Module (Course Syllabus) Catalogue

2023-2024

College/ Institute	Koya Technical Institute	
Department	Petroleum Technology -Chemical Analysis	
Module Name	Petroleum Wastewater	
Module Code	PWW304	
Degree	Technical Diploma / Bachelor ☐ High Diploma ☐ ster ☐ PhD ☐	
Semester	3	
Qualification	Master	
Scientific Title	Assist. Lecturer	
ECTS (Credits)	5	
Module type	Prerequisite ☐ Core ☐ Assist. /	
Weekly hours		
Weekly hours (Theory)	(3)hr Class	(125)Total hrs Workload
Weekly hours (Practical)	( )hr Class	( )Total hrs Workload
Number of Weeks	14	
Lecturer (Theory)	Sheeraz Majeed Ameen	

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Lecturer (Practical)	
E-Mail & Mobile NO.	
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Course Book

Course Description	In the petroleum industry and refineries, water is a necessity in the process of petroleum processing. The refining process of petroleum products is long, and the production equipment and process are complex, which will produce a lot of petroleum wastewater. Generally, the water quality of petroleum wastewater is complex, which not only contains residual oil but also contains a lot of dissolved toxic substances. The direct discharge of these wastewater without treatment will cause serious damage to air, water, soil and organisms. Petroleum wastewater is very harmful, so people use specific indicators to demarcate the pollution components in petroleum wastewater. In order to deal with harmful petroleum wastewater, protect water resources and reduce the harm of petrochemical wastewater to biology, many effective technologies have been developed. But many traditional technologies have the problems of large area, high cost, and low treatment efficiency, and the simple use of a wastewater treatment technology will cause a lot of waste of resources. Therefore, it is an important direction to study the wastewater treatment process combined with various technologies and improve the efficiency of traditional wastewater treatment methods.
Course objectives	Understand the conceptual and theoretical underpinning of the petroleum wastewater in oil industries and refineries. Study briefly about wastewater related to the oil, gas, petrochemical and associated industries describe the characteristics of petrochemical wastewater, the source, harm and the

	importance of treatment. Concepts of workplace wastewater engineering and sewage. Provide knowledge of characterization of waste water.
Student's obligation	Missed classes will not be compensated including the quizzes and the scheduled assignments. The students will lose marks on unattended classes with quizzes unless a legal document or authorized leave is presented which should explain the excuse of the absence
Required Learning Materials	many useful tools will be used in this course to enhance the students to get better understanding including colored markers, slideshows, white board, smart board, and hand-outs. also, scientific trips will organize to students for more detail in field Evaluation

Evaluation

Task		Weight (Marks)	Due Semester	Relevant Learning Outcome
Paper Review				
Assignments	Homework	10	2	
	Class Activity	2		
	Report	8	1	
	Seminar	8	1	
	Essay			
	Project			
Quiz		8	2	
Lab.				
Midterm Exam		24	1	
Final Exam		40	1	
Total		100		

Specific learning outcome:	1- By the end of successful completion of this course, the students will be able to: 1. Outline planning of waste water collection, conveyance and treatment systems for Petroleum refineries. 2. Provide knowledge of characterization of waste water generated in a petroleum industry. 3. Impart understanding of treatment of sewage and the need for its treatment
Course References:	1. M.J. Hammer,"Water & Wastewater Technology" John wiley & Sons, End Edition 2. Ray Asfahl, "Industrial Safety and Health Management" Prentice Hall.

	3. S.D. Lin & C.C. Lee, "Water and wastewater Calculation Manual" Mc-GrawHill, 2001. 4. Technical Guideline on The Environmental Impact Assessment of petroleum operations in the Kurdistan Region of Iraq (2014) Ministry of Natural Resources 5. Gulf Publishing Company, "Environmental Engineering Control in Petroleum Engineering" 1996. 6. M.L. Davis & D.A. Cornwell. "Introduction to Environmental Engineering" Tata McGraw & Hills, 2007. 7. Environmental Engineering-II: Sewage disposal and Air pollution Engineering, Garg

Course topics (Theory)	Week	Learning Outcome
• Introduction to wastewater • What is a wastewater • History of wastewater problems • Everyone's Responsibilities toward wastewater	1	
•Hazards of Petrochemical Wastewater in Refineries. • Introduction to wastewater Treatment • Importance of Petrochemical Wastewater Treatment.	2	
• Petrochemical wastewater's main components in refineries and oil industry. •characteristics of refinery sewage quality	3	
•Petrochemical wastewater impact on the environment. •Petrochemical wastewater impact on the Soil and Ground water •Petrochemical wastewater impact on the Surface Water.	4	
•Wastewater treatment in refineries •Elements of environmental pollution in the refineries.	5	
•Forms of oil in Oily Wastewater •wastewater containing phenol •sources of sulfur containing sewage.	6	

• Stages and Types of Petrochemical Wastewater Treatment Technology. •Pre-Treatment •Advanced Treatment.	7	
• Physiochemical Process of Wastewater Removal of suspended solids **Common method of Physical treatment** •gravity precipitation •air flotation. •Membrane separation: • Coagulation • Flocculation •	8	
•Membrane separation: •biofilm can be divided into four categories: microfiltration (MF), ultra-filtration (UF), nanofiltration (NF) and reverse osmosis (RO).	9	
•Removal of Dissolved Solids Membrane Technology, • Membrane separation	10	
•*Coagulation/Flocculation Methods in Pre-Treatment processes of Petrochemical Wastewater.*	11	
nutrient removal particle settling (sedimentation) • Filtration(oil solids are removed with sand filters, bag filters, flocculants and oil/water separators	12	
Chemical method of Treatment Oxidation	13	
•Biological processes for wastewater treatment • Removal of suspended Hydrocarbons, Removal of Dissolved Hydrocarbons • Microorganisms (naturally-occurring, commercial, specific groups and acclimatized sewage sludge Oxidation (oxidize organic matter)	14	
Practical Topics	**Week**	**Learning Outcome**

Questions Example Design

1-Define Petroleum Wastewater.

2-What will happen after the petrochemical wastewater enters the water body?

3-What is the purposes of petroleum wastewater study program?

4-What is main sources and uses of water in refineries

5-Turbidity contamination in Raw water make several problems like -------- ,---------- , and the removal methods used are ---------- , ---------- , --------- .

6- The Methods that uses for removing Suspended Solids in Raw water are ------- , ----------, ---------- .

7- Hydrogen sulphide contamination in Raw water make several problems like -------- ,----------

8-The characteristics of refinery Wastewater expressed by some physical and chemical indicators write seven of these indicators?

Extra notes:
External Evaluator