مواصفات مقرر: هندسة حفر 2

Course Specification of: Drilling Engineering 2

General information about the course المعلومات العامة عن المقرر						
1.	اسم المقرر Course Title	Drilling Engineering 2				
2.	رمز المقرر ورقمه Course Code and Number	PNGE 332				
3.	الساعات المعتمدة للمقرر Credit Hours	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	Third Level / Second Semester				
5.	المتطلبات السابقة المقرر (إن وجدت) Pre-requisites (if any)	PNGE 331 (Petroleum Drilling Engineering (1)				
6.	المتطلبات المصاحبة (إن وجدت) Co-requisites (if any)	None				
7.	البرنامج الذي يدرس له المقرر Program (s) in which the course is offered	Bachelor of Petroleum and Natural Gas Engineering				
8.	لغة تدريس المقرر Language of teaching the course	English				
9.	نظام الدراسة Study System	Academic year of two semesters				
10.	مكان تدريس المقرر Location of teaching the course	Faculty of Petroleum and Natural Resources				
11.	اسم معد(و) مواصفات المقرر Prepared by	Dr. Ibrahim Ali Farea				
12.	تاريخ اعتماد مجلس الجامعة Date of Approval	2020				

Course Description وصف المقرر

وصف المقرر ر بالإنجليزية	وصف المقرر ر بالعربية
The course presents an overview of drilling engineering with in-depth treatment of casing, rotary drilling bit, drill string, bottom-hole assembly design/evaluation and drilling parameters optimization. The student also will be introduced with additional topics in drilling engineering, namely various drilling techniques such as horizontal and directional drilling, coiled tubing, multi-lateral drilling, and wellbore surveying techniques. Other topics include well design for safety and efficiency and drilling economics evaluation.	

Prepared by	Quality Assurance Unit	Dean of the Faculty	Dean of the Development & Quality Assurance Center
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Prof. Dr. Al Qaseem Mohammed Abas

Course Intended Learning Outcomes (CILOs) مخرجات تعلم المقرر			
After completing the course, the student will be able to:		بعد الانتهاء من دراسة المقرر سوف يكون الطالب قادرا على أن:	
a1.	Explain the process and importance of casing design, drill string design and optimization of the drilling parameters.		– a2
a2.	Classify key aspects of various drilling techniques, planning and related control and economics.		
b1.	Analyze the physical forces that affect downhole drilling equipment, and casing performance.		–b1
b2.	Select the most effective drilling technique and equipment, based on analysis of drilling record and trajectory survey.		- b2
c1.	Design the components of drill string, casing string, and hole geometry to meet the desired operating.		- c1
c2.	Apply technical and economic constraints to optimize the drilling projects		- c2
d1.	Demonstrate good communication skill through report writing and presentation.		- d1

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	Explain the process and importance of casing design, drill string design and optimization of the drilling parameters.	A2	*Define the basic concepts of petroleum exploration, drilling and production as well as demonstrate global and local safety and environment impact on oil and gas operations.*
a2	Classify key aspects of various drilling techniques, planning and related control and economics.		
b1	Analyze the physical forces that affect downhole drilling equipment, and casing performance.	B2	*Evaluate well logs and well test operations to identify maps of reservoir and select the best method of petroleum recovery.*
b2	Select the most effective drilling technique and equipment, based on analysis of drilling record and trajectory survey.		
c1	Design the components of drill string, casing string, and hole geometry to meet the desired operating.	C1	*Carry out special engineering design in all petroleum engineering projects*

c2	Apply technical and economic constraints to optimize the drilling projects.	**C2**	*Analysis of well logs and well testing and practice the techniques for constructing engineering graphics.*
d1	Demonstrate good communication skill through report writing and presentation.	**D1**	*Collaborate effectively within multidisciplinary teams under stressful environment and within constraints.*

مواءمة مخرجات التعلم باستراتيجيات التعليم والتعلم والتقويم
Alignment of CILOs to Teaching and Assessment Strategies

أولا: مواءمة مخرجات تعلم المقرر (المعارف والفهم) باستراتيجية التعليم والتعلم والتقويم:
First: Alignment of Knowledge and Understanding CILOs

مخرجات المقرر/ المعرفة والفهم Knowledge and Understanding CILOs		استراتيجية التعليم والتعلم Teaching Strategies	استراتيجية التقويم Assessment Strategies
a1 -	Explain the process and importance of casing design, drill string design and optimization of the drilling parameters.	• Active Lecture • Independent learning • Class discussions • Video	• Written exams • Quizzes • Oral questions
a2 -	Classify key aspects of various drilling techniques, planning and related control and economics.		

ثانيا: مواءمة مخرجات تعلم المقرر (المهارات الذهنية) باستراتيجية التدريس والتقويم:
Second: Alignment of Intellectual Skills CILOs

مخرجات المقرر/ المهارات الذهنية Intellectual Skills CILOs		استراتيجية التعليم والتعلم Teaching Strategies	استراتيجية التقويم Assessment Strategies
b1 -	Analyze the physical forces that affect downhole drilling equipment, and casing performance.	• Active Lecture • Problems-based learning • Class discussions • Independent learning • Tutorials • Case studies	• Written exams • Oral evaluation • Assignments • Reports evaluation • Homework
b2 -	Select the most effective drilling technique and equipment, based on analysis of drilling record and trajectory survey.		

ثالثا: مواءمة مخرجات تعلم المقرر (المهارات المهنية والعملية) باستراتيجية التدريس والتقويم:
Third: Alignment of Professional and Practical Skills CILOs

مخرجات المقرر/ المهارات المهنية والعملية Professional and Practical Skills CILOs		استراتيجية التعليم والتعلم Teaching Strategies	استراتيجية التقويم Assessment Strategies
c1-	Design the components of drill string, casing string, and hole	• Active Lecture	• Written exams

	geometry to meet the desired operating.	• Tutorials • Class discussions • Problems solving • Project • Group working	• Homework • Project evaluation • Reports evaluation
c2-	Apply technical and economic constraints to optimize the drilling projects.		

رابعا: مواءمة مخرجات تعلم المقرر (المهارات العامة) باستراتيجية التدريس والتقويم:

Fourth: Alignment of Transferable (General) Skills CILOs

مخرجات المقرر Transferable (General) Skills CILOs		استراتيجية التعليم والتعلم Teaching Strategies	استراتيجية التقويم Assessment Strategies
d1-	Demonstrate good communication skill through report writing and presentation.	• Class discussions • Project • Preparing scientific reports • Presentations • Group working	• Reports evaluation • Oral Presentation • Oral evaluation

Course Content محتوى المقرر

Theoretical Aspect موضوعات الجانب النظري

الرقم Order	الموضوعات الرئيسة/ الوحدات Topic List / Units	الموضوعات الفرعية Sub Topics List	عدد الأسابيع Number of Weeks	الساعات الفعلية Contact Hours	رموز مخرجات التعلم للمقرر (CILOs)
1	**Drill string**	- Mechanical properties of Drill Pipe - Drill-string general design criteria - Drill Collar selection	1	2	a1,b1,c1
		- Drill-pipe design and selection - Dog-leg Severity - Lateral tool joint loading	1	2	
2	**Rotary drilling bit selection**	- Bit record and dull -grading - Bits Selection criteria - Break-even analysis	1	2	a1,b2,c2
3	**Factors affecting rate of penetration**	- Rig and Personnel efficiency - Formation Characteristics - Mechanical factors	1	2	a1,a2,b1,c1,c2

		- Drilling fluid properties - Hydraulic factors			
4	**Well Casing and casing string design**	- Casing specifications - Casing seat selection	1	2	a1,b1,c1,c2,d1
		- Casing string design criteria - Collapse - Burst	1	2	
		- Tension - Special design considerations	1	2	
5	**Overview and directional drilling design guideline**	- Reasons for Directional drilling - Factors Affecting Directional Planning - Types of well trajectory and their features	1	2	a2,b2,c2
6	**Directional Well Planning**	- Positioning and coordinate systems - Survey calculation Methods - Basic Well Planning - Anti-collision and advanced well planning	1	2	a2,b2,c2,d1
7	**Directional Drilling Measurements and well survey**	- Magnetic and non-Magnetic requirements - Magnetic single-shot instruments - Magnetic Multiple-shot instruments - Gyroscopic measurements - Logging while drilling - Problems in directional wells	1	2	a2,b2,c1,c2
8	**Drilling Tools & Deflection Methods**	- Drilling Tools (DC, Subs, HWDP, stabilizers) - Deflection Methods (Whipstocks, Jetting, Motors) - Bottom Hole Assemblies	1	2	a1,a2,b1,b2,c1,c2
9	**Horizontal and multi-lateral wells**	- Purposes - Horizontal and multi-lateral wells planning considerations	1	2	a2,b2,c2
10	**Hole geometry selection**	- Flow String Size - Hole - casing annulus - Hole - Drill string annulus - Bit-casing combination	1	2	a2,b2,c1,c2
11	**Drilling Costs**	- Drilling time	1	2	a2,b2,c1,c2,d1

	and Economics	- Drilling cost - Drilling contracts - Drilling Economics			
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
1	Drill Collar evaluation and selection	1	2	a1,b1,c1,d1
2	Drill pipe calculations /design/ selection	1	2	
3	Analyze rotary drill bit record and dull-grading system and study of the steps required for systematic bit selection	1	2	b2,c2,d1
4	Calculating and plotting graphs factors affecting rate of penetration	1	2	b1,c1,c2,d1
5	Analysis and calculations of Casing seat selection	1	2	a1,b1,c1,c2,d1, d1
6	Casing design calculation and plotting graphs	1	2	
7	Casing selection procedures	1	2	
8	Azimuth and inclination angel determination and Study of various types of well profiles	1	2	a2,b2,c2,d1
9	Calculation methods of planning the directional trajectory	1	2	b2,c2,d1
10	Calculating the trajectory of a well	1	2	b2,c1,c2,d1
11	Horizontal and multi-lateral trajectory calculation considerations	1	2	b2,c2,d1
12	Calculations and selection of Hole - casing annulus Hole - drill string annulus Drill string- casing annulus	1	2	a2,b2,c1,c2,d1
13	Calculate the total drilling time and plot the depth-time curve and detailed time estimates	1	2	b2,c1,c2,d1
14	Analyze and calculate the detailed drilling cost and plot the depth-cost curve	1	2	
اجمالي الأسابيع والساعات الفعلية **Number of Weeks /and Contact Hours Per Semester**		**14**	**28**	

Teaching Strategies استراتيجيات التعليم والتعلم

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- Active Lecture
- Independent learning
- Video
- Class discussions
- Problems-based learning
- Problems solving
- Project
- Tutorials
- Case studies
- Group working
- Preparing scientific reports
- Presentations

Tasks and Assignments الأنشطة والتكليفات

م No	التكليف/ الواجب Assignments/ Tasks	نوع التكليف (فردي/ تعاوني)	الدرجة المستحقة Mark	أسبوع التنفيذ Week Due	خرجات التعلم CILOs (symbols)
1	Using buoyancy factor or the pressure-area method Compute and select required Drill Collar to apply desired weight on bit (WOB) for vertical or directional drilling well.	Individual	3	W2	b1,c1,c2, d1
2	Choose one of the drilling parameters and try to determine the optimum operating condition.	Individual	3	W6	b1,c1,c2, d1
3	Design of (Intermediate casing/ Drill-string/ optimize drill bit performance) for a particular Well-X Petroleum field data. As a Project / Case Study.	Cooperative	6	W11	b1,b2,c1, c2,d1
4	Calculate and choose Bit-Casing Combinations/ Hole - Drill string Annulus/ Casing seat selection.	Individual	3	W13	b1,c1,c2, d1
	Total Score إجمالي الدرجة		15		

Learning Assessment تقييم التعلم

الرقم No.	أنشطة التقييم Assessment Tasks	أسوع التقييم Week due	الدرجة Mark	نسبة الدرجة إلى الدرجة النهائية Proportion of Final Assessment	مخرجات التعلم CILOs (symbols)
1	Tasks and Assignments	W2,W6, W11,W13	20	13.3%	b1,b2,c1,c2,d1
2	Quiz	W6	5	3.3%	a1,a2,b1,b2
3	Midterm Exam	W8	20	13.3%	a1,a2,b1,b2
4	Oral Presentation & evaluation	W 11	5	3.3%	b1,b2,c1,c2
5	Quiz	W12	5	3.3%	a1,a2,b1,b2

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6	Final Exam (practical)	W15	25	16.8%	b1,b2,c1,c2
7	Final Exam (theoretical)	W16	70	46.7%	a1,a2,b1,b2, c1,c2
Total الإجمالي			**150**	**100.00%**	

Learning Resources مصادر التعلم

Required Textbook(s) المراجع الرئيسة (لا تزيد عن مرجعين)

1. Bourgoyne, A.T., Millheim, K.K., Chenevert, M.E., Young, F.S., 1991, Applied Drilling Engineering, 2st printing, Richardson, Texas, SPE.
2. Robert F. Mitchell, Stefan Z. Miska, 2011, Fundamentals of Drilling Engineering, 1st printing, Richardson, Texas, SPE Text Book Series Volume 12.

Essential References المراجع المساندة

1. Azar, J.J. and Samuel, G.R.2007, Drilling Engineering, PennWell Publishing Company Tulsa, Oklahoma.
2. William Lyons, first edition 2010, Working Guide to Drilling Equipment and Operations, Gulf Publishing Elsevier, USA.
3. Hugh Williamson, BP AMOCO UPSTREAM TECHNOLOGY GROUP, September 1999, Directional survey handbook, Issue 1. Aberdeen AB10 1SJ Scotland.
4. Neal J. Adams, 1995, Drilling Engineering, PennWell Publishing company, Tulsa, Oklahoma.
5. Carl Gatlin Department of Petroleum Engineering, the University of Texas, 2006, Petroleum Engineering Drilling and well Completion, Prentice. Hall, Inc. USA.

Electronic Materials and Web Sites *etc.* المصادر الإلكترونية ومواقع الإنترنت

1- http://www.SPE.org/store
2- https://en.wikipedia.org/wiki/Directional Drilling
3- http://petrowiki.org/ Directional Drilling engineering
4- http://www.drillingformulas.com/cutting-slip-velocity-calculation-method-1/

Course Policies الضوابط والسياسات المتبعة في المقرر

1	**Class Attendance حضور الفعاليات التعليمية** - A student should attend not less than 75 % of total hours of the subject; otherwise he/she will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring a proof statement from university Clinic. If the absent is more than 25% of a course total contact hours, student will be required to retake the entire course again. -
2	**Tardy الحضور المتأخر** - For late in attending the class, the student will be initially notified. If he repeated lateness in attending class, he/she will be considered as absent. -
3	**Exam Attendance/Punctuality ضوابط الامتحان** - A student should attend the exam on time. He/she is permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and -

	he/she will be considered as absent in exam.
4	**Assignments & Projects التعيينات والمشاريع** - In general, one assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time, mostly one week after given the assignment.
5	**Cheating الغش** - For cheating in exam, a student will be considered as fail. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty.
6	**Plagiarism الانتحال** - Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proofed a plagiarism of a student, he/she will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university or according to the university roles.
7	**Other policies سياسات أخرى** - Mobile phones are not allowed to use during a class lecture. It must be closed; otherwise the student will be asked to leave the lecture room. - Mobile phones are not allowed in class during the examination. - Lecture notes and assignments might be given directly to students using soft or hard copy.

قسم/ برنامج: Petroleum and Natural Gas Engineering

العام الجامعي: 2019- 2020م

خطة مقرر: هندسة حفر 2

Course Plan (Syllabus): Drilling Engineering 2

Information about Faculty Member Responsible for the Course معلومات عن أستاذ المقرر							
الاسم Name	*Dr. Ibrahim Ali Farea*	الساعات المكتبية (أسبوعيا) Office Hours		3			
المكان ورقم الهاتف Location &Telephone No.	*775009252*	السبت SAT	الأحد SUN	الاثنين MON	الثلاثاء TUE	الأربعاء WED	الخميس THU
البريد الإلكتروني E-mail	*Farea3@yahoo.com*						

General information about the course معلومات عامة عن المقرر						
1.	اسم المقرر Course Title	Drilling Engineering 2				
2.	رمز المقرر ورقمه Course Code and Number	PNGE 332				
3.	الساعات المعتمدة للمقرر Credit Hours	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	Third Level / Second Semester				
5.	المتطلبات السابقة للمقرر Pre-requisites	PNGE 331 (Petroleum Drilling Engineering (1)				
6.	المتطلبات المصاحبة (إن وجدت)Co –requisite	None				
7.	البرنامج الذي يدرس له المقرر Program (s) in which the course is offered	Bachelor of Petroleum and Natural Gas Engineering				
8.	لغة تدريس المقرر Language of teaching the course	English				
9.	مكان تدريس المقرر Location of teaching the course	Academic year of two semesters				
10	مكان تدريس المقرر Location of teaching the course	Faculty of Petroleum and Natural Resources				
11	تاريخ اعتماد مجلس الجامعة Date of Approval	2020				

Course Description وصف المقرر

The course presents an overview of drilling engineering with in-depth treatment of casing, rotary drilling bit, drill string,

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bottom-hole assembly design/ evaluation and drilling parameters optimization. The student also will be introduced with additional topics in drilling engineering, namely various drilling techniques such as horizontal and directional drilling, coiled tubing, multi-lateral drilling, and wellbore surveying techniques. Other topics include well design for safety and efficiency and drilling economics evaluation.	

Course Intended Learning Outcomes (CILOs) مخرجات تعلم المقرر

After completing the course, the student will be able to:	بعد الانتهاء من دراسة المقرر سوف يكون الطالب قادرا على أن:
a1. Explain the process and importance of casing design, drill string design and optimization of the drilling parameters.	**- a1**
a2. Classify key aspects of various drilling techniques, planning and related control and economics.	**– a2**
b1. Analyze the physical forces that affect downhole drilling equipment, and casing performance.	**–b1**
b2. Select the most effective drilling technique and equipment, based on analysis of drilling record and trajectory survey.	**- b2**
c1. Design the components of drill string, casing string, and hole geometry to meet the desired operating.	**- c1**
c2. Apply technical and economic constraints to optimize the drilling projects.	**- c2**
d1. Demonstrate good communication skill through report writing and presentation.	**- d1**

Course Content محتوى المقرر

Theoretical Aspect خطة تنفيذ الموضوعات النظرية

الرقم Order	الوحدات (الموضوعات الرئيسة) Units	الموضوعات التفصيلية Sub Topics	الأسبوع Week Due	الساعات الفعلية Con. H
1	**Drill string**	- Mechanical properties of Drill Pipe - Drill-string general design criteria - Drill Collar selection	1	2
		- Drill-pipe design and selection - Dog-leg Severity - Lateral tool joint loading	2	2

2	**Rotary drilling bit selection**	- Bit record and dull -grading - Bits Selection criteria - Break-even analysis	3	2
3	**Factors affecting rate of penetration**	- Rig and Personnel efficiency - Formation Characteristics - Mechanical factors - Drilling fluid properties - Hydraulic factors	4	2
4	**Well Casing and casing string design**	- Casing seat selection criteria - Casing specifications	5	2
		- Casing string design criteria - Collapse Burst	6	2
		- Tension - Special design considerations	7	2
5	**Overview and directional drilling design guideline**	- Reasons for Directional drilling - Factors Affecting Directional Planning - Types of well trajectory and their features	8	2
6	**Directional Well Planning**	- Positioning and coordinate systems - Survey calculation Methods - Basic Well Planning - Anti-collision and advanced well planning	9	2
7	**Directional Drilling Measurements and well survey**	- Magnetic and non-Magnetic requirements - Magnetic single-shot instruments - Magnetic Multiple-shot instruments - Gyroscopic measurements - Logging while drilling - Problems in directional wells	10	2
8	**Drilling Tools & Deflection Methods**	- Drilling Tools (DC, Subs, HWDP, stabilizers) - Deflection Methods (Whipstock, Jetting, Motors) - Bottom Hole Assemblies	11	2
9	**Horizontal and multi-lateral wells**	- Purposes - Horizontal and multi-lateral wells planning considerations	12	2
10	**Hole geometry selection**	- Flow String Size - Hole - casing annulus - Hole - Drill string annulus - Bit-casing combination	13	2
11	**Drilling Costs and Economics**	- Drilling time - Drilling cost - Drilling contracts	14	2

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		- Drilling Economics		
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	▪ Drill Collar evaluation and selection	1	2
2	▪ Drill pipe calculations /design/ selection	2	2
3	▪ Analyze rotary drill bit record and dull-grading system and study of the steps required for systematic bit selection	3	2
4	▪ Calculating and plotting graphs factors affecting rate of penetration	4	2
5	▪ Analysis and calculations of Casing seat selection	5	2
6	▪ Casing design calculation and plotting graphs	6	2
7	▪ Casing selection procedures	7	2
8	▪ Azimuth and inclination angel determination and Study of various types of well profiles	8	2
9	▪ Calculation methods of planning the directional trajectory	9	2
10	▪ Calculating the trajectory of a well	10	2
11	▪ Horizontal and multi-lateral trajectory calculation considerations	11	2
12	▪ Calculations and selection of: - Hole – casing annulus - Hole – drill string annulus - Drill string- casing annulus	12	2
13	▪ Calculate the total drilling time and plot the depth-time curve and detailed time estimates	13	2
14	▪ Analyze and calculate the detailed drilling cost and plot the depth-cost curve	14	2
اجمالي الأسابيع والساعات الفعلية Number of Weeks /and Contact Hours Per Semester		**14**	**28**

Teaching Strategies استراتيجيات التعليم والتعلم

- Active Lecture
- Independent learning
- Video
- Class discussions
- Problems-based learning
- Problems solving
- Project
- Tutorials
- Case studies
- Group working

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- Preparing scientific reports
- Presentations

Tasks and Assignments الأنشطة والتكليفات

م No	التكليف/ الواجب Assignments	نوع التكليف (فردي/ تعاوني)	الدرجة المستحقة Mark	أسبوع التنفيذ Week Due
1	Using buoyancy factor or the pressure-area method Compute and select required Drill Collar to apply desired weight on bit (WOB) for vertical or directional drilling well.	Individual	3	W2
2	Choose one of the drilling parameters and try to determine the optimum operating condition.	Individual	3	W6
3	Design of (Intermediate casing/ Drill-string/ optimize drill bit performance) for a particular Well-X Petroleum field data. As a Project / Case Study.	Cooperative	6	W11
4	Calculate and choose Bit-Casing Combinations/ Hole- Drill string Annulus/ Casing seat selection.	Individual	3	W13
	Total Score إجمالي الدرجة		15	

Learning Assessment تقويم التعلم

م No	أساليب التقويم Assessment Method	موعد(أسبوع) التقويم Week Due	الدرجة Mark	الوزن النسبي% Proportion of Final Assessment
1	Tasks and Assignments	W2,W6, W11,W13	20	13.3%
2	Quiz	W6	5	3.3%
3	Midterm Exam	W8	20	13.3%
4	Oral Presentation & evaluation	W 11	5	3.3%
5	Quiz	W12	5	3.3%
6	Final Exam (practical)	W15	25	16.8%
7	Final Exam (theoretical)	W16	70	46.7%
	Total المجموع		150	100 %

Learning Resources مصادر التعلم

Required Textbook(s) المراجع الرئيسة (لا تزيد عن مرجعين)

1. Bourgoyne, A.T., Millheim, K.K., Chenevert, M.E., Young, F.S., 1991, Applied Drilling Engineering, 2st printing, Richardson, Texas, SPE.
2. Robert F. Mitchell, Stefan Z. Miska, 2011, Fundamentals of Drilling Engineering, 1st printing, Richardson, Texas, SPE Text Book Series Volume 12.

Essential References المراجع المساندة
1. Azar, J.J. and Samuel, G.R.2007, Drilling Engineering, PennWell Publishing Company Tulsa, Oklahoma. 2. William Lyons, first edition 2010, Working Guide to Drilling Equipment and Operations, Gulf Publishing Elsevier, USA. 3. Hugh Williamson, BP AMOCO UPSTREAM TECHNOLOGY GROUP, September 1999, Directional survey handbook, Issue 1. Aberdeen AB10 1SJ Scotland. 4. Neal J. Adams, 1995, Drilling Engineering, PennWell Publishing company, Tulsa, Oklahoma. 5. Carl Gatlin Department of Petroleum Engineering, the University of Texas, 2006, Petroleum Engineering Drilling and well Completion, Prentice. Hall, Inc. USA.
Electronic Materials and Web Sites *etc.* المصادر الإلكترونية ومواقع الإنترنت
1. http://www.SPE.org/store 2. https://en.wikipedia.org/wiki/Directional Drilling 3. http://petrowiki.org/ Directional Drilling engineering 4. http://www.drillingformulas.com/cutting-slip-velocity-calculation-method-1/

Course Policies الضوابط والسياسات المتبعة في المقرر

1	**Class Attendance حضور الفعاليات التعليمية** - A student should attend not less than 75 % of total hours of the subject; otherwise he/she will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring a proof statement from university Clinic. If the absent is more than 25% of a course total contact hours, student will be required to retake the entire course again
2	**Tardy الحضور المتأخر** - For late in attending the class, the student will be initially notified. If he repeated lateness in attending class, he/she will be considered as absent.
3	**Exam Attendance/Punctuality ضوابط الامتحان** - A student should attend the exam on time. He/she is permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam.
4	**Assignments & Projects التعيينات والمشاريع** - In general one assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time, mostly one week after given the assignment.
5	**Cheating الغش** - For cheating in exam, a student will be considered as fail. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty.
6	**Plagiarism الانتحال** - Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proofed a plagiarism of a student, he/she will be

	disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university or according to the university roles.
7	**Other policies سياسات أخرى** - Mobile phones are not allowed to use during a class lecture. It must be closed; - otherwise the student will be asked to leave the lecture room. - Mobile phones are not allowed in class during the examination. - Lecture notes and assignments might be given directly to students using soft or hard copy.