

Module (Course Syllabus) Catalogue 2020-2021

College/ Institute	Koya Technical Institute	
Department	Petroleum technology/Chemical Analyzing	
Module Name	Petroleum Wastewater & its Treatment	
Module Code	PWT304	
Degree	Technical Diploma <input checked="" type="checkbox"/> Diploma <input type="checkbox"/> Master <input type="checkbox"/>	Bachelor <input type="checkbox"/> PhD <input type="checkbox"/> High <input type="checkbox"/>
Semester	3	
Qualification	Master	
Scientific Title	Assist. Lecturer	
ECTS (Credits)	5	
Module type	Prerequisite <input type="checkbox"/> Core <input type="checkbox"/> Assist. <input checked="" type="checkbox"/>	
Weekly hours		
Weekly hours (Theory)	(3)hr Class	(125)Total hrs Workload
Weekly hours (Practical)	()hr Class	()Total hrs Workload
Number of Weeks	16	
Lecturer (Theory)	sheeraz Majeed Ameen	

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Lecturer (Practical)	
E-Mail & Mobile NO.	
Websites	https://academicstaff.epu.edu.iq/faculty/sheeraz.ameen

Course Book

Course Description	<p>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.</p> <p>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.</p>
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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 describes 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	<table border="1"> <thead> <tr> <th>Task</th> <th>Weight (Marks)</th> <th>Due Week</th> <th>Relevant Learning Outcome</th> </tr> </thead> <tbody> <tr> <td>Paper Review</td> <td></td> <td></td> <td></td> </tr> <tr> <td rowspan="6">Assignments</td> <td>Homework</td> <td>4</td> <td>2</td> </tr> <tr> <td>Class Activity</td> <td>2</td> <td></td> </tr> <tr> <td>Report</td> <td>5</td> <td>1</td> </tr> <tr> <td>Seminar</td> <td>5</td> <td>1</td> </tr> <tr> <td>Essay</td> <td></td> <td></td> </tr> <tr> <td>Project</td> <td></td> <td></td> </tr> <tr> <td>Quiz</td> <td>14</td> <td>4</td> <td></td> </tr> <tr> <td>Lab.</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Midterm Exam</td> <td>20</td> <td></td> <td></td> </tr> <tr> <td>Final Exam</td> <td>50</td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Task	Weight (Marks)	Due Week	Relevant Learning Outcome	Paper Review				Assignments	Homework	4	2	Class Activity	2		Report	5	1	Seminar	5	1	Essay			Project			Quiz	14	4		Lab.				Midterm Exam	20			Final Exam	50			Total			
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Specific learning outcome:	By the end of successful completion of this course, the students will be able to: <ol style="list-style-type: none"> 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:	<ol style="list-style-type: none"> 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
<ul style="list-style-type: none"> • Introduction to wastewater • What is a wastewater • History of wastewater problems • Everyone's Responsibilities toward wastewater 	1	
<ul style="list-style-type: none"> • Introduction to wastewater Treatment <p>What are Petroleum wastewater's main components in refineries and oil industry.</p> <ul style="list-style-type: none"> • Why treats wastewater 	2	

<ul style="list-style-type: none"> • Sewage-load • Conventional Sewage Treatment 		
Physiochemical Process of Wastewater Removal of suspended solids <ul style="list-style-type: none"> • Coagulation • Flocculation • nutrient removal particle settling (sedimentation) • Filtration(oil solids are removed with sand filters, bag filters, flocculants and oil/water separators) 	3	
Removal of Dissolved Solids Membrane Technology, <ul style="list-style-type: none"> • Membrane separation 	4	
Biological processes for wastewater treatment <ul style="list-style-type: none"> • Removal of suspended Hydrocarbons, Removal of Dissolved Hydrocarbons • Microorganisms (naturally-occurring, commercial, specific groups and acclimatized sewage sludge Oxidation (oxidize organic matter) 	5	
Conventional Sewage Treatment <ul style="list-style-type: none"> • Preliminary treatment • Primary sedimentation • Secondary Treatment 	6	
Secondary Treatment <ul style="list-style-type: none"> • Trickling filters • Activation sludge plant • Simplified activated sludge description 	7	
Sludge <ul style="list-style-type: none"> • What is sludge • why treat sludge • Surplus activated sludge 	8	

<p>Miscellaneous Treatment Methods: Nitrification and Denitrification- Removal of phosphates- UASB- Membrane reactors- Integrated fixed film reactors. Anaerobic Processes: Septic Tanks, Imhoff tanks- Working principles and Design-Disposal of septic tank effluent-FAB Reactors</p> <ul style="list-style-type: none"> • Digestion 		
<p>Bio-solids (sludge) management: Characteristics- Handling and treatment of sludge-thickening- Anaerobic digestion of sludge. Disposal of sewage: Methods of disposal- Disposal into water bodies- Oxygen sag Curve- Disposal into sea-disposal on land- Sewage sickness.</p>	9	
<p>Anaerobic Digestion</p> <ul style="list-style-type: none"> • What is sludge digestion • Types of Digestion • Composition of sludge • Main Design Consideration • Design a digestion center 	10	
<p>Nutrient Removal</p> <ul style="list-style-type: none"> • What are nutrients • Sources of nutrients • Why Remove nutrients • How to remove nutrients from sewage 	11	
<p>Waste Stabilization Pond</p> <ul style="list-style-type: none"> • Types of waste stabilization Pond • Design Parameters • Anaerobic pond design • Facultative pond Design 	12	

Practical Topics	Week	Learning Outcome
Questions Example Design		
Extra notes:		
<p>External Evaluator</p> <p>The aim of this course is to direct the student toward a better understanding about wastewater treatments in its detailed processes which Mrs. Sheeraz did it clearly in the course syllabus and this course details and covers the main aspects too.</p> <p>Sardasht Rifaat Taher</p>		

