COURSE OVERVIEW DE0853
Well Planning
(E-Learning Module)

Course Title
Well Planning
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Course Reference
DE0853

Course Format & Compatibility
SCORM 1.2. Compatible with IE11, MS-Edge, Google Chrome, Windows, Linux, Unix, Android, IOS, iPadOS, macOS, iPhone, iPad & HarmonyOS (Huawei)

Course Duration
30 online contact hours
(3.0 CEUs/30 PDHs)

Course Description

This E-Learning course is designed to provide participants with a detailed and up-to-date overview of well planning. It covers the reservoir rocks, petroleum traps, exploration, types of wells and drilling services; the well site preparation, hammering, drilling bits, down hole tools, drilling mud and well head; the directional drilling, gyro survey, logging and cementing chemicals equipment and job types; the open and case hole logging, BHA design components, heavy weight drill pipe (HWDP), measurement while drilling (MWD) and logging while drilling (LWD); and the various types of strings of casing, standardization of casing and classification of CSG.

Further, the course will also discuss the type of coupling, casing threads and couplings, tensile force balance on pipe body and pipe body yield strength; the internal yields pressure for pipe (burst), selection of casing setting depths and rig types and components; the basic mud logging and well planning; the drilling string components, functions of drilling mud, common rig terms, rock properties, porosity and factors affecting compaction rate; the causes of abnormal pressure and signs of abnormal pressure; and the leak off test, rig processes, drilling & coring, tripping, differential sticking, casing and cementing.

During this course, participants will learn the major factors in drilling fluid selection including the function of drilling fluid or mud and common drilling fluid properties; the directional drilling, horizontal drilling and multilateral drilling; the survey calculations, tangential method, methods of deflecting a wellbore, methods of deflection and rotor/stator configuration; the main components of a drilling rig, types of drilling fluids, bit types and rig types; the well construction, evaluation and hydraulic fracturing; the characteristics and mechanics of beam pump (sucker-rod pump), gas lift and electrical submersible pump; the well planning; and the geophysical data, types of petroleum reservoirs, well plan basics and stuck pipe.

Course Objectives

Upon the successful completion of this course, participants will be able to:-

- Apply and gain an in-depth knowledge on well planning
- Discuss reservoir rocks, petroleum traps, exploration, types of wells and drilling services
- Illustrate well site preparation and describe hammering, drilling bits, down hole tools, drilling mud and well head
- Determine directional drilling, gyro survey, logging and cementing chemicals equipment and job types
- Recognize open and case hole logging, BHA design components, heavy weight drill pipe (HWDP), measurement while drilling (MWD) and logging while drilling (LWD)
- Identify the various types of strings of casing, standardization of casing and classification of CSG
- List the type of coupling as well as describe casing threads and couplings, tensile force balance on pipe body and pipe body yield strength
- Discuss internal yields pressure for pipe (burst), selection of casing setting depths and rig types and components
- Apply basic mud logging and well planning as well as recognize drilling string components, functions of drilling mud, common rig terms, rock properties, porosity and factors affecting compaction rate
- Identify the causes of abnormal pressure and signs of abnormal pressure
- Illustrate leak off test, rig processes, drilling & coring, tripping, differential sticking, casing and cementing
- Discuss the major factors in drilling fluid selection including the function of drilling fluid or mud and common drilling fluid properties
- Describe directional drilling, horizontal drilling and multilateral drilling
- Carryout survey calculations, tangential method, methods of deflecting a wellbore, methods of deflection and rotor/stator configuration
- Recognize the main components of a drilling rig, types of drilling fluids, bit types and rig types
- Employ well construction & evaluation and hydraulic fracturing as well as discuss the characteristics and mechanics of beam pump (sucker-rod pump), gas lift and electrical submersible pump
- Apply well planning and identify the geophysical data, types of petroleum reservoirs, well plan basics and stuck pipe

Who Should Attend

This course covers systematic techniques on well planning for planning engineers, drilling and field engineers, petroleum engineers and other technical staff involved in drilling optimization or planning.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- USA International Association for Continuing Education and Training (IACET)

  Haward Technology is an Authorized Training Provider by the International Association for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 1-2013 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 1-2013 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Association for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

Training Methodology

This Trainee-centered course includes the following training methodologies:-

- Talking presentation Slides (ppt with audio)
- Simulation & Animation
- Exercises
- Videos
- Case Studies
- Gamification (learning through games)
- Quizzes, Pre-test & Post-test

Every section/module of the course ends up with a Quiz which must be passed by the trainee in order to move to the next section/module. A Post-test at the end of the course must be passed in order to get the online accredited certificate.

Course Fee

As per proposal

Course Contents

- Oil & Gas: Characteristics & Occurrence
- Reservoir Rocks
- Petroleum Traps
- Exploration
- Types of Wells
- Exploratory Wells
- Confirmation Wells
- Development Wells
- Drilling Services
- Well Site Preparation
- Hammering
- Drilling Bits
- Down Hole Tools
- Drilling Mud
- Well Head
- CMT
- Cold Cutter

- Hot Welding
- Directional Drilling
- Gyro Survey
- Logging
- Cementing Chemicals
- Cementing Equipment
- Cementing Job Types
- Drilling Oil Well Part
- Logging Services
- Open Hole Logging
- Case Hole Logging
- OH & CH Logging Techniques
- BHA Design
- BHA Design Components
- Drilling Bits (Rock & PDC)
- Bit Sub (Including Float Valve)
- Shock Sub (SS)
- Drill Collar (DC)
- String Stabilizers (S.STB) & Near Bit Stabilizers (NB.STB)
- Jar (H/M & Fully Hydraulic)
- Heavy Weight Drill Pipe (HWDP)
- Drill Pipe (DP)
- Motor
- MWD (Measurement while Drilling)
- LWD (Logging While Drilling)
- BHA Design Types
- Drilling Abbreviations
- Casing Design
- Objectives
- Types of Strings of Casing
- Example Hole & String Sizes
- Example Casing Programs
- Conductor (1 or 2) (40'-300')
- Surface (300'-5000')

- Intermediate CSG (1 or 2)
- Production CSG
- Drilling Liner
- Production Liner
- Standardization of Casing
- Classification of CSG
- Length of Casing Joints
- Outside Diameter (4.5-20")
- Weight per foot
- Type of Coupling
- Casing Threads & Couplings
- CSG & LCSG
- API BCSG Connector
- API XCSG Connector
- API Connectors
- Strength
- Grades of Casing Recognized by the API
- Tensile Force Balance on Pipe Body
- Pipe Body Yield Strength
- Internal Yields Pressure for Pipe (Burst)
- Example
- Commonly Used Bit Sizes for Running API Casing
- Commonly Used Bit Sizes that will Pass through API Casing
- Selection of Casing Setting Depths
- Casing Design – Collapse
- Casing Design – Tension
- Casing Design – Burst (from Internal Pressure)
- Burst Example
- API Design Factors (Typical)
- Basic Mud Logging
- Well Planning
- Rig Types & Components
- Land Rigs
- Offshore Rigs

- Jack-up Rigs
- Semi-Submersible
- Drilling Ships
- Platform rigs
- Land Rig Components
- Mast or Derrick
- Monkey Board
- V-Door
- Crown
- Elevators
- Substructure
- Rotary Table
- Slips
- Kelly
- Swevel
- Top Drive
- Drilling String Components
- Stabilizers
- Rotary Bits
- Functions of Drilling Mud
- Diamond Bits
- Some Offshore Components
- Heave (Motion] Compansation
- Mud Pumps
- Solid Control Equipment
- Blow Out Preventor (Bop)
- Common Rig Terms
- Rig Personnel
- Pressure Concepts
- Pressure
- Rock Properties
- Porosity
- Porosity Generations
- Saturation

- Permeability
- Overburden
- Compaction
- Factors Affecting Compaction Rate
- Matrix Stress
- Overburden Gradient
- Formation Pressure
- Normal Pressure
- Abnormal Pressure
- Concept of Continuous Deposition
- Pressure Seal
- Equilibrium
- Transition Zone
- Causes of Abnormal Pressure
- Signs of Abnormal Pressure
- Normalized Drilling Rate
- “d” Exponent
- Corrected “d” Exponent
- Factors Affecting dc
- Flow Line Temperature
- Size & Shape of Cuttings
- Pore Pressure Calculations
- Resistivity
- Sonic
- Fracture Pressure
- Principal Stresses
- Fracture Development
- Poisson Ratio
- Leak Off Test
- Rig Processes
- Drilling & Coring
- Tripping
- Stuck Pipe
- Mechanisms of Stuck Pipe

- Differential Stuck
- Differential Sticking
- Key Seat
- Packing Off & Bridging
- Settled Cutting Straight Hole
- Settled Cutting Deviated Hole
- Electric Logging
- Casing
- Function of Casing
- Casing Accessories
- Scratchers
- Float Collars
- Cementing
- Well Completion
- Drilling Fluid
- Major Factors in Drilling Fluid Selection
- Function of Drilling Fluid or Mud
- Common Drilling Fluid Properties
- Density
- Rheology Measurements
- Newtonian Fluids
- Non-Newtonian Fluids
- Mathematical Models Used to Describe Mud
- Viscosity Measurements
- Viscometer
- Gel Strength
- Types of Drilling Fluids
- Air
- Water
- Water Based Muds
- Clays
- Attapulgite
- Polymers
- Sodium Polyacrylate (SPA)

- Polyacrylamides (PHPA)
- XC Polymers
- Oil based Mud
- Reasons for Using Oil based or Synthetic based Mud
- Directional Drilling
- Introduction
- Horizontal Drilling
- Multilateral Drilling
- Designer Well
- Survey Calculations
- Common Terminology for a Directional Profile
- Most Common Survey Methods
- Tangential Method
- Radius of Curvature Equations
- Minimum Curvature Equations
- Vertical Section Equations
- Directional Drilling
- Dogleg Severity
- Problems Caused by Dogleg
- Survey Instruments
- Significant Advances in Directional Drilling Technology
- Types of Survey Instruments
- Compass
- Directional MWD Tool
- Gyroscopic Tools
- Rate or North Seeking Gyro
- Logging While Drilling (LWD)
- Methods of Deflecting a Wellbore
- Methods of Deflection
- Whipstock
- Jetting
- Rotary BHA
- Building Assembly
- Directional Drilling

- Rotor/Stator Configuration
- Speed (RPM) / Torque (Ft-LBs)
- Changes in DD Practices
- Power Pack Section
- Typical PDM Power Curve
- Bearing Function
- Turbodrill
- Typical Steerable Motor Configuration
- Effect of Bend Housing Angle on Build Rate and Bit Side Load
- Effect of Hole Erosion on Build Rate
- Rotary Steerable
- Steerable Motor in the Slide & Rotate Mode
- Limitations of Steerable Motors in the Slide Mode
- Limitations of Steerable Motors in the Rotate Mode
- Rotary Steerable Systems being Designed & Used today
- Schlumberger Rotary Steerable Assembly
- Gyrodata Rotary Steerable Assembly
- Economics of Rotary Steerable
- Drilling & Completions
- Drilling & Completions Basics
- Main Components of a Drilling Rig
- Hoisting System
- Rotating System
- Circulating System
- Circulating System & Solid Control
- Types of Drilling Fluids
- Power System
- Drill String & Bit
- Bit Types
- Well Control
- Rig Types
- Offshore Drilling Rigs
- Shallow-Water Barge Rig
- Platform Rig

- Jack-Up Rig
- Semi-submersible Rig
- Semi-submersible Generations
- Drillships
- Cost
- Well Construction & Evaluation
- Well Construction & Well Types
- Directional Drilling – why?
- Angle Build with Motors
- MWD vs Near Bit Sensors
- Evaluation Methods
- Mud Logging and LWD/MWD
- Electrical Logs Showing Oil-bearing Sand
- Completion Types
- Gravel Pack
- Hydraulic Fracturing
- Horizontal Wells
- Horizontal Open-Hole Gravel Pack
- Horizontal Well Cased-Hole
- Drivers of Multilateral Technology
- Intelligent Well Systems (IWS)
- Beam Pump (Sucker-Rod Pump)
- Mechanics
- Characteristics
- Gas Lift
- Mechanics
- Characteristics
- Electrical Submersible Pump (ESP)
- Mechanics
- Characteristics
- Potential Environmental Emissions
- Aspects & Impacts
- Disposal & Treatment Options
- Drilling Waste Concerns

- Well Planning: A Multi-Disciplinary Approach
- Geophysical Data
- Types of Petroleum Reservoirs
- Well Plan Basics
- HIVE – Well Planning
- Decision Space; Temis 3D + Earth Vision
- Comparison of Andrew A09 to Planned Rev H (A17) Trajectory
- Hole Sections Rev H (A17) Trajectory
- Andrew NDS: Lower 12 ¼ Section
- Tectonic Stress
- Settled Cuttings 35 & Higher Angle Wellbore
- Stuck Pipe
- Drilling Cost Estimation
- Drilling Uncertainty Statement – Summary
- Pushing the Envelope
- Build: Drilling Performance
- Extending the Drilling envelope
- BP Steps Out in GoM Deepwater
- Drill-Support ROV Systems