

## Module (Course Syllabus) Catalogue 2023-2024

College/ Institute	Koya Technical Institute	
Department	Petroleum Technology / Production and Refining	
Module Name	Petroleum Geology	
Module Code	PEG205	
Degree	Technical Diploma <input checked="" type="checkbox"/> Bachelor <input type="checkbox"/> High Diploma <input type="checkbox"/> Master <input type="checkbox"/> PhD <input type="checkbox"/>	
Semester	2	
Qualification		
Scientific Title	Lecturer	
ECTS (Credits)	4	
Module type	Prerequisite <input type="checkbox"/> Core <input checked="" type="checkbox"/> Assist. <input type="checkbox"/>	
Weekly hours	5 hr	
Weekly hours (Theory)	( 2 ) hrs Class	( 27 ) Total hrs Workload
Weekly hours (Practical)	( 3 ) hr Class	( 50 ) Total hrs Workload
Number of Weeks	12	
Lecturer (Theory)	Rawand Dlshad Abdulla	
E-Mail & Mobile NO.	rawand.abdulla@epu.edu.iq-07702164848	
Lecturer (Practical)	Rawand Dlshad Abdulla	
E-Mail & Mobile NO.	rawand.abdulla@epu.edu.iq-07702164848	
Websites		

# Course Book

<b>Course Description</b>	<p>The course covers the principles of petroleum geology starting From the types of organic matters, their chemical component, and the main producer of each type. Kerogen definition and its different classifications consider one of the main subjects of the course which comprises part of the information needed in the process of source rock evaluation. Stages of petroleum generation and the different kinetics occur at each stage are well clarified in this course. Modes of primary migration and the factors affect its efficiency will be taught within the subject of source rocks, while secondary migration of petroleum and the factors control it are titles within the subject of reservoir rocks. Definition of oil traps and their classification also among the main subjects which the students will be learn. Crude oils, their chemical composition and their classifications are among the basics that students must be familiar with. The course also includes lectures about methods of petroleum exploration and life cycle of oil fields from exploration to abandonment. The lectures at the end of course are dealing with techniques of reservoir evaluation, reserve definitions, and an explanation of all of the parameters used in the process of reserve calculation.</p>
<b>Course objectives</b>	<ol style="list-style-type: none"><li>1. Providing the students with knowledge about basics of Petroleum geology.</li><li>2. Learning how to join between principles of Petroleum Geology and the practical work in the field.</li><li>3. Making the students being familiar with the petroleum Geology of Iraq and Kurdistan especially.</li><li>4. Preparing geologists that can work with petroleum exploration teams or as a well site geologist in the national Or foreign oil companies.</li></ol>
<b>Student's obligation</b>	<p>It is essential for students to attend classes as non-attendance can have a detrimental impact on their understanding of the course material. Additionally, students are required to submit all assignments, including homework, reports, seminars, and any other tasks designated by the lecturer in a timely and accurate manner.</p>

<b>Required Learning Materials</b>	There are several teaching and learning materials used in this course, including projectors, PowerPoint slides, and computers. Laboratory and Field trip visits are also included to demonstrate modern tools utilized in the industry.				
<b>Evaluation</b>	<b>Task</b>	<b>Weight (Marks)</b>	<b>Due Week</b>	<b>Relevant Learning Outcome</b>	
	Paper Review				
	Assignments	Homework	10		
		Class Activity	2		
		Report	14		
		Seminar	14		
		Essay			
		Project			
	Quiz		4		
	Lab.				
	Midterm Exam		16		
	Final Exam		40		
Total		100			
<b>Course References:</b>	<p>1. Allen, P.A. and Allen, J.R., 1990, Basin Analysis (Principles and Applications) Ch.10, Black Well Publishing Ltd., Malden, USA, 451p.</p> <p>2. Beckman, H., 1976, Geology of Petroleum Vol.2 (Geological Prospecting of Petroleum), Pitman Publishing, London, 183p.</p> <p>3. Levenson, A.I., 1967, Geology of Petroleum (Second edition), San Francisco, 174p.</p> <p>4. Moody, G.B. (edit.), 1961, Petroleum Exploration Hand Book, McGraw-Hill Book Company.</p> <p>5. North, F.K., 1985, Petroleum Geology, Bulter and Tanner Ltd., London, 607p.</p> <p>6. Selly, R.C., 1998, Elements of Petroleum Geology (Second edition), New York, 470p.</p> <p>Useful Journals:</p> <p>1. American Association of Petroleum Geologists Bulletin (AAPG Bulletin), <a href="http://aapg.geoscienceworld.org">http://aapg.geoscienceworld.org</a>.</p> <p>2. Journal of Petroleum Geology. (<a href="http://www.jpg.co.uk">www.jpg.co.uk</a>).</p> <p>3. Marine and Petroleum Geology, Elsevier.</p>				

Course topics (Theory)	Week	Learning Outcome
Course introduction	1	Oil & gas industry of Kurdistan region of Iraq
General Geology and Structural Geology	2	A basic introduction to The Main Branches of Geology and Relationship of petroleum geology to other geology sciences
Minerals & Crystals	3	Introduction to minerals and properties of minerals
Rocks	4	Geological knowledge about rocks and types of rock
Igneous rock Sedimentary rocks Metamorphic rock	5	Geological knowledge about rocks and types of rock
Petroleum system (Source Rocks & Generation of Petroleum)	6	<p>1. Learning students what source rocks mean and what are the Requested properties that any rock must have for calling it as Source Rock.</p> <p>2. To give students information about the stages of oil and gas formation and nature of the transformations occur to the organic matters (kerogen) with increasing burial depth and Temperature effect.</p>

Migration of Petroleum	7	<ol style="list-style-type: none"> <li>1. To give the students information about the way that oil transport (migrate) in the subsurface and terms used in describing each type of transportation.</li> <li>2. To show the students evidences about migration of petroleum in subsurface.</li> <li>3. To give the students information about compaction occurs to Sediments (especially source rocks) and its effect on migration of petroleum.</li> </ol>
Reservoir rocks & Oil Traps	8	<ol style="list-style-type: none"> <li>1. Teaching students what reservoir rocks mean and what are their main properties.</li> <li>2. To give the students information about the two main types of Reservoir rocks namely Clastic and Carbonate reservoirs. &amp;</li> <li>1. To give students information about the term Trap in petroleum geology with a historical background about its usage.</li> <li>2. Learning students the terms associated with traps and their Geological applications.</li> <li>3. Showing students the bases which depend on for trap classification.</li> <li>4. Making students being familiar with the different types of oil traps with examples from Iraq, Middle East, and world.</li> </ol>
Petroleum Exploration	9	<ol style="list-style-type: none"> <li>1. To give students information about programs of oil exploration.</li> <li>2. Teaching students methods followed in the process of oil Exploration.</li> </ol>
Wire line logging	10	

Reservoir Characterization	11	1. To give students information about the properties that affect Potentiality of reservoir beds. 2. Teaching students methods and calculations used in reservoir evaluation.
Petroleum Reserve Estimation	12	1. Teaching students the different meanings of oil and gas reserves. 2. To give students information about methods of reserve calculation and parameters used in reserve calculation equations
<b>Practical Topics</b>	<b>week</b>	<b>Learning Outcome</b>
Composition of the earth	1	
Geological time scale	2	
Map topographic map and contour map	3	
Identifying Igneous Rocks	4	
Identifying Metamorphic Rocks	6&5	
Identifying Sedimentary Rocks	7&8	
Direction in the field without a compass and by using a compass	9	
Global Positioning System GPS	10	
Wireline logging (log interpretations (CAL- (GR	11	
Wireline logging log interpretations (CAL- (GR, Res, DEN and NEU	12	

# Examinations

Q/ Multi choices questions

**1) Holding capacity of a trap depends on its:**

- Permeability
- Water saturation
- Porosity
- Closure

**2) Hydrodynamic condition affects the effectiveness of cap rocks when:**

- Water flows upward
- Water flows downward
- Water flows by an angle down or upwards
- Water flows horizontally

**3) Maturity level of any source rock has an effect on its:**

- Genetic potential
- Transformation ratio
- Oil window
- S1 and S2

**4) Elements of petroleum systems may include:**

- Maturation of organic matters
- Expulsion of petroleum
- Entrapment
- Preservation of petroleum in traps

**5) The main producers of organic matter in sediments include:**

- Phytoplanktons and zooplanktons
- Lipids and lignins
- Dinoflagellates and Foraminiferas
- Spores and bacteria

Q/ Filling blanks by suitable answer (the answer may be a single Word or more than one sentence):

1. DST is a test of -----.
2. In ----- drive; pressure drops continuously, but slowly.
3. A cap rock is effective if its capillary pressure exceeds -----.
4. Organic rich shale is more effective than shale as cap rocks because -----.

**Q/ Define the following:**

- 1) Digenetic trap 2) Remigration of petroleum 3) Oil Pool 4) Drill Stem Test (DST) 5) Condensates