University of Mosul

College of Petroleum and Mining Engineering

Department of Petroleum Reservoir Engineering

Course Descriptions

Third Stage / 1st Semester (Semester)

Dr. Maha Muneeb Al-Dabbagh

Head of Department

Dr. Ayman Mahmoud Ahmed

Chairman of the Scientific Committee

Ministry of Higher Education and Scientific Research

University of Mosul

College of Petroleum and Mining Engineering

Department of Petroleum Reservoir Engineering

Course Descriptions

Petroleum Reservoir Engineering

Third Stage

(Semester)

2024 – 2025

Course Description Form

1. Course Name:
Seismic Exploration
2. Course Code:
PRE 311
3. Semester / Year:
1st semester / Third year
4. Description Preparation Date:
1/9/2024
5. Available Attendance Forms:
Classroom attendance for theoretical and practical lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
75 hr / 3.5 units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Ayman Mahmoud Ahmed ; Dr. Mahmood Salman Ahmed Email: ayman.geology@uomosul.edu.iq ; mahmood.salman@uomosul.edu.iq

8. Course Objectives	
Course Objectives	The student learned the basics of refraction and reflection seismic exploration. - Learn how to collect, process, and interpret seismic data. - The student learned how to build the final structural and stratigraphic model for use in the field of exploration and characterization of hydrocarbon reservoirs.
9. Teaching and Learning Strategies	
Strategy	Developing study programs that link seismic exploration with other disciplines within reservoir engineering that contribute to solving scientific issues. Providing the local and regional community with an oil reservoir engineer with a broad theoretical and practical background, including seismic exploration. Emphasize the role of scientific field and laboratory research, modeling, and geophysical studies in solving issues.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hours	Introduction: Types of seismic waves, velocities of rocks & fluids. SEISMIC WAVES : attenuation, amplitudes	Seismic Exploration	Theoretical	General questions and discussion or real-time quiz
2	2 hours	Reflection , refraction and diffraction .Acoustic impedance.	Seismic Exploration	Theoretical	General questions and discussion or real-time quiz

		Seismic wave propagatic Introduction - Huyg principles The law reflection using Huyg principles.			
3	2 hours	The law of refraction using Fermats principles – The law of reflection using Fermat's principles The main characteristic features of seismic prospecting methods Wave Terminology.	Seismic Exploration	Theoretical	General questions and discussion or real-time quiz
4	2 hours	Velocity in rocks is affected by many proper. Methods of computing seismic velocity. Spread Configuration.	Seismic Exploration	Theoretical	General questions and discussion or real-time quiz
5	2 hours	Principle of refraction seismic. Conducting refraction seismic surveys. Correction of field data, interpretation of data obtain the velocities thickness over sim layered structures.	Seismic Exploration	Theoretical	General questions and discussion + monthly quizzes
6	2 hours	Two layered and three layered horizontal. Faulted interfaces, dippir irregular layers.	Seismic Exploration	Theoretical	General questions and discussion or real-time quiz
7	2 hours	Seismic reflection surveying Reflection and transmiss of normally incident seisı	Seismic Exploration	Theoretical	General questions and discussion or real-time quiz
8	2 hours	Geometry of reflected wave path Normal move out (NI ΔT).	Seismic Exploration	Theoretical	General questions and discussion or real-time quiz
9	2 hours	Effect of NMO Dipping Reflector How to find the dip angl dipping reflector?	Seismic Exploration	Theoretical	General questions and discussion or real-time quiz
10	2 hours	The shot gather Common mid-point profiling Corrections applied to seismic data	Seismic Exploration	Theoretical	General questions and discussion or real-time quiz
11	2 hours	The shot gather Common mid-point profiling Corrections applied to seismic data	Seismic Exploration	Theoretical	General questions and discussion or real-time quiz

12	2 hours	Digital processing of seismic data, Data processing Sequence	Seismic Exploration	Theoretical	General questions and discussion or real-time quiz
13	2 hours	1-Essential Processing True Amplitude Recovery Data Editing, Common de point (CDP) or Comr reflection point (CRP), ' importance of CDP-Stack	Seismic Exploration	Theoretical	General questions and discussion or real-time quiz
14	2 hours	CDP-Gather, 2-Optional processing ,De-convolution Trace equalization, Migration Coherency, Characteristic of seis event	Seismic Exploration	Theoretical	General questions and discussion or real-time quiz
15	2 hours	Seismic interpretation, Base map, Seismic sections, Synthetic seismogram, When there is a well and the well has synthetic seismogram, When there is a well and the well has no synthetic, seismogram or there is no well, Seismic maps	Seismic Exploration	Theoretical	General questions and discussion + end of semester exam
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	3 hours	Lab-1/Elasticity theory Elastic Moduli	Seismic Exploration	Practical	Solution with lab repo
2	3 hours	Lab-2/ Uphole velocity sur	Seismic Exploration	Practical	Solution with lab repo
3	3 hours	Lab-3 / Two – Layer Case	Seismic Exploration	Practical	Solution with lab repo
4	3 hours	Lab-3 / Two – Layer Case	Seismic Exploration	Practical	Solution with lab repo
5	3 hours	Lab-4 / Three – Layer Cas	Seismic Exploration	Practical	Solution with lab repo
6	3 hours	Lab-5 / Fault Problem	Seismic Exploration	Practical	Solution with lab repo monthly exam
7	3 hours	Lab-6 / Dipping– Layer Ca	Seismic Exploration	Practical	Solution with lab repo
8	3 hours	Lab-6 / Dipping– Layer Ca	Seismic Exploration	Practical	Solution with lab repo
9	3 hours	Lab-7/ Seismic Reflec Events	Seismic Exploration	Practical	Solution with lab repo
10	3 hours	Lab-7/ Seismic Reflec Events	Seismic Exploration	Practical	Solution with lab repo
11	3 hours	Lab-8 / Seismic Reflec Horizontal and Dipp Reflector	Seismic Exploration	Practical	Solution with lab repo
12	3 hours	Lab-9 / Seismic Reflec Dipping Reflector	Seismic Exploration	Practical	Solution with lab repo
13	3 hours	Lab-10/ Seismic Reflection Dynamic (NMO) and St corrections	Seismic Exploration	Practical	Solution with lab repo
14	3 hours	Lab-10/ Seismic Reflection	Seismic Exploration	Practical	Solution with lab repo

		Dynamic (NMO) and St corrections			
15	3 hours	Lab-11/ Seismic Reflection Dipping Reflector	Seismic Exploration	Practical	Solution with lab repo end of semester exam

11. Course Evaluation

Distribute the score out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral, monthly, and written exams, reports, etc.
The semester grade is 50%, including 35% theoretical, including attendance, class discussions, and quizzes, and lab reports, and 15% practical.
The end-of-semester grade is 50%, including 40% theory and 10% practical.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	An Introduction to Applied and Environmental Geophysics, 2nd Edition John M. Reynolds ISBN: 978-0-471-48535-3 April 2011 , 710 pages
Main references (sources)	Applied Geophysics ,2nd Edition AUTHORS:W. M. Telford L. P. Geldart R. E. Sheriff DATE PUBLISHED: February 1991AVAILABILITY: Available FORMAT: Paperback ISBN: 9780521339384
Recommended books and references (scientific journals, reports…)	Applied Geophysics for Geologists and Engineers The Elements of Geophysical Prospecting Book • Second Edition • 1981
Electronic References, Websites	Applied, theoretical and engineering geophy electronic sites.
Curriculum Update Percentage or Description	9%

Head of department

Lecturer

Dr. Ayman Mahmoud Ahmed

Course Description Form

1. Course Name:
Well logging
2. Course Code:
PRE312
3. Semester / Year:
semester 1 / Third year
4. Description Preparation Date:
15/ 9/2024
5. Available Attendance Forms:
Physical and online
6. Number of Credit Hours (Total) / Number of Units (Total)
150 hours / 6 unit
7. Course administrator's name (mention all, if more than one name)
Name: Maan Hasan Abdullah Email: maan.abdalla@uomosul.edu.iq
8. Course Objectives

Course Objectives	1. To develop problem solving skills and understanding the application of techniques. 2. To understand well environment, formation evaluation, and reservoirs locations. 3. This course deals with the basic concept of well log. 4. This is the basic subject for all required well logs and their requirements . 5. To perform all required analysis and interpretations. 6. To determine subsurface reservoirs and its importance in oil industry.

9. Teaching and Learning Strategies	
Strategy	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	3	3	Basic rock properties	Theoretical + practical	Discussion
Week 2	3	3	Saturation parameters	Theoretical + practical	Discussion
Week 3	3	3	Introduction to well logging	Theoretical + practical	Discussion
Week 4	3	3	Types of Porosity logs	Theoretical + practical	Discussion
Week 5	3	3	Density log	Theoretical + practical	Quiz
Week 6	3	3	Neutron log	Theoretical + practical	Discussion
Week 7	3	3	Sonic log	Theoretical + practical	Discussion
Week 8	3	3	Gamma ray log	Theoretical + practical	Home work
Week 9	3	3	SP log	Theoretical + practical	Discussion
Week 10	3	3	Resistivity logging	Theoretical + practical	Exam
Week 11	3	3	Potential and gradient sondes	Theoretical + practical	Discussion
Week 12	3	3	Application and limitations of Resistivity logging	Theoretical + practical	Discussion
Week 13	3	3	Application of logging techniques in solving explora related problems	Theoretical + practical	Discussion
Week 14	3	3	Integration of geophysical methods	Theoretical + practical	Discussion
Week 15	3	3	Advantages of integration	Theoretical + practical	Discussion
			Weekly Lab. Syllabus		
Week 1	2	3	Lab 1: Introduction to the well log	**practical**	**Report**
Week 2	2	3	Lab 2: Corrections of well log data	**practical**	**Report**
Week 3	2	3	Lab 3: Uses of porosity logs	**practical**	**Report**
Week 4	2	3	Lab 4: Gamma ray and its effect on lithology porosity	**practical**	**Report**
Week 5	2	3	Lab 5: Resistivity log analyses	**practical**	**Report**
Week 6	2	3	Lab 6: Combination, and inerpretation	**practical**	**Report**
Week 7	2	3	Lab 7: Delineate the pay net zones	**practical**	**Report**

11. Course Evaluation

Quizzes 10%
Assignments 10%
Project 10%
Report 10%
Midterm Exam 10%
Final Exam 50 %

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Well logging for earth science, by Darwin V. Ellis, and Julian M. Singer, Springer, 2007

Main references (sources)	.- Mineral Beneficiation A CONCISE BASIC COURSE, SUBBA RAO, D.V., 2011, S.D.S. Autonomous College Andhra Pradesh, India, Taylor & Francis Group press, 173 pp.
Recommended books and references (scientific journals, reports…)	1- Well logging and formation evaluation, by Toby Darling, Gulf Professional Publishing, 2005.
Electronic References, Websites	1- www.rocscince.org
Curriculum Update	5%

Head of department

Lecturer

Dr. Maan Hasan Abdullah

Course Description Form

1. Course Name:	
Oil Well Drilling Engineering 1	
2. Course Code:	
PRE313	
3. Semester / Year:	
Semester 1 / Third Year	
4. Description Preparation Date:	
10/09/2024	
5. Available Attendance Forms:	
Student attendance	
6. Number of Credit (Total) / Number of Units (Total):	
90 Hours	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Mohammed Ali Malallah Email: dr.mohammed.ali@uomosul.edu.iq	
8. Course Objectives	
Course Objectives	1. Understanding the basics of drilling operations, including drilling fluids, drill bits, and drilling rig components. 2. Learning how to design and implement drilling programs for various types of wells, such as oil/gas wells. 3. Gaining knowledge on drilling safety practices and how to handle emergency situations during drilling operations. 4. Familiarizing with drilling optimization techniques, such as directional drilling, hydraulics optimization, and bit selection.
9. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this course is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.
10. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
week1	3	An ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.	Introduction to drilling, Classification of drilling operations, well planning and design	Attendance	General questions and discussion
Week2	3	An ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.	Properties and functions of drilling fluid, Types and properties of clay in water	Attendance	Questions and Discussion
Week3	3	An ability to acquire new engineering knowledge and skills in the engineering fields.	types of drilling fluids	Attendance	Questions and Discussion
Week4	3	An ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.	Drilling hazards dependent on mud control, drilling mud calculations	Attendance	Quiz
Week5	3	An ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.	Drilling methods (cable tool drilling, rotary drilling)	Attendance	Discussion & General questions
Week6	3	An ability to acquire new engineering knowledge and skills in the engineering fields.	Drilling rig components and systems, Basic component of rotary drilling equipment	Attendance	Exam
Week7	3	An ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.	Drilling string and accessories	Attendance	Discussion & General questions
Week8	3	An ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.	Types of bits, drill bit design and selection	Attendance	Questions and Discussion
Week9	3	An ability to acquire new engineering knowledge and skills in the engineering fields.	Casing of oil wells, Functions of casing	Attendance	Questions and Discussion

Week10	3	An ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.	Types of casing. Casing Strings	Attendance	Group assignments
Week11	3	An ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.	Parameters of casing design, Selection of casing and bit types	Attendance	Questions and Discussion
Week12	3	An ability to acquire new engineering knowledge and skills in the engineering fields.	Cementing of oil wells Classification and properties of cements	Attendance	Discussion & Quiz
Week13	3	An ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.	Classification of cementing operations	Attendance	Discussion & General questions
Week14	3	An ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.	Cementing equipment	Attendance	Group assignments
Week15	3	An ability to acquire new engineering knowledge and skills in the engineering fields.	Methods and calculations of cementing	Attendance	Exam

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Oil well Drilling Engineering Principles Practice. Hussain Rabia
Recommended books and references (scientific journals, reports…)	Well Engineering & Construction : by Hussain Rabia
Electronic References, Websites	
Updating	7%

Head of department

Lecturer

Dr. Mohammed Ali Malallah

نموذج وصف المقرر

1. Course Title and Academic Level
Rock Mechanics
2. Course Code
PRE314
3. Semester/Year
First Semester/Third year
4. Date this description was prepared
24/09/2024
5. Available Attendance Formats
Theoretical, Online, Laboratory
6. Number of Class Hours (Total) / Number of Units (Total)
75/5
7. Name of Course Supervisor (if more than one name is provided) and Academic Title
Practical & Theoretical Name: Sura M. Ali Email:swazaal@uomosul.edu.iq Zahraa Ghanem The practical lab
8. Course Objectives

Course Objectives	1. Learn the basics of rock mechanics, including the physical and mechanical properties of rocks and their classification. 2. Identify the failure mechanisms that lead to rock fracture due to ground stresses. 3. Employ these mechanisms to evaluate and treat problems that occur in hydrocarbon reservoir rocks, in the walls of drilled wells, and in the generation of hydraulic fractures. 4. Describe the stresses in the ground before and after a well is drilled. 5. Describe how rock fails when drilled. 6. Explain the engineering of shear and tensile failure in a well. 7. Understand the differences in well stability in deviated and vertical wells. 8. Explain the conditions of reservoir pressure and settlement. 9. Calculate the optimum weight of drilling mud, thus preventing failures and collapses in the well walls.

9. Teaching and Learning Strategies	
Strategy	The main strategy adopted in delivering this unit is to encourage student participation in exercises, while simultaneously improving and expanding their critical thinking skills. This will be achieved through classroom instruction, interactive homework, and by considering simple experimentation that includes some sampling activities of interest to students.

10. Course structure

Week Hours	Hours	Learning Outcomes	Learning Method	Evaluation Method
Week 1	5	Introduction- Rock Mechanics and Rock Engineering concepts- Rock types-	Practical + Theoretical	Introduction, Explanation, Questions, and Discussion
Week 2	5	Physical, Engineering &Mechanical Properties of Intact Rocks- Tensile, Compressive and Shear Strength of Intact Rocks.	Practical + Theoretical	Explanation, Questions, and Discussion
Week 3	5	Shear Strength Parameters of Intact Rocks: Mohr Diagram- Deformation of Intact Rock- Deformation Parameters: Modulus of Elasticity; Poisson's Ratio - Types of deformation of some rocks.	Practical + Theoretical	Explanation, Questions, and Discussion , Report
Week 4	5	Intact Rock Classification System based on: Compressive Strength; UCS & E; UCS, E &υ. Three methods for intact rock classification: Strength System; Modulus Ratio System; Strength – Deformation System.	Practical + Theoretical	Explanation, Questions, and Discussion
Week 5	5	Physical and Mechanical Properties of discontinuity surfaces: Joint Wall Hardness; Schmidt Hammer Test- Shear Strength of Discontinuity surfaces.	Practical + Theoretical	Explanation, questions, and discussion, report
Week 6	5	Classification Systems of discontinuity Surfaces: Joint Spacing OR Fracture Intercept: RQD-System.	Practical + Theoretical	Explanation, questions, and discussion, homework solution
Week 7	5	Stress, Strain, Deformation Characteristics: Types of stresses: Mohr Circle representation of stresses. Deformation - Ideal Materials: Elastic, Viscous, Plastic. Unconfined compression test: Generalized stress-strain curve for rocks, Compressive Strength, shear strength. Direct shear test: Confining Pressure, Triaxial test, Failure envelope. Tensile Strength.	Practical + Theoretical	Explanation, questions, and discussion, report

Week 8	5	Elasticity: Linear Elasticity- Stress Tensor. Mean normal stress, Principal Stresses, Mohr's Stress Circle. Strain: Normal strain - Shear Strain - Strain Tensor- Volumetric Strain- Principal Strains. Elastic Moduli, Hooke's law. General relations between stresses and strains for isotropic materials, Bulk Modulus, compressibility, Some relations between elastic moduli, Strain Energy. Non-Linear Elasticity.	Practical + Theoretical	Explanation, questions, and discussion, daily exam
Week 9	5	Failure mechanics: Strength and related concepts. Shear failure, Tensile failure, Pore collapse. Effective stresses. Failure envelope, Tresca criterion, Mohr–Coulomb criterion, Griffith criterion, Modified Griffith criterion, Compaction failure. Fracturing: Extended Leak off Test.	Practical + Theoretical	Explanation, questions, and discussion, report
Week 10	5	Earth Stresses: Stress in the Earth before drilling a Borehole - Factors controlling Earth Stresses: Tectonic Setting, Depth, Pore pressure, Lithology, Temperature and Structure. Stress in the Earth after drilling a Borehole: Wellbore Stresses: Far Field Stresses - Wellbore Stresses: Radial Stress, Tangential Stress, Axial Stress. Deviated borehole in an anisotropic stress field.	Practical + Theoretical	Explanation, questions, and discussion, daily exam
Week 11	5	Geometry of Borehole Shear Failures a) Shear Failure Shallow Knockout. (b) Shear Failure Wide Breakout. c) Shear Failure High-Angle Echelon. (d) Shear Failure Narrow Breakout. e) Shear Failure Deep Knockout. (f) Shear Failure Low-Angle Echelon.	Practical + Theoretical	Explanation, questions, and discussion, report
Week 12	5	Reservoir Geomechanics: Compaction and subsidence - Modelling of reservoir compaction - Uniaxial reservoir compaction - The depleting sphere - Reservoir stress path - Time delayed reservoir compaction.	Practical + Theoretical	Explanation, questions, and discussion, monthly exam
Week 13	5	From compaction to subsidence - The size of the subsidence bowl - Subsidence above a disk shaped reservoir - Stress alteration in the overburden.	Practical + Theoretical	Explanation, questions, and discussion, report

Week 14	5	Well problems and reservoir geomechanics - Reservoir geomechanics as a tool to optimize drilling and production strategies.	Practical + Theoretical	Explanation, questions, and discussion
Week 15	5	Borehole Stability in Deviated Wellbores: 1) In relaxed basins ($\sigma_v > \sigma_H > \sigma_h$): Drilling parallel to σ_H, Drilling parallel to σ_h. 2) In tectonically stressed basins ($\sigma_H > \sigma_h > \sigma_v$): Drilling parallel to σ_H, Drilling parallel to σ_h.	Practical + Theoretical	Explanation, questions, and discussion

Practical experiments and laboratory tests	
First Experiment	Physical Properties of Rocks
Second Experiment	Point Load Test
Third Experiment	Splitting Tension Test
Fourth Experiment	Uniaxial Compression Test
Fifth Experiment	Triaxial Compression Test

11.Course Evaluation and Grade Divisions

The grade is distributed out of 100 based on the tasks assigned to the student, such as daily preparation, daily, oral, monthly and written exams, reports, etc.

12.Learning and teaching resources

Required textbooks (methodology, if available).	Fjær, E., Holt, R.M., Horsrud, P., Raaen, X. and Risnes, 2008.Petroleum-related rock mechanics 2nd ed.
Primary references sources))	Goodman, R. E. (1989) Introduction to Rock Mechanics, John Wiley & Sons, New York. Jaeger, J. G. and cook, N. G., (1979) Fundamental of rock mechanics, Chapman & hall London. .
Recommended supporting books and references (scientific journals, reports, etc)	Zoback, M.D. (2007). Reservoir Geomechanics. Cambridge University Press, Cambridge, ISBN-978-0-5 77069-9
Electronic references, websites	http://thepowerofbook12.blogspot.com/0521146194
description updates	%9

Head of department

Lecturer

Assist. Lect. Sura M. Ali

Course Description Form (Petroleum Production Engineering - Second Course)

University: Mosul College: Petroleum and Mining Engineering Department or branch: Petroleum Reservoir Engineering

1. Course Name:
Petroleum Product Engineering
2. Course Code:
PRE 315
3. Semester / Year:
First semester / third year
4. Description Preparation Date:
2024/9/16
5. Available Attendance Forms:
Attendance in class
6. Number of Credit Hours (Total) / Number of Units (Total) (2 theoretical, 1 activity)
45hr/3
7. Course administrator's name (mention all, if more than one name)
Name: Nabil Youssef Mohamed El-Banna Email: **nabil.albanna@uomosul.edu.iq**
8. Course Objectives

Course Objectives	1. Identify the parts and types of oil wells. 2. Study the types of flow within an oil reservoir and the types of oil well completions. 3. Study the types of packers, well perforation methods, and related perforation directions and perforation fluid types. 4. In addition to the above, the semester includes all the components required to prepare wells for oil productions
9. Teaching and Learning Strategies	
Strategy	**The teaching strategy in this course depends on the instructor explaining the topic, clarifying this by presenting realistic examples similar to the course, and then discussing the course vocabulary with the students.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	3		1- Water and gas coning	Attendance and discussion	
Week 2	3		2-- Meyer and Gardner and Pirson Methods (Gas coning, water coning)	Attendance and discussion	
Week 3	3		3- Simultaneous Gas and Water coning	Attendance and discussion	
Week 4	3		4- Completion Efficiency (Sfm)	Attendance and discussion	
Week 5	3		5- Completion Efficiency (SC, Spp)	Attendance and discussion	
Week 6	3		6- Flow efficiency	Attendance and discussion	
Week 7	3		7- Drill Stem Testing, DST	Attendance and discussion	
Week 8	3		8- Monthly examination	Attendance	
Week 9	3		9- Pressure versus Time Plot	Attendance and discussion	
Week 10	3		10- Steps of determining reservoir properties by using Horner plot to analysis pressure buildup test:	Attendance and discussion	
Week 11	3		11-Reservoir and fluid anomaly indicatic	Attendance and discussion	
Week 12	3		12-Depletion	Attendance and discussion	
Week 13	3		13-Oil and Gas Separation	Attendance and discussion	
Week 14	3		14-Separators Design , Capacity of separators	Attendance and discussion	
Week 15	3		15- Final Monthly examination	Attendance and discussion	

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports …. etc

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	**Petroleum product engineering**
Main references (sources)	**1. Reservoir Engineering Hand Book (Tarek Ahmad)**
Recommended books and references (scientific journals, reports…)	**2. Fundamental of Reservoir Engineering (L. P. Dake)**
Electronic References, Websites	
Updating	3%

Head of department

Lecturer

Dr. Nabil Youssef Mohamed

Course Description Form

1. Course Name:
Applied Reservoir Engineering I/3rd Stage
2. Course Code:
PRE214
3. Semester / Year:
First semester/ Third Year
4. Description Preparation Date:
2024/9/5
5. Available Attendance Forms:
Daily attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
75hr/3.5
7. Course administrator's name (mention all, if more than one name)
Name: RAYAN ABDUL-HAQ AHMED Email: rayyanhamoo@uomosul.edu.iq

8. Course Objectives	
Course Objectives	•It aims to teach students the basics of reservoir engineering and related properties of reservoir fluids, then the classification of hydrocarbon reservoirs, and the porosity and permeability of reservoirs. • It defines and specifies reservoir drive mechanisms. • It addresses the material balance equation.
9. Teaching and Learning Strategies	
Strategy	Teaching is done by means of on-screen presentation, as well as explanation on the whiteboard, as well as showing some videos, relying on images, and using PowerPoint to simplify and clarify, in addition to utilizing some modern programs and using computers to consolidate the material in the student's mind and enable the student to be able to use the software.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	Acquire the scientific concepts and foundations that can distinguish the student as a petroleum engineer. - Study reservoir fluids. - Identify the properties of reservoir rocks, including porosity, permeability,	Introduction to Reservoir Rock Properties	Readings, self-study, and discussion groups. - Classroom exercises and activities. - Research sessions are held to explain and analyze	Participating in classroom. Delivering activities. Midterm and final exams and activities. Short and surprise quizzes
2	5		Reservoir Fluid Properties ● Natural gas properties		
3	5		● Crude Oil Properties		
4	5		Total Formation Volume Factor		
5	5		Petroleum Reservoirs and Reservoir Rocks		
6	5		Porosity Ø		
7	5		An averaging techniques for porosity calculations		
8	5		Permeability K		
9	5		Permeability For radial flow of fluids into a wellbore		

10	5	reservoir rock texture, and reservoir classification.	The Klinkenberg Effect	engineering phenomena. - Hands-on training on studying and calculating fluid properties and performing reservoir calculations .	
11	5		porosity and permeability relationship, Pressure Potential & Pressure Gradient in Static Fluid Columns		
12	5		Oil Recovery Methods, Reservoir Primary Recovery Mechanisms and Reserve Estimation Methods		
13	5		Material Balance Equation		
14	5		The Drive Indices		
15	5		Material Balance Equation as a Straight Line		

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Main references (sources)	Reservoir Engineering Handbook, Tarek Ahmed, 4th edition (2010) Reservoir Engineering Handbook, Tarek Ahmed, 4th edition (2010) Applied Petroleum Reservoir Engineering, Ronald E. Terry and J. Brandon Rogers,(Craft & Hawkins Revisioned Edition) 3rd edition (2014(.
Recommended books and references (scientific journals, reports...)	Petroleum reservoir rock and fluid properties
Electronic References, Websites	https://pvt-pro.software.informer.com/2011.1/ https://cpanhd.sitehost.iu.edu/C101webnotes/chemical-nomenclature/hydrocarbons.html https://www.e-education.psu.edu/fsc432/content/elemental analysis-and-ternary-classification-crude-oils

Head of department

Lecturer

RAYAN ABDUL-HAQ AHMED

University of Mosul

College of Petroleum and Mining Engineering

Department of Petroleum Reservoir Engineering

Course Descriptions

Third Stage / 2nd Semester (Semester)

Dr. Maha Muneeb Al-Dabbagh

Head of Department

Dr. Ayman Mahmoud Ahmed

Chairman of the Scientific Committee

Course Description Form

1. Course Name:
Oil Well Drilling Engineering 2
2. Course Code:
PRE 317
3. Semester / Year:
Semester 2 / 2024-2025
4. Description Preparation Date:
29/9/2024
5. Available Attendance Forms:
Student attendance
6. Number of Credit (Total) / Number of Units (Total):
90 Hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Mohammed Ali Malallah Alrashedi Email: dr.mohammed.ali@uomosul.edu.iq

8. Course Objectives	
Course Objectives	1. Understanding the basics of drilling operations, including drilling fluids, drill bits, and drilling rig components. 2. Design and implement drilling programs for various types of wells, such as oil/gas wells. 3. Gaining knowledge on drilling safety practices and how to handle emergency situations during drilling operations. 4. Familiarizing with drilling optimization techniques, such as directional drilling, hydraulics optimization, and bit selection.

9. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this course is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
Week1	3	An ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.	Hydraulics of primary cementing operations	Attendance	Discussion & General questions
Week2	3	An ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.	Factors affecting drilling rate (effect of pressure, effect of physical properties of drilling mud, effect of weight on bit and rotary speed, economical effect)	Attendance	Questions and Discussion
Week3	3	An ability to acquire new engineering knowledge and skills in the engineering fields.	Directional Drilling, Directional Drilling Applications	Attendance	Questions and Discussion
Week4	3	An ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.	Factor affecting hole inclination of directional wells	Attendance	Group assignments
Week5	3	An ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.	NonPetroleum Applications of Directional Drilling	Attendance	Questions and Discussion
Week6	3	An ability to acquire new engineering knowledge and skills in the engineering fields.	Definitions in Directional Drilling, Types of Profile in Directional Drilling	Attendance	Questions and Discussion
Week7	3	An ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.	Methods of calculations of directional wells	Attendance	Exam
Week8	3	An ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.	Horizontal drilling, Types of Horizontal drilling	Attendance	Group assignments
Week9	3	An ability to acquire new engineering knowledge and skills in the engineering fields.	Air Drilling	Attendance	Questions and Discussion
Week10	3	An ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.	Design of air drilling operations	Attendance	Questions and Discussion

Week11	3	An ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.	Drilling Problems and its Solution (Part 1)	Attendance	Questions and Discussion
Week12	3	An ability to acquire new engineering knowledge and skills in the engineering fields.	Drilling Problems and its Solution (Part 2)	Attendance	Group assignments
Week13	3	An ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.	Drilling Problems and its Solution (Part 3)	Attendance	Questions and Discussion
Week14	3	An ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.	Well Completion Techniques	Attendance	Questions and Discussion
Week15	3	An ability to acquire new engineering knowledge and skills in the engineering fields.	Formation pore pressure and fracture resistance	Attendance	Exam

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Oil well Drilling Engineering Principles Practice. Hussain Rabia
Recommended books and references (scientific journals, reports…)	Well Engineering & Construction : by Hussain Rabia
Electronic References, Websites	
Updating	6%

Head of department

Lecturer

Dr. Mohammed Ali Malallah

Course Description Form

1. **Course Name:**	
Applied Reservoir Engineering II	
2. **Course Code:**	
PRE322	
3. **Semester / Year:**	
2nd semester / Third Year	
4. **Description Preparation Date:**	
7 / 1 / 2025	
5. **Available Attendance Forms:**	
In-person class.	
6. **Number of Credit Hours (Total) / Number of Units (Total)**	
Number of Credit Hours (Total) :75 Number of Units (Total): 3	
7. **Course administrator's name (mention all, if more than one name)**	
Name: Assist. Lec. Osamah Amer Abduljaleel Email: osamah.a.448@ntu.edu.iq Name: Eng. Mohammed Ahmed Younis Email: mohammed.ahmed.y@uomosul.edu.iq Name: Eng. Amna Akram Mohammedwfi Email: amna.akram@uomosul.edu.iq	
8. **Course Objectives**	
Course Objectives	● Estimation of OOIP using Havlena-Odeh approach. ● Studying the aquifers and water influx calculations using different model. ● Calculation of flow rates for different types of fluids and flow regimes.
9. **Teaching and Learning Strategies**	
	Lecture Method: Teacher explains content directly. **Collaborative Learning:** Small groups work together to solve problems **Flipped Classroom:** Students learn content at home, practice in class. **Self-learning.**

10. **Course Structure**					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
Week 1& 2	10	Apply material balance using straight-line method to find OOIP.	Material balance equation as a straight line.	Theory + Tutorial	Questions and discussion
Week 3	5	Identify and classify different aquifer types	Classification of aquifers	Theory + Tutorial	Quiz
Week 4	5	An introduction to water influx models and estimation of water influx volume using pot aquifer model.	Water influx models, pot aquifer model	Theory + Tutorial	Questions and discussion
Week 5	5	Calculation of water influx volume using Schilthuis' steady-state model	Schilthuis' steady-state model	Theory + Tutorial	Assignment
Week 6	5	Derive Hurst's modified steady-state equation.	Hurst's Modified Steady-State Model.	Theory + Tutorial	Questions and discussion
Week 7	5	Analyze Van Everdingen-Hurst unsteady-state model	The Van Everdingen-Hurst Unsteady-State Model.	Theory + Tutorial	Questions and discussion
Week 8	5	Estimation of water influx volume in edge water drive.	Edge-Water Drive	Theory + Tutorial	Assignment
Week 9	5	Understanding the principle of Superposition with applications.	Principle of Superposition.	Theory + Tutorial	Questions and discussion
Week 10	5	Assess students' knowledge and understanding.	Mid-term exam		Exam
Week 11	5	Estimation of water influx volume in bottom water drive	Bottom-Water Drive	Theory + Tutorial	Questions and discussion
Week 12	5	Estimation of water influx volume using Fetkovich's Method. Compare Fetkovich's method to Van Everdingen-Hurst.	Fetkovich's Method.	Theory + Tutorial	Quiz

Week 13	5	Describe flow regimes and fluid types in reservoirs.	Fluid Flow in Petroleum Reservoir, types of fluids, flow regimes.	Theory + Tutorial	assignment
Week 14	5	Analyze steady-state linear flow in reservoirs	Steady-State Flow, linear flow	Theory + Tutorial	Questions and discussion
Week 15	5	Calculation of the pressure profile (distribution) around the wellbore.	Steady-State Flow, radial flow.	Theory + Tutorial	Questions and discussion

11. Course Evaluation

2 Quizzes	**10%**
3 Assignments	**5%**
Attendance	**5%**
Midterm Exam	**30%**
Final Exam	**50%**
Total	**100%**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	● Petroleum Reservoir Engineering Handbook, Tarek Ahmed 4th edition (2010). ● Applied Petroleum Reservoir Engineering Third Edition. Ronald E. Terry J. Brandon Rogers (2015).
Recommended books and references (scientific journals, reports...)	https://link.springer.com/book/10.1007/978-3-030-28140-3
Electronic References, Websites	
Updating	5%

Head of department

Lecturer

Osamah Amer Abduljaleel

Course Description Form

1. Course Name:

Natural Gas Engineering

2. Course Code:

PRE320

3. Semester / Year:

First Semester /2024-2025

4. Description Preparation Date:

1-9-2024

5. Available Attendance Forms:

6. Number of Credit Hours (Total) / Number of Units (Total)

4/100

7. Course administrator's name (mention all, if more than one name)

Dr.Ahmad Abdulsalam Aabid, ahmadchemical1991@uomosul.edu.iq

8. Course Objectives

Course Objectives	1. Knowledge the WORLD PICTURE FOR NATURAL GAS. 2. Knowledge of information on natural gas in Iraq . 3. Learn about the sources of natural gas. 4. Know the components of natural gas and the impurities present with it. 5. Learn the basics of natural gas separation processes. 6. Knowledge of natural gas transmission methods and local and regional transmission lines.

9. Teaching and Learning Strategies

Strategy	Type something like: The main strategy that will be adopted in delivering this module is to encourage stude participation in the exercises, while at the same time refining and expanding their critical thinking skills. This be achieved through classes, interactive tutorials and by considering types of simple experiments involving sc sampling activities that are interesting to the students.

10. Course Structure

Week	Hours	Required Learn Outcomes	Unit or subject na	Learning method	Evaluation metho
1	3	General information	INTRODUCTION	READING	
2	3		WORLD PICTURE FOR NATURAL GAS	Dialogue Question	

3	3	Increase information	NATURAL GAS IN IRAQ	report	
4	3		COMPANY OF NATURAL GAS IN IRAQ		
5	3	design	SOURCES OF NATURAL GAS	Quiz	
6	3		NATURAL GAS COMPOSITIONS		
7	3	design	PROCESSING AND PRINCIPAL PRODUCTS	Discussion	
8	3		COMBUSTION CHARACTERISTICS		
9	3		ROLES OF GAS PLANTS	Quiz	
10	3		IMPORTANT SUPPORT COMPONENTS		
11	3		SEPARATOR PRINCIPLES	Seminar	
12	3		Compression OF GAS		
13	3		Natural Gas Transportation		
14	3		Liquefied Natural Gas		
15	3		EXAMINATION	Exam	

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricu books, if any)	Fundamentals of Natural Gas Processing, L. L. Faulkner, © 2006 by Taylor and Francis Group, LLC.
Main references (sources)	Advanced Natural Gas Engineering, X. W. XGAS AND M. Economides, Gulf Publishing Company Houston, Texas, 2009.
Recommended books a references (scientific journ reports…)	The Geopolitics of Natural Gas in the Republic of Iraq Harvard University's Belfer Center and Rice University's Baker Institute Center for Energy Studies November 2013.
Electronic Referenc Websites	https://onlinecourses.nptel.ac.in/noc19_ch24/preview

Head of department

Lecturer

Dr. Ahmad Abdulsalam

Course Description Form

1. Course Name:
Formation Evaluation
2. Course Code:
PRE322
3. Semester / Year:
Second/ 2024-2025
4. Description Preparation Date:
2025
5. Available Attendance Forms:
Blended
6. Number of Credit Hours (Total) / Number of Units (Total)
60/ 3
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Maha Muneeb Mahmood Email: mahamuneeb@uomosul.edu.iq
8. Course Objectives

Course Objectives	• Identify main methods that evaluate rocks and fluid propertie reservoir. • Learn about the methods of evaluation during drilling using Mud logging (Surface logging). • Evaluate the petrophysical properties of reservoir using the basic principles of coring and core • Provide the methods that estimate the reservoir parameters using well logs such as lithology, borehole condition, porosity, permeability, fluid saturations (reservoir characterization).

9. Teaching and Learning Strategies	
Strategy	Giving lectures and presenting videos Brainstorming Self-learning

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Define the formation evaluation	Introduction of formation evaluation	Giving lectures + showing videos	Asking and discussion questions

2	2	Recognize Mud Logging	Mud Logging (Introduction)	Lectures + discussion	Asking and discussion questions
3	2	Analyze ROP and Gas curves	Rate of Penetration, Gas Detection	Giving lectures + showing videos	Asking and discussion questions
4	2	Describe rock samples	Collecting Samples and Show Evaluation	Lectures + discussion	Quiz
5	2	Interpret the result of core analysis	Cores and Core Analysis	Giving lectures + showing videos	Asking and discussion questions
6	2	Define well logging	Well Logging (Introduction)	Lectures + discussion	Asking and discussion questions
7	2		**Midterm Exam**		
8	2	List porosity type	Porosity Types	Lectures + discussion	Asking and discussion questions
9	2	List the porosity logs and analyze density log curve	Porosity Logs (Application of Density Log)	Giving lectures + showing videos	Asking and discussion questions
10	2	analyze neutron log curve	Application of Neutron Log	Lectures + discussion	Quiz
11	2	analyze sonic log curve	Application of Sonic log	Lectures + discussion	Asking and discussion questions
12	2	Interpret Cross Plots	Cross Plots for porosity and Lithological Identification	Lectures + discussion	Asking and discussion questions
13	2	Evaluate the resistivity logs	Evaluation by Resistivity Logs	Giving lectures + showing videos	Quiz
14	2	Use NeuraLog software	Using NeuraLog software	Lectures + discussion	Apply the software
15	2	Using IP Software	Using IP Software		Apply the software

Practical Part	
Week 1	Lab 1: Calculation of the Rate of Penetration
Week 2	Lab 2: Estimation of the porosity and permeability from core data.
Week 3	Lab3: Chromatograph analysis of hydrocarbon gases
Week 4	Lab 4: Calculation of the total porosity from neutron log
Week 5	Lab 5: Calculation of the total porosity from Density log
Week 6	Lab 6: Calculation of the effective porosity from neutron and density logs
Week 7	Lab7: Calculation of the primary (matrix) and secondary porosity from sonic log
Week 8	Lab 8: Estimate the lithology from cross plot technique

Week 9	Lab 9: Estimate fluid volumes (BVW, ROS, and MOS).
Week 10	Lab 10: NeuraLog applications
Week 11	Lab 11: Interactive Petrophysics applications.

11. Course Evaluation

Theoretical material (35% divided between 25% monthly exam, 5% daily exam, and 5% student attendance) + 40% final exam.
Practical material (15% divided between 10% monthly exam and 5% assignments and reports) + 10% final exam.

12. Learning and Teaching Resources

Required textbooks.	
Main references (sources)	**1-** Open-hole Log Analysis and Formation Evaluation by Richard M. Bateman, 2012. **2-** Formation Evaluation with Pre-Digital Well Logs, by Richard M. Bateman, 2020. **3-** Well Logging and Formation Evaluation, by Toby Darling, 2005. **4-** The Expanding Role of Mud Logging, by Ablard, 2012. Oilfield Review
Recommended books and references (scientific journals, reports…)	1- Schlumberger Log Interpretation, Principles /Applications, 1989 2- Schlumberger Log Interpretation Charts, 2009.
Electronic References, Websites	http://www.slb.com https://www.spec2000.net/index.htm https://www.youtube.com/watch?v=Sy3QBs9dJfo&list=PLOQDWHZ5FHVP2vJG0Cg91uPlWPtr3pgd

Head of department

Lecturer

Course Description Form

1. Course Name:
Seismic Interpretation
2. Course Code:
3. Semester / Year:
2nd semester / Third year
4. Description Preparation Date:
1/9/2024
5. Available Attendance Forms:
Classroom attendance for theoretical and practical lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
75hr/ 3.5 units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Ayman Mahmoud Ahmed ; Dr. Mahmood Salman Ahmed Email: ayman.geology@uomosul.edu.iq ; mahmood.salman@uomosul.edu.iq

8. Course Objectives	
Course Objectives	➢ It aims to teach the student how to interpret seismic profiles in reflector capture and correlate them with wells drilled in the area to determine the quality of the reflectors. ➢ Correlate the subsurface geologic reality and the structures found therein, including folds, faults, salt domes, and oil potential. ➢ 3D and 4D seismic reflection surveying has been established to identify changes in oil producing fields with the ground and how to optimize their exploitation.

9. Teaching and Learning Strategies	
Strategy	➢ Developing study programs that link seismic interpretation with other disciplines within reservoir engineering that contribute to solving scientific issues. ➢ Providing the local and regional community with an oil reservoir engineer with a broad theoretical and practical background, including seismic interpretation. ➢ Emphasize the role of scientific field and laboratory research, modeling, and geophysical studies in solving issues.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2 hours	Quality Control of Survey And Processing	Seismic Interpretation	Theoretical	General questions and discussion or real-time quiz
2	2 hours	Picking A Survey: Reflection Identification From Synthetic Seismogram Well-Seismic Ties Measurements in Time and in Depth	Seismic Interpretation	Theoretical	General questions and discussion or real-time quiz
3	2 hours	Well-Seismic Ties, Measurements In Time and In Depth, Comparison of Seismic and Well Data, Check Shot Data, The Modeling Process, Tying Synthetic to Seismic Data	Seismic Interpretation	Theoretical	General questions and discussion or real-time quiz
4	2 hours	Mis-Ties and their Causes	Seismic Interpretation	Theoretical	General questions and discussion or real-time quiz
5	2 hours	Digitization Map Construction (quality map, iso-chron map) Vertical & horizontal resolutions, Types of reflectors Attributes of reflection signals	Seismic Interpretation	Theoretical	General questions and discussion + monthly quizzes
6	2 hours	Seismic velocities, acoustic impedance, Velocity Maps, Depth Conversion, Isopachs, Seismic properties Fluid properties, Seismic r physics	Seismic Interpretation	Theoretical	General questions and discussion or real-time quiz
7	2 hours	Reporting and Management Presentation, Seismic Interpretation Exercise Description of the Data. Interpretation of Seismic Lines. Features Revealed by the Seismic Data.	Seismic Interpretation	Theoretical	General questions and discussion or real-time quiz
8	2 hours	What is reflector? Time versus depth. Well log versus seismic data. Seismic Interpretation and Subsurface Mapping.	Seismic Interpretation	Theoretical	General questions and discussion or real-time quiz

9	2 hours	Mapping of Hydrocarbon Bearing &Water Bearing Structures, Gas Hydrates ,Pattern Recognition , Thin Bed Modeling ,Seismic Modeling.	Seismic Interpretation	Theoretical	General questions and discussion or real-time quiz
10	2 hours	Geological Interpretation , Location of Stratigraphic Traps ,Direct Detection Of Hydrocarbons ,Wave Equation Migration and its Various Forms , Artificial Intelligence ,Artificial Neural Network (ANN) and Gas Detection Using AVO Analysis.	Seismic Interpretation	Theoretical	General questions and discussion or real-time quiz
11	2 hours	History And Basic Ideas of 3D interpretation techniques + Resolution + Examples of 3D Data Improvement + Sampling Requirements + Volume Concept + Slicing The Data Volume + manipulating the slices +Dynamic Range And Data Loading +Synergism And Pragmatism in Interpretation.	Seismic Interpretation	Theoretical	General questions and discussion or real-time quiz
12	2 hours	ness: color principles, interpretative value of color+ assessment of color + assessment of zero phase scenes + physiological impact of color. , Structural Interpretation: direct contouring & the importance of the strike perspective + fault recognition & mapping + interpretation in the vicinity of salt + composite displays	Seismic Interpretation	Theoretical	General questions and discussion or real-time quiz
13	2 hours	interpretation procedures + advantages & disadvantages of different displays + horizontal sections from widely spaced data + subtle structural features + visualization & auto tracking, Stratigraphic Interpretation, Reservoir Identification, Tuning phenomena in	Seismic Interpretation	Theoretical	General questions and discussion or real-time quiz

		reservoirs, Reservoir evaluation, Horizon & formation attributes, Visualization of horizon attributes. Interpretation of Seismic Reflection Data The Seismic Interpretation Tools The Seismic Structural Interpretation The Seismic Structural Features The Seismic Stratigraphic Interpretation Basic Stratigraphic Concepts			
14	2 hours	Time laps 4D seismic: understand the use of Gasman's equation to assess variations in reservoir fill during production (fluid substitution) and the uses of seismic attributes (e.g. AVO)in time lapse 4D seismic analysis of hydrocarbon reservoirs. Borehole seismic techniques	Seismic Interpretation	Theoretical	General questions and discussion or real-time quiz
15	2 hours	Case Histories Of 3D& 4D Seismic Surveys.	Seismic Interpretation	Theoretical	General questions and discussion + end of semester exam
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	3 hours	Lab-1/Basic concepts in seismic interpretation	Seismic Interpretation	Practical	Solution with lab report
2	3 hours	Lab-2/ Objectives, procedure and seismic rock physics.	Seismic Interpretation	Practical	Solution with lab report
3	3 hours	Lab-3 / Seismic rock physics.	Seismic Interpretation	Practical	Solution with lab report
4	3 hours	Lab-4 / Seismic Velocities, frequency, wavelength, PR	Seismic Interpretation	Practical	Solution with lab report
5	3 hours	Lab-5 / Seismic Velocities, frequency, wavelength, PR	Seismic Interpretation	Practical	Solution with lab report
6	3 hours	Lab-6 / Correlating well and seismic data.	Seismic Interpretation	Practical	Solution with lab report + monthly exam
7	3 hours	Lab-6 / Correlating well and seismic data.	Seismic Interpretation	Practical	Solution with lab report
8	3 hours	Lab-7 / Tying a Well to a Seismic Line	Seismic Interpretation	Practical	Solution with lab report
9	3 hours	Lab-8/ Amplitude response analysis	Seismic Interpretation	Practical	Solution with lab report

10	3 hours	Lab-9/ Amplitude response analysis	Seismic Interpretation	Practical	Solution with lab report
11	3 hours	Lab-10 / Computation of seismic records and plotting section.	Seismic Interpretation	Practical	Solution with lab report
12	3 hours	Lab-11 / Determination Of Velocity	Seismic Interpretation	Practical	Solution with lab report
13	3 hours	Lab-12/ interpretation of reflection data Plotting of seismic sections.	Seismic Interpretation	Practical	Solution with lab report
14	3 hours	Lab-13/ testing and handling of seismic prospecting units.	Seismic Interpretation	Practical	Solution with lab report
15	3 hours	Lab-14/ Automatic migration and mapping techniques 3d & 4d seismic time sections by internet and software	Seismic Interpretation	Practical	Solution with lab report + end of semester exam

11. Course Evaluation

Distribute the score out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral, monthly, and written exams, reports, etc.
The semester grade is 50%, including 35% theoretical, including attendance, class discussions, and quizzes, and lab reports, and 15% practical.
The end-of-semester grade is 50%, including 40% theory and 10% practical.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	An Introduction To Seismic Interpretation .By Mcqull R.,Bacon,M .And Barclay ,W.1984
Main references (sources)	Seismic Data Interpretation and Evaluation for Hydrocarbon Exploration and Production
Recommended books and references (scientific journals, reports…)	Practical Seismic Interpretation for Petroleum Exploration. First steps in seismic interpretation.
Electronic References, Websites	Applied, theoretical interpretation geophysics electronic s
Curriculum Update Percentage or Description	9%

Head of department

Lecturer

Dr. Ayman Mahmoud Ahmed