MODULE DESCRIPTION
وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Geophysics		**Module Delivery**		
Module Type	Core		☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☒ Seminar		
Module Code	PENG323				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	3		**Semester of Delivery**	Fifth	
Administering Department	Petroleum Engineering Department		**College**	College of Engineering	
Module Leader	Lec. Murtadha D Abdullah		**e-mail**	Murtadha.abdullah@alayen.edu.iq	
Module Leader's Acad. Title	Assist Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Lec. Murtadha D Abdullah		**e-mail**	Murtadha.abdullah@alayen.edu.iq	
Peer Reviewer Name	Hasnaa M.EL-Arwash		**e-mail**	Hasnaa.Mohammed@alayen.edu.iq	
Scientific Committee Approval Date	2025/10/5		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**PENG215: Fundamentals of Petroleum Engineering**	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Principles and techniques of seismic data acquisition, Types of seismic sources and receivers, Seismic Data Processing, Seismic Data Interpretation, Well Logging Principles and Interpretation, Gravity and Magnetic Methods in Exploration, Electromagnetic Methods for Reservoir Delineation, Advanced Geophysical Techniques3D,4D Seismic Imaging.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Knowledge	A2	A.2.1. Define the fundamental principles, concepts of geophysics and its applications, well logs principles in the petroleum industry. A.2.2. Describe seismic data acquisition, processing, and interpretation techniques,2D seismic,3D seismic,4D seismic. A.2.3. Identify reservoir properties using well log interpretation techniques. A.2.4. Apply gravity, magnetic methods to geological mapping and hydrocarbon exploration, advanced geophysical techniques electromagnetic methods and 3D,4D seismic imaging, in reservoir characterization.
	Skills	B1	B.1.1. Function efficiently as an individual B.1.2. Function as a member of multidisciplinary and multicultural teams.
	Ethics	C3	C.3.1. Utilize contemporary technologies C.3.2. Make use of codes of practice and standards, quality guidelines, C.3.3. Utilize health and safety requirements C.3.4. Show environmental issues and risk management principles.

Indicative Contents المحتويات الارشادية	• UNIT 1: Introduction, Seismic Data Acquisition, Seismic Data Processing (6 hr) • UNIT 2: Seismic Data Interpretation, Well Logging Principles and Interpretation1, Well Logging Principles and Interpretation2 (6 hr) • UNIT 3: Gravity and Magnetic Methods in Exploration, Electromagnetic Methods for Reservoir Delineation, Advanced Geophysical Techniques: 3D Seismic Imaging(6 hrs) • UNIT 4: Geophysical Case Studies and Interpretation, Geophysical Case Studies and Interpretation (6 hr) • UNIT 5: Group Project: Geophysical Analysis and Interpretation, Group Project: Geophysical Analysis and Interpretation, Project Presentations and (6 hr)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	✓ Presentations. ✓ Discussions. ✓ Tutorial and graphics. ✓ Problem solving. ✓ Brain storming. ✓ Research and reporting. ✓ Group solving problem ✓ Report & discussion assessment.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعنا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعنا	3.46
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	A2
	Assignments	2	20% (20)	2 and 12	A2
	Projects / Lab.				
	Report	1	10% (10)	13	A2
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	A2
	Final Exam	3hr	50% (50)	16	A2
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري		
	Material Covered	
Week 1	**Introduction to Geophysics and its Applications in Petroleum Engineering** • Definition and scope of geophysics in the petroleum industry • Overview of geophysical methods used for petroleum exploration and production • Importance of integrating geophysics with other disciplines in reservoir characterization	A2
Week 2	**Seismic Data Acquisition** • Principles and techniques of seismic data acquisition • Types of seismic sources and receivers • Survey design considerations and acquisition parameters	A2, B1, C3
Week 3	• Preprocessing steps: data quality control, noise reduction, and data enhancement • Time and depth conversion techniques • Migration and velocity analysis for imaging subsurface structures	A2, B1, C3
Week 4	**Seismic Data Interpretation** • Basic concepts of seismic interpretation • Identifying seismic reflections, faults, and stratigraphic features • Mapping subsurface structures and hydrocarbon reservoirs using seismic data	A2, B1, C3

Week 5	**Well Logging Principles and Interpretation** • Introduction to well logging tools and measurements • Interpretation of well logs for reservoir characterization • Estimating reservoir properties such as porosity, permeability, and fluid saturations	A2, B1, C3
Week 6	**Well Logging Principles and Interpretation** • Estimating reservoir properties porosity, permeability, and fluid saturations	A2, B1, C3
Week 7	**Gravity and Magnetic Methods in Exploration** • Principles and applications of gravity and magnetic methods • Data acquisition and interpretation techniques • Mapping geological structures and potential hydrocarbon prospects using gravity and magnetic data	A2, B1, C3
Week 8	**Electromagnetic Methods for Reservoir Delineation** • Introduction to electromagnetic methods and their applications • Time-domain and frequency-domain electromagnetic surveys • Interpretation of electromagnetic data for reservoir delineation and fluid identification	A2, B1, C3
Week 9	**Advanced Geophysical Techniques: 3D Seismic Imaging** • Principles and advantages of 3D seismic imaging • Seismic data acquisition and processing for 3D surveys • Interpretation and visualization of 3D seismic data for reservoir characterization	A2, B1, C3
Week 10	**Geophysical Case Studies and Interpretation** • Analyzing and interpreting real-world geophysical data sets • Case studies showcasing the application of geophysics in reservoir characterization and management	A2, B1, C3
Week 11	**Geophysical Case Studies and Interpretation** • Hands-on exercises for students to practice geophysical interpretation techniques	A2, B1, C3
Week 12	**Group Project: Geophysical Analysis and Interpretation** • Students form groups to work on a comprehensive geophysical project • Each group will be assigned a dataset to analyze and interpret • Students will apply geophysical techniques learned throughout the course to solve a specific problem or answer a research question	A2, B1, C3
Week 13	**Group Project: Geophysical Analysis and Interpretation** • Students form groups to work on a comprehensive geophysical project • Each group will be assigned a dataset to analyze and interpret • Students will apply geophysical techniques learned throughout the course to solve a specific problem or answer a research question	A2, B1, C3
Week 14	**Project Presentations and Course Wrap-up** • Groups present their project findings and interpretations • Class discussion and feedback on the projects	A2, B1, C3
Week 15	• Wrap-up of the course, highlighting key concepts and takeaways	A2, B1, C3
Week 16	**Preparatory week before the final Exam**	A2

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Aminzadeh, F., & Dasgupta, S. N. (2013). *Geophysics for petroleum engineers*. Newness.	Yes
Recommended Texts	• Kundu, S. N. (2023). *Springer Geoscience for Petroleum Engineers*. Nature.	No
Websites	https://eng.alayen.edu.iq//colleges/e/42	

Grading Scheme مخطط الدرجات				
Group	**Grade**	**التقدير**	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.