirs.		Week 10	2
6	Reservoir Drive Mechanisms and their Characteristics		Week 11	2
7	Diffusivity Equation		Week 12	2
8	Calculation of Oil in Place		Week 13	2

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9	Material Balance Equation (MBE)	Calculation of Hydrocarbon Volumes	Week 14-15	4
10	Final Exam		Week 16	2
عدد الأسابيع والساعات الفعلية Number of Weeks /and Contact Hours Per Semester			16	32

Practical / Training/ Tutorials/ Exercises Aspects خطة تنفيذ موضوعات الجانب العملي			
الرقم Order	موضوعات العملي/ المهام / التمارين Practical/ Tutorials/ Exercises Aspects	الأسبوع Week Due	الساعات الفعلية Cont. H
1	(Porosity (ϕ) and Saturation (S).	Week 1	2
2	Permeability and relative permeability curves	Week 2-3	4
3	Wettability and Capillary Pressure	Week 4	2
4	Reservoir Fluid Properties	Week 5-6	4
5	Mid Term Exam	Week 7	2
6	Classification of Oil and Gas Reservoirs.	Week 8	2
7	Reservoir Drive Mechanisms and their Characteristics	Week 9	2
8	Diffusivity Equation	Week 10-11	4
9	Calculation of Oil in Place	Week 12	2
10	Material Balance Equation (MBE) Calculation of Hydrocarbon Volumes	Week 13	2
11	Final Exam	Week 14	2
اجمالي الأسابيع والساعات الفعلية Number of Weeks /and Contact Hours Per Semester		14	28

استراتيجيات التعليم والتعلم Teaching Strategies
<ul style="list-style-type: none"> - Lectures - Discussion - Demonstration - Brain storm - Problem solving - Self and independent learning - Tutorials & practical classes , - Case study, - Computer based teaching - Small group working

الأنشطة والتكليفات Tasks and Assignments				
م	التكليف/ الواجب	نوع التكليف (فردى/ تعاوني)	الدرجة المستحقة Mark	أسبوع التنفيذ Week Due

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No	Assignments			
1				
Total Score إجمالي الدرجة			15/150	10/ 100

Learning Assessment تقويم التعلم				
م No	أساليب التقويم Assessment Method	موعد (أسبوع) التقويم Week Due	الدرجة Mark	الوزن النسبي % Proportion of Final Assessment
1	Report	Quarter	5	3.4%
2	Participation	Weekly	10	6.6%
3	Quizzes	End of a topic	10	6.6%
4	Mid-Term (theoretical)	Week 9	15	10%
5	Mid-Term (practical)	Week 7	15	10%
6	Final Exam (practical)	Week 14	25	16.7%
7	Final Exam (theoretical)	Week 16	70	46.7%
المجموع Total			150	100 %

Learning Resources مصادر التعلم	
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Electronic Materials and Web Sites etc. المصادر الإلكترونية ومواقع الإنترنت	
1-www.spe.com 2- www.schlumberger.com 3-www.aapg.com	

Course Policies:	
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	by consulting other students or going to the professor's office hours.
2	Tardy: - Attendance and arriving on time for the class are necessary. If the student is late, he will be prevented from class.
3	Exam Attendance/Punctuality: - According to the rules the student gets absent in the exam of the course.
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7	Other policies: - The student should by a commitment by the rules inside class and university. Therefore, he is expected to show respect for his classmate, instructors & others.