

## Module (Course Syllabus) Catalogue 2023-2024

College/ Institute	Koya Technical Institute	
Department	Petroleum Technology / Operation And Control	
Module Name	Drilling Technology	
Module Code	DRI401	
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	4	
Qualification		
Scientific Title	Lecturer	
ECTS (Credits)	7	
Module type	Prerequisite <input type="checkbox"/>	Core <input type="checkbox"/> Assist. <input checked="" 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	
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Websites		

# Course Book

<b>Course Description</b>	<p>The Drilling Technology course provides a comprehensive understanding of the principles, methods, and equipment utilized in drilling operations within the oil and gas industry. This course covers various aspects of drilling, including techniques, equipment selection, safety protocols, and environmental considerations. Students will explore topics such as rotary drilling, directional drilling, wellbore stability, casing design, and well control. The course emphasizes hands-on learning through practical exercises, case studies, and simulations.</p>
<b>Course objectives</b>	<ol style="list-style-type: none"><li>1. Understand the fundamental principles of drilling operations.</li><li>2. Familiarize with different drilling techniques and their applications.</li><li>3. Learn about the selection and operation of drilling equipment.</li><li>4. Identify and analyze potential drilling hazards and safety measures.</li><li>5. Explore environmental considerations associated with drilling activities.</li><li>6. Develop skills in well planning, design, and execution.</li><li>7. Gain proficiency in wellbore stability analysis and casing design.</li><li>8. Acquire knowledge of well control techniques and emergency response procedures.</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>	<p>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.</p>

		Task	Weight (Marks)	Due Week	Relevant Learning Outcome
<b>Evaluation</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>	<ol style="list-style-type: none"> <li>"Drilling Engineering" by J.J. Azar and G. Robello Samuel</li> <li>"Drilling Technology in Nontechnical Language" by Steve Devereux</li> <li>"Advanced Drilling and Well Technology" by Xianai Huang</li> <li>"Petroleum Engineering Handbook, Volume II: Drilling Engineering" edited by Larry W. Lake</li> <li>"Practical Well Planning and Drilling Manual" by Steve Devereux</li> <li>"Applied Drilling Engineering" by Adam T. Bourgoyne Jr., Keith K. Millheim, and Martin E. Chenevert</li> <li>"Well Control for the Drilling Team" by IWCF and IADC</li> <li>"Directional Drilling" by George E. King</li> <li>"Casing Design Theory and Practice" by S.S. Rahman and G.V. Chilingarian</li> <li>"Introduction to Directional and Horizontal Drilling" by Thomas Raymond.</li> </ol>				

Course topics (Theory)	Week	Learning Outcome
Course introduction	1	Understand the significance of drilling in the oil and gas industry Identify key components and terminologies in drilling operations
Well Types	2	Define different types of wells including exploration, production, and injection wells - Understand the purpose and function of each well type
Drilling Rigs	3	Define drilling rigs and their primary components - Understand the basic classifications of drilling rigs
Rig Components	4	- Define drilling rig components and their roles in the drilling process - Understand the basic classifications of rig components
Hoisting System	5	- Define the hoisting system and its importance in drilling operations - Understand the basic components of the hoisting system
Rotation System	6	- Define the rotation system and its significance in drilling operations - Identify the primary components of the rotation system

Circulation System	7	- Define the mud circulation system and its role in drilling operations - Understand the basic components of the mud circulation system
Well Control System	8	- Define the well control system and its importance in drilling operations - Understand the basic components of the well control system
Power Generation System	9	- Define the power generation system and its importance in drilling operations - Understand the basic components of the power generation system
Drilling Methods	10	- Define drilling methods and their importance in various drilling operations - Understand the basic classifications of drilling methods
Drilling Economics and Cost Analysis	11	- Analyze the economic factors influencing drilling decisions - Calculate drilling costs and assess cost-effectiveness
Case Studies and Practical Applications	12	- Apply theoretical knowledge to real-world drilling scenarios - Solve practical problems and make informed drilling decisions
<b>Practical Topics</b>	<b>week</b>	<b>Learning Outcome</b>
Experiment No. 1 (Mud Density).	1	

Experiment No. 2 Mud Weighting	2	
Experiment No. 3 (Mud Dilution)	3	
Experiment No. 4 (Effect of Temperature on Mud Density)	4	
Experiment No. 5 (Funnel Viscosity)	6&5	
Experiment No. 6 (Viscosity and Yield point)	7&8	
Experiment No. 7 (Gel strength)	9	
Experiment No. 8 (Hydrogen Ion Concentration (pH)).	10	
Experiment No. 9 (Sand Content)	11	
(Experiment No. 10 (Filtration)	12	

## Examinations

### Q/ Multi choices questions

1. What is the primary function of a rotary table in drilling operations?
2. a) To circulate drilling fluids b) To rotate the drill string c) To control well pressure d) To support the derrick
3. Which drilling method is known for its ability to reach highly deviated or horizontal wells? a) Percussion drilling b) Directional drilling c) Rotary drilling d) Coil tubing drilling
4. What is the purpose of a blowout preventer (BOP) in drilling operations?
5. a) To regulate the flow of drilling fluids b) To control well pressure and prevent uncontrolled flow of fluids c) To provide support for the derrick d) To rotate the drill string

6. Which drilling system utilizes a coiled tubing instead of conventional drill pipe?
  - a) Percussion drilling
  - b) Directional drilling
  - c) Rotary drilling
  - d) Coil tubing drilling
7. What is the primary advantage of horizontal drilling?
  - a) Increased drilling speed
  - b) Reduced environmental impact
  - c) Greater reservoir access
  - d) Lower drilling costs
8. Which drilling method is commonly used for drilling under rivers or environmentally sensitive areas?
  - a) Percussion drilling
  - b) Directional drilling
  - c) Rotary drilling
  - d) Multilateral drilling
9. What is the purpose of managed pressure drilling (MPD)?
  - a) To increase drilling efficiency
  - b) To reduce drilling costs
  - c) To control well pressure within a narrow range
  - d) To maximize reservoir access
10. Which drilling component is responsible for hoisting and lowering the drill string?
  - a) Drawworks
  - b) Rotary table
  - c) Crown block
  - d) Mud pump
11. What is the function of a mud gas separator in drilling operations?
  - a) To remove solid particles from drilling fluids
  - b) To separate gas from drilling fluids
  - c) To regulate mud flow rate
  - d) To control well pressure
12. What is the primary advantage of percussion drilling?
  - a) High drilling speed
  - b) Minimal environmental impact
  - c) Enhanced directional control
  - d) Reduced drilling costs

Answers:

1. b) To rotate the drill string
2. b) Directional drilling

3. b) To control well pressure and prevent uncontrolled flow of fluids
4. d) Coil tubing drilling
5. c) Greater reservoir access
6. b) Directional drilling
7. c) To control well pressure within a narrow range
8. a) Drawworks
9. b) To separate gas from drilling fluids
10. a) High drilling speed

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

1. The \_\_\_\_\_ is the primary component responsible for hoisting and lowering the drill string. Answer: drawworks
2. Directional drilling is commonly used to reach \_\_\_\_\_ reserves located beneath obstacles such as rivers or environmentally sensitive areas. Answer: remote or inaccessible
3. Blowout preventers (BOPs) are crucial for \_\_\_\_\_ and preventing uncontrolled flow of fluids during drilling operations. Answer: controlling well pressure
4. The rotary table provides the \_\_\_\_\_ motion necessary to turn the drill string and bit during drilling operations. Answer: rotational
5. Managed pressure drilling (MPD) is utilized to \_\_\_\_\_ well pressure within a narrow range to avoid well control issues. Answer: control or regulate
6. The purpose of a mud gas separator is to \_\_\_\_\_ gas from drilling fluids to prevent dangerous situations such as blowouts. Answer: separate or remove
7. Multilateral drilling involves drilling multiple \_\_\_\_\_ from a single wellbore to access multiple reservoirs. Answer: lateral or sidetracks
8. The function of a crown block and traveling block is to support and guide the \_\_\_\_\_ during hoisting operations. Answer: drilling line or drill string
9. Coil tubing drilling utilizes a continuous length of tubing to drill and \_\_\_\_\_ wells more efficiently than conventional methods. Answer: complete or access
10. Percussion drilling relies on the \_\_\_\_\_ of the drill bit to break rock formations by repeatedly striking it with a heavy tool.