



## Module (Course Syllabus) Catalogue 2022-2023

College/ Institute	Erbil Technology College	
Department	Petroleum Technology	
Module Name	Petroleum Properties	
Module Code	PEP 202	
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 <sup>nd</sup>	
Qualification	MSc. Petroleum Engineering	
Scientific Title	Lecturer	
ECTS (Credits)	7	
Module type	Prerequisite <input type="checkbox"/>	Core <input checked="" type="checkbox"/> Assist. <input type="checkbox"/>
Weekly hours		
Weekly hours (Theory)	( 2 )hr Class	( 5 )Total hrs Workload
Weekly hours (Practical)	( 3 )hr Class	( 7 )Total hrs Workload
Number of Weeks	12	
Lecturer (Theory)	Ahmed Rafiq Tofiq	
E-Mail & Mobile NO.	07505641986 <a href="mailto:ahmed.al_bajalan@epu.edu.iq">ahmed.al_bajalan@epu.edu.iq</a>	
Lecturer (Practical)	Ahmed , Ibrahim , Ahmed	
E-Mail & Mobile NO.	07505641986	
Websites		

# Course Book

<p><b>Course Description</b></p>	<p>Our modern technological society relies very heavily on fossil fuels as an important source of energy. Crude oil is produced from the deep underground reservoir and must undergo a series of refining processes which converts it into a variety of products - petrol for cars, fuel oil for heating, diesel fuels for transportation means, bitumen for roads. The goal of this course is familiarizing the petroleum students with these technologies</p> <p>It is designed to provide them with an understanding of the crude oil and its origins and how it can be classified to its original bases (paraffinic base, naphthenic base or aromatic base) and some related topics such as classification of crude oil and studying its physical properties on laboratorial base (e.g. water content, flash point and fire point, smoke point &amp; ... etc</p>
<p><b>Course objectives</b></p>	<p>The main objective of oil and gas properties module is to familiarize the students with the theories of genesis of petroleum origin and to find out the main formation of oil and gas.</p> <p>The chemical and physical composition of crude oil consider as a main goal of this course. By the end of this course the student should also know how to classify crude oil according to API. The practical part of this course aims to give an experimental knowledge about physical properties of crude oil such as flash point, fire point, and water content</p>
<p><b>Student's obligation</b></p>	<p>Attendance – is expected at all lectures and labs. Attendance in lecture and lab is required for course completion. Class attendance is monitored and recorded. YOU are responsible for missed information. Attendance does affect your grade because you probably missed something you needed to learn how to do. Students in all sections of this course will be required to do the following:</p> <ol style="list-style-type: none"> <li>1. Students will participate in lecture activities including discussions, quizzes and in class assignments</li> <li>2. Quizzes are designed to assist you in understanding the course materials and to provide you with examples of the type of questions that will be on the exams.</li> <li>3. Students will turn in assigned homework problems and questions</li> <li>4. Students may participate in optional cooperative learning groups</li> </ol>

	5. Students will participate in laboratory experiments and turn in laboratory reports				
<b>Required Learning Materials</b>	<p>1. Noted and handout of lecture are given to students containing details of the topics using power point presentation.</p> <p>2. During the lecture, lecturer explains subject by a written on white board to become more understandable and simple.</p> <p>3. At the end of the lecture, lecturer allows students ask their questions.</p> <p>4. Regarding practical lectures, they give in the Lab where the students are divided into more than one groups.</p> <p>5. The students work as multigroup at the lab to run equipment's and to submit a report for what they have done at the lab for the next practical lecture.</p>				
<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	10		
		Report	10		
		Seminar	10		
		Essay			
		Project			
	Quiz	5			
	Lab.				
	Midterm Exam	16			
	Final Exam	40			
Total	100				
<b>Specific learning outcome:</b>	<p>By the end of this course the student will gain the knowledge about:</p> <p>1- Theories of genesis of crude oil (Organic and Inorganic theory)</p> <p>2- Theoretical back ground about refining processes.</p> <p>3- Hydrocarbons and non-hydrocarbons compounds, classification of crude oil according to type and also by some characterization methods.</p> <p>4- Crude oil products and its physical and chemical properties.</p>				
<b>Course References:</b>	<p>1- Emil .J.Burk (1997) Properties of Petroleum Reservoir Fluid , International human resources and development ,Boston.</p> <p>2- Characterization and Properties of Petroleum Fractions, M. R. Riazi.</p> <p>3- The Chemistry and Technology of Petroleum, fourth edition, james g. speight.</p> <p>4- Practical Advances in Petroleum Processing, Vol.(1), Vol(2) by : Chang S. Hsu and Paul R. Robinson, 2006.</p>				

5- Handbook of Petroleum Processing, DAVID S. J. "STAN" JONES, PETER R. PUJAD'O,2006.

<b>Course topics (Theory)</b>	<b>Week</b>	<b>Learning Outcome</b>
Introduction to History of Petroleum, Main oil and gas area in \ What is petroleum, Main oil and gas Area in Kurdistan , Definition of Crude oil, and its Classification according to API degree...	1	
Petroleum Technology Life cycle (Upstream, Mid-stream and Downstream), Up Stream stage (Exploration, Appraisal, Drilling) process	2	
Definition of Crude oil, and its Classification according to API degree...	3	
Organic and Inorganic theories of formation of crude oil and natural gas , Rock Types (Igneous , Sedimentary and Metamorphic)	4	
Fundamental Petroleum Reservoir ( Reservoir classification, and Fluid Properties, porosity, permeability, saturation)	5	
General chemical hydrocarbon composition in petroleum. Hydrocarbons (Paraffins, Olefins, and Naphthenes) Non Hydrocarbon Sulphur compound, Nitrogen compound, Oxygen compound, Metallic compound	6	
Physical Evaluation of crude oil Classification of crude oils. According to API, density, Specific gravity, Viscosity and viscosity index,	7	
Laboratory classification of crude oil according to volatility, combustion, melting point and oxidisation.	8	
Classification of laboratory test & physical properties of crude oil (Reid Vapor Pressure, ASTM Distillation, Flash point and Fire point,	9	
Classification of Laboratory test and physical properties (Slat Content, The weight percentage of sulfur content, Pour point and Cloud point, Ash Content.)	10	
Classification of laboratory test & physical properties of crude oil (Sediments and water content, Self-Ignition point, Thermal decomposition point,	11	
The Carbon residue, The acidity, Octane number, Cetane number, Aniline point)	12	

Practical Topics	Week	Learning Outcome
<ul style="list-style-type: none"> <li>Measuring API ° gravity of Crude Oil through measuring specific gravity by Bottle</li> </ul>	1	
<ul style="list-style-type: none"> <li>Measuring API ° gravity of Crude Oil through measuring specific gravity by pycnometer</li> </ul>	2	
<ul style="list-style-type: none"> <li>Measuring API ° gravity of Crude Oil through measuring specific gravity by hydrometer</li> </ul>	3	
<ul style="list-style-type: none"> <li>Determination of smoke point of light petroleum product</li> </ul>	4	
<ul style="list-style-type: none"> <li>Measuring Flash point and fire point (closed abel test ) and Open Test.</li> </ul>	5	
<ul style="list-style-type: none"> <li>Carbon Residue of Petroleum Products, Conradson Carbon Residue Test (CCR).</li> </ul>	6	
<ul style="list-style-type: none"> <li>Measuring water and sediment content of petroleum products</li> </ul>	7	

## Questions Example Design

**Q4) Given the following core data, calculate the geometric average permeability?**

Sample	$h_i$ , ft	$k_i$ , md
1	1.0	10
2	1.0	30
3	0.5	100
4	1.5	40
5	2.0	80
6	1.5	70
7	1.0	15
8	1.0	50
9	1.5	35
10	0.5	20

**Q5) Calculate the viscosity index for a lubricate oil which have 70.61 cst observed kinematic viscosity at 40°C and 9.10 cst at 100 °C ?**

### Practical Questions

Q1) Fill in the following blanks with the correct answer: -

1. The aim of sulfur experiment is to determine the percentage of sulfur in -----, -----, -----
2. In cloud point experiment the sample becomes hazy or cloudy due -----
3. The range of salt concentration covered in salt experiment are -----, ----- (PTB) as chloride concentration/volume of crude oil.
4. Domestic kerosene must not have a sulfur content of more than ----- by weight
5. The salt experiment measure ----- of a solution of crude oil in a mixed alcohol solvent.
5. The aim of doctor experiment is to detect the ----- in fuels and solvent.
6. In the color test experiment the result of gasoline should not exceed -----

**Extra notes:**

**External Evaluator**