



مواصفات مقرر: الاستكشاف الكهربائي والكهرومغناطيسي

Course Specification of: Electrical & Electromagnetism Exploration

المعلومات العامة عن المقرر					
1.	اسم المقرر Course Title	الاستكشاف الكهربائي والكهرومغناطيسي Electrical & Electromagnetism Exploration			
2.	رمز المقرر ورقمه Course Code and Number	GEOS 452			
3.	الساعات المعتمدة للمقرر Credit Hours	الساعات المعتمدة			الإجمالي Total
		محاضرات Lecture	عملي Practical	سمنار/تمارين Seminar/Tutorial	
		2	1	-	3
4.	المستوى والفصل الدراسي Study Level and Semester	4 th level, 2 nd semester			
5.	المتطلبات السابقة للمقرر (إن وجدت) Pre-requisites (if any)	Geos 334			
6.	المتطلبات المصاحبة (إن وجدت) Co-requisites (if any)	-			
7.	البرنامج الذي يدرس له المقرر Program(s) in which the course is offered	Bachelor of Geosciences (Geophysics Track)			
8.	لغة تدريس المقرر Language of teaching the course	English/Arabic			
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	Assoc.Prof. Ahmed Alaydrous			
12.	تاريخ اعتماد مجلس الجامعة Date of Approval	2020			

وصف المقرر

وصف المقرر بالإنجليزية

For students undertaking this course, the aim is to introduce the basic concepts and applications of electricity and magnetism. Geophysicists are employed in a wide range of industries, including petroleum and mineral exploration, groundwater, contaminants and salinity evaluation. This course investigates geophysical techniques, covering topics in electrical and electromagnetics. The course also involves methods of geophysical data analysis, visualization and interpretation through a series of laboratories.

مخرجات تعلم المقرر (CILOs)

بعد الانتهاء من دراسة المقرر سوف يكون الطالب قادرا على أن: || After completing the course, the student will be able to:

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Assoc.Prof. Bassim
AlKhirbash

Dean of the Development
& Quality Assurance Center
Assoc.Prof. Huda Al-Emad

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



a1.	Define the concept of electric charges and describe the types of charge distributions.	- a1
a2.	Contrast between electric and magnetic fields and their effects on charges and currents.	- a2
a3.	Demonstrate the relationships between electric and magnetic fields and appreciate that light is a consequence of this relationship.	a3.
b1.	Distinguish the different ways to calculate the electric fields.	-b1
b2.	Connect between electric and magnetic field through Maxwell's equations and relate it to the properties of the fields it describes.	- b2
c1.	Apply Coulomb's and Gauss's laws to calculate the electric field of a charged body.	- c1
c2.	Carry out field applications on both electrical trenching and vertical electrical soundings	- c2
d1.	Collaborate effectively within a team.	- d1
d2.	Acquire entrepreneurial skills to prepare technical reports.	- 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.	Define the concept of electric charges and describe the types of charge distributions.	A1	
a2.	Contrast between electric and magnetic fields and their effects on charges and currents.	A2	
a3.	Demonstrate the relationships between electric and magnetic fields and appreciate that light is a consequence of this relationship.	A3	
b1.	Distinguish the different ways to calculate the electric fields.	B2	
b2.	Connect between electric and magnetic field through Maxwell's equations and relate it to the properties of the fields it describes.	B2	
c1.	Apply Coulomb's and Gauss's laws to calculate the electric field of a charged body.	C2	
c2.	Carry out field applications on both electrical trenching and vertical electrical soundings	C3	
d1.	Collaborate effectively within a team.	D1	

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d2.	Acquire entrepreneurial skills to prepare technical reports.	D3	
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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 -	Define the concept of electric charges and describe the types of charge distributions.	Interactive Lectures Discussion Case study	Examinations, Assignments, Oral presentations
a2 -	Contrast between electric and magnetic fields and their effects on charges and currents.		
a3 -	Demonstrate the relationships between electric and magnetic fields and appreciate that light is a consequence of this relationship.		
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 -	Distinguish the different ways to calculate the electric fields.	Discussion Demonstration Brain storm Problem solving	Essay test, Assignments, Oral presentations.
b2 -	Connect between electric and magnetic field through Maxwell's equations and relate it to the properties of the fields it describes.		
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-	Apply Coulomb's and Gauss's laws to calculate the electric field of a charged body.	Tutorials & practical classes, case study, Computer based teaching	Achievement tests Chart Drawing practical exams
c2-	Carry out field applications on both electrical trenching and vertical electrical soundings		



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
d1- Collaborate effectively within a team.	Small group working Student-led Seminars Case Study Method	Achievement tests Team working
d2- Acquire entrepreneurial skills to prepare technical reports.		

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 الفعالية Contact Hours	رموز مخرجات التعلم للمقرر (CILOs)
1	Vector analysis	Coulomb's law and its applications.	1	2	a1 a2 b1 b2 d1 d2
2	Electric field and forces.	Electric potential, Gauss's law and its applications	1	2	a2 a3 b1 c3 d1 d2
3	Electric dipole, Electric potential, Energy and power in electric circuits.	(Millikan oil drop experiment)	1	2	a2 a3 b1 c3 d1 d2
4	Maxwell's Equations	Electrical Resistivity/Conductivity and Rocks	2	4	a2 a3 b1 c3 d1 d2
5	Effect of dielectric.		1	2	a2 a3 b1 c3 d1 d2
6	Time-domain electromagnetics	Frequency-domain electromagnetics (1-D) Frequency-domain electromagnetics (1, 2-D)	2	4	a3 b2 c1 c2 d1 d2
7	Molecular model of induced charge Current	Resistance and Electromotive force. Magnetic field.	1	2	a3 b2 c1 c2 d1 d2
8	Magnetic force.	Energy stored in magnetic field, Magnetic ring.	1	2	a3 b2 c1 c2 d1 d2
9	Electrical and Electromagnetic Methods	Classifications and their Importance in Geo-exploration	2	4	a1 b1 b2 c1 c2 d1 d2
10	Resistivity Method	Interpretation of Resistivity Data. Field Applications.	2	4	a1 b1 b2 c1 c2 d1

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				d2
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	Introduction to Resistivity	1	2	a1 b1 b2 c1 c2
2	Resistivity Sounding	2	4	b1 b2 c1 c2 d1 d2
3	Modeling resistivity data	2	4	b1 b2 c1 c2 d1 d2
4	Electromagnetic methods: EM conductivity	1	2	a1 b1 b2 c1 c2
5	EM conductivity	1	2	a1 b1 b2 c1 c2
6	GeoModel - Electromagnetic Conductivity Surveys	2	4	b1 b2 c1 c2 d1 d2
7	Ground Penetrating Radar: Introduction	1	2	a1 b1 b2 c1 c2
اجمالي الأسابيع والساعات الفعلية Number of Weeks /and Contact Hours Per Semester		10	20	

استراتيجيات التعليم والتعلم Teaching Strategies	
<ul style="list-style-type: none"> ▪ Interactive Lectures ▪ Discussion ▪ Brain storm ▪ Problem solving ▪ Small group working ▪ Student-led Seminars 	

الأنشطة والتكليفات Tasks and Assignments					
م No	التكليف/ الواجب Assignments/ Tasks	نوع التكليف (فردى / تعاونى)	الدرجة المستحقة Mark	أسبوع التفويض 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	Lab Exercises	Weekly	20	13.4%	b1, b2, c1, c2
2	Participation	Weekly	10	6.7%	a1, a2, c1, c2, d1
3	Quizzes	End of a topic	10	6.7%	a1, a2, a3 b1, b2,
4	Mid-Term written exam	Week 7	20	13.3%	a1, a2, b1, b2,
5	Final lab Exam	Week 14	20	13.3%	b1, b2, c1, c2, d1
6	Final Exam (theoretical)	Week 16	70	46.6%	all
Total الإجمالي			150	100.00%	

Learning Resources مصادر التعلم

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

1. Physics for Scientists and Engineers, sixth edition. By: Serway, Beichner, Saunders College Publishing 2000
2. Keary, P., Brooks, M. and I. Hill, 2002, An Introduction to Geophysical Exploration, 3rd ed. , Blackwell Science, Oxford.

1. Dobrin, M. B. and Savit, C. H., 1988, Introduction to Geophysical Prospecting, McGraw
2. Hill, New York. Introduction to Physics 6th edition by Halliday and Resnick, 2000Wiley
3. Looking into the Earth: An introduction to geological geophysics; Alan E. Mussett, M. Aftab Khan. Cambridge University Press, 2009.

Electronic Materials and Web Sites etc. المصادر الإلكترونية ومواقع الإنترنت

<http://www.hyperphysics.com/>
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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.
5	Cheating: - 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: -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: -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: العلوم الجيولوجية (مسار الجيوفيزياء Geosciences) العام الجامعي: 2020-2021م

خطة مقرر: الاستكشاف الكهربائي والكهرومغناطيسي

Course Plan (Syllabus): Electrical & Electromagnetism Exploration

معلومات عن أستاذ المقرر Information about Faculty Member Responsible for the Course						
الاسم Name	Assoc.Prof. Ahmed Alaydrous		الساعات المكتبية (أسبوعياً) Office Hours			
المكان ورقم الهاتف Location & Telephone No.	777005199		السبت SAT	الأحد SUN	الاثنين MON	الثلاثاء TUE
البريد الإلكتروني E-mail	a.alaydrous@su.edu.ye					الأربعاء WED
						الخميس THU

معلومات عامة عن المقرر General information about the course						
1.	اسم المقرر Course Title	الاستكشاف الكهربائي والكهرومغناطيسي Electrical & Electromagnetism Exploration				
2.	رمز المقرر ورقمه Course Code and Number	GEOS 452				
3.	الساعات المعتمدة للمقرر Credit Hours	الساعات المعتمدة Credit Hours				الإجمالي Total
		محاضرات Lecture	عملي Practical	سمنار/تمارين Seminar/Tutorial	تدريب Training	
		2	1	-	-	3
4.	المستوى والفصل الدراسي Study Level and Semester	4 th level, 2 nd semester				
5.	المتطلبات السابقة للمقرر Pre-requisites	Geos 334				
6.	المتطلبات المصاحبة (إن وجدت) Co-requisite	-				
7.	البرنامج الذي يدرس له المقرر Program (s) in which the course is offered	Bachelor of Geosciences (Geophysics Track)				
8.	لغة تدريس المقرر Language of teaching the course	English/Arabic				
9.	مكان تدريس المقرر Location of teaching the course	Faculty of Petroleum and Natural Resources				

وصف المقرر Course Description

For students undertaking this course, the aim is to introduce the basic concepts and applications of electricity and magnetism. Geophysicists are employed in a wide range of industries, including petroleum and mineral exploration, groundwater, contaminants and salinity evaluation. This course investigates geophysical techniques, covering topics in electrical and electromagnetics. The course also involves methods of geophysical data analysis, visualization and interpretation through a series of laboratories.



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 Define the concept of electric charges and describe the types of charge distributions.	- a1
a2 Contrast between electric and magnetic fields and their effects on charges and currents.	- a2
a3 Demonstrate the relationships between electric and magnetic fields and appreciate that light is a consequence of this relationship.	-a3
b1 Distinguish the different ways to calculate the electric fields.	-b1
b2 Connect between electric and magnetic field through Maxwell's equations and relate it to the properties of the fields it describes.	- b2
c1 Apply Coulomb's and Gauss's laws to calculate the electric field of a charged body.	- c1
c2 Carry out field applications on both electrical trenching and vertical electrical soundings	- c2
d1 Collaborate effectively within a team.	- d1
d2 Acquire entrepreneurial skills to prepare technical reports.	- 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 الفعالية Con. H
1	Vector analysis	Coulomb's law and its applications.	Week 1	2
2	Electric field and forces.	Electric potential, Gauss's law and its applications	Week 2	2
3	Electric dipole	Electric potential, Energy and power in electric circuits. (Millikan oil drop experiment)	Week 3	2
4	Maxwell's Equations	Electrical Resistivity/Conductivity and Rocks	Week 4-5	4
5	Effect of dielectric.		Week 6	2
6	Midterm exam		Week 7	2

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7	Time-domain electromagnetics	Frequency-domain electromagnetics (1-D) Frequency-domain electromagnetics (1, 2-D)	Week 8-9	4
8	Molecular model of induced charge Current	Resistance and Electromotive force. Magnetic field.	Week 10	2
9	Magnetic force.	Energy stored in magnetic field, Magnetic ring.	Week 11	2
10	Electrical and Electromagnetic Methods	Classifications and their Importance in Geo-exploration	Week 12-13	4
11	Resistivity Method	Interpretation of Resistivity Data. Field Applications.	Week 14-15	4
12	Final exam		Week 16	2
عدد الأسابيع والساعات الفعلية Number of Weeks /and Contact Hours Per Semester			16	32

خطة تنفيذ موضوعات الجانب العملي Practical / Training/ Tutorials/ Exercises Aspects			
الرقم Order	موضوعات العملي/ المهام / التمارين Practical/ Tutorials/ Exercises Aspects	الأسبوع Week Due	الساعات الفعلية Cont. H
1	Introduction to Resistivity	Week 1	2
2	Resistivity Sounding	Week 2-3	4
3	Modeling resistivity data	Week 4-5	4
4	Electromagnetic methods: EM conductivity	Week 6	2
5	Mid term exam	Week 7	2
6	EM conductivity	Week 8	2
7	GeoModel - Electromagnetic Conductivity Surveys	Week 9-10	4
8	Ground Penetrating Radar: Introduction	Week 11	2
9	Final lab exam	Week 14	2
اجمالي الأسابيع والساعات الفعلية Number of Weeks /and Contact Hours Per Semester		12	24

استراتيجيات التعليم والتعلم Teaching Strategies
<ul style="list-style-type: none"> ▪ Interactive Lectures ▪ Discussion ▪ Demonstration ▪ Brain storm ▪ Problem solving ▪ Small group working

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▪ Student-led Seminars

Tasks and Assignments الأنشطة والتكليفات

م No	التكليف/ الواجب Assignments	نوع التكليف (فردى/ تعاونى)	الدرجة المستحقة Mark	أسبوع التنفيذ Week Due
1				
Total Score إجمالي الدرجة			15/150 10/ 100	

Learning Assessment تقييم التعلم

م No	أساليب التقييم Assessment Method	موعد (أسبوع) التقييم Week Due	الدرجة Mark	الوزن النسبي % Proportion of Final Assessment
1	Lab Exercises	Weekly	20	13.4%
2	Participation	Weekly	10	6.7%
3	Quizzes	End of a topic	10	6.7%
4	Mid-Term written exam	Week 7	20	13.3%
5	Final lab Exam	Week 14	20	13.3%
6	Final Exam (theoretical)	Week 16	70	46.6%
Total المجموع			150	100.00%

Learning Resources مصادر التعلم

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

3. Physics for Scientists and Engineers, sixth edition. By: Serway, Beichner, Saunders College Publishing 2000
4. Keary, P., Brooks, M. and I. Hill, 2002, An Introduction to Geophysical Exploration, 3rd ed. , Blackwell Science, Oxford.

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المصادر الإلكترونية ومواقع الإنترنت etc. Electronic Materials and Web Sites

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Course Policies:

1	<p>Class Attendance:</p> <ul style="list-style-type: none"> - 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	<p>Tardy:</p> <ul style="list-style-type: none"> - Attendance and arriving on time for the class are necessary. If the student is late, he will be prevented from class.
3	<p>Exam Attendance/Punctuality:</p> <ul style="list-style-type: none"> - According to the rules the student gets absent in the exam of the course.
4	<p>Assignments & Projects:</p> <ul style="list-style-type: none"> - Papers survey or projects should be submitted by the time detriment by the professor.
5	<p>Cheating:</p> <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	<p>Plagiarism:</p> <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	<p>Other policies:</p> <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.