



مواصفات مقرر: إكمال الآبار

Course Specification of: Well Completion

المعلومات العامة عن المقرر						
1.	اسم المقرر Course Title	Well Completion				
2.	رمز المقرر ورقمه Course Code and Number	PNGE 433				
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	Fourth Level / First Semester				
5.	المتطلبات السابقة للمقرر (إن وجدت) Pre-requisites (if any)	PNGE 331 (Petroleum Drilling Engineering (2))				
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				

وصف المقرر	
وصف المقرر بالإنجليزية	وصف المقرر بالعربية
<p>The student is introduced to subsurface operations needed to prepare the well for production after being drilled and cased. Parts covered include: well completion designs based upon reservoir, mechanical and economic considerations, outline of inflow performance for generic reservoir completions, the specifics of perforating and stimulation, the production system, comprising bottom-hole, tubing, choke and surface facilities, subsurface production control, completion and work-over fluids, sand control and remedial cementing operations.</p>	

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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	Review the fundamentals concepts of well completions.		- a1
a2	Identify the main components, function and design criteria of a well completion.		- a2
b1	Select the most suitable design for a candidate well.		-b1
b2	Analyze the options available for completions and operations.		- b2
c1	Apply a well completion design to develop a sense of professional responsibility.		- c1
c2	Perform technical design in well completion operations.		- c2
d1	Work in groups according to responsibilities of each team member.		- 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	Review the fundamentals concepts of well completions.	A1	<i>Demonstrate the concepts of basic science and mathematics related to field of petroleum engineering.</i>
a2	Identify the main components, function and design criteria of a well completion.	A3	<i>Utilize formation evaluations, well logging, well test analysis, modeling and simulation programs to define properties of reservoir rock and fluid in oil and gas bearing formation.</i>
b1	Select the most suitable design for a candidate well.	B1	<i>Use the principles of engineering in developing solutions to practical petroleum engineering and select appropriate computer software for modeling.</i>
b2	Analyze the options available for completions and operations.	B2	<i>Evaluate well logs and well test operations to identify maps of reservoir and select the best method of petroleum recovery.</i>
c1	Perform technical design in well completion operations.	C1	<i>Carry out special engineering design in all petroleum engineering projects.</i>
c2	Apply a well completion design to develop a sense of professional responsibility.	C2	<i>Analysis of well logs and well testing and practice the techniques for constructing engineering graphics.</i>
d1	Work in groups according to	D1	<i>Collaborate effectively within multidisciplinary</i>

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responsibilities of each team member.

teams under stressful environment and within constraints.

مواعمة مخرجات التعلم باستراتيجيات التعليم والتعلم والتقويم

Alignment of CILOs to Teaching and Assessment Strategies

أولاً: مواعمة 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 - Review the fundamentals concepts of well completions.	- Active Lecture - Discussions	- Quiz
a2 - Identify the main components, function and design criteria of a well completion.	- Independent-learning - Video	- Written exam - Oral questions

ثانياً: مواعمة 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 - Select the most suitable design for a candidate well.	- Active Lecture - Project	- Homework - Quizzes
b2 - Analyze the options available for completions and operations.	- Tutorial - Problem solving - Group discussions	- Written exam - Oral evaluation - Project evaluation

ثالثاً: مواعمة 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- Perform technical design in well completion operations.	- Active Lecture - Class discussions	- Written exam - Oral evaluation
c2- Apply a well completion design to develop a sense of professional responsibility.	- Project - Case Study - Tutorial	- Project evaluation - Case Study evaluation - Homework

رابعاً: مواعمة مخرجات تعلم المقرر (المهارات العامة) باستراتيجية التدريس والتقويم:

Fourth: Alignment of Transferable (General) Skills CILOs

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مخرجات المقرر Transferable (General) Skills CILOs		استراتيجية التعليم والتعلم Teaching Strategies	استراتيجية التقويم Assessment Strategies
d1-	Work in groups according to responsibilities of each team member.	- Group working - Project - Presentation	- Project evaluation - Oral Presentation - Oral evaluation

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 المقرر (CILOs)
1	Basics of Well completion design	- Types of completion - Applications	2	4	a1,a2,b1, b2
2	Well Performance	- Inflow and Outflow Relationships	1	2	a1,a2,b1, b2
3	Reservoir damage	- Mechanism - Damage causes and mitigation	1	2	a1, b1, b2, c1
4	Perforating operation	- Types of perforators - Perforating Tools - Perforating design	1	2	a1,a2,b1, b2, c1
5	Well Stimulation	- Hydraulic fracturing - Acidizing	1	2	a1,a2,b1, b2, c1
6	Completion Equipments & Materials	- Wellhead Assembly - Production Packers - Subsurface Control Equipment	2	4	a1,a2,b1, b2,c2
7	Well tubing design and stress analysis	- Tubing classification - Tubing stress analysis - Mechanical Properties and tubing selection	2	4	a1,a2,b1, b2,c1,c2
8	Horizontal & Multilateral well completion	- Horizontal & Multilateral well application - Types of completion and equipment in Horizontal & Multilateral well	1	2	a1,a2,b1, b2,c1

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		- Completions with Downhole Flow Control			
9	Completion and work-over fluids	- Definition and uses - Properties of completion and work-over fluids - Selection Criteria	1	2	a1,a2,b, ,c1
10	Sand control operations	- Sand control operations and equipment design	1	2	a1,a2,b1, b2,c1
11	Remedial cementing	- Design of remedial cementing jobs	1	2	a2,b1, b2,c1
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	Estimate the recovery volume by different drive	1	2	b1,b2,c1,c2,d1
2	Linear flow of liquid through rock	1	2	b1,b2,c1,c2,d1
3	Radial inflow Calculation	1	2	b1,b2,c1,c2,d1
4	Pressure drop through a producing oil and gas reservoir curves	1	2	b1,b2,c1,c2,d1
5	Calculation Inflow performance relationship different methods	1	2	b1,b2,c1,c2,d1
6	Calculation of Predicting skin	1	2	b1,b2,c1,c2,d1
7	Perforating Tools selection design calculation	1	2	b1,b2,c1,c2,d1
8	Perforating design calculation	1	2	b1,b2,c1,c2,d1
9	Design and Models of stimulation techniques- Proppant & Frac. Fluid	1	2	b1,b2,c1,c2,d1
10	Design and Models of stimulation techniques- Acid	1	2	b1,b2,c1,c2,d1
11	Calculation of the operating flowrate for an oil Well	1	2	b1,b2,c1,c2,d1
12	Tubing size selection	1	2	b1,b2,c1,c2,d1
13	Piston force on the packer calculation	1	2	b1,b2,c1,c2,d1
14	Estimation of completion fluid properties	1	2	b1,b2,c1,c2,d1
اجمالي الأسابيع والساعات الفعلية		14	28	

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Number of Weeks /and Contact Hours Per Semester

Teaching Strategies استراتيجيات التعليم والتعلم

- Active Lecture
- Class discussions
- Independent-learning
- Project
- Tutorial
- Problem solving
- Group working
- Case Study
- Presentation
- Group discussions
- Video

Tasks and Assignments الأنشطة والتكليفات

م No	التكليف/ الواجب Assignments/ Tasks	نوع التكليف (فردى / تعاونى)	الدرجة المستحقة Mark	أسبوع التنفيذ Week Due	خرجات التعلم CILOs (symbols)
1	Flowing bottom-hole pressure prediction - Exercise	Individual	2	W4	b1,b2, c1, c2
2	Calculation of Inflow performance and choose the appropriate completion operation- Exercise		3	W7	b1,b2, c1, c2
3	Calculation of the operating flowrate for an oil Well and Tubing size selection - Exercise		3	W12	b1,b2, c1, c2
4	Design of (Stimulation techniques/Perforating parameters/ Completion components/Tubing) for a particular well. – Project/ Case Study	Cooper ative	7	W14	b1,b2, c1, c2,d1
Total Score إجمالي الدرجة			15		

Learning Assessment تقييم التعلم

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)
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%	a1,a2,b1,b2

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5	Quiz	W12	5	3.3%	b1,b2,c1
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	

Learning Resources مصادر التعلم

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

- Jonathan Bellarby, 2009. Well Completion Design. Elsevier Science; 1st Edition. Aberdeen, UK.
- Wan Renpu, 2011. Advanced Well Completion Engineering. Gulf Professional Publishing; 3rd Edition. USA.

Essential References المراجع المساندة

- Penberthy W. L. and Shaughnessy C. M., 1992. Sand Control. SPE Series on Special Topics; Vol. 1.
- Bell W. T., 1995. Perforating. SPE Henry L Doherty Series; 1st Edition.

Electronic Materials and Web Sites etc. المصادر الإلكترونية ومواقع الإنترنت

- <http://www.heavyoilinfo.com>
- <http://www.spe.org/web/csp/>

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: إكمال الآبار

Course Plan (Syllabus): Well Completion

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

المعلومات العامة عن المقرر General information about the course					
1	اسم المقرر Course Title	Well Completion			
2	رمز المقرر ورقمه Course Code and Number	PNGE 433			
3	الساعات المعتمدة للمقرر Credit Hours	الساعات المعتمدة Credit Hours			الإجمالي Total
		محاضرات Lecture	عملي Practical	سمنار/تمارين Seminar/Tutorial	
		2	-	1	3
4	المستوى والفصل الدراسي Study Level and Semester	Fourth Level / First Semester			
5	المتطلبات السابقة المقرر (إن وجدت) Pre-requisites (if any)	PNGE 331 (Petroleum Drilling Engineering (2))			
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			
12	تاريخ اعتماد مجلس الجامعة Date of Approval	2020			

وصف المقرر Course Description	
The student is introduced to subsurface operations needed to prepare the well for production after being drilled and cased. Parts	

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covered include: well completion designs based upon reservoir, mechanical and economic considerations, outline of inflow performance for generic reservoir completions, the specifics of perforating and stimulation, the production system, comprising bottom-hole, tubing, choke and surface facilities, subsurface production control, completion and work-over fluids, sand control and remedial cementing operations.

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. Review the fundamentals concepts of well completions.	- a1
a2. Identify the main components, function and design criteria of a well completion.	- a2
b1. Select the most suitable design for a candidate well.	-b1
b2. Analyze the options available for completions and operations.	- b2
c1. Perform a well completion design to develop a sense of professional responsibility.	- c1
c2. Apply technical design in well completion operations.	- c2
d1. Work in groups according to responsibilities of each team member	- d1

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 Well completion design	Types of completion and Applications:	1	2
		Reservoir- Wellbore Interface	2	2
2	Well Performance	Inflow and Outflow Relationships	3	2
3	Reservoir damage	Mechanism Damage causes and mitigation	4	2
4	Perforating operation	Types of perforators	5	2
		Perforating Tools		
		Perforating design		
5	Well Stimulation	Hydraulic fracturing	6	2

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		<ul style="list-style-type: none"> Acidizing 		
6	Completion Equipments & Materials	<ul style="list-style-type: none"> Wellhead Assembly Production Packers 	7	2
7	Cont. ... Completion Equipments & Materials	<ul style="list-style-type: none"> Subsurface tubing auxiliaries equipment Subsurface Production control equipment Communication equipment and subsurface safety valves 	8	2
8	Well tubing design and stress analysis	<ul style="list-style-type: none"> Tubing classification Tubing stress analysis Mechanical Properties and tubing selection 	9	2
9	Horizontal & Multilateral well completion	<ul style="list-style-type: none"> Horizontal & Multilateral well completion and application Completions with Downhole Flow Control 	11	2
10	Completion and work-over fluids	<ul style="list-style-type: none"> Definition and uses Properties of completion and work-over fluids Selection Criteria 	12	2
11	Sand control operations	<ul style="list-style-type: none"> Sand control operations and equipment design 	13	2
12	Remedial cementing	<ul style="list-style-type: none"> Design of remedial cementing jobs 	14	2
عدد الأسابيع والساعات الفعلية Number of Weeks /and Contact Hours Per Semester			16	32

Practical / Training/ Tutorials/ Exercises Aspects الخطة تنفيذ موضوعات الجانب العملي

الرقم Order	موضوعات العملي/ المهام / التمارين Practical/ Tutorials/ Exercises Aspects	الأسبوع Week Due	الساعات الفعلية Cont. H
1	Estimate the recovery volume by different drive	1	2
2	Linear flow of liquid through rock	2	2
3	Radial inflow Calculation	3	2
4	Pressure drop through a producing oil and gas reservoir curves	4	2
5	Calculation Inflow performance relationship different methods	5	2
6	Calculation of Predicting skin	6	2
7	Perforating Tools selection design calculation	7	2
8	Perforating design calculation	8	2
9	Design and Models of stimulation techniques- Proppant & Frac. Fluid	9	2
10	Design and Models of stimulation techniques- Acid	10	2
11	Calculation of the operating flowrate for an oil Well	11	2
12	Tubing size selection	12	2
13	Piston force on the packer calculation	13	2

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14	▪ Estimation of completion fluid properties	14	2
اجمالي الأسابيع والساعات الفعلية Number of Weeks /and Contact Hours Per Semester		14	28

استراتيجيات التعلم والتعلم Teaching Strategies	
<ul style="list-style-type: none"> - Active Lecture - Class discussions - Independent-learning - Project - Tutorial - Problem solving - Group working - Case Study - Presentation - Group discussions - Video 	

الأنشطة والتكليفات Tasks and Assignments				
م No	التكليف/ الواجب Assignments	نوع التكليف (فردى/ تعاونى)	الدرجة المستحقة Mark	أسبوع التنفيذ Week Due
1	Flowing bottom-hole pressure prediction - Exercise	Individual	2	W4
2	Calculation of Inflow performance and choose the appropriate completion operation- Exercise		3	W7
3	Calculation of the operating flowrate for an oil Well and Tubing size selection - Exercise		3	W12
4	Design of (Stimulation techniques/Perforating parameters/ Completion components/Tubing) for a particular well. – Project/ Case Study	Cooperative	7	W14
Total Score إجمالي الدرجة			15	

تقويم التعلم Learning Assessment				
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%

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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 الرئيسية (لا تزيد عن مرجعين)

- Jonathan Bellarby, 2009. Well Completion Design. Elsevier Science; 1st Edition. Aberdeen, UK.
- Wan Renpu, 2011. Advanced Well Completion Engineering. Gulf Professional Publishing; 3rd Edition. USA.

Essential References المراجع المساندة

- Penberthy W. L. and Shaughnessy C. M., 1992. Sand Control. SPE Series on Special Topics; Vol. 1.
- Bell W. T., 1995. Perforating. SPE Henry L Doherty Series; 1st Edition.

Electronic Materials and Web Sites etc. المصادر الإلكترونية ومواقع الإنترنت

- <http://www.heavyoilinfo.com>
- <http://www.spe.org/web/csp/>

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.