Lesson plan 3 Coiled Tubing Level 3, 4						
Time	Lecture	Content	Delivery Method for level 3	Delivery Method for Level 4	Teaching Aids	Assessing understanding
08:00 - 08:30		**Homework revision**	Check the answers for yesterday homework with students and discuss the correct answers	Check the answers for yesterday homework with students and discuss the correct answers	Verbal White board	Discussion
08:30 - 09:30	3.1	**Application CT** When coiled tubing is used	Explain the uses and limitations of coiled tubing	Explain the uses and limitations of coiled tubing	Verbal Power point	Open Question Q & A
	3.2	**Equipment CT** The coiled tubing equipment in different operating environments	Explain why it is important to use the correct coiled tubing equipment for different parameters: - Pressure ratings - Flow - Fluid composition - Temperature - Connection compatibility. Explain why compatibility with external equipment systems is important: - Drilling rig - Production facility - Remote	From a given situation assess if the coiled tubing equipment is suitable for different parameters: - Pressure ratings - Flow - Fluid composition - Temperature - Connection compatibility. Explain why compatibility with external equipment systems is important: - Drilling rig - Production facility - Remote	Power point Manual video	Discussion
09:30 - 11::00	3.3	**PRESSURE CONTROL Surface PCE Stack CT** PCE required for coiled tubing operations	Explain the function and positioning of the surface PCE components required for coiled tubing operations	From a given situation, assess the surface PCE components required and explain their function for coiled tubing operations	Power point video	Open Question Q & A

	3.4	**Primary Barrier Elements CT** Primary barrier elements (strippers) used during coiled tubing operations	Describe the function and positioning of primary barrier elements (strippers) used during coiled tubing operations: - Side door - Radial. Outline the operating limits of coiled tubing strippers: - Exposed to buckling - Height limitations - Access for maintenance	Describe the function and positioning of primary barrier elements (strippers) used during coiled tubing operations: - Side door - Radial. Outline the operating limits of coiled tubing strippers: - Exposed to buckling - Height limitations - Access for maintenance	Whiteboard Power point	Open Question Q & A
11:00 - 11:30		Lunch Break				
11:30 - 12:00	3.5	**Primary Barrier Elements CT** Coiled tubing primary barrier sealing elements (strippers) and how to operate them correctly	Explain how the coiled tubing primary barrier sealing element will operate: - Using well pressure assistance on closing - Using operating pressures - With hydraulic connections	Explain how the coiled tubing primary barrier sealing element will operate: - Using well pressure assistance on closing - Using operating pressures - With hydraulic connections	Power point video	Class discussion
	3.6	**Primary Barrier Elements CT** Primary barrier element integrity during coiled tubing operations	Explain the factors that can affect primary barrier elements integrity during coiled tubing operations: - Hydraulic pressure - Roughness of the coiled tubing - Fluid composition - Maintenance	From a given situation, explain how to prevent primary barrier element failure during coiled tubing operations considering the following factors: - Hydraulic pressure - Roughness of the coiled tubing	Power point Manual	Discussion

			- Running speeds	- Fluid composition - Maintenance - Running speeds		
12:00 - 12:30	3.7	**Secondary Barrier Elements – BOPs (Ram Type Preventers) CT** Secondary barrier elements (coiled tubing BOPs) used during coiled tubing operations	Describe the function and positioning of secondary barrier elements (coiled tubing BOPs) used during coiled tubing operations and their operating limits, including potential for failure: - Combi - Triple - Quad	From a given diagram, assess if the coiled tubing BOP space-out and configuration is suitable for the operation	Power point Manual	Open Question Q & A
12:30 - 13:00	3.8	**Secondary Barrier Elements – BOPs (Ram Type Preventers) CT** BOP ram configurations for different coiled tubing operations	From a given situation, identify the required changes to the coiled tubing BOP ram configuration for: - Changes to coil tubing diameter and type - Different fluid composition - Changes to pressure and temperature	From a given situation, assess the required changes to the coiled tubing BOP ram configuration for: - Changes to coil tubing diameter and type - Different fluid composition - Changes to pressure and temperature	Power point Manual video	Open Question Q & A
13:00 - 13:30	3.9	**Secondary Barrier Elements – BOPs (Ram Type Preventers) CT** How to operate secondary barrier elements (coiled tubing BOPs)	Explain how to operate secondary barrier elements (coiled tubing BOPs) during coiled tubing operations including: - Closing and operating	From a given situation, explain the correct actions to take if the secondary barrier elements (coiled tubing BOPs) fail to seal or function	Power point Manual video	Group discussion

			sequences - With operating pressures - Lining up with hydraulic connections			
13:30 - 14:00	3.10	**Shearing Devices CT** Coiled tubing shearing devices	Explain the function, positioning and operating limits of coiled tubing - Shear ram - Shear/seal ram/valve. Explain when to use coiled tubing - Shear ram - Shear/seal ram/valve	Explain the function, positioning and operating limits of coiled tubing - Shear ram - Shear/seal ram/valve. From a given situation, assess why and when to use - Shear ram - Shear/seal ram/valve	Power point video	Discussion
14:00 - 14:15	3.11	**Other Well Control Devices CT** Downhole check valves (back pressure valves) in a Bottom Hole Assembly (BHA) during coiled tubing operations	Explain the positioning of downhole check valves (back pressure valves) in a coiled tubing BHA and how to test them Outline the advantages and disadvantages of using downhole check valves (back pressure valves) in a coiled tubing BHA	From a given situation assess the positioning of downhole check valves (back pressure valves) in a coiled tubing BHA and how to test them Outline the advantages and disadvantages of using downhole check valves (back pressure valves) in a coiled tubing BHA	Power point Manual video	Open Question Q & A
14:15 - 14:30		Coffee Break				
14:30 - 14:45	3.12	**PRESSURE CONTROL (BARRIER ELEMENTS AND ENVELOPES) PRINCIPLES CT**	From a given coiled tubing situation or surface rig-up diagram, identify	From a given changing coiled tubing situation or surface rig-up	Power point White board	Open Question Q & A

		Grouping barrier elements into barrier envelopes during coiled tubing operations	which are primary and secondary barrier elements and group them into envelopes	diagram, identify which are primary and secondary barrier elements and group them into envelopes Assess from a given barrier configuration and PCE design if the coiled tubing operation can be completed safely Assess where potential leak paths may develop		
14:45 - 15:00	3.13	**Other operations - PCE Stack CT** A coiled tubing pressurised deployment system	Describe when a coiled tubing pressurised deployment system is used Explain the barrier configuration and PCE design required to maintain the double barrier philosophy	From a given situation, assess when a coiled tubing pressurised deployment system is used Explain the barrier configuration and PCE design required to maintain the double barrier philosophy	Power point Manual White board	Discussion
	3.14	**Other operations - PCE Stack CT** Annular preventer use during coiled tubing operations	Describe when an annular preventer would be used during a coiled tubing operation	Explain how and why an annular preventer is used during a coiled tubing operation, and its operating limits	Power point	Group discussion
	3.15	**Safely repair or replace a failed primary barrier element CT** Maintaining a double barrier when changing a coiled tubing stripper rubber during intervention	Explain the requirements for maintaining a double barrier when changing coiled tubing stripper	From a given situation, assess how to maintain a double barrier when changing coiled tubing stripper	Power point Manual	Open Question Q & A

15:00 - 15:15		operations	rubbers during intervention operations	rubbers during intervention operations		
	3.16	**Safely repair or replace a failed primary barrier element CT** Secondary barrier elements and envelopes for coiled tubing operations if a primary barrier element fails	Explain the correct actions to take if a primary barrier element fails during coiled tubing operations. Describe how and when to apply the secondary barrier elements/envelopes considering: - Equipment operating limits - Testing after closure - Monitoring for pressure - Double barrier protection	From a given situation, explain the correct actions to take if a primary barrier element fails during coiled tubing operations considering: - How to maintain double barrier protection - Operating limits of secondary barrier element - Ability to verify barrier envelope integrity	Power point Manual	Open Question Q & A
15:15 - 15:30	3.17	**PCE Rig Up CT** The equipment required for a safe and compatible coiled tubing PCE rig-up	Explain which PCE is required to complete a safe and compatible coiled tubing rig-up	Analyse given information of the PCE stack, and explain which equipment is required to complete a safe and compatible coiled tubing rig-up	Power point Manual	Open Question Q & A
	3.18	**PCE Testing CT** PCE pressure tests and function tests with coiled tubing in place	Explain how to do pressure tests and function tests on the PCE with coiled tubing in place	From a given situation, verify how to do pressure tests and function tests on the PCE with coiled tubing in place, and assess if the test results are acceptable	Power point Manual White board	Discussion
	3.19	**WELL INTERVENTION OPERATIONS CT** **Operational**	Explain the operational limits of coiled tubing due to:	From a given situation, assess if the coiled tubing is	Power point Manual video	Open Question Q & A

		Considerations (with well control consequences) CT The operational limits of coiled tubing	- Wear and fatigue by cycling - Different well conditions - Pull and drag due to well geometry	suitable to use by considering: - Wear and fatigue by cycling - Different well conditions - Pull and drag due to well geometry		
	3.20	**Operational Considerations (with well control consequences) CT** The forces on coiled tubing created by well pressure	Explain the forces on the coiled tubing caused by well pressure, flow and conditions to create: - Buckling - Collapse	Explain the effects of flow and well condition changes on the coiled tubing Describe the steps required to manage the forces produced during: - Buckling - Collapse	Power point Manual	Open Question Q & A
15:30 - 15:45	3.21	**Controlled Well Shut in CT** Coiled tubing shear ram equipment operating limits	From a given diagram or description, identify the coiled tubing nonshearable components -Sand screens - Perforating guns - BHA tools and components	From a given diagram or description, assess what action to take if there is a non-shearable component across the BOP: - Sand screens - Perforating guns - BHA tools and components	Power point Whit board	Discussion
	3.22	**Controlled Well Shut in CT** How to shut in the well quickly and safely with or without coiled tubing in the hole	Explain how to safely shut in the well during a coiled tubing operation: - With coiled tubing in the hole - Without coiled tubing in the hole - With BHA tools and components positioned at	From a given situation, assess how to safely shut in the well during a coiled tubing operation: - With coiled tubing in the hole - Without coiled tubing in the hole - With BHA tools and components	Power point Manual	Discussion

			surface	positioned at surface		
	3.23	**Loss of Pressure Control During Well Intervention Operations CT** How to identify defects that could affect BOP function during a coiled tubing operation	From a given diagram or description of a coiled tubing BOP, explain what to do when a defect occurs: - Leaking flange/fitting connections - Leaking o-ring connections - Leaking weep holes Damaged seals	From a given diagram or description of a coiled tubing BOP, explain what to do when a defect occurs: - Leaking flange/fitting connections - Leaking o-ring connections - Leaking weep holes - Damaged seals. Explain the further actions required once the situation is made safe	Power point Manual video	Open Question Q & A
15:45 - 16:00	3.24	**Loss of Pressure Control During Well Intervention Operations CT** What to do if the power unit, injector head, tubing reel or control system fails during a coiled tubing operation	Explain how to make the situation safe while maintaining control of the well if the power unit, injector head, tubing reel or control system fails during a coiled tubing operation	From a given situation, assess what to do if the power unit, injector head, tubing reel or control system fails during a coiled tubing operation, and explain the further actions required once the situation is made safe	Power point Manual video	Open Question Q & A
	3.25	**Loss of Pressure Control During Well Intervention Operations CT** What to do if the pumping or circulation system fails during a coiled tubing operation	Explain how to make the situation safe while maintaining control of the well if the pumping or circulation system fails during a coiled tubing operation	From a given situation, assess what to if the pumping or circulation system fails during a coiled tubing operation, and explain the further actions required once the situation is made	White board Manual	Group discussion

				safe		
	3.26	**Loss of Pressure Control During Well Intervention Operations CT** What to do if the coiled tubing leaks at surface	Explain how to make the situation safe while maintaining control of the well if the coiled tubing leaks at surface during a coiled tubing operation: - Between the stripper and the injector - Between the gooseneck and the reel: - With corrosive fluids - With non-corrosive fluids	From a given situation, assess how to make the situation safe while maintaining control of the well if the coiled tubing leaks at surface during a coiled tubing operation: - Between the stripper and the injector - Between the gooseneck and the reel: - With corrosive fluids - With non-corrosive fluids	Power point Manual	Open Question Q & A
16:00 - 16:15	3.27	**Loss of Pressure Control During Well Intervention Operations CT** What to do if there is an external leak between the safety head and the Xmas Tree while coiled tubing is below the Sub Surface Safety Valve (SSSV)	Explain how to make the situation safe while maintaining control of the well if there is an external leak between the safety head and the Xmas Tree while coiled tubing is below the SSSV	From a given situation, assess what to do if there is an external leak between the safety head and the Xmas Tree while coiled tubing is below the SSSV, and explain the further actions required once the operation is made safe	Power point Manual	Open Question Q & A
	3.28	**Loss of Pressure Control During Well Intervention Operations CT** What to do if the coiled tubing down hole check valves (back pressure valves) leak while in the	Explain how to make the operation safe while maintaining control of the well if the coiled tubing down hole check valves (back pressure	From a given situation, assess what to do if the coiled tubing down hole check valves (back pressure valves) leak while in	Power point Manual video	Open Question Q & A

		hole during a coiled tubing operation	valves) leak while in the hole during a coiled tubing operation	the hole during a coiled tubing operation and explain the further actions required once the operation is made safe		
	3.29	**Loss of Pressure Control During Well Intervention Operations CT** What to do if the coiled tubing leaks below the stripper during a coiled tubing operation	Explain how to make the operation safe while maintaining control of the well if the coiled tubing leaks below the stripper during a coiled tubing operation	From a given situation, assess what to do if the coiled tubing leaks below the stripper during a coiled tubing operation and explain the further actions required once the operation is made safe	Power point Manual video	Open Question Q & A
16:15 - 16:45	3.30	**Loss of Pressure Control During Well Intervention Operations CT** What to do if an alarm sounds when coiled tubing is in the well and you are required to muster in a safe area	Explain how to make the operation safe while maintaining control of the well if an alarm sounds and you are required to muster in a safe area when coiled tubing is in the well	From a given situation, assess what to do if an alarm sounds and you are required to muster in a safe area when coiled tubing is in the well and explain the further actions required once the operation is made safe	Power point	Discussion
	3.31	**Loss of Pressure Control During Well Intervention Operations CT** What to do if the coiled tubing breaks on surface or downhole during a coiled tubing operation	Explain how to make the operation safe while maintaining control of the well if the coiled tubing breaks during a coiled tubing operation: - On surface - Downhole	From a given situation, assess what to do if the coiled tubing breaks during a coiled tubing operation and explain the further actions required once the operation is made safe: - On surface - Downhole	Power point Manual	Open Question Q & A

	3.32	**Loss of Pressure Control During Well Intervention Operations CT** What to do if there is a leak at the rotating joint during a coiled tubing operation	Explain how to make the operation safe while maintaining control of the well if there is a leak at the rotating joint during a coiled tubing operation	From a given situation, assess what to do if there is a leak at the rotating joint during a coiled tubing operation, and explain the further actions required once the operation is made safe	Power point Manual video	Open Question Q & A
1 hr.		Homework (multi-choice) exercises			Exercises Book	To be discussed next day