

### PRODUCTION ENGINEERING

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### PRODUCTION ENGINEERING

NO/CODE	COURSE TITLE	COURSE DURATION
UETMT-PRO-101	Introduction to Production Operations	5 days
UETMT-PRO-102	Beam Pump	5 days
UETMT-PRO-103	Artificial Lift Systems- Optimization and Troubleshooting	5 days
UETMT-PRO-104	Production Operations	5 days
UETMT-PRO-105	Production Optimization using Nodal Analysis	5 days
UETMT-PRO-106	Production System & Advanced Well Test Analysis	5 days
UETMT-PRO-107	Production Surface Handling Facilities Technology	5 days
UETMT-PRO-108	Production Logging	5 days
UETMT-PRO-109	Production Logging Interpretation	5 days
UETMT-PRO-110	Production Problem Solving	5 days
UETMT-PRO-111	Modern Methods of Heavy Oil Production	5 days
UETMT-PRO-112	Production/Processing Facilities	5 days
UETMT-PRO-113	Production Technology for other Disciplines	5 days





#### INTRODUCTION TO PRODUCTION OPERATIONS

#### UETMT- PRO- 101

Program Duration: 5 days

Level: Intermediate

#### **PROGRAM DESCRIPTION**

Many Oil Production Processes present a significant challenge to Oil Treating Equipment Design and Operations. This program has been developed to provide an in-depth, yet practical review of the art and Science of Crude Oil Processing Facilities from the Wellhead to the delivery of a specification Crude Oil Product to the Refinery. Solution Gas Handling Processes and Equipment will be discussed as well. The program's content is both comprehensive and wide-ranging.

The sessions will cover the Process Objectives, Equipment Behavior, Interaction of the Process and Equipment, and Troubleshooting Techniques, Analysis, and Problem Solving of the different Crude Oil Processing Facilities. A Case Study approach covers some selected Process and Equipment found in Oil & Gas Production Facilities will be deeply discussed. All Case Studies are developed from "Actual Case Studies"..

#### PROGRAM OBJECTIVES

By the end of the training course, participants will be able to:

- Select and evaluate Processes and Equipment used to condition Well Fluids, to meet Sales or Disposal Specifications.
- Apply Physical and Thermodynamic property Correlations and principles to the Design and Evaluation of Oil Production and Processing Facilities.
- Perform equipment sizing calculations for major production facility equipment.
- Evaluate Processing Configurations for different applications.
- Understand the Fundamentals of Separation in vessels by Gravity.
- Identify the meaning of "Phases Separation".
- Identify Separators Classification and Internals.
- Be familiar with Sizing of Separators.
- Operate and Troubleshoot Separator Problems.
- . Identify Emulsions, Emulsifying Agents, and Demulsifies.
- Understand Factors Affecting Emulsion Breakdown and Treating.
- Recognize the external and internal Parts of Treater Equipment.
- Know how simply to Size Heater-Treaters.
- How to operate and troubleshoot Heater-Treaters
- Identify the fundamentals of Crude Oil Stabilization and Sweetening.
- Identify Storage Tank Types and Components.
- Recognize and develop solution to Operating Problems in Oil Production **Facilities**
- Identify Hazardous Conditions and apply Safety Procedures.

#### TARGET AUDIENCE

Technical Personnel involved in the activities of Oil and Gas Processing Facilities, Engineers, Operation and Maintenance Personnel involved in the areas of the Petroleum Industry who require a comprehensive overview of Crude Oil Processing Facilities, Operation & Troubleshooting will find this course ideally suited for them.

#### **PROGRAM OUTLINES**

- **Overview of Oil and Gas Processing Facilities**
- **Fluid Properties**
- Phase Behavior
- Processing Configurations (example PFD's)
- Phase Separation of Gas, Oil and Water
- Emulsions
- Sand, Wax & Asphaltenes
- Oil Treating
- Field Desalting

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- Crude Stabilization & Sweetening
- Crude Oil Storage & Vapor Recovery
- **Overview of Gas Processing**
- Relief & Flare Systems

#### **PROGRAM CONTENT**

- DAY 1: Course Introduction
- Pre-assessment

- **Overview of Oil and Gas Processing Facilities** Introduction to Surface Facilities
- Field Development Overview
- Why Surface Facilities
- Fluid Characterization
- The function of the Surface Facilities Processes

#### **Production Fluid Separation** Separation Process

- **Principles of Separation**
- Separation System Problems
- **Factors Affecting Separation**
- **Phases Separation**
- Separator Application
- **Stage Separation**
- Separators Classification
- Separator Internals
- Class Work Exercise & Video Demonstration

#### DAY 2:

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- Separator Sizing
- Separation Operation and Troubleshooting
- Treaters
- Gumbarrel
- Electrostatic
- Dehydration Performance Factors
- Video Demonstration
- Group Discussion on the Equipment Used
- **Class Exercise**

#### DAY 3:

#### **Oil Desalting**

- Introduction
- Emulsions
- **Emulsifying Agents**
- **Emulsion Terminology**
- Demulsifiers
- Factors Affecting Emulsion Breakdown
- Theory of Desalting Process
- **Dual Polarity Oil Dehydration**
- **Electrical Desalting of Crude Oils**
- Group Discussion on the Equipment Used

#### DAY 4:

#### Design Concept of the Desalter System Operation

- Start-up Procedure
- Shut-down Procedure
- Troubleshooting
- **Crude Oil Sweetening**
- **Crude Oil Stabilization**
- Gas Treatment Overview
- Crude Measurement

Purpose of Flares

**Flashback Prevention** 

Gas/Liquid Separation

Noise and Smoke Control

Types of Flares

Flare Safety

**Flare Selection** Efficiency, Emissions Troubleshooting

Class Exercise & Video Demonstration

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#### DAY 5: Relief & Flare Systems

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#### **BEAM PUMP**

UETMT- PRO- 102

Program Duration: 5 days Level: INTERMEDIATE & ADVANCE

#### PROGRAM OBJECTIVES

1- Intermediate course is intended to improve the Technical Skills for Engineers in Production/Operations Engineering and for nonspecialists who need an understanding of Production and Well Operations. The objective is to give an overview of the Production Operations Engineer's responsibilities and of the deductive Process and Techniques that are required. Productivity and cost effectiveness will be taught together with some of the major considerations in programming and on-site supervision of well operations.

2- The advanced course is intended for staff who are directly involved with Production Engineering and who have practical experience with the issues involved. The objective is to provide an in-depth discussion of various analysis and design techniques, reinforced by in-class exercises and examination of actual case histories. The course will also aim to introduce some topics which may be outside of the engineer's current experience but which he may need later in his career.

#### PROGRAM CONTENT

#### DAY 1:

- General information about types of Beam Pumping Units:
- Optional Equipment and Special Features
- Pumping unit Operation and Maintenance.
- Field Automation and Well Optimization.

#### DAY 2:

Downhole Rod Pumps Sucker Rods Additional downhole Equipment:

a- Gas Separators

- **b-** Tubing Anchoring
- c- Pump off Controllers and Jack Shafts

- d- Rod Scrapers and guides
- e- Downhole Completion step by step

#### DAY 3:

- Distinction between Gas Locking, Gas Interference, and a Pumped off Condition
- Gas Separation Designs and Devices.
- Pumps and Accessories for Gas locking conditions, particulate & Scale Producing Conditions, High volume Production.

#### DAY 4:

#### System Design:

- a- Pump Capacity
- b- Rod and beam Pump System Design
- c- Estimation of Dynamic Effects
- d- Effect of Surface equipment on the Pumping System
- e- Rod Loading
- f- Rod Fall Velocity

#### **Computer Design Programs:**

a-Beam Pump Data entry, what Type of data required to be in low is and how to upload and download from low is and SAM.

b-How to calculate the Production and card load .

c- Over view about S. Rod and how to run S. Rod.

#### <u>DAY 5:</u>

- Troubleshooting for Pump Installations.
- How to find out there is a problem in Pump from low is &how to troubleshoot pump in location.
- How to deal with SAM well manager & what to check in it.
- Type of Dynograph & how to understand them (in low is & location).



#### ARTIFICIAL LIFT SYSTEMS- OPTIMIZATION AND TROUBLESHOOTING

#### UETMT- PRO- 103

Program Duration: 5 days

Level: Intermediate

#### PROGRAM DESCRIPTION

This is an intermediate course aims to improve the Technical Skills for Junior Engineers and Petroleum Technicians who need a basic understanding of Production Methods. The objective of this course is to give an overview of the Production Operations Engineers and Technicians responsibilities and of the deductive Process and Techniques that are required.

#### PROGRAM OBJECTIVES

By the end of this program, participants will be able to recognize the Fluid Properties, Multiphase Flow Regimes and all Lifting methods: Rod Pumps, Progressive Cavity Pumps (PCP), Gas Lift, Electrical Submersible Pumps (ESP), and Hydraulic Lift Systems. Discussion of alternate Deployments and multi-sensor applications for Surveillance and Optimization. Strategies and Best Practices for Field Production Optimization are discussed. The effectiveness for NODAL Systems Analysis for Lifting Performance Optimization is demonstrated.

#### TARGET AUDIENCE

This course is designed for Petroleum Technicians / Junior Engineers who are involved in Oil Production and the Design, Maintenance and Optimization of Artificial Lift, especially Electrical Submersible Pump and continuous-flow Gas Lift Systems.

#### PROGRAM CONTENT

#### DAY 1:

- Overview of Artificial Lift
- Comparison of Artificial Lift Systems
- Artificial Lift Analysis Using Measured Data
- Artificial Lift Selection

#### **Electrical Submersible Pumping Systems**

1- Introduction

#### 2- System Components:

- Pump
- Seal Section
- Motor
- Power Cable
- Gas Separators
- Down Hole Monitoring
- Motor ControlRecording Ammeter
- Transformer
- Check Valve and unloader

#### Electric Submersible Pumps (ESP)

- Applications, Design and Selection of ESP's
- Surface Equipment
- Subsurface Equipment
- Installation and Operations
   Exercise
- Exercise

#### <u>DAY 2</u>

#### Gas Lift Systems Theory and Design

- Principles of Gas Lift
- The Gas Lift Process
- The Advantages and Disadvantages of Gas Lift
- Types of Gas Lift Installations
- Continuous Gas Lift Design
- Flowing Temperature Gradient
- Unloading Practices
- Continuous Gas Left Analysis
- Gas Lift Valves
- Design and Operations
- Intermittent vs. Continuous Systems
- Intermittent Flow Gas Lift System
- Exercise



- Interpretation of Ammeter Charts
   Cleaning and Testing Submersible Pumps for Reuse
  - General discussion of Problem Areas and Design Requirements

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Fluid Flow Fundamentals Black Oil PVT Inflow Performance Relationships Nodal Analysis Technology

#### DAY 3

- Beam Pumping:
- 1- Pumping Units 2- Prime Movers
  - 3- Sucker Rods
  - 4- Downhole Rod Pumps
  - 5- Additional down hole Equipment
  - Gas Separators
  - Tubing Anchoring
  - Pump off Controllers and Jack Shafts
  - Rod Scrapers and Guides
- 6- System Design:
- Pump Capacity
- Rod and Beam Pump System Design
- Estimation of Dynamic effects by the API and Gibbs Methods
- Effect of Surface Equipment on the Pumping System
- Rod Loading
- Rod Fall Velocity
- 8- Surface and Subsurface Equipment
- 9- Power Requirements
- 10- Dynamometers and Troubleshooting
  - 11- Optimization
  - 12- Exercise for Designing a SRP System

#### DAY 4:

#### **Progressive Cavity Pumps System**

- Applications
- Surface and Subsurface Equipment
- Geometry of Downhole Pump
- Fit (Interference), Viscosity, Slip
- Elastomers
- Power Requirement Exercise for Designing a PCP System

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- **Hydraulic Pumping**
- Introduction
- Power Fluid
- Down hole Completion
- Other Facilities
- Piston Pumps
- Hydraulic Piston Pump Design
- Jet Pump
- Weir Turbine Pump

Pump Thrust Cavitations

**General Pump Design Concerns:** 

Viscous Fluid Effects

**Equipment Selection Considerations** 

Design Procedure

**Design Procedure** 

Progressive Cavity Pump:

**Rods and Tubing** 

4- Potential Problem Areas

Failure and Problem Analysis:

Failure Classification

5- Special Applications

Progressive Cavity Pump Power Transmission Unit

Sand and water production.

Stalling and start-uo Toeque.

2- System Components

DAY 5:

1-Introduction

3- Pump Life

Gas

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#### **PRODUCTION OPERATIONS**

UETMT- PRO- 104

Program Duration: 5 days

#### **PROGRAM OVERVIEW**

This course represents the core of our production engineering program and is the foundation for all future studies in this subject. The participant will become familiar with the procedures and techniques that increase production and cut operating costs. The course provides a fundamental and integrated understanding of wells, their design, operation and treatments.

#### TARGET AUDIENCE

 Petroleum, production, reservoir, facility, drilling and research engineers; geologists; field supervisors and managers; service company engineers and managers

#### **TARGETED COMPETENCIES**

- Well Completions
- Perforating Operation
- Improve Well Productivity
- Production Operations

#### **PROGRAM OBJECTIVES**

- Plan and implement well completions, workovers, stimulation treatments, and routine production operations with an efficiency that increases profits
- Evaluate the flow capacity of a well
- · Achieve reliable zonal isolation by efficient primary cementing
- Devise an integrated plan for efficient well completion and treatments
- Select and plan an appropriate perforating operation using underbalanced or extreme overbalance procedures
- Ascertain why formations are damaged and how to prevent or correct such damage
- Find out which stimulation is best and how to perform these jobs

- Review your current practices to improve well productivity
- Apply proven technologies and recent innovations in production operations

#### **PROGRAM CONTENT**

- Geological Considerations
- Reservoir fundamentals
- Well Testing
- Inflow
- Primary Cementing
- Well Completions
- Outflow
- Workover Fluids
- Perforating
- Completion Equipment: Tubing, Packers, Flow Control Devices
- Production Logging
- Squeeze Cementing
- Workovers
- Formation damage
- Surfactants
- Paraffin and asphaltene
- Rock mechanics
- Hydraulic fracturing
- Sand control
- Acidizing
- Corrosion control
- Scale deposition, removal, and prevention



#### PRODUCTION OPTIMIZATION USING NODAL ANALYSIS

#### UETMT- PRO- 105

Program Duration: 5 days

#### PROGRAM OVERVIEW

NODAL\* analysis views the total producing system as a group of components potentially encompassing reservoir rock/irregularities, completions (gravel pack, open/closed perforations, open hole), vertical flow strings, restrictions, multi-lateral branches, horizontal/hilly terrain flow lines/risers, integrated gathering networks, compressors, pump stations, metering locations, and market/system rate/pressure constraints. An improper design of any one component, or a mismatch of components, adversely affects the performance of the entire system. The chief function of a system-wide analysis is to increase well rates

#### TARGET AUDIENCE

- Production Engineer
- Process Engineer
- Production Supervisors
- Process Supervisor
- Completion Engineer

#### TARGETED COMPETENCIES

- NODAL Analysis
- Inflow Performance
- Completion Performance
- Tubing Performance
- Flowline Performance
- Artificial Lift

#### PROGRAM OBJECTIVES

- Apply NODAL<sup>™</sup> Analysis concepts viewing the total producing system as a whole from the Reservoir Rock through the completion, Well bore and gathering system, to the market while honoring system rate/pressure constraints
- Avoid improper design where any one component, or a mismatch of components, adversely affects the performance of the entire system
- Perform a system-wide analysis to increase well rates by identifying bottlenecks and design an efficient field-wide flow system, including wells, artificial lift, gathering lines and manifolds
- Use NODAL<sup>™</sup> analysis, together with reservoir simulation and analytical tools, for planning new field development

#### PROGRAM CONTENT

#### **General Overview of Nodal Analysis:**

 Supply/Demand Analogies, Natural balance and Stable/unstable Equilibrium Concepts, Diminishing Returns, Independent/Dependent Subsystems, Converging/Diverging Flows

#### **Inflow Performance:**

 Reservoir Performance Basics, Darcy, Jones and Ramey Turbulence Parameters, Empirical Models of Vogel and Fetkovich, the benefits and Drawbacks of Well-Test and C&N Values, Appropriate Models for Differing Well Descriptions, Rigorous multi-layer IPR Curves including Cross flow Effects



#### **Completion Performance:**

• Completion Modeling basics, Perforation and Gravel Pack Pressure Drop, Linear and Radial Flow Patterns through Gravel Packs, the Pressure Drop in a Gravel-filled Wellbore, Optimal Perforation Density, the rate Reduction Caused by a Partial Completion

#### **Tubing Performance:**

 Wellbore related pressure drops and dynamics, videotapes of vertical and horizontal flow patterns, diverging and converging flow dynamics, route preference, production logging physics in deviated/horizontal wellbores, wellbore slugging and pressure behavior in vertical, deviated, and horizontal wellbores, friction drop through restrictions and undulating horizontal sections, sonic flow and minimum lifting rates concepts, unloading techniques and examples

#### Flowline Performance:

• Panhandle, C&S, Dukler Pressure Drop Models, and Identifying Bottlenecks in a Gathering Network, Line Loops and Jumpers, circular/parallel/layered gathering systems

#### **Future Performance:**

 Integrating Reservoir Performance, Development Planning, and Market Constraints into field Forecasts, Optimizing Capital Investments when juggling new Well, re-completion, Compressor, Artificial Lift, and Flowline Options

#### **Artificial Lift:**

 Advanced Gas Lift Design and Troubleshooting, Electric Submersible Pump Fundamentals, Jet Pumps, and Sucker Rod Pumping basics

#### Other:

 Designing Dynamic Skills, Liquid content in Gas Streams, Why there is no such thing as a "Dry" Gas Well?, identifying loaded Wells, Predicting Wellbore Temperatures and Why publicly available bottomhole Pressure Data is almost always lower than reality





#### **PRODUCTION SYSTEM & ADVANCED WELL TEST ANALYSIS**

#### UETMT- PRO- 106

Program Duration: 5 days

#### **PROGRAM OBJECTIVES**

#### a) Production System and Inflow & Outflow:

The objective of this part is to allow participants understanding the production system in order to optimize the tubing size and its accessories, choke size, flow line size and artificial lift design. In addition he should be able to study factors affecting inflow and outflow performance to best design the wells for maximizing productivity.

#### b) Well Test Analysis:

The objective of this part is to allow participants understanding the transient flow and steady state flow and the effect of reservoir boundaries on the pressure wave. Finally, the participants should be able to interpretation well test and recommends the corrective action in case of any damage. Also, he should be able to use the results to modify the reservoir model in cooperation with G& G department for simulation purposes.

#### TARGET AUDIENCE

Reservoir Engineers, Reservoir Engineering Managers, Reservoir Simulation Engineers, Petroleum Engineers & Production technologists

#### **Targeted Competencies:**

- Production System Analysis
- Inflow & Outflow Performance
- Reservoir Fluid Flow
- Rock properties
- Gas Well Testing

#### PROGRAM CONTENT

#### **Production System Analysis**

- Introduction to production system
- Pressure drop through formation & perforations
- Pressure drop through tubing
- Pressure drop through restrictions
- Pressure drop through SCSSSV
- Pressure drop through choke
- Flow through pipelines
- Effect of back pressure on the system

#### **Inflow & Outflow Performance**

- Darcy Law (Linear & Radial flow)
- Vogel method
- Standing modified method
- Fetkovich method
- Flow efficiency calculations and cross plot
- Flow correlations in vertical and horizontal lines

#### **Factors Affecting inflow performance**

- Bottom hole & reservoir pressure
- Productivity Index (P.I)
- Mobility (K/u)
- Reservoir thickness (H)
- Porosity
- Compressibility

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- Skin effect
- Drainage area
- Sand control (screens & gravel pack if any)



#### Factors Affecting Outflow Performance

- Tubing size
- Gas liquid ratio
- Tubing restrictions (SSSV, Nipples, X-overs,....)
- Artificial lift method
- Choke size
- Separator pressure

#### **Fundamentals of Reservoir Fluid Flow**

- · Primary flow variables
- Flow Equations
- Principle of Superposition

#### **Rock Properties**

- Porosity
- · Permeability
- Compressibility

#### Pressure Draw down Test

- Analysis of transient flow data
- · Analysis of pseudo-state data
- Well bore storage
- · Multi phase flow
- Type curve analysis
- Test design

#### **Multi Rate Testing**

- Applications
- Two-rate test
- General multi rate analysis

#### Pressure build up test

- Horner & MDH methods
- Extended Muskat analysis
- Agrwal method
- Other problems of interpretations
   Linear boundaries Pressure transient in fractured reservoirs

#### • Finite & infinite conductivity

- Naturally fractured reservoirs

#### **Gas Well Testing**

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- Build up & draw down tests
- Fractured gas wells
- Gas well deliverability testing

#### Flow after flow test

 Isochronal & modified isochronal tests

#### **Injection Well Testing**

- · Pressure falloff test
- Injectivity test
- Step rate test

#### Evaluation of formation damage Interference and pulse testing

- Homogeneous Isotropic & an Isotropic
- Single active & multi active

#### Well, Reservoir and **Boundary Models**

· Limited entry well

Dual Permeability

Radial Composite

Circular boundaries

Intersecting and parallel

• Constant pressure

boundaries

Actual examples

Nodal analysis

Well test analysis

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faults

Linear Composite

• Dual Porosity Response

Horizontal well





#### PRODUCTION SURFACE HANDLING FACILITIES TECHNOLOGY

#### UETMT- PRO- 107

Program Duration: 5 days

#### PROGRAM OVERVIEW

This program combines traditional and innovative learning methods in helping participants to develop performance competencies in surface handling facilities technology. Lectures and discussions introduce them to key subject areas, and provide them with the background knowledge that they will use during mentor-guided exercises and e-Learning workshops. These workshops include pre-assessments and postassessments that test each participant's "before" and "after" knowledge of the subject, together with simulated job assignments that they complete as part of an engineering team. A mentor introduces each e-Learning segment and coaches the teams as they work through their job assignments. This coaching is provided on an "as needed" basis to enhance the learning experience, guide each team's efforts and help them avoid critical mistakes.

#### TARGET AUDIENCE

Production and Operations Engineers

#### TARGETED COMPETENCIES

- Production Facilities
- Wellheads
- Flow Control Equipment
- Flow lines
- Metering and Control Systems
- Utility Systems

#### **PROGRAM OBJECTIVES**

By the end of the program, participants will be able to describe upstream production facility components, understand how they function and outline general requirements for separating, treating and metering produced oil, water and gas.

#### **PROGRAM CONTENT**

#### **Production Facilities Overview**

- Fluid Handling from the Wellhead to the Separator
- Wellheads, Flow Control Equipment and Flow lines
- Separation of Produced Oil
- Treatment of Produced Oil
- Treatment of Produced Water
- Treatment and Handling of Produced Gas
- Metering and Control Systems
- Overview of Utility Systems and Equipment

#### **Surface Production Operations**

- Production Facilities Overview
- Production System Components
- Surface Facility Functions and Fluid Treatment Objectives
- Fluid Handling from the Wellhead to the Separator
- Wellheads, Flow Control Equipment and Flowlines
- Flow Control at the Wellhead
- Flowlines
- Valves, Fittings & Flanges
- Production Manifolds
- Team Exercise- Production Flow line Design

#### Separation of Produced Oil

- **Two-phase Separation**
- Introduction

#### **Equipment Description**

- Separator Design

#### **Three-phase Separation**

- Introduction **Equipment Description**
- Selection Criteria
- Vessel Internals
- **Potential Operating Problems**
- Separator Design

#### **Stage Separation**

- Team Exercise—Selection and Sizing of a Production Separator
- Treatment of Produced Oil
- **Treatment of Emulsions**
- **Desalting and Crude Stabilization**

### **Treatment of Produced Water**

**Removal of Oil** 

#### **General Principles**

- Equipment Description
- **Design Procedures**

#### **Removal of Solids and Dissolved Gases**

- **General Principles**
- Equipment Description
- **Design Procedures**

#### Team Workshop—Produced Water Treatment

#### **Treatment and Handling of Produced Gas Removal of Acid Gases**

- Process Descriptions
- Process Selection

#### Gas Dehydration

- Process Descriptions
- Process Selection

#### Gas Compression

- Processes and Equipment
- Design Procedures

#### Team Exercise—Produced Gas Handling

- Metering and Control Systems
- Pressure Measurement and Control
- **Temperature Measurement and Control**
- Flow Measurement and Control
- Level Measurement and Control
- Control Valves and Shutdown Systems

#### Safety in Surface Production Operations

- **Emergency Preparedness**
- Incident Reporting & Investigation
- Safety Hazards in Oil & Gas Production
- Safe Work Practices
- Safety & Control of Site Activities
- E-Learning Team Workshop—Surface Production Operations
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#### Selection Criteria Vessel Internals

- **Potential Operating Problems**





#### **PRODUCTION LOGGING**

UETMT- PRO- 108

#### Program Duration: 5 days

#### PROGRAM OVERVIEW

Production logging refers to a suite of logs that are normally run on completed injection or production wells to evaluate the performance of the well itself or of the reservoir as a whole. Other production logs can evaluate the well completion or look behind pipe to evaluate the formation and its fluids in the near-well vicinity. Production logs are playing an increasing role in modern reservoir management by providing the only means of identifying downhole fluid movements directly. This program will cover fluid flow in pipes (both single and multiphase flow), the theoretical bases of production logging techniques, production log interpretation, and operational considerations. Numerous field examples are used to illustrate the principles of production log interpretation.

#### TARGET AUDIENCE

 Petroleum and drilling engineers and managers, reservoir engineers, production engineers/ technologists, petrophysicists, log analysts, and anyone interested in understanding what production logs and casedhole surveys can tell us

#### TARGETED COMPETENCIES

- Slip Velocity Correlations
- Multiphase Log Interpretation
- Production Logging
- Well Diagnosis and Reservoir Surveillance
   Radioactive Tracer
- Spinner Flowmeters

#### PROGRAM OBJECTIVES

- Select the most appropriate production logging services for well diagnosis and reservoir surveillance
- Define injection well profiles using temperature, radioactive tracer, and spinner flowmeters
- Measure zonal inflows in production wells using temperature logs
- Locate behind-pipe channels with temperature, tracer, or noise logs
- Apply combinations of flowmeters, fluid density, and fluid capacitance logs to measure multiphase flow profiles Interpret cement bond logs and ultrasonic logs to determine cement quality
- Measure flow inside and outside casing with pulsed neutron tools
- Apply specialty tools for flow profiling in horizontal wells

#### **PROGRAM CONTENT**

- Problem identification and solution with production logs
- Temperature logs
- Radioactive tracer logs
- Spinner flowmeter logs
- Log combinations for injection well profiling
- Multiphase flow effects
- Deflector or basket flowmeters
- Fluid density logs

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- Fluid capacitance logs
- Slip velocity correlations
- Multiphase log interpretation
- Noise logs
- Cement bond logs
- Ultrasonic pulse-echo logs
- Pulsed neutron logs for flow identification
- Horizontal well production logs

#### **PRODUCTION LOGGING INTERPRETATION**

#### UETMT- PRO- 109

Program Duration: 5 days

Program Level: Advanced

#### PROGRAM OBJECTIVES

- Provide participants with a good working knowledge of the various sensors and characteristics of the production Logging Tools, now becoming of paramount importance. This is a comprehensive coverage of the results we can expect to obtain from Production Logs and their applications.
- Upon completion of this course, the participant will have a knowledge about all aspects of the fundaments of Cased hole and Production Logging
- Understand the importance of log quality control and the conditions under which logging is carried out.
- Practical insights into the steps and procedures of implementing a Production Logging Process
- Participant at the end of the course will be able to evaluate and analysis of production logging either qualitative or quantitative.

#### TARGET AUDIENCE

- Production, Petroleum and Reservoir Engineers
- Petrophysicists, Log Analysts
- Others involved in maximizing recovery or planning workover operations.

#### TARGETED COMPETENCIES

- Production Logging Tools
- Under Static Conditions
- Formation Evaluation Logging
- Natural Gamma Ray Logging
- Carbon/Oxygen Logging
- Cased Hole Resistivity Tool
- Well Integrity Evaluation

#### PROGRAM CONTENT

- Introduction
- Objective and Applications
- What is Production Logging
- Conditions under which production Logging is carried out?
- Under Static Conditions
- Under Dynamic Conditions
- Formation Evaluation Logging
- Natural Gamma Ray Logging
- Pulsed Neutron Capture Logs
- Neutron Logging
- Carbon/Oxygen Logging
- Sonic Acoustic Techniques
- Cased Hole Resistivity Tool
- Well Integrity Evaluation
- Cement Evaluation Logging
- Acoustic Cement Evaluation
- Ultrasonic pulse echo Cement Evaluation Multiphase Flow
- Cement Quality Logging Guidelines
- Downhole Casing Inspection
- Mechanical Caliper
- Acoustic Casing Inspection Tools
- Electromagnetic Casing Inspection Tools Planning and
- Production Logging

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- Simulation Production Tools
- New generation Production Logging
- Water-Flow Logging
- Gravel pack Logging
- Temperature Logging
- Measurements through tubing
- Horizontal wells Production Logging
- Planning and Executing Logging

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- Operations

  Interpretation
- (Examples)





#### PRODUCTION PROBLEM SOLVING

UETMT- PRO- 110

#### Program Duration: 5 days

#### **PROGRAM OBJECTIVES**

To provide participants with practical insights and in-depth understanding of reservoir and wellbore problems.

#### **TARGET AUDIENCE**

Petroleum, Production, Reservoir Supervisors and Engineers.

#### **TARGETED COMPETENCIES**

- Reservoir and Wellbore
- Multiphase Flow Impact
- Formation Damage
- Surface Piping
- Artificial Lift

#### PROGRAM CONTENT

Overview of common problems that cause low oil/gas rates.

#### **Reservoir Caused Problems.**

- Productivity (PI / IPR).
- Skin.
- Low Permeability.
- Low Reservoir Pressure.

#### Wellbore Problems.

- Tubular Sizing.
- Multiphase Flow Impact.
- Scale, Paraffin, Emulsions.
- Formation Damage.

#### **Contaminants – Caused Problems.**

- Corrosion.
- H2S and CO2.

#### Surface Piping & other sources of problems.

- Flow-line Size.
- Restrictions.
- Slugging.

#### **Artificial Lift Limitations.**

- Gas Lift Problems and Detection Methods.
- Electric Submersible Pump Problems.
- Rod Pump Problems.

#### **Production Equipment malfunctioning**

**Proven techniques of Troubleshooting** 

#### MODERN METHODS OF HEAVY OIL PRODUCTION

#### UETMT- PRO- 111

#### Program Duration: 5 days

#### PROGRAM OBJECTIVES

To improve understanding and awareness of Oil displacement by steam flooding. To improve efficiency of heavy Oil production.

To aid personnel skills.

#### TARGET AUDIENCE

- Production petroleum engineers.
- Production supervisors.
- Chemicals engineers.

#### TARGETED COMPETENCIES

- Oil Displacement
- Convective heat transfer
- Steam flooding
  Horizontal wells
- Well bore
- Artificial lift

#### PROGRAM CONTENT Introduction & Overview :

- Why producing fuel from heavy oil reservoirs has become increasingly necessary?
- Heavy oil and bitumen.
- Enhanced oil recovery methods.
- PVT Properties of heavy oil.

#### Basis of Oil Displacement.

- Relative Permeability.
- Fractional Flow & Frontal displacement.
- Dimensional analysis.

#### Convective heat transfer.

- · Heat fronts & Steam heating.
- Lateral heat transfer.

#### Steam flooding.

- Steam properties & Steam flooding mechanism.
- O/W ratio.
- Cyclic steam stimulation.
- Bitumen recovery.
- Steam-assisted gravity drainage.

#### Displacement of heavy-oil.

- Factors affecting displacement.
- Multi-phase flow.
- Segregated flow.
- Buckley Leverett equation.
- Application to heavy-oil water and steam flooding.
- · Mechanism of displacement in steam processes.

#### EOR methods for Heavy Oil.

- Steam Stimulation & Steam flooding.
- In-Situ combustion.

#### Heavy Oil Production.

- Drain, drainage rate and wormhole.
- Horizontal wells. (Effect of reservoir parameter, heat requirements).
- Well bore heating.
- Artificial lift (jet Pumping, Progressive cavity pumps).





#### **PRODUCTION/PROCESSING FACILITIES**

#### UETMT- PRO- 112

Program Duration: 5 days

Level: Foundation

#### PROGRAM OVERVIEW

The emphasis of this course is on oil and gas production facilities downstream of the well choke or production manifold. The handling of associated liquids such as oil, condensate, water, etc., is emphasized. Practical operating problems are considered along with engineering aspects of production facilities. This program is a logical choice in a sequence that may also include other sub-surface equipment and reservoir training.

#### TARGET AUDIENCE

 Production department Engineers/senior operating personnel

#### TARGETED COMPETENCIES

- Well Fluids
- Thermodynamic Property Correlation
- Evaluation of Production Facilities
- Equipment Sizing Correlation

#### **PROGRAM OBJECTIVES**

- Select and evaluate processes used to condition well fluids (oil, gas, water) to meet sales or disposal specifications
- Apply physical and thermodynamic property correlations and principles to the design and evaluation of production facilities
- Perform equipment sizing correlations for major production facility equipment
- Recognize and develop solutions to operating problems and control issues in production facilities



PRODUCTION TECHNOLOGY FOR OTHER DISCIPLINES

#### UETMT- PRO- 113

Program Duration: 5 days

#### PROGRAM OVERVIEW

This course stresses the production technology required to effectively develop and operate an asset, and the role of production engineering in a multi-discipline development project. Practical application of production practices is emphasized. Both theory and actual field examples are presented along with class problems, exercises, and related streaming videos. Well completion equipment and tools are viewed and discussed. Participants will work several exercises such as a basic continuous gas lift, ESP and stimulation designs. Nodal analysis problems are set up and solved on the computer and horizontal and multilateral technology is presented.

This course includes the use of computers, which are provided at additional cost, for each two participants.

#### **TARGET AUDIENCE**

Exploration and production technical professionals, team leaders, managers, and support staff who require a more extensive knowledge of production engineering and operations than that acquired in their own disciplines

#### **TARGETED COMPETENCIES**

- Production Technology
- Sand Control
- Artificial Lift Systems
- Perforating Fracturing
- Production System Optimization

#### PROGRAM OBJECTIVES

- Apply production engineering principles and practices and make basic calculations
- Identify and incorporate the role of production engineering and operations in oil and gas exploitation planning and development
- Maximize team interaction and understand the dynamics required between production engineering and other disciplines

#### PROGRAM CONTENT

- Role and tasks of production technology
- Completion design Inflow and outflow performance
- Sand control
- Artificial lift systems (gas-lift, esp, beam-pump, pcp)
- Perforating Fracturing
- Formation damage and well stimulation
- Field surveillance and data
- Production system optimization

### UNITED EASTERN TECHNICAL AND MANAGEMENT TRAINING

# ABOUT UETMT



To ensure a competent, qualified, and highly motivated workforce focused on achieving the critical outcomes, through the Development and Administration of costeffective and result-oriented Human Resource and Occupational Training Programs, Services, and Practices.

United Eastern Technical and Management Training is aligned with the Abu Dhabi Vision 2020 and contributes to achieve the UAE Economic Vision 2020 by promoting Social and Human Resources Development and by preparing the National workforce to serve Industrial and Technological growth in UAE.

#### **OUR SERVICES**

United Eastern Technical and Management Training is primarily involved in Oil and Gas Training & Development; Human Capital and Talent Acquisition. United Eastern Technical and Management Training delivers is a mixture of Standard Courses ranging from 1-day computing courses to customized, off-the-shelf

Oil and Gas Training Programs of over a year's duration tailored to an Individual Organization's requirements. Courses may be attendance only, assessed against specific client needs or courses that lead to recognized National and/or International Qualifications.

#### **STRATEGIC GOALS**

- Build a Competent Workforce
- Build a Competency base Integrated System for Managing and Assessing Performance
- Provide Training to Transfer knowledge and Develop Skills

### **OUR MISSION**

Is to facilitate the community and staff members of our clients towards meeting their responsibilities and tasks. Supported by a team of highly experienced specialists and maintaining an open vision for the ever changing trends and maintaining the upmost standards, United Eastern Technical and Management Training will strive to provide an unparalleled competent workforce, permanently lowering your operating costs and contributing to meeting organizational goals.

#### **VALUES STATEMENT**

We believe in demonstrated Competence, Institutional Integrity, Personal Commitment and deep sense of Nationalism.

#### **STRATEGIC GOALS**

- Define Core Curriculum based on Competencies of market Corporate needs
- Conduct ongoing Evaluations/Assessments of Programs
- Determine delivery methods and Sources
- Offer Training/Learning Opportunities to meet Organizational Needs
- Consistently align with Operations and Project Workforce Planning Requirements
- Skills Enhancement Process (SEP) for continuous Development
- Each Individual will have a Skills Enhancement Training Plan
- On-Job Learning supported by focused Technical Training



### WHY CHOOSE UETMT?

- **UETMT** is the Number ONE choice in the provision of Competency Management Consultancy Services
- We are innovators in providing Learning Solutions to fill identified Competence Gaps

Our team of experts bring with them a breadth and depth of experience in successful and sustainable Competency Management

- We employ the best of the best thought-leaders committed to the improvement of Competency across the Oil & Gas Industry
- UETMT is offering Complete spectrum of Training and Competency Development
- Our training is designed to create an environment and experience where you can accelerate and LIVE THE LEARNING EXPERIENCE when training others.
- Our Instructors are world-class approved trainers, with extensive experience in the Middle East.
- Our international experience working with clients in various countries has spanned from individual course delivery to complete multi-year workforce nationalization programs. We understand the needs of our multi-cultural learners especially in the oil and gas context.
- By combining expert-led courses, in-class projects customized for your asset challenges, field and lab courses that provide hands-on learning experiences, industry leading software tools, and one-on-one mentoring, UETMT training blends a targeted skills-development program that aligns your team's abilities to your strategic objectives
- UETMT works with International bodies that provide access to global standards and certification. This ensures that our products and processes match global requirements and add a level of assurance to our clients, whilst enabling them to adopt standards that provide real business benefit to them and their employees. As an example:
- UETMT is an Approved Center of the Scottish Qualification Authority (SQA), a UK Governmental Organization, offering Customized Award Programs (SVQ Level) credit rated onto the Scottish Credit and Qualifications Framework (SCQF).
- UETMT is approved by the Engineering Construction Industry Training Board (ECITB), a UK organization



UETMT is ISO Certified by QSR ISO 9001: 2008- Quality Management System (QMS) ISO 14001: 2004- Environmental Management System (EMS)

OHSAS 18001: 2007- Occupational Health & Safety Management System (OHSAS)



UNITED EASTERN TECHNICAL NAGEMENT TRAINING

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