

Course Syllabus



1	Course title	Geophysics	
2	Course number	0305771	
3	Credit hours	3 hrs. (Theory)	3 hrs. (Theory)
	Contact hours (theory, practical)	3 hrs. (Theory / week)	
4	Prerequisites/corequisites		
5	Program title	M.Sc. In Geology	
6	Program code	0305	
7	Awarding institution	The University of Jordan	
8	School	Science	
9	Department	Geology	
10	Course level	M.Sc.	
11	Year of study and semester (s)		
12	Other department (s) involved in teaching the course		
13	Main teaching language	English	
14	Delivery method	☒ Face to face learning ☐ Blended ☐ Fully online	
15	Online platforms(s)	☐ Moodle ☐ Microsoft Teams ☐ Skype ☒ Zoom ☐ Others.....	
16	Issuing/Revision Date	19/8/2024	

17 Course Coordinator:

Name: Dr. Mu'ayyad Al Hseinat	Contact hours: Sun, Mon and Thur (9:00-12:00)
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18 Other instructors:

Name:

Office number:

Phone number:

Email:

Contact hours:

Name:

Office number:

Phone number:

Email:

Contact hours:

19 Course Description:

As stated in the approved study plan.

Seismic methods and its importance in exploration, analysis and interpretation of seismic refraction data, constant and variable velocity models. Processing and interpretation of reflection data, preparation of seismic & geologic cross-sections. Gravity methods & its importance in exploration, Gravitational effect of subsurface bodies and models, separation of anomalies. Electrical methods and its importance in exploration, quantitative interpretation of resistivity data. Magnetic methods and its importance, qualitative & quantitative interpretation.

20 Course aims and outcomes:

A- Aims:

The course will provide the students with advance understanding of the concepts, principles and techniques of system design, process and application component of geophysical methods starting from data acquisition, processing, interpretation and modeling and solving geophysical problems.

The topics covered in this course will allow the students to better understand of the different geophysical techniques and their importance, i.e., reflection seismic, refraction seismic, electrical, electromagnetic methods, gravity, magnetic methods, radiometric methods, and geophysical well logging.

B- Students Learning Outcomes (SLOs):

Upon successful completion of this course, students will be able to:

1. being able to apply logical, critical, systematic, and innovative thinking in the context of development or implementation of science and technology that concerns and implements the value of humanities in accordance with their area of expertise,
2. understanding the theoretical concepts of geophysics in natural science and principles in application to geological studies and basis of geophysics to a specific natural phenomenon,
3. Understanding all different types of geophysical methods are and how to select a geophysical method based on the target and conditions.
4. Understanding the benefit of each individual method on the geophysical surveying field.

SLOs SLOs of the course	SLO (1)	SLO (2)	SLO (3)	SLO (4)
1. Introduction and review of geophysics	X			
2. Geophysical data processing	X	X	X	X
3. Approaching the Subsurface	X	X	X	X
4. Geophysics in oil exploration	X		X	X
5. Geophysics in mining exploration	X		X	X
6. Seismic Exploration: Fundamental Considerations	X			
7. The Seismic Refraction Method	X	X	X	X
8. The Seismic Reflection Method	X	X	X	X

9. Electrical Resistivity Methods	X		X	X
10. Gravity method	X		X	X
11. Magnetic Method	X		X	X
12. Electromagnetic method	X		X	X
13. Radiometric surveying methods	X		X	X
14. Geophysical borehole logging methods	X		X	X

21. Topic Outline and Schedule:

Week	Lecture	Topic	Intended Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
1	1.1 1.2 1.3	Introduction and review of geophysics	Reviewing of previous knowledge and fundamentals of geophysics	Face to face			Discussion + quizz	Text Books / lecture notes and YouTube Channels
2	2.1 2.2 2.3	Geophysical data processing	Understanding digital seismic data processing	Face to face			Discussion Home Assignments	Text Books / lecture notes and YouTube Channels
3	3.1 3.2 3.3	Approaching the Subsurface	Students able to know how to explore subsurface information	Face to face			Discussion + quizz	Text Books / lecture notes and YouTube Channels
4	4.1 4.2 4.3	Geophysics in oil exploration	comparing different exploration methods: integration and implementation in geological and geophysical field surveys to design geophysical	Face to face			Discussion	Text Books / lecture notes and YouTube Channels
5	5.1 5.2	Geophysics in mining exploration		Face to face				Text Books / lecture notes and

	5.3		Exploration methods related to oil and mineral targets.				First exam	YouTube Channels
6	6.1	Seismic Exploration: Fundamental Considerations	Understanding the basic concepts of Physics: seismic wave propagation, exploration seismology history, development of technology, seismic refraction method and reflection seismic method, understanding about seismic data processing Technique refraction and 2D reflection.	Face to face			Discussion	Text Books / lecture notes and YouTube Channels
	6.2							
	6.3						Home Assignments	
7	7.1	The Seismic Refraction Method		Face to face			Discussion	Text Books / lecture notes and YouTube Channels
	7.2						Home Assignments	
	7.3							
8	8.1							
	8.2							
	8.3							
9	9.1	The Seismic Reflection Method					Discussion	Text Books / lecture notes and YouTube Channels
	9.2					Home Assignments		
	9.3							
10	10.1	Electrical Resistivity Methods		Face to face			Discussion	Text Books / lecture notes and YouTube Channels
	10.2						Home Assignments	
	10.3							
11	11.1	Gravity method	Understanding the concept and technology of gravity and magnetic methods in subsurface description, and being able to design the acquisition of	Face to face			Discussion	Text Books / lecture notes and YouTube Channels
	11.2							
	11.3						Home Assignments	
12	12.1	Magnetic		Face to face				Text Books / lecture

	12.2	Methods	gravity and magnetic exploration data.				Discussion	notes and YouTube Channels
	12.3						Home Assignments	
13	13.1	Electromagnetic methods	Understanding concepts, principles and techniques of Electromagnetic Methods (GPR, VLF, and MT) and their procedures starting from data acquisition, processing, subsurface modeling	Face to face			Discussion	Text Books / lecture notes and YouTube Channels
	13.2							
	13.3						Home Assignments	
14	14.1	Radiometric surveying methods	Understanding concepts, principles and techniques of Radiometric Methods (Instruments for measuring radioactivity) and their importance	Face to face			Discussion	Text Books / lecture notes and YouTube Channels
	14.2							
	14.3							
15	15.1	Geophysical borehole logging methods	Understanding the basic concepts of well logging measurements and different logging types for formation evaluation.	Face to face			Discussion	Text Books / lecture notes and YouTube Channels
	15.2							
	15.3						Final exam	

22 Evaluation Methods:

Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)	Platform
First exam	20	Weeks (1-5)		After week 5	Personal
Second exam	20	Weeks (6-10)		After week 10	Personal
Final exam	40	Weeks (4-15)		After week 15	Personal
Home Assignments + Quizzes	10	9 topics		During 9 weeks	Personal

Grading policy:

Letter	Percentage
A	>88
A-	81-87
B+	76-80
B	71-75
B-	66-70
C+	61-65
C	0-60

23 Course Requirements

(e.g: students should have a computer, internet connection, webcam, account on a specific software/platform...etc):

Students need a computer (or smartphone) and internet access to watch important videos.

24 Course Policies:

A- Attendance policies:

Absences from class will be recorded. The allowable absences for the student are 3 numbers.

Late homework assignments will not be graded unless a valid and substantiated written excuse is provided.

B- Absences from exams and submitting assignments on time:

It is not allowed to be absent from the exams, in case of compelling conditions, a makeup exam will be held. The assignments should be all delivered on time.

C- Health and safety procedures:

N/A

D- Honesty policy regarding cheating, plagiarism, misbehavior:

There will be no leniency or tolerance with regard to cheating and system bypass issues, necessary actions will be taken by the department committee.

E- Grading policy:

As seen in section 22 above.

F- Available university services that support achievement in the course:

The main library, computer rooms with internet access.

25 References:

A- Required book(s), assigned reading and audio-visuals:

1. Burger, H. Robert, Anne F. Sheehan, Craig H. Jones. (2006). Introduction to applied geophysics: exploring the shallow subsurface. W. W. Norton & Company, In. 614 pp.
2. Philip Kearey, Michael Brooks, Ian Hill. (2002). An Introduction to Geophysical Exploration. THIRD EDITION, Blackwell Science Ltd. 281 pp.
3. John M. R., (2011). An Introduction to Applied and Environmental Geophysics, 2nd ed. Ohn Wiley & Sons, Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK.
4. Dobrin, M. B., (1981), Introduction to geophysical prospecting, 3rd ed., McGraw-Hill, Auckland.
5. Sharma, P. V., (1986), Geophysical methods in geology, 2nd ed., Prentice Hall, New Jersey.

B- Recommended books, materials, and media:

-YouTube channel, Internet, Support material (s): presentations, homework and video clips.

26 Additional information:

Introduce several geophysical software/s.

Name of Course Coordinator: Dr. Mu'ayyad Al Hseinat	Signature: -----	Date: ----
Head of Curriculum Committee/Department: -----	Signature: -----	---
Head of Department: -----	Signature: -----	-
Head of Curriculum Committee/Faculty: -----	Signature: -----	-
Dean: -----	Signature: -----	