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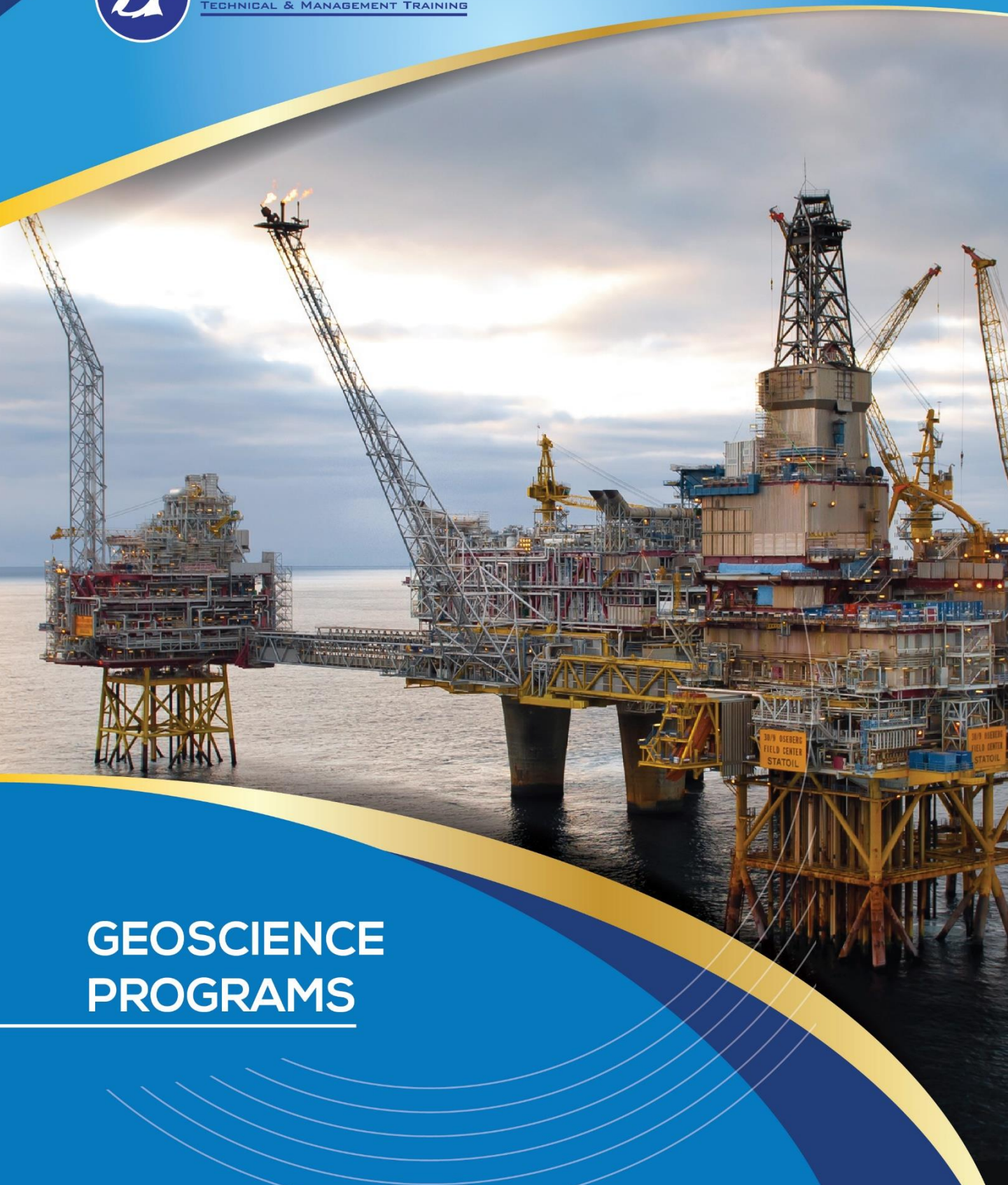

GEOSCIENCE PROGRAMS

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- A INTRODUCTORY / MULTI-DISCIPLINE
- B GEOLOGY
- C GEOPHYSICS
- D PETROPHYSICS

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'United Eastern – Reception (info@uetmc.ae)

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NO/CODE	COURSE TITLE	COURSE DURATION
UETMT-GE-A-101	Introduction to Oil & Gas (Upstream and Downstream)	10 days
UETMT-GE-A-102	Introduction to Petrophysics (Log Analysis, LWD & Wireline)	5 days
UETMT-GE-A-103	Petrophysics for non-petrophysicists	5 days
UETMT-GE-A-104	Basic of Petrophysics	5 days
UETMT-GE-A-105	Introduction to Upstream Industry	10 days
UETMT-GE-A-106	Introduction to Seismic Interpretation	5 days
UETMT-GE-A-107	Introduction to Seismic Stratigraphy: An Exploration “Workshop"	5 days
UETMT-GE-A-108	Introduction to Open Hole Log Analysis	5 days
UETMT-GE-A-109	Basic Petroleum Geology	5 days
UETMT-GE-A-110	Basic Geophysics	5 days
UETMT-GE-A-111	Basic Petroleum Technology	5 days
UETMT-GE-A-112	Basic Sequence Stratigraphy	5 days
UETMT-GE-A-113	Basic Seismic Acquisition & Processing	5 days
UETMT-GE-A-114	Basic Petrophysics & Well Log Interpretation	5 days

INTRODUCTION TO OIL & GAS (UPSTREAM AND DOWNSTREAM)

UETMT-GE-A-101

Program Duration: 10 days | Program Level: Fundamental

PROGRAM OVERVIEW

The main purpose of this General Introductory Program is to familiarize the non-specialized Staff with the Basic Knowledge of the Upstream and Downstream Functions of the Petroleum Industry. The program will describe the "Upstream" Function of the Petroleum Industry including Exploration, Drilling and Well Completion, Production and Recovery. It also discusses the "Downstream" Sector of the Industry including; Transportation, Refinery, Petrochemicals, Marketing and LNG Industry.

TARGET AUDIENCE

- Supervisory Personnel and Professional Staff in Non-Technical Disciplines
- Fresh University Graduates and Transferees joining the Petroleum Industries

TARGETED COMPETENCIES

- Fundamentals of Drilling System and Services
- Site Preparation, Construction and Drilling Environment
- Rig Selection
- Rotary Drilling
- Cementing Planning
- Hydraulics Planning and Program
- Well Control Equipment
- Well Control
- Well Completion Design and Equipment
- Completion Fluids
- Perforating

PROGRAM OBJECTIVES

- Gain an overview of Petroleum Industry and the unique conditions that characterize the different Work Environment
- The expected benefit of this program will be reflected on the way participants will perform – post the course - their jobs due to being familiar with the required awareness of the nature of this industry and to improve the team work spirit because of understanding the other colleagues work commitments.

PROGRAM CONTENT

1- The Nature, Origin and uses of Petroleum

- What is Petroleum?
- How Petroleum was formed?
- Petroleum Accumulations and Origin
- Chemical Composition of Petroleum
- History of the Use of Petroleum
- Future of the Petroleum Industry

2- Petroleum Geology

- Basics concepts of Geology
- Basic Rock Properties
- Rock Types
- How Oil or Gas is contained in Rocks?
- Petroleum Traps
- Petroleum Migration
- Seismic Method
- Geologic Mapping Method
- Exploration Well

3- Petroleum Reservoirs

- Oil Reservoirs
- Gas Reservoirs
- Gas-Condensate Reservoirs
- Reservoir Driving Mechanisms
- Reservoir Pressure Maintenance
- Reservoir Performance and Monitoring
- Reservoir Simulation
- Reservoir Fluids and Reservoir Pressure
- Improving Oil Recovery

4- Drilling and Completion

- Drilling Operations
- Directional Drilling
- Drilling Fluids
- Drilling Problems
- Rotary Drilling Rigs
- Offshore Drilling Rigs
- Offshore Drilling Platforms
- Casing Strings
- Wellhead and Surface Control Equipment

5- Production

- Well Logging
- Wire Line Operations
- Well Stimulation
- Well Productivity
- Completion Types and Methods
- Completion Equipment
- Common Subsurface Completion Equipment
- Completion Problems
- Natural Flow of Oil Wells
- Artificial Lift Methods:
  - Sucker Rod Pumping
  - Hydraulic Pumping
  - Electric Submersible Pumping
  - Gas Lift
- Oil & Gas Well Problems
- Formation Damage
- Acidizing

6- Oil & Water Handling Facilities

- Oil and Gas Separation
- Multi-stage Separators
- Separators Potential Operating Problems
- Oil Field Emulsions
- Emulsion Treating Equipment
- Water Treatment
- Oil Treatment

7- Petroleum Transportation and Storage

- Motor Transportation
- Ocean- going Tankers
- Crude Oil Pipelines
- Products Pipelines
- Modern Gas Pipelines
- Oil Measurement
- Gas Measurement

8- Crude Oil Refining

- Distillation
- Conversion
- Treatment

9- Other field Production Equipment

- Types of Meters and Principle of Operation
- Pumps
- Compressors
- Flowlines and Valves
- Improving Crude Oil Reserves

INTRODUCTION TO PETROPHYSICS (LOG ANALYSIS, LWD & WIRELINE)

UETMT-GE-A-102

Program Duration: 5 days | Program Level: Fundamental

PROGRAM OVERVIEW

Petrophysics remains a vital Component to many facets of the Petroleum Industry, from Quantification of Hydrocarbon Reserves, Developmental Strategies to real-time Decision Making for Reservoir Navigation.

This 5 days course addresses the Fundamental tenets of Petrophysics and Formation Evaluation, using Integrative Perspective of Multiple Datasets, including Geological, Geophysical, Logging and Core Data. Significant worldwide case histories are included, as well as several exercises designed to provide hands-on experience.

You will learn the latest Geological, Geophysical and Logging/Core Technologies to understand better their role in Petrophysical Analysis, Formation Evaluation, and Reservoir Characterization. Pros & Cons of key datasets will be addressed, with emphasis on need for Integrative studies and selection of tool combinations to resolve key issues. You will learn quick-look qualitative techniques as well as quantitative aspects such as volume of shale/clay, Porosity, Permeability, and Water Saturation Determinations.

TARGET AUDIENCE

This 5 day course is recommended for Geologists, Geophysicists, Log and/or Core Analysts, Exploration & Production Managers, and Reservoir Engineers.

TARGET COMPETENCIES

- Acquisition program
- Routine core analysis
- Identify mineralogy & lithology
- Porosity determination
- Zone isolation & pipe integrity

PROGRAM OBJECTIVES

- Understand better the latest Geological, Geophysical, and Logging/Core Technologies and their role in Petrophysical Analysis, Formation Evaluation, and Reservoir Characterization.
- Address the Pros and Cons of key datasets, with emphasis on need for integrative studies and Calibration of Datasets.
- Apply quick-look qualitative techniques as well as quantitative aspects to understand vital aspects such as volume of shale/clay, Porosity, Permeability, and Water Saturation Determinations.
- Select tool combinations to resolve key issues and for specific applications.
- Assess uncertainty in Petrophysical measurements and techniques and its Influence on Reserve Estimation.

PROGRAM CONTENT

Day 1: Introduction

- Discussion of the "need" for Petrophysical Analysis and Formation Evaluation, including Integrated Core and Log Analysis with Case examples, illustrating their importance to Hydrocarbon Exploration and Production.

Day 2: Rock and Fluid Properties

- Classification and Identification of Clastic and Chemical Sedimentary Rocks
- Impact of Weathering, Burial, and Lithification on Sedimentary Rocks
- Cement Types and Origin
- Porosity and Permeability
- Flow Anisotropy and Well Placement (exercise)
- Impact of grain arrangements, Matrix materials, and Fluid Types
- Water Saturation Determination (Basic Archie Analysis and Complex Modifications)
- Pressure Analysis

Day 3: Aspects of Drilling and Logging

- Mud Logging
- Core Acquisition and Interpretation
- Wireline and LWD Logging and Imaging
- Analogue Studies
- Well Correlation (exercise)

Day 4: Core and Log Analysis

- Gamma Ray Log Analysis, including Spectral GR
- Volume of Shale (Vsh) Analysis (exercise)
- Porosity Log Analysis (Density, Neutron Porosity, and Sonic)
- Lithologic Determination (exercise)
- Resistivity Log Analysis and Water Saturation
- Water Saturation (Sw) Determination (exercise)
- Clay Conductivity and Sw (exercise)
- Acoustic Log Analysis (Compressional, Shear, and Stoneley Waves)
- Porosity and Bulk Volume Hydrocarbons (exercise)

Day 5: Core and Log Analysis (continued)

- Nuclear Magnetic Resonance
- Hydrocarbon and Water Typing (exercise)
- Azimuthal (image) Log Analysis
- Dip Determination (exercise)
- Calibration of Core and Log Data

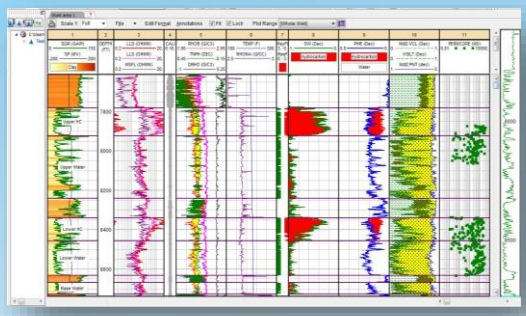
Seismic Petrophysics

- Seismic versus Log Comparison and Data Integration
- Seismic Attribute Analysis
- Bright, Dim, and Flat Spots; Amplitude versus offset/angle analysis; zero and 90-degree phase
- Attribute Analysis (exercise)
- Summary and Concluding Remarks

PETROPHYSICS FOR NON-PETROPHYSICISTS

UETMT-GE-A-103

Program Duration: 5 days | Program Level: Fundamental



PROGRAM OVERVIEW

This program will introduce you to the complex world of logs and broader subject of petrophysics. It will provide the trainee and non-petrophysicist with a practical, working knowledge of this increasingly important discipline. You will learn how to achieve company objectives cost effectively, how to avoid common mistakes during drilling, logging data acquisition and quicklook log analysis, and how to answer the basic questions which your particular discipline needs logs to answer. All theory is closely interleaved with simple exercises to clarify and consolidate the principles under discussion. No knowledge of logs or formation evaluation is required but by the end of the course you will be able to plan for basic formation evaluation data acquisition, recognize reservoir rock and net pay, estimate quicklook porosity, saturation and an approximate value for permeability, from common logs. You will feel 'familiar' with logs, the most ubiquitous reservoir data in the oil and gas industry, and be able to function effectively in your day to day work as a geoscientist. The basics of all conventional logs are covered including Nuclear Magnetic Resonance, wireline formation testers and cement bond logs.

TARGET AUDIENCE

Trainee Petrophysicists, Wireline Engineers, Wellsite Geologists, Operations Geologists, Exploration Geologists, Reservoir Geologists, Drilling Engineers, Production Engineers, Petroleum Engineers, Reservoir Engineers, G&G Technical Assistants, Geophysicists, Core Analysts. Anyone involved in the acquisition, quick look interpretation, review or use of formation evaluation data.

TARGET COMPETENCIES

- Open Hole Logs
- Drilling and Mud Systems
- Formation Evaluation
- Reservoir Simulation

PROGRAM OBJECTIVES

- A practical, working familiarity with common open hole logs
- For each major logging tool it's:
- Operating principle
- Role in oil company operations
- Common problems and quality control, and
- Quick look interpretation
- The Do's and Don'ts of drilling and mud systems to acquire good data
- Design cost effective logging runs for general and specific purposes
- Simply and reliably qualitatively interpret a set of typical logs for reservoir quality, fluid contacts and net pay
- To simply and reliably quantitatively interpret of a set of typical logs for quick look porosity, saturation, reservoir rock and netpay
- To use simple crossplots, the Archie Equation and Pickett Plots
- Why mudlogs and core are useful and briefly, how they are used with logs
- How to quickly asses if log data and petrophysical results are 'fit for purpose'

This program has an excess of material from numerous wells. It includes numerous 'real world' useful tips and a practical reference manual to work from after the program.

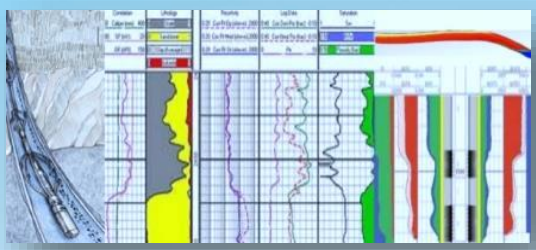
PROGRAM CONTENT

- Why logs and formation evaluation are important
- A concise and practical introduction to each tool
- Recommended mud characteristics and logging suites for 3 common situations
- Use of simple, reliable clues to interpret the essential features of a well
- Use of cross plots and established quantitative quick look methods
- When to be cautious with logs and how to avoid common pitfalls during quick look analysis
- How to use mudlogs and core to check and consolidate quick look log analysis
- How to apply simple checklists to logs and petrophysical results before their use in reserves or reservoir simulation (the geological model)
- Evaluation spreadsheet templates and Key Equations List
- Daily morning Recap and Questions session
- Final Course Recap and Key Recommendations
- Live PC examples using TerraSciences or Geology software
- Micropracticals, Morning and Afternoon Workshops, Experience and Debate

BASIC OF PETROPHYSICS

UETMT-GE-A-104

Program Duration: 5 days | Program Level: Fundamental



PROGRAM OVERVIEW

Petrophysics is Fundamental to understanding the Properties of Oil and Gas Fields. It lies at the center of all subsurface activities: Whether in the context of Open-hole Operations on new Drill Wells, Cased-hole Operations on producing wells or in integrated team building Reservoir Models for Asset Evaluation, Field Development or Reservoir Management.

In this program emphasis will be placed on the Integration of all available data, Understanding the context in which the data are acquired and selection of appropriate methods and Parameters. Common Pitfalls encountered in the Interpretation Process, and their Consequences, will be identified. Interpretation exercises are an important element of the course.

TARGET AUDIENCE

Reservoir Engineers, Geoscientists, Petrophysicists and others involved in the Oil and Gas Subsurface Management life cycle, with some experience in Formation Evaluation, who wish to broaden their practical knowledge and understanding of Petrophysical Data Acquisition, Quality Control and Interpretation.

TARGET COMPETENCIES

- Logging and Other Data Acquisition
- Log Interpretation
- Formation Evaluation Workflow
- Water Saturation
- Fluid Contacts Log Derived
- Formation Pressure Data

PROGRAM OBJECTIVES

- The role of Petrophysics
- Definitions of the main Petrophysical Parameters Capillarity, Fluid Distribution, Free Water level and Fluid Contacts.
- Logging tool Measurement Principles and the effect of the Borehole Environment
- Log Data Quality Assurance
- Quick-look Log Interpretation
- Data Preparation, Database Construction and Environmental Corrections
- Deterministic Petrophysical Interpretation in clean and Shaly Sands
- Deterministic Interpretation in Carbonates
- Reporting and Delivering results to other disciplines
- Introduction to Formation Evaluation
- Petrophysics definition and Contribution the Nature and Origin of Reservoir Rocks
- Main Petrophysical Parameters:
- Porosity, Permeability, Water Saturation, Effect of Clays and definition of total and effective Porosity, Capillary Distribution of Fluids; Free Water level and Fluid Contacts and net pay.
- Petrophysical Interpretation Process overview

PROGRAM CONTENT

Logging and other Data Acquisition

- Methods of Data Acquisition and Depth Measurement Wire-line Logging Tools; Evolution, Physical Principles, Responses, Applications, Resolution Logging while Drilling (LWD) Tools, Additional data type's Mud Log Data, Core Data, and Routine special Formation Testing Tools

Log Quality Assurance and Quick-look Log Interpretation

- Depth Control and tie-in Log Response QC Environmental Corrections
- Quick –look Interpretation Log Consistency Checks
- Lithology recognition Reservoir/Non-reservoir Discrimination
- Recognizing Fluid Types and Contacts
- Porosity Estimation
- Estimating Formation Water Resistivity
- Water Saturation Estimation
- Net and Pay Picks

Logging and other Data Acquisition

- Formation Evaluation Workflow
- Data Preparation and Database
- Shale or Clay Volume
- Lithology Recognition
- Total and Effective Porosity
- Water Saturation in Clean Sands
- Water Saturation in shaly sands effect of clay
- When to use Shaly sand methods
- Fluid contacts Log derived
- Using formation Pressure data
- Permeability Prediction
- Net and pay Determination
- Validation of Models
- Data display and Reporting
- Petrophysical Deliverables
- Differences compared with Clastics
- Recognition of Lithology Limestone/Dolomite Anhydrite/Salt
- Total and effective Porosity
- Water Saturation relationship of Parameters to Porosity Type
- Porosity Permeability Relationships effect of Pore Structure
- Rock Typing

INTRODUCTION TO UPSTREAM INDUSTRY

UETMT-GE-A-105

Program Duration: 10 days | Program Level: Fundamental

PROGRAM OBJECTIVES

To familiarize non-petroleum technical personnel of the broad, diverse technological and operational aspects of petroleum engineering in the upstream oil and gas industry.

TARGET AUDIENCE

- The non-petroleum engineers, technicians in oil and gas related areas, accountants, and support personnel working in the operation and engineering divisions.
- Attendees when will have completed the course will possess general knowledge of the oil and gas industry, its importance as a strategic commodity, the complexity of its operations and the diversity of operations and technique used. Such knowledge and appreciation will improve their vision of how they do their jobs.
- Assessment of learning is planned for each section of the course.

TARGET COMPETENCIES

- Seismic Process
- 2-D and 3-D Interpretation Techniques
- Geologic Model
- Subsurface Stratigraphy
- Structural Styles from Seismic Data

PROGRAM CONTENT

Overview of Oil and Gas Resources and Industry

Basic Review of Petroleum Geology

- The Geologic Column
- Petroleum Traps
- Origin of Petroleum, Migration and Accumulation

Oil Well Drilling Technology

- The Rig: Basic Functions and Components
- The Drilling Fluids: Functions, Types and Compositions
- Well Design: A Descriptive Review
- Fundamental Drilling Operations and problems

Well Completion and Workover Operations

- Completion Types
- Completion Equipment
- Basics of Acidizing and Hydraulic Fracturing
- Sand Control

Production Engineering and Operations

- Surface Production Facilities
- Pipelines and Gathering Systems
- Separation and Treatment of Oil, Gas and Water
- Artificial lift Systems
- Storage Systems and Tank Forms

Reservoir Engineering

- Definitions of reserves
- Reservoir Drive Mechanisms
- Primary Recovery
- Enhanced Recovery Methods

Oilfield Safety

Environmental Aspects

INTRODUCTION TO SEISMIC INTERPRETATION

UETMT-GE-A-106

Program Duration: 5 days | Program Level: Fundamental

PROGRAM OVERVIEW

Can I observe the Reservoir on Seismic? How large is the Reservoir? Did the Well cut a Fault? Can Seismic help me tie a set of Wells? What kind of a Structural Trap did I drill into? Is the Structure valid or a Seismic Artifact? Are these reflections Real or Multiples? How can I combine Structural and Stratigraphic Interpretations to develop a Structural and Depositional History? How does Seismic Data Acquisition and Processing impact my Interpretation? Will my Well Encounter Hazards such as Abnormal Pressure or Shallow Gas?

In this 5-day in-depth program, the participant learns to answer these and related questions by gaining an understanding of the Seismic System, its Limitations and Pitfalls, and by Interpreting 2-D and 3-D Seismic Examples of Structural and Stratigraphic Features associated with actively Producing Hydrocarbon Areas.

TARGET AUDIENCE

Geologists, Geophysicists, and Engineers who want to use Seismic Data for Petroleum Exploration and/or Production – Familiarity with Geological Terminology will be helpful

TARGET COMPETENCIES

- Seismic Process
- Seismic Sections Interpretations
- Geologic Model
- Subsurface Stratigraphy

PROGRAM OBJECTIVES

By the end of this course, participants will learn to

- Understand the Seismic Process
- Interpret Seismic Sections
- Develop a Geologic Model
- Prepare Maps
- How to relate the Subsurface Stratigraphy to Well Data
- Identify different Structural Styles from Seismic Data
- How to create a basic Stratigraphic Framework using Seismic Stratigraphy

PROGRAM CONTENT

- Basics: Geological Controls on the Propagation, Reflection, and Refraction of Seismic Waves
- Data Acquisition and Processing with emphasis on its potential impact on Interpretation
- 2-D and 3-D Interpretation Techniques
- Seismic Interpretation of different Structural Styles: Extensional, Compressional, Strike-slip, Inverted, Salt and Gravity Dominated Basins
- Seismic Velocities
- Sequence Stratigraphy and Seismic Facies Analysis
- Acoustic Impedance
- DHIS
- AVO

INTRODUCTION TO SEISMIC STRATIGRAPHY: AN EXPLORATION "WORKSHOP"

UETMT-GE-A-107

Program Duration: 5 days | Program Level: Fundamental

PROGRAM OVERVIEW

One of the most revolutionary, most effective, yet most under-utilized tools introduced into exploration this century is that of seismic stratigraphy. It is not a tool exclusive to geophysicists; nor is it a tool only for geologists. Seismic stratigraphic techniques are based upon an integration of firm, well-established geological and geophysical fundamentals. When properly applied, seismic stratigraphy provides a powerful foundation for geohistory analysis, helping describe a basin's evolution and the resulting effects upon its spatial and temporal variation in hydrocarbon potential. Seismic stratigraphy chronostratigraphically constrains both the sedimentological and fault-mechanical stratigraphy of a basin. Furthermore, it can provide a predictive model extrapolated beyond the borehole as to aspects of the quality of potential reservoirs and seals, their sedimentary environments of deposition, and in some cases, even their paragenesis. In this rigorous workshop, participants will learn how to apply the basic theory and methods of seismic stratigraphic analysis to seismic profiles representing a variety of rock types, structural styles, and tectonic settings worldwide. Areas for the projects include borehole-constrained seismic data drawn from such regions as the Alaska North Slope, Gulf of Mexico, Red Sea, Southeast Asia, South America and Western Africa.

TARGET AUDIENCE

Geophysicists, Geologists, Explorationists, and Managers who are interested in an introduction or review of the Theory and Application of Contemporary Seismic Stratigraphic Techniques to Exploration

TARGET COMPETENCIES

- Reservoir Rocks
- Seismic Stratigraphy
- Hydrocarbon Zones
- Gamma Rays, Spectral Gamma-rays
- Photoelectric effect
- Porosity Measurement

PROGRAM OBJECTIVES

- Utilize Seismic Stratigraphic methods to determine Seismic Facies
- Build Geohistory Analyses of Exploration Basins
- Predict Potential Reservoirs and Seals

PROGRAM CONTENT

- Historical development
- Review of geophysical fundamentals
- Direct hydrocarbon indicators
- Sequence analysis
- Chronostratigraphic charts
- Sea level curve construction
- Seismic facies analysis
- Seismic characterization of carbonates
- Seismic classification of deltas
- Seismic characterization of turbidities
- Recognition of high stand and low stand system tracts
- Mechanical (structural) stratigraphy
- Geohistory analysis

INTRODUCTION TO OPEN HOLE LOG ANALYSIS

UETMT-GE-A-108

Program Duration: 5 days | Program Level: Fundamental

PROGRAM OVERVIEW

This course is ideal for anyone who has no prior knowledge or experience, especially newcomers to the Oil Industry. Within one week you will gain all the Confidence you need to understand and interpret all the basic open-hole Logs.

TARGET AUDIENCE

Geologists, Geophysicists, Petroleum Engineers, Petrophysicists, Technicians - even managers, if they are exposed to (or use) open-hole Logs in their daily work.

TARGET COMPETENCIES

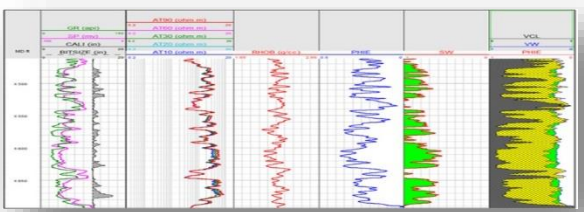
- Rock Types
- Hydrocarbon Zones
- Porosity and Water Saturations

PROGRAM OBJECTIVES

Even if you have never seen a Log before, at the end of this course you will be able to recognize all the Basic Logs, know what they are measuring and how to read them, recognize all the common Rock Types, identify Hydrocarbon Zones, calculate Porosity and Water Saturations, and even have confidence in your choice of Interpretation Parameters.

PROGRAM CONTENT

- How to identify Reservoir Rocks
- Invasion Profile
- Why the SP is important, and how to use it
- Identifying Hydrocarbon zones from Resistivity Logs
- How the Basic Logging tools work, and what they measure
- The common Rock Types, and how to identify them
- How to use Gamma Rays, Spectral Gamma-rays and the Photoelectric effect
- What Porosity is and how the different kinds of Porosity are measured
- Archie's equation - where it comes from, what it means, and how to use it to calculate Water Saturation
- How to handle Shaly Zones
- Quick-look and reconnaissance Interpretation methods
- Cross-plot Techniques and some useful short-cuts



BASIC PETROLEUM GEOLOGY

UETMT-GE-A-109

Program Duration: 5 days | Program Level: Fundamental

PROGRAM OVERVIEW

Basic Petroleum Geology applies Geological Principles to Petroleum Geology, covering Structural Geology, Depositional Environments, and the Origin, Migration, and accumulation of Petroleum. The Geological requirements of a wide variety of disciplines in the Petroleum Industry are satisfied without requiring a Technical background. Participants will be able to gain perspective about the value of Geological reasoning and its relationship to their job/role.

TARGET AUDIENCE

Petroleum Industry Personnel in need of basic Geological Training, including Production, Drilling, and Geophysical Personnel, planners, Economists, Administrators, and Technicians

TARGET COMPETENCIES

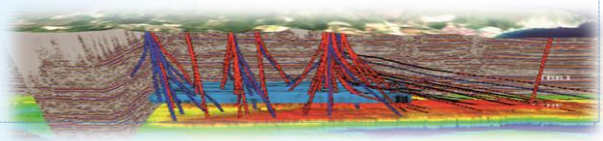
- Basin Modelling
- Basin Analysis
- Stratigraphy
- Sedimentary Petrology and Sedimentology
- Structural Geology

PROGRAM OBJECTIVES

- Fundamentals of Rock Formation and Deformation, the essentials of Sedimentary Environments, and How Petroleum Migrates and Accumulates
- How Rock Characteristics are related to Modern Geological Processes
- About Plate Tectonics and Petroleum
- How Geology affects Engineering Practices
- Elements of Geophysics and Exploration
- About Petroleum Source and Reservoir Rocks
- About Depositional Environments and Porosity and Permeability Distribution
- How to recognize Depositional Environments on Electric Logs, Correlate Electric Logs, and make contour maps and cross sections
- About Geological time and history

PROGRAM CONTENT

- Minerals and Rocks
- Earth Structure
- Plate Tectonics
- Geological Times
- Weathering, Erosion and Deposition
- Depositional Basins and Petroleum
- Diagenesis
- Reservoirs
- Structural Geology and Petroleum
- Origin, Migration, and Accumulation of Petroleum



BASIC GEOPHYSICS

UETMT-GE-A-110

Program Duration: 5 days | Program Level: Fundamental

PROGRAM OVERVIEW

The course is designed to familiarize anyone using seismic data with the nature of the data and what it exactly represents. One of the key goals of the course is to explain the large and confusing amount of "jargon" that is used by the Geophysical community when they use seismic data as a communication vehicle.

The program is supplemented by a large number of case histories that graphically illustrate the principles in the course material. These are updated with every course presentation to keep up with the rapidly developing technology in this field. The course participants are given a data disk with several executable programs for parameter calculation and seismic modeling. The data disk also contains all of the course slides and exercises.

TARGET AUDIENCE

Geoscientists, Engineers, Team Leaders, Geoscience Technicians, Asset Managers, and anyone involved in using seismic data that needs to understand and use this data as a communication vehicle.

TARGET COMPETENCIES

- Seismic Data
- Subsurface Rock Parameters
- Lithology
- Pore Filling

PROGRAM OBJECTIVES

- Understand how seismic data represents subsurface rock parameters including the relative structure, lithology, and pore filling material
- Gain a knowledge of how seismic data is acquired and processed to produce a three dimensional seismic image
- Understand the limits of vertical and horizontal resolution inherent in the seismic data
- How seismic data is used to define reservoir parameters and how it relates to reservoir development; this includes a detailed discussion of AVO and other seismic attributes
- Understand the various approaches to seismic imaging and how the velocity model relates to this image
- How new technology including seismic inversion have helped us to define rock properties including pore filling material, pore pressure, water saturation, and fracture orientation
- Value the recent focus on developments such as time lapse seismic surveys for reservoir monitoring purposes

PROGRAM CONTENT

- The nature of seismic data
- What is propagating?
- What causes seismic reflections and how they relate to rock properties including pore filling material
- The wavelet in the seismic data and its limit of resolution
- Seismic velocities as they relate to rock properties and the imaging process
- The relationship between seismic velocities and pore pressure
- Pore pressure prediction
- Seismic data processing and seismic migration
- Prestack, poststack, time and depth imaging
- Direct hydrocarbon indicators and AVO
- Seismic inversion for rock and fluid properties
- Seismic attributes
- Time lapse reservoir monitoring
- Recent developments in seismic acquisition, processing, and interpretation

BASIC PETROLEUM TECHNOLOGY

UETMT-GE-A-111

Program Duration: 5 days | Program Level: Fundamental

PROGRAM OVERVIEW

Basic Petroleum Technology in its five-day format, is designed for non-technical personnel and managers, and presents a practical understanding of the Petroleum Industry in an interesting, effective, and efficient manner. Included are the basics of the industry from terminology through basic technology and from geology through processing of the petroleum product. Offshore operations are also considered.

The program emphasis "understands" the technology. Participants are placed in the position of Reservoir Engineer, and "Our Reservoir" is defined, analyzed and put in production. Next, drill sites are chosen. Participants are then placed in the position of Drilling/Completion Engineer, and the drilling/completion program for "Our Well" is analyzed. Participation results in greater job confidence, enthusiasm and productivity.

TARGET AUDIENCE

Secretarial, administrative, management, field support, accountants, purchasing, economics, legal, finance, human resources, drafting, land and data processing personnel, as well as investors and royalty owners

TARGET COMPETENCIES

- Basic Geology
- Reservoir Fluid
- Rock Properties
- Basics of Seismic Technology

PROGRAM OBJECTIVES

- Basic Geology as related to Oil and Gas Reservoirs
- Reservoir Fluid and Rock Properties
- Basics of Seismic Technology
- Reservoir definition and development; production and recovery
- Fundamentals of Drilling, well completions and Production Operations
- Basic concepts of primary and enhanced recovery operations
- Surface Operations
- Terminology of Exploration and Production

PROGRAM CONTENT

- Reservoir Fluid Properties
- Petroleum Geology
- The Petroleum Reservoir
- Exploration Technology
- Drilling Technology
- Well Completion and Workover
- Production Operations
- Recovery
- Surface Processing
- Offshore Operations

BASIC SEQUENCE STRATIGRAPHY

UETMT-GE-A-112

Program Duration: 5 days | Program Level: Fundamental

PROGRAM OVERVIEW

Sequence Stratigraphy, based on Sedimentary Response to changes in relative Sea Level gives the Explorationist and the Development Geoscientist a powerful new predictive tool for regional Basin Analysis, Shelf to Basin Correlation and Reservoir Heterogeneity. Perhaps most importantly, Sequence Stratigraphy gives the Geoscientist a Superior Framework for the Integration of Geologic, Geophysical and Engineering Data and Expertise.

We will develop the basic concepts of Sequence Stratigraphy such as the Integration of Eustasy and Tectonic Subsidence which gives rise to the Basic Cycle Hierarchy that can be observed in the Geologic Record. Using these basic concepts we will build a general Predictive Stratigraphic Model Emphasizing the Petroleum System and particularly stressing Shelf to Basin Correlation.

The particular strength of this program is the application of these Basic Principles to Actual Subsurface Data sets gathered into a series of well-founded exercises. In recent Programs the Data sets included Miocene Delta Complexes in Venezuela Cretaceous incised valleys in the US, Paleozoic mixed Carbonate Clastic basin floor fans and low stand Prograding complexes in the US and Jurassic basin floor and slope fans in France.

TARGET COMPETENCIES

- Stratigraphic Sequences
- Seismic Reflection Geometries
- Basin Architecture

TARGET AUDIENCE

Geologists, Geophysicists, Biostratigraphers and Engineers involved in Exploration or Reservoir Characterization

PROGRAM OBJECTIVES

By the end of this program, the participants will be able to:

- Identify Stratigraphic Sequences
- Interpret Seismic Reflection Geometries
- Relate Sequence Stratigraphy to Basin Architecture, Relative Sea Levels and History
- Build Predictive Stratigraphic Model

PROGRAM CONTENT

- Historical Framework
- Seismic Geometries
- Unconformities
- Relative sea Level changes-Unconformities- Eustacy
- Parasequences and their Stacking Patterns
- Parasequences as a Correlation Tool
- Relationship of Stratigraphic patterns to changes in subsidence rates as driven by regional and earth scale Tectonic Processes
- Cycle Hierarchy
- World-wide Cycle Chart and its Application
- The Sequence Stratigraphic Model
- LST Sequence Boundaries, Diagenesis related to unconformities, incised valleys, Slope fans, basin Floor Fans and Prograding Complexes Illustrated by slide Presentation and Individual exercises
- TST incised valley fill, two phase Sedimentation Pattern, Source Rock and Reservoir Seal illustrated by slide Presentation and individual exercises
- HST alluvial, deltaic, shoreline complexes and shelf sands illustrated by slide presentation and individual exercises
- Exploration and Production Scaled Case Histories
- Exploration/Production Strategies

NO/CODE	COURSE TITLE	COURSE DURATION
UETMT-GEO-B-101	Introduction to Geology, Formation Pressures and Well Pressure Control	5 days
UETMT-GEO-B-102	Operations Geology	5 days
UETMT-GEO-B-103	Petroleum Geology	5 days
UETMT-GEO-B-104	Advanced applied Petroleum Geology	5 days
UETMT-GEO-B-105	Development Geology	5 days
UETMT-GEO-B-106	Operations Geology and Petrophysics	5 days
UETMT-GEO-B-107	Petroleum Exploration Opportunities and Risk Analysis	5 days
UETMT-GEO-B-108	Petroleum Geology of North Africa	5 days
UETMT-GEO-B-109	Structural Geology	5 days
UETMT-GEO-B-110	Extensional Structural Styles	5 days
UETMT-GEO-B-111	Structural Geology in Petroleum Exploration and Development	7 days
UETMT-GEO-B-112	Compressional Structural Styles	5 days
UETMT-GEO-B-113	Structural Styles in Petroleum Exploration	5 days
UETMT-GEO-B-114	Structural Restoration, Balancing and Prediction	5 days
UETMT-GEO-B-115	Structural Modeling: Tool for Evaluating Hydrocarbon Entrapment Capacity	5 days
UETMT-GEO-B-116	Subsurface Mapping	5 days
UETMT-GEO-B-117	Production Geology for other Disciplines	5 days
UETMT-GEO-B-118	Prospect and Play Assessment	5 days
UETMT-GEO-B-119	Prospect Evaluation, Risk & Volume Assessment	5 days
UETMT-GEO-B-120	Prospect Evaluation, Play Assessment Analysis Fault Sealing Analysis & Uncertainty Analysis	5 days

NO/CODE	COURSE TITLE	COURSE DURATION
UETMT-GEO-B-121	Fault Seal Analysis	7 days
UETMT-GEO-B-122	New Techniques in Structural Geology	5 days
UETMT-GEO-B-123	Sequence Stratigraphy	5 days
UETMT-GEO-B-124	Sequence Stratigraphy: (An Applied Workshop)	5 days
UETMT-GEO-B-125	Depositional Systems and Sequence Stratigraphy	5 days
UETMT-GEO-B-126	Petroleum Geochemical: Tools for Effective Exploration & Development	5 days
UETMT-GEO-B-127	Geochemical Techniques for Solving Reservoir Management and field Development Problems	5 days
UETMT-GEO-B-128	Advanced Petroleum Geochemistry	5 days
UETMT-GEO-B-129	Sedimentary Basins and Petroleum Geology of the Middle East	10 days
UETMT-GEO-B-130	Sedimentation in Non-marine Settings	5 days
UETMT-GEO-B-131	Clastic Sedimentology for Exploration	5 days
UETMT-GEO-B-132	Clastic Exploration and Reservoir Sedimentology	5 days
UETMT-GEO-B-133	Applied Sedimentology for Hydrocarbon Exploration and Exploitation	5 days
UETMT-GEO-B-134	3D Reservoir Modeling using Petrel Software (Intermediate)	7 days
UETMT-GEO-B-135	3D Reservoir Modeling using Petrel Software (Advanced)	15 days
UETMT-GEO-B-136	Petroleum Systems Modelling for Exploration Risk Assessments	5 days
UETMT-GEO-B-137	Probabilistic Modeling of Petroleum Reservoirs	5 days
UETMT-GEO-B-138	Clastic, Carbonate Reservoirs & Reservoir Characterization using Data Integration	5 days
UETMT-GEO-B-139	Fractured Reservoir Development	5 days
UETMT-GEO-B-140	Stratigraphic Reservoir Characterization For Petroleum Geologists, Geophysicists, and Engineers	10 days
UETMT-GEO-B-141	Naturally Fractured Reservoirs: Geologic and Engineering Analysis	5 days
UETMT-GEO-B-142	Quantitative Modelling and its Application to Stratigraphic Interpretation and Seismic Reservoir Assessment	5 days

INTRODUCTION TO GEOLOGY, FORMATION PRESSURES AND WELL PRESSURE CONTROL

UETMT-GEO-B-101

Program Duration: 5 days | Program Level: Fundamental

PROGRAM OBJECTIVES

Upon completing this 5-day course, participants will be able to:

- Understand rig mathematics and perform basic calculations.
- Define the components of formation pressure (Pore, Fracture and Overburden) and understand how they relate to one another.
- Understand and apply methods for predicting and measuring subsurface pressures.
- Plan and calculate the well pressure profile for a given lithological column.
- Define hydrostatic head.
- Recognize the causes and warning signs of kicks.
- Describe the common well control methods (Driller's and Engineer's) based on the Constant Bottomhole Pressure Concept. Perform pressure gradient calculations.
- Explain and be able to record shut-in pressures and implement initial shut-in procedures.
- Describe well control via simulation.

TARGET AUDIENCE

- Operations Geologist, Drilling Engineers with up to two years' working experience in Drilling Engineering/Operations.

TARGET COMPETENCIES

- Formation Pressure
- Subsurface Pressures
- Hydrostatic Head
- Well Control Methods

PROGRAM CONTENT

The program content will consist of **Lectures and Discussions**, along with **Workshops** that combine class exercises to illustrate the practical applications of the subject matter.

Day 1: Rig Mathematics

- Terms and definitions
- Review of basic mathematical operations
- Measurements and systems of units
- Tank volumes and capacities
- Pipe volumes and capacities
- Mud weight and volume calculations
- Pressure and temperature measurements and calculations
- Pressure gradients and specific gravities
- Pump output and displacement

Components of Formation Pressure

- Pore pressure
- Overburden pressure
- Fracture pressure
- Relationships among pressure components
- Significance of formation pressure in well planning, construction and operations

Day 2: Pore Pressure Prediction

- Description
- Prediction methods (pre-drilling)
- Prediction methods (during and after drilling)
- Measurement
- Origins of abnormal pore pressure
- Examples of abnormal pore pressure environments
- Prediction of abnormal pore pressure
- Underpressured environments
- Determination of pore pressure profile

Fracture Gradient Determination

- Description
- Prediction methods
- Measurement
- Determination of fracture pressure profile

Day 3: Wellbore Pressure

- Hydrostatic head
- Differential pressure
- Overbalance and under-balance
- Effects of circulation and pipe movement
- Determination of mud weight profile

Well Control Objectives

- Primary, secondary and tertiary well control
- Occurrences and examples of well control situations
- Elements and objectives of a well control program

Day 4: Causes of Kicks

- Insufficient Mud Weight
- Improper hole fill-up
- Surge and Swab effects
- Wellbore Fluid level Drop

Kick Prevention Guidelines

- Well Planning Considerations
- Recommended Drilling Practices
- Pre-recorded Well Data
- BOP Testing
- Other Precautionary Measures

Kick Detection

- Primary Indicators
- Secondary Indicators
- Applications and Limitations

Day 5: Initial Shut-in Procedures

- During Drilling
- During Tripping
- Diverter Procedures
- Information to be recorded at shut-in

Well Control Methods

- Constant bottomhole pressure (BHP) concept
- Kill mud weight and volume calculations
- One-circulation (Engineer's) method
- Two-circulation (Driller's) method

Well Control via Simulation

- Special Problems in Well Control
- Role of Simulation in Well Control
- Examples of Simulation Applications

OPERATIONS GEOLOGY

UETMT-GEO-B-102

Program Duration: 5 days | Program Level: Intermediate

PROGRAM OVERVIEW

At the end of the integrated course participants will be able to contribute effectively to the preparation of planned wells and their concurrent operations during the exploration, appraisal and development phase. As geoscientists, petroleum engineers, well engineers and production technologists are increasingly assembled in asset, project or operational teams they must not only understand each other in technical matters, but should also contribute to each other's efforts in these aspects: a driller should know why it is important to cut a core or log a particular interval despite potential drilling problems and geoscientists should understand drilling operations and their inherent hazards and problems. All should be able to understand and prepare daily drilling reports with a full appreciation of the various subjects. Cuttings, cores, logs and well tests should be analyzed, cross-correlated and compiled to mesh with prognoses and existing data to effectively manage the impact on the field development plan. Correct procedures in tendering and contracting should be followed to minimize the duration of the operations and to maximize the quality of the operations services provided. Understanding of all operations should greatly improve the effectiveness of the Operations Geologist.

TARGET AUDIENCE

- Operations Geologist, Drilling Eng.
- All Geoscientists, Petroleum Engineers, Well Engineers and Technical Personnel who in the course of their career will attend or direct subsurface and Wellsite operations

TARGET COMPETENCIES

- Drilling Operations
- Geological Drilling Hazards
- Drilling Cuttings and Cores
- Field Development Plan

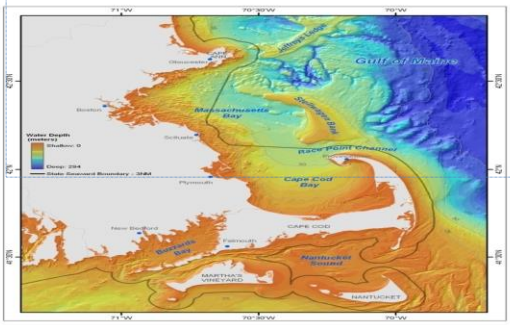
PROGRAM OBJECTIVES

- Plan and prepare for a drilling location
- Plan and prepare for geological services
- Identify drilling Operations
- Identify geological drilling Hazards
- Understand and apply logging services
- Understand well testing services
- Evaluate drilling reports
- Describe drilling cuttings and cores
- Evaluate the impact on the field development plan
- Prepare and compile operations reports

PROGRAM CONTENT

- Petroleum geology and its systems
- Operations geology: prospect to well planning, provision of geological services
- Wellsite geology: geological sampling, sample analysis and well stratigraphy, cutting & core description
- Structural geology: fractures, faults, borehole geology
- Drilling Operations: bits, fluids, casing & cement, drilling problems & well control, directional Drilling, Geosteering
- Logging operations: acquisition, tools, quick look interpretation, MWD/LWD, geosteering
- Well testing & fluids: reservoir properties, rock & fluid interaction, permeability, averaging, data gathering & interpretation
- Impact on FDP: case histories
- Tendering & contracting
- Reporting: geological data, petrophysical data, pressure data
- Exercises: cores, cuttings, quick look, pressures, daily drilling report

- **Note: A basic knowledge of geology and/or petroleum geology is advisable if not required to fully appreciate the course contents**



PETROLEUM GEOLOGY

UETMT-GEO-B-103

Program Duration: 5 days | Program Level: Intermediate

PROGRAM OVERVIEW

Petroleum Geology applies Geological Principles to Petroleum Geology, covering Structural Geology, Depositional Environments, and the Origin, Migration, and Accumulation of Petroleum. The Geological requirements of a wide variety of disciplines in the Petroleum Industry are satisfied without requiring a Technical background. Participants will be able to gain perspective about the value of Geological reasoning and its relationship to their job/role.

Petroleum Geology program explains the application of Geological Principles to Petroleum Geology. Emphasis is on depositional Environments, Structural Geology, the Origin, Migration, Accumulation of Petroleum, and related Geological Processes.

TARGET AUDIENCE

- Petroleum Systems, Reservoir & Exploration Geologist
- Petroleum Industry Personnel in need of Geological Training, including Production, Drilling, and Geophysical Personnel, Accountants, Planners, Economists, and Technicians

TARGET COMPETENCIES

- Petroleum Geology
- Basin Modelling
- Basin Analysis
- Stratigraphy
- Sedimentary Petrology and Sedimentology
- Structural Geology

PROGRAM OBJECTIVES

By the end of this program, participants will be able to know:

- Fundamentals of Rock Formation and Deformation
- The essentials of Sedimentary Environments
- How Rock Characteristics are related to Modern Geological Processes
- About Plate Tectonics and Petroleum
- How Geology affects Engineering Practices
- Elements of Geophysics and Exploration
- About Petroleum source and Reservoir Rocks
- About Depositional Environments and Porosity and Permeability Distribution
- How to recognize Depositional Environments on Electric Logs, Correlate Electric Logs, and make Contour Maps and Cross Sections
- About Geological time and History

PROGRAM CONTENT

- Introduction to the Earth
- The Formation of Oil/Hydrocarbon
- Different Types of Source Rock
- Maturity & Migration into Reservoir
- Secondary Migration
- Petroleum Play
- Concept of Source, Trap, Seal and Timing Minerals and Rocks
- Earth Structure
- Plate Tectonics
- Geological Times
- Weathering, Erosion and Deposition
- Depositional Basins and Petroleum
- Diagenesis
- Reservoirs
- Structural Geology and Petroleum
- Origin, Migration, and Accumulation of Petroleum
- Trapping Mechanism
- Concept of Source, Trap. Seal and Timing

ADVANCED APPLIED PETROLEUM GEOLOGY

UETMT-GEO-B-104

Program Duration: 5 days | Program Level: Advanced

PROGRAM OBJECTIVES

Reviews the fundamental elements of Petroleum Geology. It starts by placing hydrocarbons in a global context; the philosophy and structure of the Oil Industry; Energy trends; future resources. The Petroleum Environment is then reviewed: Source Rocks, Reservoirs, Traps, Seals and the timing of generation relative to trap formation. The course then examines the subsurface environments, subsurface temperature and pressure and the impact on petroleum systems.

The usage and display of subsurface geological data, and an introduction to seismic and wireline logs. This is then developed into a definition of petroleum systems and an introduction to play fairway definition and finally leads / prospects.

TARGET AUDIENCE

- Exploration Geologists & Geochemist
- Drilling and Petroleum Engineers, Directional Drillers, Mud Engineers, Bit Design and Application Engineers.

TARGET COMPETENCIES

- Petroleum Geology
- Source Rocks
- Reservoirs
- Traps
- Seals

PROGRAM CONTENT

Introduction to Geology

- Structure and Composition of the earth
- The Time Scale, Stratigraphy and Fossils
- Geological Processes
- Basic Rock Types and Classifications
- Folding and Faulting

Sedimentary Rocks

- Classification Schemes
- Clastics
- Carbonates
- Chemical Rocks
- Surface Processes
- Environments of Deposition
- Depositional Features
- Sedimentary Structures

Petroleum Geology

- Origins of Hydrocarbons
- Migration and Traps

Sedimentary Petrology

- Mud Rocks
- Clastic Rocks
- Carbonates
- Chemical Rocks

Wellsite Description and Analysis

- Sample Collection and Processing
- Drill Cuttings/Oil Show Evaluation

Case Study

- Lithological Evaluation
- Oil show evaluation/Reservoir Plays
- Drilling Problems

DEVELOPMENT GEOLOGY

UETMT-GEO-B-105

Program Duration: 5 days Program Level: Intermediate

PROGRAM OVERVIEW

Knowledge of the controls on Reservoir pore space distribution is critical in the appraisal, development, and efficient management of reservoirs. Participants will learn, through hands-on exercises, how to compile a development plan for a field which emphasizes optimal recovery. The construction of cross-sections and maps for estimating hydrocarbons-in-place are shown to play a pivotal role in production efficiency.

Emphasis is placed on the selection of samples for core analysis and on how to distinguish reservoir and non-reservoir rocks. Structural style and facies concepts are used to locate drill sites and describe reservoirs. Ingredients needed for geologic reservoir models will be reviewed. Participants learn to recognize the need to modify development plans and implement activities for correction of deficiencies. Each session is custom tailored for the region in which the session is presented.

TARGET AUDIENCE

- Reservoir, Development and Exploration Geologists; Geophysicists; Trophysicists; Log Analysts; Petroleum Engineers; and Technicians

TARGET COMPETENCIES

- Reservoir Pore Space Distribution
- Reservoir Optimal Recovery
- Core Analysis
- Structural Style and Facies

PROGRAM OBJECTIVES

- Select optimum Drillsites for Field Development
- Select and use logs and core samples for maximum benefit in distinguishing reservoir and non-reservoir rock
- Construct geologic reservoir models
- Apply seismic analysis to reservoir development
- Apply facies characteristics to reservoir performance to optimize development
- Compile a development plan

PROGRAM CONTENT

- Influence of Geological Characteristics on Development
- Economic value of Synergistic Development Teams
- Appraisal: Determining Recoverable Hydrocarbons
- Reservoir Fluid Properties and Saturation
- Influence of Capillarity on Hydrocarbon Distribution and Fluid Contacts
- Volumetric Reserve Estimation and Calculation
- Depositional and Digenetic Controls on Reservoir Rock (pore space), Barriers, and Hydrocarbon Distribution
- Aquifer Characterization, Distribution, and Mapping
- Seismic Applications in appraisal and Development
- Development Drilling: How to optimize Hydrocarbon Recovery
- Reservoir Zonation and Thickness Mapping
- Reservoir pore space configurations and Mapping
- Material balance and Performance Predictions
- Geological and Petrophysical activities in field review and special studies for infill Drilling and enhanced Oil Recovery
- Steps in building a Geologic Reservoir Model

OPERATIONS GEOLOGY AND PETROPHYSICS

UETMT-GEO-B-106

Program Duration: 5 days Program Level: Intermediate

PROGRAM OBJECTIVES

This course is designed to provide training in the practice and theory of Operations Geology and Petrophysics. It is suited to all those who supervise or are directly involved in Wellsite Data Acquisition and Evaluation. It is also suited to those who are involved in Well Planning and Well Proposals. A large amount of Data is acquired (at substantial cost), during a Drilling Operation; Mud Logs, Wireline Logs, MWD Logs, Lithologs, Cores and sidewall Cores, Geochemistry Data Well Seismic Data, Formation Pressure Data & Drilling and Well Engineering data.

TARGET AUDIENCE

- Operations Geologists
- Operations Petrophysicists
- Wellsite Geologists
- Exploration Wireline Geologists
- Development Geologists
- Petroleum Engineers
- Technical Assistants
- Drilling Engineers, who wish to gain a greater understanding of the Geological and Data Acquisition aspects of the Drilling Operation

TARGET COMPETENCIES

- Operations Geology and Petrophysics
- Wellsite Data Acquisition and Evaluation
- Well Planning
- Well Proposals
- Formation Pressure Data
- Drilling and Well Engineering Data

PROGRAM CONTENT

- Basic Drilling Operations
- Borehole Configuration
- Well Objectives
- Well Planning and Design
- Geological Data Acquisition
- Mud Logging
- Wellsite Geological Reporting
- Drill Cuttings Analysis
- Subsurface Gases
- Subsurface Fluid Pressure
- Coring Operations
- Basic Core analysis
- Sidewall Cores
- MWD and Horizontal Drilling
- Oil Shows
- Geochemistry
- Wireline Logging Tools
- Wireline Log Supervision
- Logs – lithological Interpretation
- Wireline Logs – basic level Petrophysical Interpretation
- RFT Testing
- Composite Logs and Final Well Reports

PETROLEUM EXPLORATION OPPORTUNITIES AND RISK ANALYSIS

UETMT-GEO-B-107

Program Duration: 5 days | Program Level: Advanced

PROGRAM OBJECTIVES

The aim of this workshop is to study the different opportunities that will be available in the already developed fields, the concept of the presence of new oil to be discovered (where there is oil there is more oil) to be discussed with different international experiences along with risk analysis and projects exploration economics in Developed blocks.

TARGET AUDIENCE

The course is designed for Exploration Managers, Senior Geoscientists, Senior Geologist, Senior Geophysicist, Projects Team Leaders planners, and Petroleum Systems.

TARGET COMPETENCIES

- Petroleum Geology
- Petroleum Systems
- Hydrocarbon Generation
- Seal and Trap Types

PROGRAM CONTENT

DAY 1:

- Exploration Process Overview
- Unconventional plays stratigraphic and fractured basement
- Opportunities by new Exploration techniques seismic attributes , AVO etc.
- Missed pay zones opportunity.
- Paradigm shift and changing conventional mindset.
- Changing Exploration strategies to fit the new approaches.

DAY 2:

- New geophysical techniques to identify new exploration opportunities(Ex: passive seismic, magentotellurics, potential fields, wide-azimuth & high resolution seismic, 4D…etc)
- Exploring new plays, deeper targets & unconventional traps
- Regional review of Exploration new potentials Techniques

DAY 3:

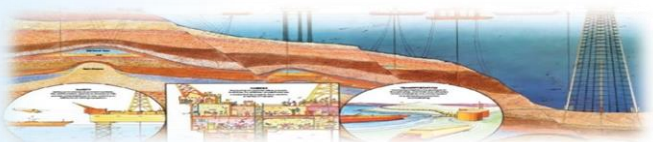
- Optimizing old technologies(ex: seismic, gravity) to meet new opportunities requirements in geologically complicated areas (e.g. seismic imaging beneath volcanic & highly faulted areas)
- Maximizing benefit from low potential wells through exploration activities
- Prioritizing Exploration Opportunities with Economic Analysis .
- Presentation of new opportunities to share holders and negotiation Skills

DAY 4:

- Maturing Leads to Prospects through new Geophysical/Geological Techniques
- Advances in Drilling & Testing
- Exploration of Geologically Complicated Areas
- (ex: Wrench Tectonics & Over thrust areas)

DAY 5:

Case studies with emphasis on state-of-the-art of recent techniques in hydrocarbon exploration and production. Case Studies in the Middle East (e.g. fractured basement Exploration)



PETROLEUM GEOLOGY OF NORTH AFRICA

UETMT-GEO-B-108

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

North Africa holds huge Reserves and resources of Oil and Gas and contains some of the most important regions for future Hydrocarbon Production. The recent Drilling successes Onshore Algeria and Offshore Egypt, and renewed Industry interest in Libya have re-invigorated Exploration activity. This course introduces the Petroleum Geology of North Africa, reviews the main Depositional Elements across the Region, and examines the Petroleum Systems and Play Types basin by basin. The course involves a series of presentations of the Geology of the region, typical Well Data are presented.

TARGET AUDIENCE

Exploration Geologists, Geophysicists, Reservoir Engineers, and Petroleum Systems

TARGET COMPETENCIES

- Depositional Basins
- Regional Stratigraphy
- Sequence Stratigraphy

PROGRAM OBJECTIVES

This course provides a comprehensive overview of the regions' Geology, reviewing the Structural Evolution of the area, and then examining each Stratigraphic interval, illustrating the evolving Depositional Systems across North Africa. The course also reviews the Petroleum Geology of each main Sedimentary Basin, highlighting the main Petroleum Systems, and discussing the main Reservoirs, source and Hydrocarbon Generation, Seal and Trap Types.

PROGRAM CONTENT

- Main Depositional Basins
- Structural Evolution of North Africa
- Regional Stratigraphy / Sequence Stratigraphy
- Palaeozoic
- Mesozoic
- Cenozoic
- Principal Source Rocks:
- Infra-Cambrian (potential?)
- Silurian (Tannezuft)
- Devonian (Frasnian)
- Cretaceous (Sirte / Rachmat)
- Cenozoic
- Hydrocarbon generation and Basin Modelling Principal Reservoirs
- Infra-Cambrian
- Cambro-Ordovician (Memouniat, Gargaf, Hamra Qzt)
- Silurian (Acacus)
- Devonian (Tadrart)
- Carboniferous (Mrar)
- Permo-Triassic (TAG-I, Ras Hamia)
- Cretaceous (Nubian Sst)
- Tertiary Carbonates (Sabil, Gialo etc) and Clastics
- Basin Review and Petroleum Systems
- Libya (Ghadames, Sirt, Kufra, Murzuk, Offshore Sirt and Pelagian)
- Egypt (Gulf of Suez, Offshore Nile, Western Desert)
- Tunisia (Ghadames, Pelagian Shelf)

STRUCTURAL GEOLOGY

UETMT-GEO-B-109

Program Duration: 5 days | Program Level: Intermediate

PROGRAM OVERVIEW

The Earth is a uniquely Dynamic Planet, whose Surface displays the results of (4) billion years of activity. Structural Geology is about the movements that have affected the Earth's Lithosphere over time, and the record they have left in the crust.

In this program we aim to achieve an understanding of these movements in quantitative terms to measure change. The program includes Theoretical Introduction based on the Force, Stress and Strain as Physical known concepts and its application in the Geological Domains. The brittle and non-brittle Deformations of the Rocks (as a Heterogamous Material) under Extension, Compression and Transform Tectonic Regimes are discussed. Systematic Description of different Structures from Micro-, Macro to Continental Scale will help to best understand the Regional Geological Structures where the latter reflects Regional Tectonics of the Continental as will as Oceanic Plates of the Earth.

TARGET AUDIENCE

- Structural, Geomechanics, Geologists and Geophysicist
- Petroleum Engineering
- Mining Engineering
- Civil Engineering
- Post graduate Students and Researchers in the domain of Structural Geology Petroleum and mining industries

TARGET COMPETENCIES

- Fundamentals of Structural Analysis
- Plate Tectonic Theory
- Mechanics of Fault Formation
- Structural Controls of Mineral
- Petroleum Deposits

PROGRAM OBJECTIVES

The objective of this program will be to

- Introduce the Fundamentals of Structural Analysis including Kinematic and Dynamic Analytical Techniques.
- Understand the Plate Tectonic Theory.
- To study the Style, Geometry, Kinematics and Dynamics of continental Rock Deformation in a Variety of Geologic Environments.
- Primary Structures are covered at the beginning of the program.
- Descriptive Nomenclature, Geometries and Mechanics of Fault Formation. Fault Movement Analysis will be covered in Lectures
- Descriptive nomenclature, geometries and mechanics of Formation of Folds.
- The laboratory works including some graphical techniques that used to describe Geological Structures and to solve problems in structural geology. Structural analysis with the stereonet is also covered.
- An important goal is also to understand the causal relationships between the different deformational structures and their relationships with the plate tectonic processes
- Get an introduction to the structural controls of mineral and Petroleum Deposits.

PROGRAM CONTENT

I- Introduction:

- Concepts and Definition on the Structural Geology
- Concept of Deformation in the Earth Crust
- Forces in Earth Crust

II- Plate Tectonic Theory:

- Concepts and Definitions
- Types of Plate boundaries
  - Divergent Plate Boundaries
  - Convergent Plate Boundaries
  - Transform Plate Boundaries
- Plate Tectonics and Magma Activity
- Mountain Building Processes

III- Kinematic Analysis : Concept of deformation (the strain)

Dynamic Analysis: Force, Stress and Mechanical behavior of the Rocks

V- Brittle Deformation (Faulting and or Fracturing):

- Stress and Faulting
- Classification of Faults
- Criteria of Fault Recognition in outcrops, Satellite & Aerial Photographs and also in Seismic Lines
- Representation of Faults

VI- Extensional Tectonics:

- Divergent Plate Boundaries and Related Structures
- Extension Tectonic Terminology
- Extension-related Structures

VII- Thrust Tectonics:

- Convergent Plate boundaries and related Structures
- Thrust Terminology
- Thrust System
- Thrust –related Structures

VIII- Wrench Fault Tectonics:

- Tectonic Setting of strike-slip Faulting
- Wrench System and related Secondary Structures

IX- Ductile Deformation (Folding):

- Classification of Folds.
- Folding Mechanism and Kinematics Analysis
- Criteria of fold Recognitions
- Representation of Folds

X- Precambrian Tectonics and related Structures:

XI- Paleozoic Tectonics and related Structures:

XII- Mesozoic Tectonics and Related Structures:

XIII- Cenozoic Tectonics and Related Structures:

EXTENSIONAL STRUCTURAL STYLES

UETMT-GEO-B-110

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

Extensional structures provide some of the world's largest known oil reservoirs and remain one of the major frontier plays of the immediate future, both onshore and, particularly, in deep water offshore. 3-D seismic has revolutionized structural mapping. However, making the most realistic geologic interpretation of these structures is only as good as our ability to recognize and exploit the fundamental characteristics of the forms that are possible. This course presents outcrop, subsurface, seismic sections, and model analogs that will provide the starting point for structural interpretation in a wide range of extensional environments. Interpretations are validated by restoration and comparison to balanced models. This course covers the latest restoration techniques and the use of predictive kinematic models appropriate for rifted and other extensional and transtensional areas.

TARGET AUDIENCE

Structural, Geo-mechanics, Exploration and Development Geologists, Geophysicists, Engineers, and Managers responsible for the Interpretation and Drilling of Extensional Structures

TARGET COMPETENCIES

- Extensional and Transtensional Deformation
- Mechanical-stratigraphic Principles
- Structural Geometry
- Kinematic Models

PROGRAM OBJECTIVES

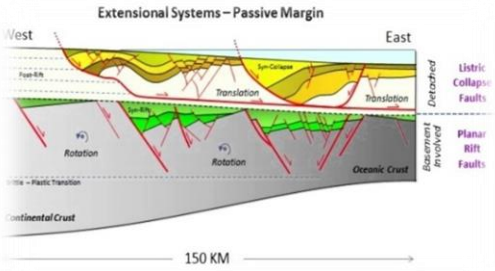
- Distinguish the characteristics of extensional and transtensional deformation for both basement-involved and thin-skinned styles
- Apply mechanical-stratigraphic principles governing the formation and evolution of extensional structures and apply restoration and balancing techniques
- Predict structural geometry from sparse or inconsistent data using kinematic models
- Recognize typical extensional and transtensional petroleum-trapping geometries

PROGRAM CONTENT

- Extensional structural styles and their plate–tectonic habitats
- Models for rifting and passive continental margin evolution
- Transtensive structures
- Detached and basement-involved styles
- Map patterns
- Half grabens and full grabens
- Footwall uplift
- Pre-inversion normal faults
- Ramp-flat and listric-fault related structures
- Rotated block with keystone graben style
- Structural validation criteria
- Selecting the best balancing and restoration technique
- Flexural-slip restoration and predication
- Vertical and oblique simple shear
- Rigid-block restoration
- Area-depth technique for section validation, depth to detachment, bed-length changes and fault prediction
- Effect of detachment-zone thickness
- Transition from horizontal to vertical displacement
- Extensional drape folds
- Trishear models of drape folds
- Sequential restoration of growth structures
- Fracturing in extensional structures

EXAMPLES

The instructors of this course are happy to accept examples from your company for analysis in the class as one of the demonstration exercises.



STRUCTURAL GEOLOGY IN PETROLEUM EXPLORATION AND DEVELOPMENT

UETMT-GEO-B-111

Program Duration: 7 days | Program Level: Advanced

PROGRAM OVERVIEW

The explosion of 3-D seismic has given us an opportunity to map structures in a more detailed manner than ever before. However, making the most realistic geologic interpretation of these structures is only as good as our ability to recognize the fundamental characteristics of the assemblage in which they occur. Only by recognition of the many facets, variations, differences, and similarities of each assemblage with its associated styles and sub-styles, can confident interpretations be made. This course provides an overview of all hydrocarbon-bearing structural assemblages from the trap to the plate-tectonic scale. The processes that produce the structures and control their variability are explained in terms of basic rock-mechanical principles and physical-model examples. Cross-section balancing and restoration are presented as tools for validating interpretations as well as for documenting structural evolution. To develop a broad experience, numerous case-history interpretations from around the world are presented as examples and interpreted in exercises.

TARGET AUDIENCE

Structural, Geomechanics, Petroleum Systems, Exploration and Development Geologists, Geophysicists, Engineers, and Geoscience Managers

TARGET COMPETENCIES

- Mechanical-stratigraphic Concepts
- Trap Geometry
- Structural Evolution
- Reservoir Porosity, Permeability, and Continuity

PROGRAM OBJECTIVES

- Apply mechanical-stratigraphic concepts to understand and predict trap geometry
- Use restoration and balance to validate an interpretation and interpret the structural evolution
- Recognize the structural style or styles of a region from map and cross-sectional expression
- Distinguish characteristics of each structural style on reflection seismic sections
- Interpret the mechanics of deformation for each structural style
- Predict the effects of deformation on reservoir porosity, permeability, and continuity

PROGRAM CONTENT

- Mechanical principles governing folding and faulting
- Mechanical stratigraphy
- Predicting structure from stratigraphy
- Deformation mechanisms
- Folding vs. Faulting
- Palinspastic restoration of cross sections
- Structural validation criteria
- Sequential restoration and growth history
- Structural assemblages: families and styles
- Fault-related folds
- Regional arches and domes
- Compaction, dissolution and impact structures
- Wrench faults: simple, convergent, and divergent
- Thin-skinned fold-thrust belts
- Basement-involved contraction
- Inversion
- Thin-skinned extension
- Basement-involved extension
- Salt sheets
- Diapirs
- Exploration problems for each style
- Plate-tectonic habitats of structural assemblages
- Effects of structures in reservoirs: joints, stylolites, faults
- Deformation that enhances or reduces permeability
- Predicting the effect of fault zones on fluid flow
- Tectonic synthesis and exploration project

COMPRESSIONAL STRUCTURAL STYLES

UETMT-GEO-B-112

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

Compressional structures provide some of the world's largest known oil reservoirs and remain major frontier plays. 3-D seismic has revolutionized structural mapping. Making the most realistic geologic interpretation of these structures requires our ability to recognize and exploit the fundamental forms. This course presents outcrop, subsurface, seismic sections, and model analogs that provide structural interpretation in a wide range of compressional environments. Interpretations are validated by restoration and by comparison to balanced models. This course covers the latest restoration techniques and the use of the predictive kinematic models for thrust-fold belts. A comparable course on extensional structural styles is available for in-house presentation.

TARGET AUDIENCE

Structural, Geomechanics, Geologists, Geophysicists, Engineers, and Managers responsible for the Interpretation and Drilling of compressional Structures

TARGET COMPETENCIES

- Compressional and Transpressional Deformation
- Thin-skinned and Basement-involved Styles
- Inversion Structures
- Mechanical-stratigraphic Principles
- Structural Geometry
- Kinematic Models

PROGRAM OBJECTIVES

- Distinguish the characteristics of compressional and transpressional deformation including distinguishing thin-skinned and basement-involved styles
- Identify the characteristics of inversion structures
- Apply mechanical-stratigraphic principles governing the formation and evolution of structures and apply restoration and balancing techniques
- Predict structural geometry from sparse or inconsistent data using kinematic models
- Recognize typical oil-field locations and geometries in compressional structures

PROGRAM CONTENT

- Compressional structural styles and their plate-tectonic habitats
- Transpressive structures
- Detached and basement-involved styles
- Inversion
- Structural validation criteria
- Selecting the best balancing and restoration technique
- Flexural-slip restoration
- Constant-area restoration
- Area-depth technique for section validation, depth to detachment, bed-length changes and fault prediction
- Fault-bend folds
- Fault-tip folds
- Fault-propagation folds
- Detachment folds
- Buckle folds and the break-fold model
- Compressional drape folds
- Duplexes
- Triangle zones
- Growth folds
- Fracturing in Compressional Structures

STRUCTURAL STYLES IN PETROLEUM EXPLORATION

UETMT-GEO-B-113

Program Duration: 5 days | Program Level: Advanced

TARGET AUDIENCE

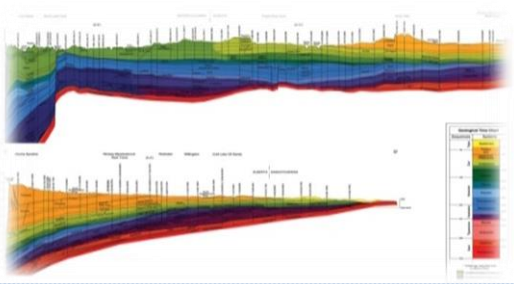
Reservoir, Development and Exploration Geologists; Geophysicists; Petrophysicists; Log Analysts; Petroleum Engineers; and experienced Technicians.

TARGET COMPETENCIES

- Hydrocarbon-Bearing
- Structural Styles and Traps
- Mechanical-Stratigraphic Concepts
- Stratigraphic Facies

PROGRAM CONTENT

- Recognize all the different hydrocarbon-bearing structural styles in map and cross-section
- Distinguish the characteristics of each Structural Style on Seismic reflection profiles
- Recognize the arrangement of Structural Styles and traps within Structural Families
- Apply mechanical-stratigraphic concepts to understand and predict trap Geometry
- Predicting Structure from Stratigraphy
- Stratigraphic Facies associated with Carbonate & Sandstone Reservoir
- Stratigraphic Traps
- Use restoration and balance to validate an Interpretation and show the Structural Evolution
- Plate-tectonic habitats of Structural Assemblage
- Mapping methods using exercises
- Mapping methods generation using Petrel Software
- Prospect Generation
- Trap Validation
- Folding vs. Faulting
- Structural Families and Styles
- Plate-tectonic habitats of Structural Assemblages
- Trap validation using Petrel Software
- 2-D & 3D Seismic Interpretation concepts
- Risk Analysis and Uncertainties
- Exercise on all previous aspects using real data and sometimes using Petrel Software



STRUCTURAL RESTORATION, BALANCING AND PREDICTION

UETMT-GEO-B-114

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

This program presents techniques and methods for validating structural interpretation and for extorting additional information such as the geometry of the structure further than the data, predicting the presence of structures which are beyond the resolution of the data. Restoration is a fundamental test of the validity of the interpretation. Well mapped outcrops, physical models, 2-D and 3-D seismic and mature-field log-based interpretation from Egypt and around the world provide analog examples for practical interpretation. The trainees will learn how to validate their interpretation and how to predict structural geometry beyond the data coverage and resolution, especially in areas with little, conflicting or misleading data. Practical interpretation skills are developed in numerous exercises including seismic, well logs, and other related data.

TARGET AUDIENCE

Exploration Geologists, Geophysists, and Geoscientists

TARGET COMPETENCIES

- Mechanical Layering Concepts
- Structural Geometry
- Tectonic Regimes
- Stress and Strain Analysis

PROGRAM OBJECTIVES

- How to apply mechanical layering concepts in prediction of structural geometry
- Be familiar with the different geometries of structural elements
- Balancing and restoration Techniques for the different tectonic regimes
- Use restoration and balance in unraveling the structural evolution of a field as well as to validate structural interpretation and prediction of structural geometry beyond the data coverage and resolution
- Program Content
- Mechanical concepts, stress and strain analysis, rheology and mechanical layering. Prediction of structural style from mechanical properties of rocks and the applied stresses
- Classical balancing techniques,
- Structural outline mapping
- Cross section construction and consistency
- Depth to detachment calculation
- Non-classical balancing and restoration techniques
- Balancing and restoration of extensional structures
- Balancing and techniques of Compressional structures (optional)
- Palinspastic Structural restoration and structural evolution
- Each subject consists of two parts, basic concepts and exercises

STRUCTURAL MODELING: TOOL FOR EVALUATING HYDROCARBON ENTRAPMENT CAPACITY

UETMT-GEO-B-115

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

Structural Modeling is a difficult - easy method. Even with good quality data, the valid structural model usually requires identification of the fundamental characteristics of the structural assemblage in which it occurs and the multiplicity of trap styles to be expected. This course grants an overview of all hydrocarbon bearing structural assemblages and their related trap types. The processes that fabricate the structures and control their styles are construed in terms of basic rock mechanical concepts. Well mapped outcrops, physical models, 2-D and 3-D seismic and mature-field log-based interpretation from Egypt and around the world provide analog examples for practical interpretation. The trainees will learn structural concepts and the major structural trap geometries, especially in areas with little, conflicting or misleading data. Practical interpretation skills are developed in numerous exercises including seismic, well logs, and FMI data.

TARGET AUDIENCE

Exploration Geologists, Geophysists, Engineers and Geoscientists

TARGET COMPETENCIES

- Mechanical Layering Concepts
- Rheology
- Balancing Techniques
- Structural Outline Mapping
- Structural Geometry

PROGRAM OBJECTIVES

- How to apply stress, strain and mechanical layering concepts in prediction of hydrocarbon trap geometry
- Be familiar with the different hydrocarbon-bearing structural styles and the associated traps
- How to distinguish between the different structural styles in seismic reflection profiles
- How to integrate, regional structural grain, well log data, seismic data, analogue models, surface structures and other structural data sets in structural modeling
- Use restoration and balance in unraveling the structural evolution of a field as well as to validate structural interpretation
- How to design a work flow to construct a structural model for your field

PROGRAM CONTENT

- Mechanical concepts, stress and strain analysis, rheology and mechanical layering. Prediction of structural style from mechanical properties of rocks and the applied stresses
- Plate tectonic habitat of the different structural assemblages
- Structural modeling of rift basins
- Structural modeling of wrench related basin
- Structural modeling of reactivated and multiply deformed basins
- Palinspastic Structural restoration and tectonic evolution
- Each subject consists of two parts, basic concepts and exercises

SUBSURFACE MAPPING

UETMT-GEO-B-116

Program Duration: 5 days | Program Level: Introductory

PROGRAM OVERVIEW

This program covers the techniques required to confidently map sub-surface structures in 3 dimensions from well data. Not just a collection of rules of thumb, this class presents the fundamental techniques used to reconstruct structures accurately and effectively in 3-D so that you will get the most out of your data. Techniques are taught in easy-to-learn forms for manual use with tracing paper, graphs, and a calculator, but the corresponding computer-mapping strategies are presented and illustrated throughout. Participants will be prepared to develop more accurate structural models of reservoirs, find new traps in old fields, extract the maximum information from exploration wells, and validate or recognize errors in existing interpretations. Experience and confidence is developed by applying the techniques in numerous practical exercises. Dr. Groshong's book, 3-D Structural Geology, is included with the program materials.

TARGET AUDIENCE

Development geologists and those exploring mature areas; early-career geologists and technologists who make structure maps; those who need to judge the validity of maps and cross sections

TARGET COMPETENCIES:

- Quantitative Contouring Techniques
- Contouring Pitfalls
- Thickness in Deviated Wells

PROGRAM OBJECTIVES

- Apply quantitative contouring techniques
- Recognize common contouring pitfalls
- Find thickness in deviated wells
- Use thickness maps to interpret structure
- Construct predictive cross sections
- Apply the best techniques for projecting data
- Map faults and integrate them into horizon maps
- Build a complete 3-D interpretation
- Recognize valid and invalid fault surfaces
- Interpret folds and faults from dipmeters
- Construct juxtaposition (Allan) diagrams for fault trap and seal analysis
- Map structures with multiple overlapping faults

PROGRAM CONTENT

- Contouring Techniques
- Triangulation
- Using dip in Mapping
- Different measures of thickness
- Thickness in deviated wells
- Isopach and Isocore maps
- Dip-domain Cross sections
- Data Projection
- Trend and plunge of folds on tangent diagrams
- Composite-surface maps
- Fault shapes and displacement distributions
- Heave and throw from stratigraphic separation
- Stratigraphic seperation from structure contour map
- Constructing fault-plane maps
- Faults on isopach maps
- Combining fault and horizon maps
- Contouring across faults
- Structural quality-control techniques
- Multiple-surface map compatibility
- Map validation using implied fault contours
- Finding faults and fault orientations with SCAT analysis of dipmeters
- Juxtaposition diagrams for trap and seal analysis
- Fault-cutoff lines in computer mapping
- Soft linked and hard linked faults
- Relay and branching fault patterns
- Mapping sequential cross-cutting faults

PRODUCTION GEOLOGY FOR OTHER DISCIPLINES

UETMT-GEO-B-117

Program Duration: 5 days | Program Level: Introductory

PROGRAM OVERVIEW

The course provides a basic overview of geology and focuses on demonstrating the practical impact of geology, geological models, and geological uncertainty on reservoir appraisal, development concept selection, and actual field development. The course emphasizes geological factors that affect engineering activities common to drilling, logging, testing, completion, development, and production. Without a common understanding between geologists and engineers, there can be no real interdisciplinary communication or teamwork in reservoir development and production activities. Engineering and geological coordination are the objectives of this course.

TARGET AUDIENCE

Petroleum Engineers requiring a more extensive knowledge of Geology, Professional staff from other disciplines, field engineers who need a good understanding of subsurface issues, and managers concerned with reservoir evaluation and management

TARGET COMPETENCIES

- Production Geology
- Correlation and Stratigraphy
- Structural Geology
- Trapping Mechanisms and Fluid Distribution

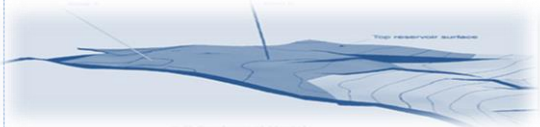
PROGRAM OBJECTIVES

Understand and apply knowledge of production geology to perform effectively in integrated Asset Teams

Impact decision making with production and geological information during field's life cycle

PROGRAM CONTENT

- Correlation and stratigraphy
- Structural geology
- Trapping mechanisms and fluid distribution
- Seismology and mapping techniques
- Clastic and carbonate reservoir geology
- Reservoir characterization and modeling volumetrics
- Well planning
- Reservoir appraisal
- Field development
- Volumetrics



PROSPECT AND PLAY ASSESSMENT

UETMT-GEO-B-118

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

Exploration professionals and managers must manage their time and resources carefully in the modern business world. Key to this management process is a full understanding of exploratory opportunities and their potential impact on the organization. Assessment of plays and prospects is an important tool in managing financial and human resources.

This fully revised and updated course evolved from an approach created through the work of Dave White into a fully modern approach to defining prospect and play volumetrics, the uncertainties in defining these volumes and the risk that the accumulation exists. It is a practical course – easy to adapt directly in the workplace. During the course, students learn evaluation techniques applicable in any assessment scheme that an organization might use. The course evaluates other published approaches and contrasts them with the recommended procedures allowing the participants to choose the very best approach to resource evaluation. It is significant to note that this course offers the industry the only quantitative play assessment procedure that is repeatable from play to play and offers measures of the play prospectiveness (size and number of future fields); no other published play assessment offers anything more than qualitative judgments. Important techniques to sum multiple prospective zones and adjacent prospects are developed.

The course objectives are: (1) to provide knowledge and unique tools for practical, systematic, predrill assessment of potentially recoverable oil and gas; (2) to use the best available methods - trap volumetrics and hydrocarbon charge for prospects, and potential numbers and sizes of prospects for plays; (3) to quantify all geologic risks and uncertainties using hand calculations; and, (4) to provide insights for managers and reviewers in evaluating assessments, avoiding pitfalls, high-grading exploration opportunities, and planning selectively for the future. It focuses on the exploration concepts and models that are essential to effective assessments. The concepts and techniques learned in the course are applied to real industry examples in exercises and workshops.

The unique tools include comprehensive assessment forms for prospects and plays, and graphs, data tables, and guidelines for making all assessment decisions. These tools help participants estimate risks and success ratios, field-size distributions, field and prospect densities, trap geometry corrections, multiple reservoir factors, porosities, permeabilities, saturations, formation volume factors, gas/oil ratios, formation temperatures, oil and gas recovery efficiencies, API gravities, gas gravities, NGL ratios, and oil and gas yields from source rocks. The forms and procedures are easily adaptable for internal usage in any oil and gas organization adoption of a consistent assessment scheme will allow for equitable comparisons of opportunities across the company and can serve as a basis for benchmarking company exploration performance.
All factors can be handled in either metric or English units. Calculations are simple, but participants will find a basic scientific hand calculator helpful.

TARGET COMPETENCIES

- Geological Risk and Uncertainty in Exploration Prospects
- Prospect Volumes
- Volumetric Prospect Assessments
- Hydrocarbon Charge Assessment
- Risk Analysis

TARGET AUDIENCE

Petroleum Systems, Basin Modeling, Geomechanics
All Exploration Team members and Leaders including Geologists, Geophysicists, Geochemists, Analysts, Reservoir Engineers, Economists, Planners and Managers who make business decisions based upon exploration data

PROGRAM OBJECTIVES

- Calculate geological risk and uncertainty in exploration prospects
- Determine prospect volumes
- Assess reserve distribution in a play
- Predict the number and estimated sizes of future fields
- Describe/calibrate risks associated with finding a successful play

PROGRAM CONTENT

- **Geological Controls of Oil and Gas Occurrence:** Their impact on exploration risk and success
- **Review of Common Assessment Methods:** Selection of the most practical approach
- **Applications of Volumetric Prospect Assessments:** Techniques, comparative data, and graphs to estimate input factors, such as trap volume, porosity, net/gross saturation, hydrocarbon fill fraction, formation volume factors, and recovery efficiencies
- **Probability Methods:** The expression of uncertainty for input factors and results including Monte Carlo techniques
- **Risk Analysis:** Principles and practice
- **Hydrocarbon Charge Assessment:** Procedures for estimating possible amounts of oil and gas generated, migrated, and trapped in prospects
- **Prospect Assessment Workshop:** Projects supplied either by the instructor or by participants, worked by teams and reported to the entire group
- **Play assessment Techniques:** Estimating the possible numbers, sizes, and associated risks for potential fields, with useful data on field densities, field-size distributions, oil versus gas relationships, and dependent versus independent risks
- **Play recognition and Mapping:** Play classification and subdivision, and play maps that high-grade the most favorable areas with minimal geologic risks
- **Play assessment Workshop:** Projects supplied either by the instructor or by participants, worked by teams and reported to the entire group
- **Aggregation of Assessment Results:** Summing, de-risking, and preparing for economic analysis
- **Limitations, Pitfalls, uses, and Discovery Concepts:** The philosophy of judging and using assessment results and the importance of basic geologic concepts

PROSPECT EVALUATION, RISK & VOLUME ASSESSMENT

UETMT-GEO-B-119

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

A decision to drill an Exploration Well with the objective to find a new Oil or Gas field must be based on a sound Assessment of the Prospect's Risks and of the volumes: - *what is the chance that a well will find Hydrocarbons, and - How much could it be?* Risk and Volume Assessments Form the basis for decisions to Drill a Well or not, and as such form the link between Subsurface Evaluation and the Business Aspects of the Petroleum Industry.

This 5 day course explains How Risks and volumes can be assessed in a realistic manner based on a sound understanding of the Geological details of the Prospect as well as of its Regional Geological setting and current play understanding.

TARGET AUDIENCE

This course is designed in the first place for Geoscientists working in Exploration, for Prospect Portfolio Analysts and for their direct Supervisors. It is also a very instructive course for staff from disciplines working closely with Exploration staff, such as Reservoir Engineers, Petrophysicists Geophysicists, Basin Modiling and Petroleum Systems

TARGET COMPETENCIES

- Volume Assessments of Exploration Prospects
- Risk and Uncertainty
- Trap
- Reservoir
- Seal

PROGRAM OBJECTIVES

At the end of the course the participants will have a good understanding of the essentials for realistic Risk and Volume Assessments of Exploration Prospects.

PROGRAM CONTENT

- The course will demonstrate that Realistic Risk and Volume Assessment is not a "black box" Operation but needs Geological understanding of the Prospect, and the Regional setting.
- *Specific topics that will be discussed include the following:*
- The Statistical Fundamentals for Risk and Volume Assessment will be presented, with practical exercises for understanding the results of a Risk & Volume Assessment displayed in expectation curves.
- The difference between Risk and Uncertainty.
- A discussion of the essential requirements for a working Petroleum System:
- Trap, Reservoir, Seal and Charge.
- Exercises in and guidelines for estimating uncertainties for Prospect Parameters, including practical advice for meaningful Distributions for uncertainty ranges.
- Particular emphasis will be given to estimating Hydrocarbon Column Lengths with their associated uncertainties in undrilled Prospects.
- Prospects and Plays; the value of Play maps and How these should be used for Assessment of prospect Risks and for ranking of Prospects within a Play.
- Calculating Volume ranges for Prospects.
- Calculating Volumes for groups of Prospects; How to add Risked Prospect volumes for a Statistically correct representation of the volume promise of a Portfolio of Prospects.
- Geophysical Evidence:
- Incorporating Geophysical Evidence (DHIs) consistently and realistically in a risk assessment.
- An understandable and geology-based workflow, consistent with Bayes theorem, will be presented

PROSPECT EVALUATION, PLAY ASSESSMENT ANALYSIS FAULT SEALING ANALYSIS & UNCERTAINTY ANALYSIS

UETMT-GEO-B-120

Program Duration: 5 days | Program Level: Advanced

TARGET AUDIENCE

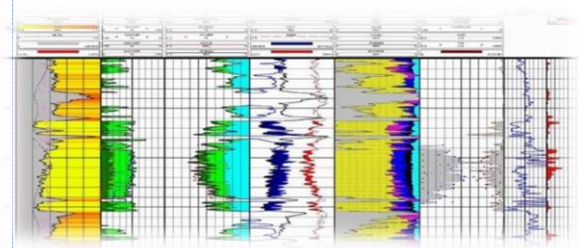
All Exploration Team members and Leaders including Geologists, Geophysicists, Geochemists, Analysts, Reservoir Engineers, Economists, Basin Modiling and Petroleum Systems, Planners and Managers who make Business decisions based upon Exploration Data.

TARGET COMPETENCIES

- Geological Risk and Uncertainty in Exploration Prospects
- Uncertainty in Exploration Prospects
- Prospect Volumes
- Volumetric Prospect Assessments
- Hydrocarbon Charge Assessment
- Risk Analysis

PROGRAM CONTENT

- Calculate Geological Risk and uncertainty in Exploration Prospects
- Determine Prospect Volumes
- Geological Controls of Oil and Gas Occurrence
- Applications of Volumetric Prospect Assessments: Techniques, Comparative Data, and Graphs to estimate input Factors, such as trap volume, Porosity, net/gross Saturation, Hydrocarbon Fill Fraction, Formation Volume Factors, and Recovery Efficiencies
- Risk Analysis
- Fault Sealing Analysis
- Uncertainty Analysis
- Exercise for doing Fault Sealing
- Assess Reserve Distribution in a Play
- Predict the number and estimated sizes of future fields
- Describe/calibrate risks associated with finding a successful Play
- Doing practical exercises for all pervious items using Software



FAULT SEAL ANALYSIS

UETMT-GEO-B-121	Program Duration: 7 days	Program Level: Advanced

TARGET AUDIENCE

Structural, Geomechanics, Development Geologists, Geophysicists, Engineers, and Managers engaged in Exploration and Development Projects, which need an overview of Structural trap shapes and modern Structural Techniques will benefit from this course.

TARGET COMPETENCIES

- Fault Zone Structure
- Fault Rock Thickness
- Fault Rock Properties
- Mechanical Seal Failure

PROGRAM CONTENT

Day 1

Fault Seal Prediction

- Fault zone structure & fault rock thickness
- Fault Rock continuity
- Fault Rock properties

Fault Sealing.

- a. Geometry and growth of faults and their impact on hydrocarbon flow in clastic sequences
- Internal structure, growth and properties of fault zones in siliciclastic sequences.
- (ii) Faults in migration modelling.
- Faults in production modelling.

Day 2

Lateral Clay injection into normal faults
Case Study – Extensional rifts.

Day 3

Fault Plane Profiles (FPP) (Juxtaposition Analysis)
Allan Maps
Seal Attributes

Day 4

Geo pressure & Seals

- a. Geo pressure: Pressure = How & When Seals Fail
- b. Top seal: Mechanical Seals (Mechanical Seal Failure)
- c. Seal strength: Capillary Seals (Capillary Seal Failure)
- d. Seal failure: Seal Strength Controls Column Height

Day 5

Mechanical Seal Failure

- Scenario 1, Seal Failure Acts as a Valve, Limits Column Height
- Scenario 2, Catastrophic Seal Failure, Water at Leak Off, No Oil or Gas Column

Day 6

Analyzing Top Seal From Seismic & Logs

- Define a Top Seal & Lithology
  (Net to Gross, Silt Content, Sequence Strat Environment)
- Isopach of Top Seal
  (Thickness Changes, Incised Channels, Pinch Out)
- Amplitude Extraction, Inversions
  (Facies, Compositional Changes, Internal Channels)
- Do Faults Breach Top Seal?
  (Coherency Slice, Dip Maps)
- Where is Top Porosity (Base of the Top Seal)
  (At Top Reservoir or Shallower (Waste Rock)

Day 7

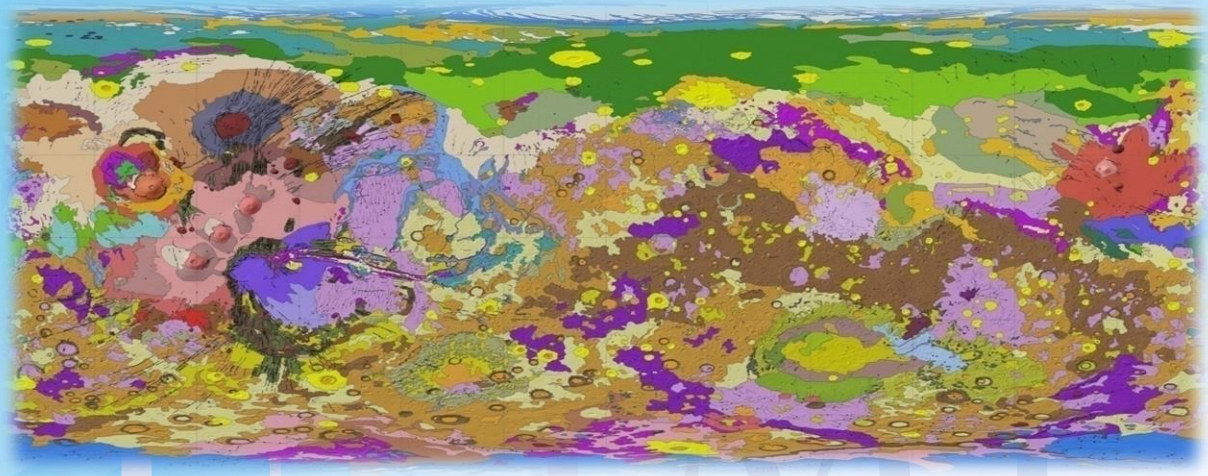
Fault Leak & Fault Seal

- Migration of Fluids through Faults
- Identify Leak Points (Position & Elevation)
- Identify Ranges for Oil & Gas Contacts
- Vertical & Lateral Connectivity of Reservoirs

NEW TECHNIQUES IN STRUCTURAL GEOLOGY

UETMT-GEO-B-122

Program Duration: 5 days | Program Level: Advanced



PROGRAM OBJECTIVES

By the end of this course, participants will be able to get full understand and discuss the different structural styles, the mechanism of their occurrence, geometry, seismic expression, interpretation and their significance in hydrocarbon exploration.

TARGET AUDIENCE

This program is designed for Exploration Geologists & Geomechanics Geologist, Geophysicist and Development Staff requiring an up-to-date understanding of Practical Structural Geology

TARGET COMPETENCIES

- Structural Geometries
- Inverted Extensional Basins
- Fold and Thrust Belts
- Structural Analysis

PROGRAM CONTENT

- Structural Geometries from Seismic Data
- Interpretation of Structures in extensional rifts
- Planar and Listric faults
- Inverted extensional basins
- Fold and thrust belts
- Strike Slip terrenes and areas of salt tectonics
- Deducing structural history in complex terrenes
- Characteristic features contemporaneous faulting
- Structural analysis of maps assessing structure maps
- Fault displacement gradients
- Mapping fault terminations
- Intersection of faults
- Contour closure on faults
- Stratigraphic separation
- Faults population studies
- Footwall up lift in extensional tectonics
- Impact on structural closure
- New approaches to extensional basin models
- Preservation and erosion of reservoir
- Computer modeling of cross-sections
- New techniques in fault seal analysis
- Risk of fault seal
- Migration and gilling histories
- Fault compartments
- Hydrocarbon column height in undrilled compartments
- Basin models for estimates of stretching and heat flow
- Paleobathmetry for sediment distribution models
- Selection restoration and balancing concepts
- Tests for viability of interpreted cross-sections
- Constraints on geometry and history
- Example applications

SEQUENCE STRATIGRAPHY

UETMT-GEO-B-123

Program Duration: 5 days | Program Level: Intermediate

PROGRAM OVERVIEW

This course will cover the followings:

- Depositional Systems Tracts
- The Tectonic Factors in Sea Level Change
- The Stratigraphic Signatures of Tectonics, Eustacy and Sedimentology.
- Identification of Reflection Terminations and Surfaces on Seismic Data. (Practical examples)
- Scale Issues.
- Wireline Log-Motif Sequence Stratigraphy. (practical example from UK North Sea)
- Neogene Plays of the Nile Delta. Interpretation of Mio-Plio-Pleistocene Prograding complex, Offshore Nile Delta.
- Exploration and exploitation strategies based on sequence straigraphic concepts.
- Cycle chart and its application.
- Practical exercises from North Sea, Niger Delta, Nile Delta, Sumatra, Gulf of Mexico, and North Central Texas.

TARGET AUDIENCE

- Geologists, Geophysicists, exploration production managers, biostratigraphers and engineers involved in exploration or reservoir characterization

TARGET COMPETENCIES

- Basin Analysis Stratigraphic Tectonics
- Stratigraphic Eustacy
- Stratigraphic Sedimentology
- Sequence Straigraphic Concepts

PROGRAM OBJECTIVES

- Identify stratigraphic sequences
- Interpret seismic reflection geometries
- Relate sequence stratigraphy to basin architecture, relative sea levels and history
- Build predictive stratigraphic model

PROGRAM CONTENT

DAY 1:

- Historical framework- Seismic Geometrics

DAY 2:

- Relative sea level changes-Unconformities- Eustacy
- Parasequences –The sequence stratigraphic model

DAY 3:

- HST LST sedimentation patterns. Examples from worldwide

DAY 4:

- Application of Sequence Strat. To the Nile valley.

DAY 5:

- workshop based on real examples

SEQUENCE STRATIGRAPHY: (AN APPLIED WORKSHOP)

UETMT-GEO-B-124

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

Sequence Stratigraphy, based on Sedimentary response to changes in relative sea level gives the explorationist and the development geoscientist a powerful new predictive tool for regional basin analysis, shelf to basin correlation and reservoir heterogeneity. Perhaps most importantly, sequence stratigraphy gives the geoscientist a superior framework for the integration of geologic, geophysical and engineering data and expertise.

We will develop the basic concepts of sequence stratigraphy such as the integration of eustasy and tectonic subsidence which gives rise to the basic cycle hierarchy that can be observed in the geologic record. Using these basic concepts we will build a general predictive stratigraphic model emphasizing the petroleum system and particularly stressing shelf to basin correlation.

The particular strength of this workshop is the application of these basic principles to actual subsurface data sets gathered into a series of well-founded exercises. In recent courses the data sets included Miocene delta complexes in Venezuela Cretaceous incised valleys in the US, Paleozoic mixed carbonate clastic basin floor fans and low stand prograding complexes in the US and Jurassic basin floor and slope fans in France.

TARGET AUDIENCE

Geologists, Geophysicists, Biostratigraphers and Engineers needing a Fundamental Understanding of the principles and applications of Sequence Stratigraphy

TARGET COMPETENCIES

- Stratigraphic Sequences
- Seismic Reflection Geometries
- Sequence Stratigraphy
- Basin Architecture
- Predictive Stratigraphic Model

PROGRAM OBJECTIVES

- Identify Stratigraphic Sequences
- Interpret Seismic reflection Geometries
- Relate Sequence Stratigraphy to basin Architecture, relative sea levels and history
- Build Predictive Stratigraphic Model

PROGRAM CONTENT

- Historical Framework
- Seismic Geometries
- Unconformities
- Relative Sea level
- Eustasy
- Parasequences and their stacking patterns
- Parasequences as a Correlation tool
- Relationship of Stratigraphic patterns to changes in subsidence rates as driven by regional and earth scale tectonic processes
- Cycle hierarchy
- World-wide cycle chart and its application
- The sequence stratigraphic model
- LST sequence boundaries, diagenesis related to unconformities, incised valleys, slope fans, basin floor fans and prograding complexes illustrated by slide presentation and individual exercises
- TST incised valley fill, two phase sedimentation pattern, source rock and reservoir seal illustrated by slide presentation and individual exercises
- HST alluvial, deltaic, shoreline complexes and shelf sands illustrated by slide presentation and individual exercises
- Exploration and production scaled case histories
- Exploration/production strategies

DEPOSITIONAL SYSTEMS AND SEQUENCE STRATIGRAPHY

UETMT-GEO-B-125

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

Sequence Stratigraphy, based on sedimentary response to changes in relative sea level gives the explorationist and the development geoscientist a powerful new predictive tool for regional basin analysis, shelf to basin correlation and reservoir heterogeneity. Perhaps most importantly, sequence stratigraphy gives the geoscientist a superior framework for the integration of geologic, geophysical and engineering data and expertise.

We will develop the basic concepts of sequence stratigraphy such as the integration of eustasy and tectonic subsidence which gives rise to the basic cycle hierarchy that can be observed in the geologic record. Using these basic concepts we will build a general predictive stratigraphic model emphasizing the petroleum system and particularly stressing shelf to basin correlation.

The particular strength of this course is the application of these basic principles to actual subsurface data sets gathered into a series of well-founded exercises.

TARGET COMPETENCIES

- Sequence Stratigraphy Concepts
- Basin Analysis
- Reservoir Heterogeneity
- Integration Of Eustasy and Tectonic
- General Predictive Stratigraphic Model

TARGET AUDIENCE

- Geologists
- Geophysicists
- Exploration/Production Managers
- Biostratigraphers and Engineers involved
- In Exploration or Reservoir Characterization

PROGRAM CONTENT

DAY 1:

- Stratigraphy and Sequence Stratigraphy Relationship.
- Underlying principles and Historical Framework.
- Time in Stratigraphy; Absolute and Relative Times.
- Seismic Reflectors and Time Lines.
- Time Graphic Presentation; Importance and Usage.
- Exercises.

DAY 2:

- Stratal Stacking Pattern and Controlling Factors.
- Unconformities and Source Unconformity.
- Unconformity Surface Time graphic Presentation.
- Exercises.
- Sequence Architecture and Stratigraphic Predictability.
- Accommodation Space.
- Cycles Hierarchy
- Eustasy and Global Sea Level changes; Causes and Controlling Factors.
- World-wide Cycle Chart and Its Application.
- Relative Sea Level Changes in Response to Eustasy and Tectonics.
- Marine Accommodation and Para-Sequence Stacking Patterns.
- Exercises.

DAY 3:

- Non Marine Accommodation Space and Controlling Factors.
- Theoretical Equilibrium Profile and tectonics.
- Base Level Changes as a common thread between Marine and Non Marine Environment.
- The Sequence Stratigraphic Model Illustrated by Slide Presentation and Individual Exercises.
- Key Sequence Stratigraphic Surfaces and Para-Sequences Correlation.
- Siliciclastics System Tracts.
- LST, Forced Regression, Sequence Boundaries, Turbidites and Basin Floor Fans, LST Prograding complexes and their associated depositional systems.
- Hydrocarbon Exploration Significance of LST.
- Surface and Subsurface Examples and Exercises.

DAY 4:

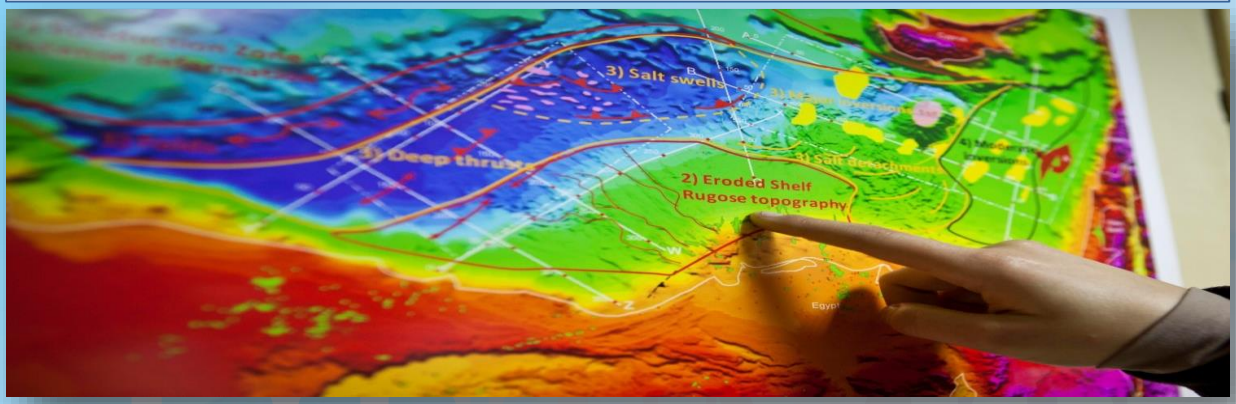
- TST, Ravinment Surface, Transgressive Lag Deposits, Healing Phase Deposits, Maximum Flooding and Condensed Section.
- TST Depositional Systems and their importance from Oil Exploration Point of View (Source, Seal and Reservoir).
- HST, Prograding wedges and Depositional Systems.
- HST Depositional Systems and their importance from Oil Exploration Point of View (Source, Seal and Reservoir).
- Surface and Subsurface Examples.
- Exercises Using a surface and Subsurface Data.
- Exploration and Exploitation Strategies Based on Sequence Stratigraphy.

DAY 5:

- Video-Based Presentation
- Course Rapping and General Exercises

PETROLEUM GEOCHEMICAL: TOOLS FOR EFFECTIVE EXPLORATION & DEVELOPMENT

UETMT-GEO-B-126 | Program Duration: 5 days | Program Level: Advanced



PROGRAM OVERVIEW

Participants will learn geochemical correlations to group's oils into families and relates them to their genetic source and migration time versus the time of trap formation.

TARGET AUDIENCE

- Exploration & Development Geologist
- Geochemists, Geophysicists, Petroleum Systems, Stratigraphers, Sedimentologists,
- Reservoir Engineers, Managers

TARGET COMPETENCIES

- Hydrocarbon Generation
- Petroleum Geochemistry
- Stratigraphic & Structural Traps

PROGRAM OBJECTIVES

- Knowing the source type and quantity, in addition to time of hydrocarbon generation, expulsion and migration direction will help in reduces the exploration risk.
- Reviewing the necessary items is petroleum geochemistry as well as, the effective source, Kitchen area relative to the stratigraphic & structural traps time and space will help in establishing the petroleum system.

PROGRAM CONTENT

DAY 1:

- Objectives and key points in Petroleum Geochemistry
- Introduction
- Source Rock Evaluation
- Quantitave Analysis (Toc)
- Qualitative Analysis (Kerogen Type)
- Exercises

DAY 2:

- Hydrocarbon Maturation
- Time Temperature Controls
- Generation
- Hydrocarbon Expulsion & Migration
- Methods of Maturity Determination
- Rock-Evaluation Analysis
- Vitrinite Reflectance
- Basin –Modeling
- Case Study & Exercise

DAY 3:

- Basics of Gas Chromatography
- Correlation Criteria
- Isotopes
- Oil- Oil- Source Correlations
- Exercises on
- Time of Hydrocarbon Generation
- Time of Hydrocarbon Expulsion and Migration versus Tectonic Events

DAY 4:

- Thermal/ Biogenic Gas
- Biological Markers
- Hydrocarbon Digenesis (Biodegradation, water washing)
- Exercises
- Hydrocarbon Expulsion Migration Accumulation
- Production Geochemistry
- Reservoir Continuity
- Mixed Production
- Prediction of viscosity, API Gravity and Sulfur in Reservoirs

DAY 5:

- Volumetric Calculation
- Exploration and Production Workshops

GEOCHEMICAL TECHNIQUES FOR SOLVING RESERVOIR MANAGEMENT AND FIELD DEVELOPMENT PROBLEMS

UETMT-GEO-B-127

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

- During field development and production, numerous problems can be solved through integration of geochemical, geological, and engineering data (see bullets above). Geochemical approaches for solving these problems are appealing since:
- They provide an independent line of evidence that can help resolve ambiguous geological or engineering data. Example: geochemical data can reveal whether small differences in reservoir pressure reflect the presence of a barrier between the sampling points.
- They are far less expensive than engineering alternatives. Example: geochemical allocation of commingled production costs only 1-5% as much as production logging.
- They have applicability where other approaches do not. Example: geochemical allocation of commingled production can be performed on highly-deviated or horizontal wells and on wells with electrical submersible pumps - well types not amenable to production logging.
- This program explains how geochemistry complements other reservoir management tools. Case studies and exercises illustrate key points. Computer-based exercises illustrate the utility of certain key software packages. Sampling pitfalls and sources of contamination are discussed. The program will NOT cover PVT (Pressure-Volume-Temperature) relationships or equation of state calculations.

TARGET AUDIENCE

Development Geologists, Geophysicists Stratigraphers, Sedimentologists, Petroleum Engineers, Managers, and Technical Personnel

TARGET COMPETENCIES

- Mud Gas Isotopes
- Reservoir Compartmentalization
- Commingled Production
- Progression of Floods
- Fluid Viscosity and Gravity

PROGRAM OBJECTIVES

- Use mud gas isotopes to identify and characterize pay zones.
- Use the Geochemistry of Produced Fluids (Oil, Gas, Water) and/or core material to:
- Identify missed Pay,
- Assess Reservoir Compartmentalization
- Allocate commingled production,
- Identify completion problems (tubing leaks, poor cement jobs, etc.),
- Characterize induced fractures (e.g., fracture height),
- Monitor the progression of floods (water, gas, or steam)
- Predict vertical and lateral variations in fluid viscosity and gravity; identify the geological processes which control fluid properties in a given field.
- Use certain key software packages (including, PeakView, ReserView, Oil Unmixer, Excess Pressure calculations,

PROGRAM CONTENT

- Using fluid compositions as “natural tracers” for tracking fluid movement and compartmentalization.
- Understanding processes that cause compositional differences between fluids (e.g., differences in source facies, source maturity, biodegradation, water washing, evaporative fractionation, etc.).
- Integrating geochemical, geological, and engineering data to identify missed pay, characterize reservoir compartmentalization, allocate commingled production, identify well completion problems, predict fluid viscosity/gravity, and monitor floods.
- Basics of oil, water, gas and mud gas compositional analyses.

ADVANCED PETROLEUM GEOCHEMISTRY

UETMT-GEO-B-128

Program Duration: 5 days | Level: Advanced

TARGET AUDIENCE

Geologists who have some experience using geochemical data.

TARGET COMPETENCIES

- Source-rock Evaluation
- Geochemical Logs
- Organic-facies

PROGRAM CONTENT

- Source-rock Evaluation
- Principles, Geochemical Logs and their Interpretation, and difficulties and errors Commonly Encountered
- Organic-facies Interpretation:
- Examples using Sources-rock Data,
- Gas Chromatography Data,
- and biomarker data;
- Case Studies and exercises;
- Maturity Interpretation: from source rock data and from biomarkers;
- Pitfalls in each techniques;
- Examples, case studies, and exercises;
- Oil/Oil Correlations;
- Oil/Source- Rock Correlations;
- Examples, case studies, and exercises
- Basin Analysis:
- An overview of the use of geochemistry in regional evaluation and basin analysis including both numerical computer simulations and traditional approaches ;
- Basin Evaluation Exercise :
- The class is divided into small groups to analyze a basin for which geological and geochemical data are provided.
- Emphasis is on both the correct interpretation of the geochemical data and on its integration into exploration.

SEDIMENTARY BASINS AND PETROLEUM GEOLOGY OF THE MIDDLE EAST

UETMT-GEO-B-129

Program Duration: 10 days | Program Level: Intermediate

TARGET AUDIENCE

- An Introductory Overview the Geological History and Structural Elements of the Middle East
- Stratigraphers, Sedimentologists, Exploration Senior Geologists & Geophysicists

TARGET COMPETENCIES

- Petroleum Geology
- Sedimentary Basins
- Paleogeography
- Stratigraphy of Infracambrian Rocks

Program CONTENT

A - Geological History

- The Consolidation of the Arabo-Nubian Massif
- Tectonic Stability
- The Hercynian Event
- The Triassic Extensional Phase
- Jurassic and Cretaceous Events
- Cenozoic Events

B-Main Structural Elements

- Sedimentary Basins structure elements
- Arches
- Transform Faults and Normal Faults

C- Infracambrian of the Middle East

- Introduction
- Paleogeography and Geologic History of the Infracambrian

D- Stratigraphy of Infracambrian Rocks

- The Early Paleozoic Quiescent Phase in the Middle East:
- The Sauk Cycle and the Early Part of the Tippecanoe Cycle
- Introduction
- The Early Paleozoic -The Sauk Sequence -of the different regions
- (OMAN, SAUDI ARABIA, JORDAN, IRAQ, KUWAIT, QATAR, UAE, TURKEY, SYRIA)
- The Early-Late Paleozoic of the Middle East: The Kaskaskia Cycle
- Introduction
- The Kaskaskia Cycle in the Middle East
- (OMAN, SAUDI ARABIA, JORDAN, IRAQ, KUWAIT, QATAR, UAE, TURKEY, SYRIA,)
- Paleogeography and Geologic History of the Late Paleozoic Kaskaskia Cycle
- The End of the Paleozoic and the Early Mesozoic of the Middle East:
- The Absaroka Cycle
- The Upper Part of the Absaroka Cycle (Triassic)
- The End of the Absaroka Cycle in Central Arabia
- The Early-Late Paleozoic of the Middle East: The Kaskaskia Cycle
- Introduction
- The Kaskaskia Cycle in the Middle East
- (OMAN,SAUDI ARABIA,JORDAN ,IRAQ ,KUWAIT ,QATAR, UAE, TURKEY, SYRIA,)
- Paleogeography and Geologic History of the Late Paleozoic Kaskaskia Cycle
- The End of the Paleozoic and the Early Mesozoic of the Middle East:
- The Absaroka Cycle
- The Upper Part of the Absaroka Cycle (Triassic)
- The End of the Absaroka Cycle in Central Arabia
- Triassic in (OMAN,SAUDI ARABIA,JORDAN, IRAQ, KUWAIT, QATAR, UAE, TURKEY, SYRIA)
- The Late Mesozoic Part of the Zuni Cycle in the Middle East: The Jurassic
- Introduction
- The Jurassic Section in the region (OMAN,SAUDI ARABIA, JORDAN, IRAQ, KUWAIT, QATAR, UAE, TURKEY, SYRIA, Iran,)
- E-Hydrocarbon Habitat of the Middle East
- Introduction
- Surface Oil and Gas Seeps
- Turkey Iran Iraq Kuwait Saudi -Arabia Bahrain Yemen
- Syria, Lebanon and Jordan
- History of Exploration
- Current Status of Middle East Oil
- Hydrocarbon Productivity

Source Rocks

- Geochemistry of Oil and Gas

Reservoir Rocks

- Infracambrian to Paleozoic
- Triassic and Jurassic
- Cretaceous
- Tertiary

Cap Rocks (Seals

- Timing of Trap Formation
- The Greater Arabian and Omani Basins
- The Zagros Basin

Potential Plays

- Hydrocarbon Habitat of the Greater Arabian Basin
- The Hydrocarbon Habitat of the Zagros Basin
- The Hydrocarbon Habitat of the Oman Basin

SEDIMENTATION IN NON-MARINE SETTINGS

UETMT-GEO-B-130

Program Duration: 5 days | Program Level: Fundamental

PROGRAM OVERVIEW

This 5-days program focuses on methods that can be used to improve the Prediction of Reservoir Size, Shape, Trend and Quality through detailed Analysis of Depositional Environments and Diagenesis.

The Sedimentary Characteristics of each of the principal Clastic Depositional Systems are presented in detail, using examples from Recent Environments, Outcrops, Cores, Wireline Logs and Test/Production Data from Oil and Gas fields in various parts of the world (United States, North Sea/Atlantic, Africa, Middle East, Far East etc).

Practical Exercises are taken from each of the principal Depositional Settings and involve detailed Mapping, Interpretation of Core and Log Characteristics, and Integration of Data from FMI Logs. Emphasis is placed on the Application of Fundamental Sedimentary Principals to actual Subsurface Data so that the participants can immediately use the information in their Exploration and Development Activities.

TARGET AUDIENCE

This Program is essential for Stratigraphers, Sedimentologists, Geologists, Geophysicists, Geoscientists and Engineers involved in the Exploration and Development of Clastic Reservoirs.

TARGET COMPETENCIES

- Genetic Stratigraphic Analysis
- Clastics
- Reservoir Properties
- Reservoir Modelling
- Well Logs and Seismic Data

PROGRAM OBJECTIVES

By the end of this program, participants will be able to know :

- Clastics, and other non-Marine Reservoir
- Example and Exercise focus on Lacustrine Sedimentation – Lake Tanganika (Tanzania)
- Reservoir Properties – Diagenesis for Lacustrine
- Reservoir Modelling – Lake Sandstone Reservoir Modelling
- How to use Well Logs and Seismic Data in this Reservoir
- References on Lacustrine

PROGRAM CONTENT

Genetic Stratigraphic Analysis

- Depositional Architecture
- Basins and Units
- Quantitative Facies Mapping
- Wireline Logs and Conventional Cores
- Seismic and Sequence Stratigraphy
- Recognition of Depositional Systems
- Process-Response Facies Models
- Integrated Genetic Stratigraphy
- Analysis of Clastic Depositional Systems
- Alluvial Fan
- Fluvial
- Eolian
- Lacustrine
- Deltaic
- Shoreline
- Shelf
- Slope and Basin
- Incised Sequences
- Shelf Margins and linked Down-slope Systems
- Characteristic Log Patterns
- Flow Units
- Prediction of Reservoir Size, Shape, Trend, Quality
- How to select Optimum Well Locations
- Lateral continuity and Quality of Seals
- Diagenesis
- Sedimentary Controls on Porosity, Permeability, Saturation
- Reservoir Exploration and Production Case Histories

CLASTIC SEDIMENTOLOGY FOR EXPLORATION

UETMT-GEO-B-131

Program Duration: 5 days | Program Level: Introductory

PROGRAM OVERVIEW

- It covers the basics of Clastic Sedimentology at Scales that are appropriate for both regional Exploration and detailed Reservoir Characterisation.
- The main types of Sedimentary Basin are briefly reviewed in the context of crystal dynamics and Plate Tectonics and the Production and Transport of Clastic Material in different Tectonic, Topographic and Climatic settings are described.
- The course discusses Processes of Erosion, Transport and Deposition of Sediments by water, wind and ice. Sedimentary Fluid Dynamics are related to Sedimentary bed forms which, in turn, are related to the Lamination and Bedding Styles that Characterize most Sandstone. These principles are applied to different Depositional Settings, Focusing on the nature of Sediment Supply, the distribution of Processes in space and time and the resultant Organization of Depositional Facies. Alluvial, Deltaic, Coastal, Shallow-marine, Slope, Deep-marine and Aeolian settings are all discussed in terms of processes, Facies and Facies Organization.
- Particular attention is given to the principles by which Depositional Settings are interpreted using both outcrop and sub-surface data and to the Correlation methods that are appropriate in different settings. Facies organization at a wide range of scales is reviewed in the context of syn-Depositional Tectonics, base-level changes and Sequence Stratigraphy. Discussion of Reservoir Characterization includes an appraisal of deterministic and Stochastic approaches to Modeling, the role of analogue Data and constraints on Sandbody connectivity.

TARGET AUDIENCE

The course is designed for Exploration and Development Geologists, Geophysicists, Reservoir Engineers and Stratigraphers, Sedimentologists .

TARGET COMPETENCIES

- Clastic Sedimentology
- Sedimentary Basin
- Sedimentary Fluid Dynamics
- Depositional Facies
- Outcrop and Sub-surface Data
- Exercises involve interpretation of Seismic, Core and Wireline Log Data, with examples drawn from different Facies, ages and Basinal Settings.

PROGRAM OBJECTIVES

- The large-scale Tectonic setting of the main types of Sedimentary Basin and the relationship between Structural Style and patterns of Sedimentary fill.
- The major tectonic, topographic and Climatic controls on the generation of Clastic.
- The basic Mechanics of Sediment Erosion, Transport and Deposition and resultant Bedforms and Sedimentary Structures. Post-depositional Processes and Products.
- The Processes, Facies and Facies Organization of major Environments of Deposition
  Alluvial, Deltaic, Coastal, Shallow-marine, Slope, Deep-marine, Aeolian & Lacustrine.

The effects of base-level changes and syn-depositional Tectonics on Patterns of Sediment Distribution.

The different approaches to Correlation and the role of Analogues in building Reservoir models in different Depositional Settings.

PROGRAM CONTENT

Types of Sedimentary Basin in different Tectonic Contexts

Review of Sedimentary Environments for each Environment:

Processes

- Facies and Facies Distribution
- Base-level, Topographic and Tectonic Controls on Sediment Distribution
- Sedimentary Geometries, Source Rocks and Reservoir Sand Bodies
- Main constraints on Correlation and Reservoir Modelling

CLASTIC EXPLORATION AND RESERVOIR SEDIMENTOLOGY

UETMT-GEO-B-132

Program Duration: 5 days | Program Level: Intermediate

PROGRAM OVERVIEW

This course has been developed to provide an understanding of the Geometry and Hydrocarbon potential of Clastic Depositional Systems and Facies, and how they are affected by such important features as Basin Configuration, Tectonics and Eustasy. Each of the major Clastic Environments is covered in Terms of Lithology, Facies, Log Response and Reservoir Quality and the Depositional Models related to Seismic Sequences. Important Basin Scale Diagenetic changes are examined to illustrate the effect on Reservoir Quality. The course includes extensive practical exercises.

TARGET AUDIENCE

The Explorationist searching for Sandstone Reservoirs must have a good understanding of the Controls on Sand Distribution and Geometry within various Depositional Settings. The course is aimed at Exploration Geologists and Geophysicists involved in Clastic Exploration Studies.

TARGET COMPETENCIES

- Clastic Depositional Systems
- Basin Configuration
- Depositional Models
- Seismic Sequences
- Basin Scale Diagenetic

PROGRAM OBJECTIVES

- Interpret Clastic Depositional Environments using Data from Cores Images, Cutting Images and Wireline Logs
- Apply new Sequence Stratigraphic concepts to Clastic Reservoirs
- Correlate wells using knowledge of Depositional Environment
- Predict Reservoir size, shape, trend and quality

PROGRAM CONTENT

- **Clastic Facies Analysis and Depositional Environments**
- Principles of Facies Analysis; Depositional Environments and Facies Sequences, Ancient and Modern - Desert, Fluvial, Deltaic, Estuarine, Marine Shoreline, Shallow Marine Shelf and deep Marine Environments; Geometry of clastic Reservoirs; Depositional Modelling and Mapping. Integration of the Models with Tectonics and Seismic Sequence Stratigraphy.
- **Log Response in Clastic Squences**
- Core Logging; Lithology Determination from Wireline Logs; Core to Wireline Log Correlation; Palaeo Environmental Mapping.
- **Clastic Petrography and Diagenesis**
- Detrital Mineralogy and Texture; Diagenetic Petrography - Recognition and Quantification, Cement types, Porosity Destruction and enhancement; Diagenetic/Porosity Modelling and Mapping.
- **Exploration Sedimentology in Play Fairway Mapping and Basin Analysis**
- Methods of Basin-wide Correlation and Layering and the Production of Isochore, N:G, Porosity and Permeability Maps for use in Play Fairway Definition.
- **Assessment in Clastic Reservoirs Volumetric**

APPLIED SEDIMENTOLOGY FOR HYDROCARBON EXPLORATION AND EXPLOITATION

UETMT-GEO-B-133

Program Duration: 5 days | Program Level: Advanced

PROGRAM OBJECTIVES

- Methods and Measurements in Sedimentology
- Conglomerates
- Sandstones
- Mudstones and Claystones
- Limestones
- Evaporites
- Siliceous Rocks
- Pyroclastic Deposits
- Peat and Coal
- Sedimentary Phosphates and Phosphorites
- Ore and non-metallic deposits in sedimentary rocks
- Depositional Systems – General remarks
- Aeolian Depositional Systems
- Glacial Depositional Systems
- Alluvial and Fluvial Depositional Systems
- Lacustrine Depositional Systems
- Deltaic Depositional Systems
- Linear Terrigenous Shoreline Depositional Systems
- Shelf Depositional Systems

TARGET COMPETENCIES

- Sedimentology Measurements Methods
- Conglomerates
- Sandstones
- Mudstones and Claystones
- Limestones

PROGRAM CONTENT

DAY 1: Introduction:

- Historical review- sedimentology and the earth sciences.
- Importance of studying sediments and sedimentary rocks.
- Economic importance
- Academic importance

DAY 2: Sedimentary Processes

- Sedimentary cycle
- Weathering:
  a. Biological weathering
  b. Physical weathering
  c. Chemical weathering
- Transportation and sedimentation
- Post digenetic processes

DAY 3: Sedimentary Rock Type

- Classification of Sedimentary rocks
- Allochothonous Rocks
  a. Rudaceous rocks: classification and nomenclature of Conglomerate and Breccia.
  b. Sandstones: Classification and Nomenclature-Description of Sandstone porosity evolution.
  c. Mudrocks: Nomenclature and classification. Sapropelite, oil shale, oil source.
  d. Claystone: Nomenclature and classification. Ortho-claystone and clay minerals: illite , Montmorillonite, Kaolinite, Glauconite, Chlorite.
  e. Pyroclastic rocks

DAY 4: Autochothonous Rocks.

- Introduction-Classification of autochothonous rocks.
  a. Carbonates.
  b. Coal deposits.
  c. Sedimentary Iron ore.
  d. Phosphates.
  e. Evaporates.

DAY 5: Sedimentary Basins

- Definition – Environment, base level and tectonism.
- Sedimentary basin, classification, Basin evolution.
- Metallogeny and petroleum generation.

3D RESERVOIR MODELING USING PETREL SOFTWARE

UETMT-GEO-B-134

Program Duration: 7 days | Program Level: Intermediate

TARGET AUDIENCE

Experience Reservoir, Development and Exploration Geologists; Geophysicists; Petrophysicists; Log Analysts; Petroleum Engineers

TARGET COMPETENCIES

- Facies Modeling
- Sequential Indicator Simulation
- Truncated Gaussian Simulation

PROGRAM CONTENT

- Facies Modeling Introduction
- Data Analysis (Discrete Properties)
- Sequential Indicator Simulation
- Object Facies Modeling
- Truncated Gaussian Simulation

Exercises

- Petrophysical Modeling
- Electric Log Analysis & Log Interpretation
- Data Analysis (Continuous Properties)
- Gaussian Simulation in Petrophysical Modeling
- Kriging in Petrophysical Modeling
- Petrophysical Modeling Using Secondary Data

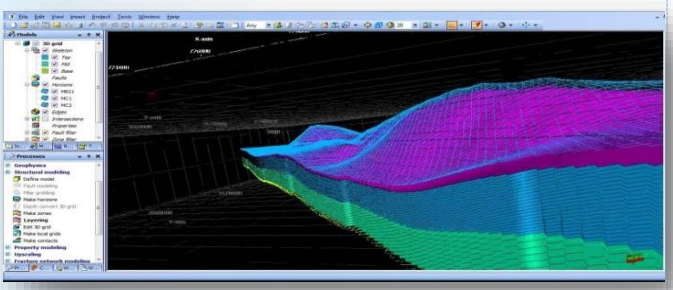
Exercises

- Volume Calculation
- Uncertainty Analysis
- Review Reservoir Modeling steps through Petrel Software

Excises

- Up Scale Well Logs
- Edit Well Log
- Plotting & Printing
- Make Contact
- 2D Survey Manger
- Mis-tie Analysis
- Editing Well Tops

Exercises



3D RESERVOIR MODELING USING PETREL SOFTWARE

UETMT-GEO-B-135

Program Duration: 15 days | Program Level: Advanced

TARGET AUDIENCE

Reservoir, Development and Exploration Geologists; Geophysicists; Petrophysicists; Log Analysts; Petroleum Engineers; and Experienced Technicians.

TARGET COMPETENCIES

- Well Data Integration
- Structural Types & Trap Validation
- Cube Handling
- Seismic Calculation
- Fault Seal Analysis

PROGRAM CONTENT

- Prospect Validation
- Extension Regime (Normal Faults and Associated Tectonic)
- Compressional Regime (Associated Tectonic)
- Fold Structure (Closure Mapping and Quantification)
- Well Data Integration
- Associated Facies Analysis
- Structural Types & Trap Validation
- Cube Handling
- Seismic Calculation
- Fault Seal Analysis
- Project Setting
- Seismic Loading & Import Well Data
- Edit Input Data
- Well Correlation
- Fault Modeling
- Pillar Gridding
- Interpretation Manger
- Fault & Horizon Interpretations
- Exercises
- Make Surfaces & Surface Operation
- Fault Operation
- Set up Scale Plots
- Exercises
- Facies Modeling Introduction
- Data Analysis (Discrete Properties)
- Sequential Indicator Simulation
- Object Facies Modeling
- Truncated Gaussian Simulation
- Exercises
- Petrophysical Modeling
- Electric Log Analysis & Log Interpretation
- Data Analysis (Continuous Properties)
- Gaussian Simulation in Petrophysical Modeling
- Kriging in Petrophysical Modeling
- Petrophysical Modeling Using Secondary Data
- Exercises
- Volume Calculation
- Uncertainty Analysis
- Review Reservoir Modeling Steps through Petrel Software
- Excises
- Up Scale Well Logs
- Edit Well Log
- Plotting & Printing
- Make Contact
- 2D Survey Manger
- Mis-tie Analysis
- Editing Well tops
- Exercises

PETROLEUM SYSTEMS MODELLING FOR EXPLORATION RISK ASSESSMENTS

UETMT-GEO-B-136

Program Duration: 5 days

Program Level: Intermediate

PROGRAM OBJECTIVES

- Geologic Risks in Petroleum Exploration are related to the Traps (Geometry, Reservoir, Seal) as well as to the Petroleum charge risk. While traps are always subjected to the most detailed possible assessments as part of the Exploration Risk Analysis, this is not always the case for charge Risking, even though it can easily be shown that the Geologic Risking is often dangerously incomplete without these Risk Assessments.
- The Technology, which is used to investigate charge Risks, is Petroleum Systems Modelling in which Basin, Play or Prospect Scale Geologic Models are created by interpreting and Mapping key Stratigraphic Units and Facies, and Subsequently processed, which can calculate the processes of Hydrocarbon Generation, Expulsion, Migration and Loss through Geologic time.
- In this course, an introduction to the Technology, the Data and commonly Performed tasks is given in order to illustrate the Role of the Technology in Exploration Risking as well as in Hydrocarbon Resource Assessments.

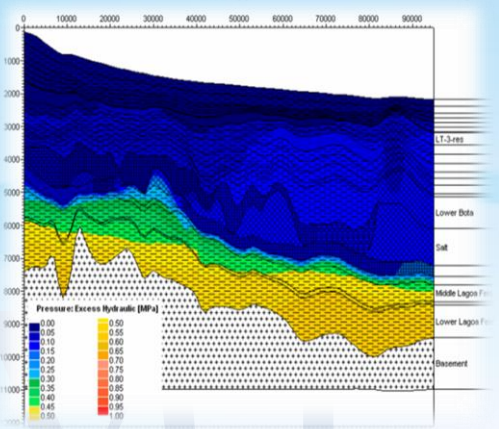
- Applications cover the entire range of Exploration phases from very early work in frontier areas to assessments in mature Production areas.

TARGET AUDIENCE

Basin Modeling, Exploration Geologists from recent graduates to experienced Explorationists who need an update to the Technology and its applications as well as of the latest Developments in the field of charge risking and Petroleum Systems Modeling

TARGET COMPETENCIES

- Geologic Risks
- Traps
- Petroleum charge risk
- Exploration Risk Analysis
- Petroleum Systems Modelling



PROGRAM CONTENT

- Typical questions which are addressed include: Have Hydrocarbons been generated in a Basin? Where were the Hydrocarbons generated? When were the Hydrocarbons generated? Could the generated Hydrocarbons have migrated to my Prospect? What are the possible Properties of the Hydrocarbons which could have migrated to my prospect?
- Examples will be shown which will illustrate the importance of asking each of these questions and key points and topics for exercises will then be:
- What is Petroleum Systems Modelling and which role does it play in Exploration Risking Procedures
- When can different Modelling be applied and what are the requirements & benefits
- What Data is needed for Petroleum Systems Modelling
- What are the workflows from input through Processing to output
- How are the models Calibrated
- What are the results that are obtained for charge risk analyses, i.e. for Hydrocarbon Generation, Migration, Accumulation and Loss
- What do I need to know about Petroleum Properties and PVT Modeling
- How can the Technology be used for Pressure Modeling
- How can sensitivity analyses be performed
- What are the limitations of the applications, for example if data is sparse or if the Geology is complex
- Finally, a review of advanced applications will be given, such as using Petroleum Systems modeling in thrust belts, advanced risking and sensitivity analysis.

PROBABILISTIC MODELING OF PETROLEUM RESERVOIRS

UETMT-GEO-B-137

Program Duration: 5 days | Program Level: Intermediate

TARGET AUDIENCE

Geologists, Geophysicists, Petroleum Engineers engaged in Exploration and Production.

TARGET COMPETENCIES

- Structural Modeling
- Sedimentary Modeling
- Petrophysical Modeling
- Geostatistics Elements
- Structural Simulation
- Sedimentary Simulation

PROGRAM CONTENT

The Geostatistical Approach

Main Steps of Reservoir Model Building

- Structural Modeling (Geometry)
- Sedimentary Modeling (Architecture)
- Petrophysical Modeling (Filling)

EXERCISE: Statistical Analysis of Spatial Data

Geostatistics Elements

- Spatial Correlations (Variogram)
- Optimal Estimation (Kriging)
- Conditional Simulations (Equiprobable Realizations)

EXERCISE:

- Porosity and Permeability Variography

Structural Simulation / Uncertainties

- Different Simulated Surfaces: Top, Base, Faults, Contacts
- Seismic and Wells Combination

EXERCISE:

- Geostatistical Regression

Sedimentary Simulation / Uncertainties

- Different Scales of Simulation: Environment, Sedimentary Bodies, Petro facies
- Main Computing Methods: Object / Truncated Gaussian / Sequential

Petrophysical Uncertainties

- Porosity Simulation (Sequential / FFT Methods)
- Seismic Integration
- Permeability / Saturation Simulations Constrained by Porosity Realizations
- Optimal selection of realizations for Dynamic Simulation (Experimental Designs)

CLASTIC, CARBONATE RESERVOIRS & RESERVOIR CHARACTERIZATION USING DATA INTEGRATION

UETMT-GEO-B-138

Program Duration: 5 days | Program Level: Advanced

TARGET AUDIENCE

All Exploration Team members and Leaders including Geologists, Geophysicists, Geochemists, Analysts, Reservoir Engineers, Economists, Planners and Managers who make Business decisions based upon Exploration Data.

TARGET COMPETENCIES

- Clastic Depositional Environments
- Sequence Stratigraphic concepts
- Clastic Reservoirs
- Depositional Architecture

PROGRAM CONTENT

- Interpret Clastic Depositional Environments using data from Cores, Cuttings and Wireline Log (Including FMI)
- Apply new Sequence Stratigraphic concepts to Clastic Reservoirs
- Correlate Wells using knowledge of Depositional Environment
- Predict Reservoir size, Shape, Trend and Quality
- Depositional Architecture
- Basins and Units
- Wireline Logs and Conventional Cores
- Seismic and Sequence Stratigraphy
- Recognition of Depositional Systems
- Process-Response Facies Models
- Integrated Genetic Stratigraphy
- Analysis of clastic Depositional Systems
- Alluvial Fan
- Fluvial
- Eolian
- Deltaic
- Shoreline
- Shelf
- Deep-water Systems
- Incised Sequences
- Shelf Margins and linked Downslope Systems
- Characteristic Log Patterns
- Flow Units
- Prediction of Reservoir Size, Shape, Trend, Quality
- How to select optimum Well Locations
- Lateral Continuity and Quality of Seals
- Sedimentary Controls on Porosity, Permeability, Saturation
- Recognize basic Characteristics of the Carbonate Depositional System important to Carbonate Reservoir Development
- Understand the Geologic and Engineering Characteristics of Carbonate Pore Systems
- Recognize the Nature of Carbonate Porosity modification by diagenesis and the role of sea level and climate in Porosity modification and gross Reservoir Heterogeneity
- Carbonate Platform Types
- Carbonate and clastic Facies Models using Petrel Software
- Basic concepts of Sequence Stratigraphy including Eustasy, relative sea level, accommodation model, and Sequence Stratigraphy as a Predictive tool
- Relationship of Stratigraphic Patterns to changes in Subsidence rates as driven by regional and earth scale Tectonic Processes
- Sequence Stratigraphic Models including the ramp, the rimmed Shelf, the Escarpment Margin, the Isolated Platform and the mixed Carbonate-siliciclastic Shelf
- Carbonate Reservoir Modeling
- Exercises from actual data sets on Petrel Software

FRACTURED RESERVOIR DEVELOPMENT

UETMT-GEO-B-139 | Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

In this 5 day intensive course, the Fundamental concepts of Mechanics and Fluid Flow in Fractured Reservoirs will be discussed, together with the origin and identification of Fractures, and Modern practical Applications and Numerical Simulation methods.

TARGET AUDIENCE

The course is intended for staff with experience with Exploration and Production activities. Target Categories of Staff include Geologists and Engineers involved with Exploration and Development of Fractured Reservoirs.

The course is also useful for Team Leaders, Production Staff, IT Staff and Support Staff working with Fractured

TARGET COMPETENCIES

- Fractured Reservoirs
- Mechanics of Fracture Networks
- Fractured Reservoir Identification

PROGRAM OBJECTIVES

At the end of the course participants will appreciate the key Economics and main issues of Fractured Reservoirs, understand the mechanics of Evolution of Fracture Networks, their Geometries and Transport Properties in different Tectonic settings, stress fields and Fluid Pressure Regimes, and have an Awareness of Modern methods and Practices for Fractured Reservoir Identification, Characterization and Development in Siliciclastic, Carbonate and Unconventional Domains. Reservoirs in Development and Production

PROGRAM CONTENT

Day 1 : Basic Principles

- Course Introduction
- Overview of Fractured Reservoirs and main issues in their Development
- Basic Principles of Stress in Rocks and Mechanics of Rock Fracture
- Classes of Fracture Networks in different Tectonic Environments
- Fractured Reservoir Geomechanics: Exercise

Day 2: Fluid Flow in Fracture Networks

- Basic Principles of Fluid Flow in Fracture Networks
- Fluid Flow in Fractures under Changing Stress States
- Creation and Analysis of Models of Fracture Networks
- Fracture Connectivity, Representative Volume, Up-scaling
- Simulation Techniques of multiphase Flow in Fractured Reservoirs
- Fracture Sealing and Evolution of vein Networks

Day 3: Carbonate Fractured Reservoirs

- Identification and Analysis of Fractures in Wireline Logs
- Outcrop studies of Fracture Networks in Carbonate - Sampling, Analysis
- Fracture Corridors, Geophysical Techniques of Fracture Characterization
- Case Studies of Fractured Reservoir Development in Carbonates
- Analogue Modeling of Fractured Reservoirs in Carbonates: Exercise

Day 4: Siliciclastic Fracture Reservoirs

- Simulation of Fracture-matrix Systems in Sandstone Reservoirs
- Optimizing Well Trajectories in Fractured Reservoirs
- Best Operational and Modeling Practices with complex Fracture Systems
- Fractured Reservoirs in over Pressured Environments
- Structural Diagenesis Case Studies

Day 5: Unconventional Fractured Reservoirs

- Development of Fractured Tight Gas Reservoirs
- Fracture Systems in Shale Gas Reservoirs
- Hydraulic Fracturing of Unconventional Reservoirs
- Hydraulic Fracture Propagation in Complex Heterogeneous Rocks
- Quiz on the main topics of the course and conclusion

STRATIGRAPHIC RESERVOIR CHARACTERIZATION FOR PETROLEUM GEOLOGISTS, GEOPHYSICISTS, AND ENGINEERS

UETMT-GEO-B-140

Program Duration: 10 days | Program Level: Intermediate

TARGET AUDIENCE
Geologists, Geophysicists and Reservoir Engineers

TARGET COMPETENCIES
- Porosity and Permeability
- Diagenesis and Reservoir Quality
- Seismic Porosity Measurement
- Capillary Pressure

PROGRAM CONTENT

Geologic Controls on Reservoir Quality
Definitions
Examination and Measurement of Porosity and Permeability
- Direct Observation
- Direct Measurement

Primary grain-size control on Reservoir Quality
Diagenesis and Reservoir Quality
Low-unit Characterization for Correlation and Upscaling
- Flow units that combine geological and Petrophys Properties

Capillary Pressure and its Applications to Reservoir Characterization
- Principles of capillary pressure
- Routine laboratory measurement of capillary Pressure
- Relationships among porosity, permeability, pore-throat size,
- Relations among capillary pressure, grain-size distribution, and water saturation (Sw)
- Conversion of air–Hg capillary-pressure measurements to Reservoir conditions
- Free water level and fluid saturations in a Reservoir
- Capillarity and seal capacity
- Pore-throat size and capillary pressure from Conventional
- Core-analysis data

Seismic Porosity Measurement

Fluvial Deposits and Reservoirs
Introduction
Braided fluvial (river) deposits and reservoirs
- Processes and Deposits
- Reservoir Examples
- Murdoch field, North Sea
- Rhoude el Baguel field, Algeria
- Prudhoe Bay field, Alaska

Meandering-river deposits and reservoirs
- Processes and Deposits
- Reservoir Examples
- Rulison field, Colorado
- Stratton field, Texas

Incised-valley-fill deposits and reservoirs
- Processes and Deposits
- Reservoir Examples

Combination fluvial reservoirs

Eolian (windblown) Deposits and Reservoirs
Introduction
Processes and Deposits
Reservoir Examples
Leman Sandstone Gas Reservoirs, North Sea
Rough Gas field, North Sea
- Pickerillfield, North Sea
- Painter Reservoir field, Wyoming
- Tensleep Sandstone, Wyoming, USA
- Location and Outcrop Characteristics
- Outcrop 3D Geologic Model
- Application to Tensleep Subsurface Reservoirs

Nondeltaic, shallow marine deposits and reservoirs
Introduction
Shallow Marine Processes and Environments
Shallow Marine Deposits
- Offshore bars or sand ridges
- Shore face par sequences and successions
- Marine-dominated, incised-valley-fill deposits
- Significance of the origin of Deposits

Shallo Marine Reservoirs
Barrier Island Deposits and Reservoirs
- Complex processes and deposits

Deltaic deposits and reservoirs
Introduction
General deltaic processes, environments (physiographic zones), and types

River-dominated delta Deposits and Reservoirs
- Processes and Deposits
- Reservoir Example: Prudhoe Bay field

Wave-dominated Deltas
- Processes and Deposits
- Reservoir example: Budare field

Tide-dominated Deltas
- Processes and deposits
- Reservoir example: Lagunillas field

Deepwater Deposits and Reservoirs
Introduction
- Definitions
- Global deepwater resources

Sedimentary Processes operative in Deep water
Depositional Models
Architectural Elements of Deepwater Deposits
- Sheet Sandstones and Reservoirs
- Levee Deposits and Reservoirs
- Ram Powell L sand Reservoir

NATURALLY FRACTURED RESERVOIRS: GEOLOGIC AND ENGINEERING ANALYSIS

UETMT-GEO-B-141

Program Duration: 5 days | Program Level: Intermediate

PROGRAM OVERVIEW

This course covers geologic and engineering concepts, methodology, and technology used to characterize, evaluate and manage naturally-fractured reservoirs. Applications and limitations of geologic and engineering procedures and tools are discussed. Field examples and case studies demonstrate the importance of integrated geologic and engineering studies in developing effective, economical reservoir management strategies for different types of reservoirs.

PROGRAM OBJECTIVES

- Detect and predict subsurface natural fracture occurrence and intensity from cores and well logs
- Determine fractured rock properties affecting reservoir performance
- Design and analyze pressure transient tests in naturally-fractured reservoirs
- Evaluate reservoir performance in naturally-fractured reservoirs
- Develop and apply numerical simulation models to fluid-flow in naturally-fractured reservoirs
- Apply coupled geomechanics/fluid-flow behavior to reservoir management strategies in naturally fractured reservoirs
- Evaluate the impact of natural fractures on hydraulic fracture stimulation

TARGET COMPETENCIES

- Fractured Rock Properties
- Pressure Transient Tests
- Reservoir Performance
- Numerical Simulation Models

TARGET AUDIENCE

Engineers and Geoscientists interested in a multi-disciplinary approach in evaluating and predicting the overall effect of natural fractures on subsurface fluid-flow and subsequent reservoir performance

PROGRAM CONTENT

- Characterization of natural fractures and fracture systems
- Influence of mechanical stratigraphy and structure on fracture development
- Detection and prediction of subsurface natural-fracture occurrence and intensity from cores and well logs
- Fractured rock properties affecting reservoir performance
- Classification of naturally-fractured reservoirs with reservoir examples and potential production problems
- Fluid-flow in naturally-fractures reservoirs
- Well performance and well testing in naturally-fractured reservoirs
- Reservoir performance in naturally-fractured reservoirs
- Numerical simulation of fluid-flow in naturally-fractured reservoirs
- Geomechanics/fluid-flow
- Behavior of naturally-fractured reservoirs
- Stimulation of naturally-fractured reservoirs
- Effects of natural fractures on reservoir permeability anisotropy, drainage area and water flood sweep efficiency

QUANTITATIVE MODELLING AND ITS APPLICATION TO STRATIGRAPHIC INTERPRETATION AND SEISMIC RESERVOIR ASSESSMENT

UETMT-GEO-B-142

Program Duration: 5 days | Program Level: Advanced

PROGRAM OBJECTIVES

This course is based on theory that mathematically relates log observations of rock type, porosity, and fluid content to compressional and shear wave velocity.

With the basic model, participants are able to predict the effect of lithology or fluid variation on the seismic trace, inverted seismic trace, or AVO measurement.

The approach is suitable not only for seismic interpretation, but for log editing and creation of synthetic logs.

The effect of bed thickness and tuning models, approaches to seismic inversion, and applicability of AVO studies are reviewed based on the basic rock property model.

An interpretation model is presented that incorporates geological and geophysical mapping procedures for reservoir evaluation and stratigraphic mapping.

This three day school concentrates on linking rock property information from the borehole logs to seismic observations. The course considers the log input and the basic seismic trace, seismic attributes, inversion of seismic traces, and amplitude versus offset measurements. No single seismic or log measurement is treated as the "truth", instead the merits of each observation are considered. Basic mathematical concepts are simplified to monograms or spreadsheets that are available with the course notes in .wks format. These ensure that the concepts of the course are replicable in the office of the participant. The course includes videos, exercises, spreadsheet analysis, and lecture.

TARGET COMPETENCIES

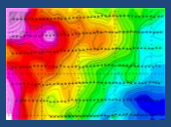
- Rock Type
- Porosity
- Fluid
- Compressional and Shear Wave Velocity

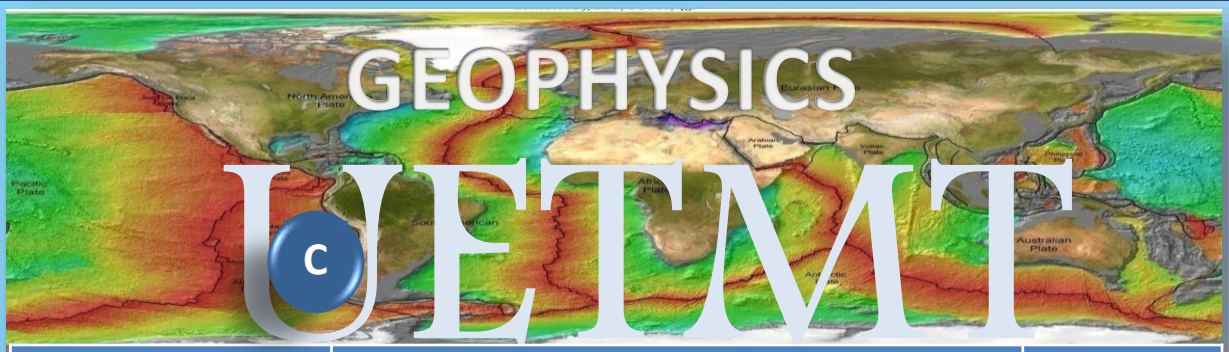
TARGET AUDIENCE

Geologists, Reservoir Engineers and Geophysicists with a desire to upscale from log and reservoir observations to the information content of the seismic trace.

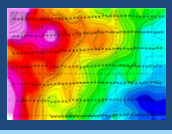
PROGRAM CONTENT

- Levels of Seismic Stratigraphic Interpretation: Checklist for prospect evaluation;
- Rock Properties: The ideal sandstone, porosity substitution, fluid substitution, shaley sands?- mineral solutions;
- Upscaling from Logs to the Seismic Trace: Wavelet derivation and characteristics, log editing, model based and simple recursive inversion;
- Quantitative Models: Zero offset tuning curves, resolution versus detection, lateral resolution, high and low velocity reservoirs, gas effect, porosity effect,
- AVO as a fluid indicator AVO as a rock type indicator, stack versus zero offset interpretation, interpretation techniques: Walthers Law, attribute maps, genetic increment maps, techniques for net pay calculation, checklist for integrated interpretation.





NO/CODE	COURSE TITLE	COURSE DURATION
UETMT-GEOPH-C-101	Seismic Survey and QC	5 days
UETMT-GEOPH-C-102	Quantitative Seismic Interpretation (QSI)	10 days
UETMT-GEOPH-C-103	Seismic Imaging of Subsurface Geology	5 days
UETMT-GEOPH-C-104	Principles of 3D Seismic Interpretation and Applications	5 days
UETMT-GEOPH-C-105	Practical Seismic Interpretation (Workshop)	5 days
UETMT-GEOPH-C-106	2D and 3D Seismic Data Interpretation For the Practicing Explorationist	5 days
UETMT-GEOPH-C-107	2D and 3D Seismic Data Acquisition for the Practicing Explorationist	5 days
UETMT-GEOPH-C-108	2D and 3D Seismic Acquisition and Design (Workshop)	10 days
UETMT-GEOPH-C-109	AVO and Seismic Attributes: Principles and Application	5 days
UETMT-GEOPH-C-110	AVO, Inversion, and Attributes: Principles and Applications	5 days
UETMT-GEOPH-C-111	Principles of Seismic Inversion	5 days
UETMT-GEOPH-C-112	Seismic Inversion Methods — (an Overview)	2 days
UETMT-GEOPH-C-113	Applications of Geophysical Inversion and Imaging	5 days
UETMT-GEOPH-C-114	Advanced Seismic Stratigraphy: A 2D, 3D Sequence and Wavelet Analysis (Workshop)	7 days
UETMT-GEOPH-C-115	Analyzing Seismic Stratigraphy through Modeling	3 days
UETMT-GEOPH-C-116	Seismic Survey Design, Data Acquisition, and Processing	10 days
UETMT-GEOPH-C-117	The Velocity Model and Seismic Depth Conversion (Intermediate)	3 days
UETMT-GEOPH-C-118	The Velocity Model & Seismic Depth Conversion (Advanced)	10 days
UETMT-GEOPH-C-119	Velocity as an Interpretation Tool	5 days
UETMT-GEOPH-C-120	Seismic Velocity Analysis	5 days



SEISMIC SURVEY AND QC

UETMT-GEOPH-C-101

Program Duration: 10 days | Program Level: Fundamental

TARGETED COMPETENCIES
- Seismic Data Acquisition
- Field Parameter Determination
- Field Parameter Design
- Quality Control

PROGRAM CONTENT

PART 1: SEISMIC DATA ACQUISITION LAND/ MARINE AND QC

1. INTRODUCTION
- Comparison of 2D and 3D

2. SEISMIC SOURCES
- Dynamite: selection of charge and depth
- Vibroseis: principle of correlation, mechanic, sweep types
- Air gun: principle; ocean bottom cable: principle, operation
- Radio telemetric system

3. FIELD PARAMETER DETERMINATION – 2D and 3D
- Noise analysis: arrays, noise test, frequency attenuation by arrays, random noise attenuation by arrays, subsurface mapping, stack array principle, offset redundancy.
- Signal analysis: temporal and spatial resolutions, temporal and spatial aliasing, array length and group interval, NMO application and NMO stretching, minimum and maximum offsets for velocity and NMO resolutions, migration aperture, sweep design and selection of optimum sweep

4. FIELD PARAMETER DESIGN – 3D
- General considerations, survey term, fold, survey size, fold and offset distributions, fold and azimuth distributions

5. FIELD TECHNIQUES – 3D LAND
- The basic method, seis.square. seis. Loop, various swaths, bottom patches

6. FIELD TECHNIQUES – 3D MARINE
- Streamer feathering, multi streamer and multi source, circular shooting. Radial shooting

7. DESIGN STEPS – 3D
- Abbreviation of terms, 2D and 3D equations, required data, spreadsheet

8. QUALITY CONTROL - QC

9. WORKSHOPS AND EXERCISES

PART 2: SEISMIC DATA PROCESSING AND QC

INTRODUCTORY REVIEW
Identification of events on field records

PROCESSING SEQUENCE
SIGNAL ANALYSIS
Discrete Time Signal, Fourier Analysis, Correlation, Convolution, Temporal Aliasing, Temporal Resolution, Stacking

DIGITAL FREQUENCY FILTERING
- Filter Design Consideration, Choice of Optimum Filter, Frequency-Wave number (F-K), domain, spatial aliasing, and spatial resolution.

SEISMIC VELOCITIES
- Velocity determination from Wells and Seismic Data, Significance of RMS Velocity, Velocity Searching Techniques, Velocity Accuracy, NMO Application, NMO Stretch.

STATIC
- Datum Static, Need, Uphole and Refraction Shooting, Static Computation and Application; Residual Static, Surface Consistent, CDP Consistent.

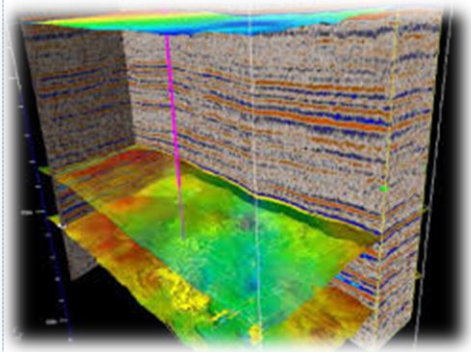
DECONVOLUTION
- The Need, Deconvolution Filter Design, Time and Frequency Domains, Whiting and Unwhiting Deconvolution Filters, Deconvolution by Polynomial Division, Statistical Approach to Deconvolution Filter, Practical Application.

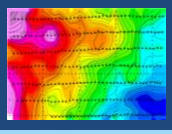
MIGRATION
- Migration, F-K Migration, Partial Prestack Migration (PSMP) or Dip Move Out (DMO), Prestack Principles, Wavefront-Maximum Convexity Curve Migration, Migration Stack, Wave-Equation Migration.

SPECIAL PROCESSING
- Random Noise Attenuation, Multiple Attenuation, Wavelet Processing;
- Amplitude Processing, Bright and Flat-Spot Analysis, Thin Layer Analysis,
- Velocity Processing, Frequency Processing, Slant Stack Processing (Tau-P),
- Modeling

QUALITY CONTROL – QC

EXERCISES AND WORKSHOPS





QUANTITATIVE SEISMIC INTERPRETATION (QSI)

UETMT-GEOPH-C-102	Program Duration: 5 days	Program Level: Advanced

PROGRAM OVERVIEW

This course provides an understanding of the evolving role of Seismic Petrophysics through the use of amplitude variations with offset or angle (AVO/AVA), Attributes, and Inversion Techniques. Understanding Rock Physics and the behavior of the Propagating Seismic Waves represents an integral part of the course, especially in the context of specific applications including enhanced Seismic Interpretation, Rock and Fluid Characterization, including Hydrocarbon Identification and Quantification, Fracture identification, and Stress/ Geomechanical Analysis. Course concepts are enhanced by numerous practical exercises and case studies.

TARGET AUDIENCE

Petrophysicists, all Geologists, Reservoir Engineers, Geophysicists, Core Analysts or anyone with a year's experience with Logs or Formation Evaluation.

TARGETED COMPETENCIES:

- Fundamentals of Seismic Wave Propagation
- Elastic Properties
- AVO/AVA Analysis
- Seismic Attribute Analysis
- Seismic Survey Design

PROGRAM OBJECTIVES

- The Fundamentals of Seismic Wave Propagation and specific Attributes of Seismic measurements toward enhanced Interpretation and Petrophysics;
- The benefits and Cons of various Attributes in various Facets of Investigation, including Stratigraphy/ Sedimentology, Structural Geology and Geomechanics, and Seismic Petrophysics;
- How to determine Elastic Properties from AVO/AVA Analysis for Fluid and Lithologic Discrimination;
- How to integrate Well Data through Seismic inversion Techniques; and
- The role of Seismic Attribute Analysis and related Techniques in understanding Risk elements from Exploration, Drilling and Completion, and Development Stages.

PROGRAM CONTENT

Day 1

• Introductory Exercises

-Interpretation Exercises

• Review of the Seismic Process

-Review of Seismic Fundamentals, including Rock Physics and aspects of Propagating Seismic Waves

• General Seismic Interpretation

- Review of Seismic Interpretation Techniques

Day 2

• Seismic Attributes

-Seismic Attribute Analysis, including Discussion of various Attribute Types and multi-Attribute Analysis.

• AVO Analysis

- An in-depth Investigation into amplitude versus offset (angle) Analysis, including Fundamental principles, applications, and Pitfalls.

Day 3

• Borehole Seismology

- Borehole Seismic measurements and Techniques, and Integration into the Seismic Petrophysical Investigations

• Seismic Inversion

- Examination of techniques and benefits of Seismic Inversion, including Prestack (Elastic) versus Poststack Inversion, deterministic versus Stochastic (Probabilistic) Inversion, and resultant products, including extraction of Physical Rock and Fluid Properties.

Day 4

• Enhanced Sedimentologic/ Stratigraphic Interpretation from Seismic Attributes

-Extracting more information of the Sedimentalogic/ Stratigraphic System, including Wavelet versus Layers, Seismic Geomorphology, Intraformational variations and Facies Analysis, and 3D Wheeler Diagrams.

• Enhanced Fault Interpretation from Seismic Attributes

- Extracting more fault information from Seismic Data by understanding and utilizing specific Attributes for enhancing Structural Interpretations, from Regional studies to Role in Reservoir Characterization, including timing and Geometry, Seal Characteristics.

Day 5

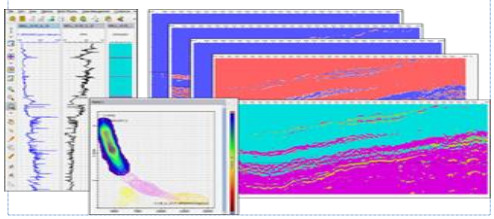
• Seismic Anisotropy Analysis

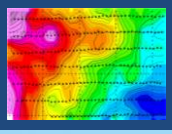
- Fracture ID—Seismic Anisotropy analysis and Fracture Mapping from Seismic Data, and Integration with other datasets, such as image Log and Core Data.

- Stress Analysis from Seismic Data—Extraction of Stress Data for Prospect seal risking, Wellbore Stability Investigations, and Reservoir behavior during Production.

• Reservoir Characterization and Understanding Risk

- Summary discussion of the role of Seismic Data and Analysis in integrative studies (Well, Core, other Datasets) to understand better the Reservoir Properties and behavior and Risk uncertainties from Exploration and Prospect Generation, through Drilling and Completion, to field development and enhanced Recovery.





SEISMIC IMAGING OF SUBSURFACE GEOLOGY

UETMT-GEOPH-C-103

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

Proper interpretation of seismic data requires an understanding of the underlying seismic model. Top-notch interpreters understand the manner in which seismic data are affected by earth structure and stratigraphy, as well as by approaches used to acquire, process, and image them. By understanding when a seismic section is a good representation of a geologic cross-section, the interpreter can assess the reliability of his seismic data. Furthermore, by appreciating the value of seismic modeling and inversion, he can utilize those technologies to verify the reasonability of his interpretation and to achieve additional insight into subsurface geology. This course also discusses analysis techniques such as Fourier spectra to enable him to evaluate the potential of his data and to communicate with specialists who use these techniques. This course introduces modern seismic imaging technology by providing an integrated approach to seismic modeling, acquisition, processing, and migration technologies. The material is presented in sufficient detail to enable the graduate to determine whether an existing data set meets his exploration needs and, if it does not, to work with specialists to reprocess it or to acquire a new data set that meets his needs. The lectures are complemented by many case-history examples and by a large number of hands-on exercises.

TARGET AUDIENCE

Seismic interpreters, geologists, and exploration managers who need to understand seismic exploration technology and technology specialists who need cross training

TARGETED COMPETENCIES

- Seismic Acquisition Processing
- Seismic Acquisition Modeling
- Seismic Survey Design
- Seismic Attribute Analysis

PROGRAM OBJECTIVES

- Communicate effectively with specialists in seismic acquisition, processing, and modeling
- Assess the effects of earth filtering, data acquisition, and processing on seismic sections
- Appreciate seismic data quality criteria: resolution, signal-to-noise ratio, and image integrity
- Understand the methodology of seismic survey design and the reasons for common data processing and imaging streams.
- Recognize whether appropriate technology has been applied to your exploration project
- Be aware of the trade-off between data quality and cost

PROGRAM CONTENT

- Basic seismology: reflections, refractions, diffractions
- Seismic Data Acquisition: hardware, common midpoint, spread geometries
- Seismic analysis: amplitude and phase spectra, sampling in time and space
- Synthetic seismogram generation
- Stratigraphic analysis: vertical resolution and its enhancement
- Amplitudes – their significance and preservation
- Improving data quality through data processing
- Seismic modeling of geologic structures
- Migration : what it accomplishes, when to use expensive prestack, depth, and wave equation approaches
- Lateral resolution
- 3-D seismic exploration: benefits, survey design and processing
- Recent advances in seismic prospecting: converted waved, time lapse, AVO

PRINCIPLES OF 3D SEISMIC INTERPRETATION AND APPLICATIONS

UETMT-GEOPH-C-104

Program Duration: 5 days | Program Level: Intermediate

PROGRAM OVERVIEW

Companies that use 3-D seismic surveys have found them to be an extremely prudent investment: Costing less than a few cents/barrel of oil, such surveys not only reduce the risk in exploration and production, they also help increase production from existing fields. Certainly, the degree of "success" of a 3-D seismic interpretation depends strongly on the techniques employed to acquire, process, and analyze the data. But this course also emphasizes an aspect that is just as important--the principles and pitfalls. 3-D interpretation is a multi-discipline team effort. Therefore, this course will benefit all geo-science professionals and not just the geophysical interpreter.

EXERCISES: Principles of interpretation using horizontal slice data utilizing reservoir models, 3-D survey design, and thickness estimation from amplitude of seismic data using a reservoir model, along with other exercises on seismic wave propagation properties related to 3-D

TARGET AUDIENCE

Interpreters, geophysicists, geologists, technical support personnel, seismic processors, exploration and data processing managers, and data acquisition managers

TARGETED COMPETENCIES

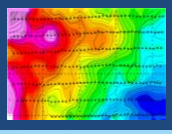
- Principles of Stratigraphic
- Structural Interpretation
- Geo-Statistical Kriging
- S-Waves in Fractured Reservoir
- Reservoir Characterization

PROGRAM OBJECTIVES

- Apply principles of stratigraphic and structural interpretation
- Use Geo-statistical Kriging
- Apply S-waves in fractured reservoir
- Estimate thickness of thin beds in 3-D
- Make use of reservoir characterization and compartmentalization tools
- Conduct risk analysis of 4-D

PROGRAM CONTENT

- Overview of 3-D data acquisition and processing
- Principles of 3-D migration, horizontal and horizon slices, and modeling
- 3-D seismic technologies
- Reduced risk using 4-D
- Successful applications of 3-D in E&P
- Geostistical Kriging and Variorgram
- Anisotropy, 3-D, 3-C, S-waves
- Principles of stratigraphic & structural interpretation
- Application of seismic attributes
- Thickness from amplitude, frequency
- Reservoir management using 3-D
- Summary of 3-D case histories from around the world
- Participants should have taken Seismic Survey Design, Data Acquisition and processing course; AVO and Seismic Attributes or equivalent.
- Participants are encouraged to bring data examples or displays, and problems related to this course for one-on-one or group discussion.



PRACTICAL SEISMIC INTERPRETATION (WORKSHOP)

UETMT-GEOPH-C-105

Program Duration: 5 days | Program Level: Advanced

PROGRAM OBJECTIVES

The participants will be introduced to seismic data interpretation. Petroleum habitat, exploration economics and management decision criteria will be described to them. Specific geologic features recognizable on seismic sections will be outlines. How to follow events along a section, as well as timing, picking and mapping them will be taught. The use of seismic sections in interpreting geologic history will be illustrated.

TARGET AUDIENCE

Geoscientists who want to broaden their perspective and capabilities in seismic interpretation.

TARGETED COMPETENCIES

- 3-D Interpretation
- Velocity Effects
- Horizontal Velocity Variations
- Interpretation of Thrust and Wrench Features
- Interpretation of Diapiric and Sedimentary Features
- Mechanics of Interpretation
- Structural and Waveform Modeling
- Seismic Waveform Analysis

PROGRAM CONTENT

Relating CMP data and Geologic sections

- Reflector curvature effects and diffractions
- Migrated versus unmigrated sections
- Acquisition and processing pitfalls
- 3-D interpretation
- Velocity effects
- Effect of vertical velocity gradient
- Conversion to depth and depth sections
- Horizontal velocity variations
- Velocity pitfalls
- Use of structural style as an interpretation aid
- Evidences of faulting
- Interpretation of thrust and wrench features
- Interpretation of diapiric and sedimentary features
- Mechanics of Interpretation
- Structural and waveform modeling
- Seismic waveform analysis
- Uses of synthetic seismograms
- Tying well data to seismic sections
- Correlation pitfalls
- Seismic stratigraphy
- Recognition of eustatic effects
- System tracts
- Seismic facies recognition
- Hydrocarbon indicator analysis
- Synthetic seismic logs
- Interactive interpretation
- 3-D capabilities
- VSP and its uses
- Shear-wave interpretation
- Variation of amplitude with offset
- Interpretation pitfalls
- Development and production seismology

2D AND 3D SEISMIC DATA INTERPRETATION FOR THE PRACTICING EXPLORATIONIST

UETMT-GEOPH-C-106

Program Duration: 5 days | Program Level: Advanced

TARGET AUDIENCE

Explorationists who are engaged in seismic interpretation. Seismic processors who wish to be exposed to the interpretation techniques

TARGETED COMPETENCIES

- Seismic Interpreter
- Interactive tracking 2D/3D
- Structure Interpretation
- Seismic Stratigraphy
- Statigraphic Interpretation

PROGRAM CONTENT

The New Seismic Interpreter:

- Requirements for data acquisition
- Requirements for data processing
- Pitfalls of seismic interpretation

General Interpretation

- Reflection identification
- Interactive tracking 2D/3D
- Tying
- Selection missies
- Synthetic seismogram missies
- Time-depth conversion

Structure Interpretation

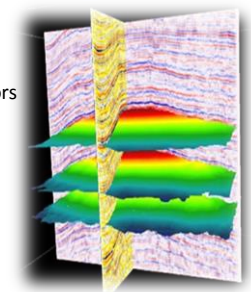
- Structures
- Contouring
- Faults
- Fault recognition and mapping
- 3D fault slicing and 3D fault seal mapping techniques

Seismic Stratigraphy

- Seismic sequence analysis
- The geological model and implementation
- 3D mapping of seismic sequence

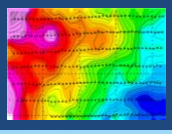
Statigraphic Interpretation

- Processing
- Color displays
- Seismic attributes
- Reef analysis
- Sand – shale analysis
- Direct hydrocarbon indicators



Interpretation by Modeling

- Concept
- Forward modeling
- Inverse modeling



2D AND 3D SEISMIC DATA ACQUISITION FOR THE PRACTICING EXPLORATIONIST

UETMT-GEOPH-C-107

Program Duration: 5 days | Program Level: Introductory

TARGET AUDIENCE

A Practical course for explorationists involved in seismic data acquisition who need to develop the skills of designing and monitoring optimum field parameters. Seismic processors and interpreters will benefit as survey design considerations are related to future data processing issues and interpretation objectives.

TARGETED COMPETENCIES

- Comparison of Seismic 2-D And 3-D Field Equipment
- Seismic Processes
- Seismic Signal Analysis
- Seismic Parameter Design

PROGRAM CONTENT:

INTRODUCTION:

Comparison of 2-D and 3-D Field Equipment:
- Vibroseis system
- Mechanic
- Electronic, and sweeps
- The dynamite system
- Airguns
- Multistreamer
- Ocean bottom cable and
- Telemetric recording equipment

Noise Analysis:
- Tests
- Arrays

Signal Analysis:
- Temporal and spatial aliasing and resolution
- NMO stretch
- Velocity and RNMO resolution
- Minimum and maximum offsets

Parameter Design:
- Stack array approach
- Group interval
- Cross line interval
- Design of optimum sweep
- Dynamite tests
- Optimum airgun array

Optimum number of channels versus number of shots
- Inline and crossline folds
- Migration aperture
- Offset redundancy
- Offset and azimuth distributions

Field Techniques:
- Progression
- Loop shooting
- Swath and circle shooting
- Monitoring and quality control

The Future:
Review of recently introduced technologies
Workshops and Exercises.

2D AND 3D SEISMIC ACQUISITION AND DESIGN (WORKSHOP)

UETMT-GEOPH-C-108

Program Duration: 10 days | Program Level: Advanced

PROGRAM OBJECTIVES

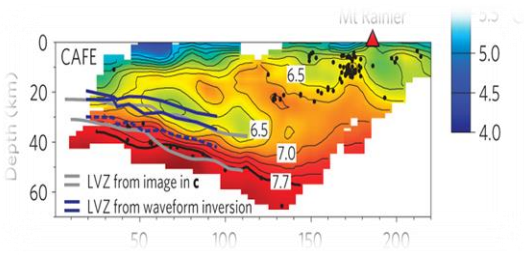
- To become familiar with 3D Seismic Acquisition and Design
- On completion of the course, participants will be able to:
- Remember the principle of 2D and 3D Seismic Reflection
- Determine the Optimum 2D and 3D Acquisition Parameters
- Optimize a Shooting Strategy during a 3D Seismic Acquisition
- Organize, plan and supervise a 3D Seismic Acquisition

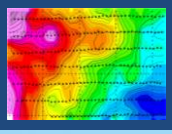
TARGETED COMPETENCIES

- 3D Seismic Acquisition and Design
- 2D and 3D Seismic Reflection
- 2D and 3D Acquisition Parameters

PROGRAM CONTENT

- Waves, travel paths, signal and noise
- Seismic sources: explosive and vibrator
- Geophone, recording systems
- Spatial filtering
- 2D geometry: CDP, fold, offset, stacking chart, workshop exercise
- 3D geometry: CDP, fold, offset, workshop exercise
- Surveying: equipment, implementation, geodesy
- Organization, planning, implementation, case studies
- Shallow water and OBC operations: organization, planning, implementation, case studies
- In Field quality control
- Theory, methodology, parameters choice
- Case study, workshop exercise
- Practical case study with geol and software
- 2D case study: complete sequence
- 3D case study: complete sequence
- 3D case studies: grid, zig-zag, shallow water





AVO AND SEISMIC ATTRIBUTES: PRINCIPLES AND APPLICATIONS

UETMT-GEOPH-C-109

Program Duration: 5 days | Program Level: Intermediate

PROGRAM OVERVIEW

How reliable and successful is your AVO or seismic attribute analysis? Did you know that not all AVO/seismic attribute anomalies are caused by oil and gas reservoirs? And that there is a whole range of natural and artificial factors that can influence AVO and attribute results? This course presents the basic principles of AVO and attribute analysis. The participant is guided in: (i) selecting the correct processing techniques, (ii) determining whether an AVO analysis is at all applicable, and (iii) choosing the appropriate attributes for analysis.

EXERCISES: on rock properties, AVO Interpretation and cross-plotting techniques, thin bed thickness, absorption due to reservoir thickness, attribute selection, many other topics

TARGET AUDIENCE

Interpreters, Geophysicists, Geologists, Technical Support Personnel, Seismic Processors, Exploration and Data Processing Managers, and Data Acquisition Managers

TARGETED COMPETENCIES

- AVO and Seismic Attributes
- AVO Concept & Related Factors
- Petrophysics and AVO

PROGRAM OBJECTIVES

- Analyze and apply AVO and seismic attributes correctly and appropriately
- Recognize pros and cons of AVO
- Determine when AVO is applicable
- Select interpretation relevant attributes
- Resolve the effect of processing on AVO and seismic attributes
- Avoid pitfalls in AVO and attributes

PROGRAM CONTENT

- AVO Concept & related factors
- AVO pitfalls and assumptions
- Petrophysics and AVO
- Rock properties and wave propagation
- Hydrocarbon detection using AVO
- AVO modeling and processing
- Impact of processing on AVO analysis
- Techniques for interpretation of AVO
- AVO Cross-plotting techniques
- Case studies of AVO
- Seismic attributes and wave factors
- Decon and scaling effect on attributes
- Time and Frequency domain attributes
- Thickness using amplitude
- Thin bed thickness from frequency
- Applications of amplitude, energy, and frequency related attributes
- Pitfalls of attributes

Participants should have taken Seismic survey design, data acquisition and processing course or equivalent.

Participants are encouraged to bring data examples related to this course.

AVO, INVERSION, AND ATTRIBUTES: PRINCIPLES AND APPLICATIONS

UETMT-GEOPH-C-110

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

The subject of direct hydrocarbon indicators and AVO has rapidly expanded to include AVO inversion, offset AVO inversion, and 4D AVO inversion. Further insight into the seismic data is supplied by looking at seismic attributes. The technology has provided the interpreter with a very new and exciting package of tools that allow us to look at the seismic image as being truly representative of both the rock properties and the pore filling material. This course is intended to provide the users and applicationists with a clear and useable understanding of the current state of these technologies. The focus of the course is on both understanding and application.

Exercises: Each topic in the course outline is reinforced by an exercise that gives the participants many practical and simple methods of integrating the course material into their everyday work.

TARGET AUDIENCE

Geophysicists, geologists, explorationists, seismic interpreters, technical support personnel, seismic data processors, exploration, production, and acquisition managers, who need a clear understanding of the details of implementation and application of this technology.

TARGETED COMPETENCIES

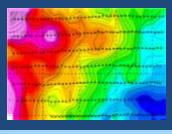
- Hydrocarbons and Seismic Image
- Hydrocarbon Indicators and AVO
- Limits of Seismic Resolution

PROGRAM OBJECTIVES

- Clearly understand how hydrocarbons affect the seismic image
- Use direct hydrocarbon indicators and AVO in the assessment of projects
- Understand the limits of seismic resolution
- Integrate these technologies into an interpretation project
- Better understand the nature of the seismic image as it relates to hydrocarbons
- Utilize the information available in the literature from experts in this rapidly developing part of seismic imaging

PROGRAM CONTENT

- Seismic fundamentals as they relate to defining the appearance of hydrocarbons in the data
- An inventory of direct hydrocarbon indicators, including AVO
- Risk rating prospects that display AVO anomalies
- Understanding rock properties and the effect of pore filling material
- AVO and how it relates to the typical production zones around the world with various ages and depths of burial
- Various methods of displaying AVO effects in the seismic data
- Acquisition and processing considerations to display hydrocarbons as a pore filling material
- Various approaches to seismic modeling and fluid replacement
- Rock properties and pore filling material from seismic inversion
- Spectral decomposition and seismic attributes as other ways of extracting reservoir information from the seismic image



PRINCIPLES OF SEISMIC INVERSION

UETMT-GEOPH-C-111

Program Duration: 5 days Program Level: Fundamental

PROGRAM OVERVIEW

This 5-day program concentrates on teaching the skills needed by experienced Seismic Interpreters to evaluate the validity and usefulness of Seismic Inversion methods applied to their data sets.

TARGET AUDIENCE

Interpreting Geophysicists and Geologists with a Strong Geophysical background, who would like a comprehensive overview of the different methods used in the Inversion of Seismic Data.

TARGETED COMPETENCIES

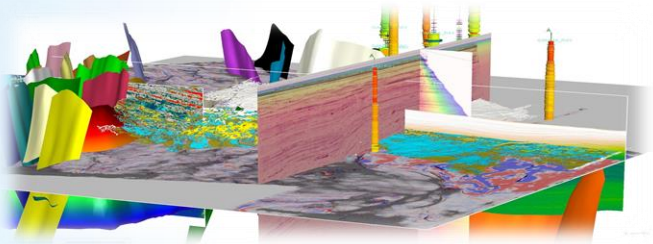
- Seismic Inversion Methods
- Convolutional Model
- Band-limited Inversion
- Seismic Processing
- Wavelet Processing

PROGRAM OBJECTIVES

- This program provides a detailed, but largely non-mathematical, overview of current Seismic Inversion Methods.
- There is an attempt in this program to demystify the multitude of seemingly
- different methods that are used today to invert Seismic Data.
- The program presents a number of applications of the Seismic inversion method to various data sets from around the world.
- The program is a combination of both lectures and practical exercises, with exercises comprising approximately 25% of the program content.
- At the end of the program, the participant should be in a better position to evaluate inversion methods performed out-of-house and to perform inversion methods in-house on interactive-Workstations.

PROGRAM CONTENT

- Introduction to the Convolutional Model
- Wavelets
- Reflectivity and noise
- The Theory of Recursive
- Band-limited Inversion, and its Strengths and Limitations
- Seismic Processing and Considerations
- Wavelet Processing
- Amplitude Recovery
- Noise Attenuation, and Imaging
- Band-limited Inversion Examples
- Sparse-spike Post-Stack Inversion
- Theory and Examples.
- Model-based Post-Stack Inversion
- Theory and Examples.
- Pre-stack Travel-time Inversion, or Tomography
- Pre-stack Amplitude Inversion, or AVO Analysis
- Inversion Case Studies and Exercises



SEISMIC INVERSION METHODS — AN OVERVIEW

UETMT-GEOPH-C-112

Program Duration: 2 days Program Level: Fundamental

PROGRAM OBJECTIVES

- This course provides a detailed, but largely non-mathematical, overview of current seismic inversion methods.
- There is an attempt in this course to demystify the multitude of seemingly
- different methods that are used today to invert seismic data.
- The course presents a number of applications of the seismic inversion method to various data sets from around the world.
- The course is a combination of both lectures and practical exercises, with exercises comprising approximately 25% of the course content.
- At the end of the course, the participant should be in a better position to evaluate inversion methods performed out-of-house and to perform inversion methods in-house on interactive workstations.
- This two-day course concentrates on teaching the skills needed by experienced seismic interpreters to evaluate the validity and usefulness of seismic inversion methods applied to their data sets.

TARGET AUDIENCE

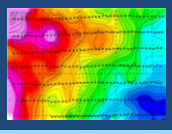
Interpreting geophysicists and geologists with a strong geophysical background, who would like a comprehensive overview of the different methods used in the inversion of seismic data.

TARGETED COMPETENCIES

- Non-Mathematical Seismic Inversion Methods
- Seismic Data Inversion
- Seismic Inversion Method

PROGRAM CONTENT

- Introduction to the convolutional model, wavelets, reflectivity and noise.
- The theory of recursive, band-limited inversion, and its strengths and limitations.
- Seismic processing and considerations, wavelet processing, amplitude recovery, noise attenuation, and imaging.
- Band-limited inversion examples.
- Sparse-spike post-stack inversion, theory and examples.
- Model-based post-stack inversion, theory and examples.
- Pre-stack traveltime inversion, or tomography.
- Pre-stack amplitude inversion, or AVO analysis.
- Inversion case studies and exercises.



APPLICATIONS OF GEOPHYSICAL INVERSION AND IMAGING

UETMT-GEOPH-C-113

Program Duration: 5 days | Program Level: Advanced

TARGET AUDIENCE

Exploration geophysicists with an understanding of fundamental mathematics Concepts discussed will be based on a foundation of basic calculus and linear algebra.

TARGETED COMPETENCIES

- Geophysical Inversion And Imaging
- Geophysical Modeling, Data Processing, and Interpretation
- Velocity Distributions
- Subsurface Seismic Reflectivity

PROGRAM CONTENT:

- The exploration geophysicist's chief function is to attempt to model the earth by use of geophysical data sets. Geophysical inversion provides a systematic vehicle to turn observations into geologic models without the use of "trial and error" methods.
- This course outlines the theory behind geophysical inversion then demonstrates applications by showing several examples of how theory relates to various kinds of data and problems.
- Inversion is viewed as the method of fitting earth model responses to data sets; the procedure relates to geophysical modeling, data processing, and interpretation.
- The applications of inversion involve the imaging of layered earth systems as well as more complicated velocity distributions. Once velocity information is obtained by inversion methods this information may be used in the imaging procedures such as depth migration in order to obtain subsurface seismic reflectivity.
- Various case history examples demonstrate how inversion can estimate geological models from reflection seismic. VSP, cross-borehole seismic gravity and well log data.
- The course focuses on traditional 2-D and 3-D exploration problems as well as applications to reservoir characterization through the use of borehole seismic imaging.
- Emphasis is placed on the integration of methods which provide enhanced definition of petroleum reservoirs. Course participants are encouraged to present data examples for class discussions.
- Introduction: turning geophysical observations into geologic models; Seismic impedance estimation: imaging layered earth and complex velocity distributions; Optimization methods and Least squares inversion; Seismic travel time tomography and depth migration; Reservoir characterization by borehole tomography and reflection imaging;
- Integrated interpretation of geophysical data: incorporating reflection and cross-borehole seismic, VSP, gravity and well-log data; Full waveform inversion methods; Conclusions and future directions.

ADVANCED SEISMIC STRATIGRAPHY: A 2D, 3D SEQUENCE AND WAVELET ANALYSIS (WORKSHOP)

UETMT-GEOPH-C-114

Program Duration: 7 days | Program Level: Advanced

PROGRAM OVERVIEW

Seismic Stratigraphy is a powerful tool for Exploration and Exploitation, especially when the Rock-Fluid Information within the Seismic Wavelet (Reflection Character Analysis) is integrated with the lithofacies-stratigraphic Information, which is determined from reflection group geometry (Sequence Analysis).

The methods used in this workshop do not rely upon either Cosmetic Processing or Interpretation as an art; instead, Practical Methods of Seismic Stratigraphy are employed as a Science, based upon firm, tested principles that are applied to a spectrum of tectonic Structural Styles and Depositional Environments. More substantial than a standard lecture format, this rigorous, five-day program is a problem-oriented, hands-on workshop including significant group discussion and presentation. Participants learn how to make seismic modeling-interpretation judgments as a basis for Seismic-facies and reflection character analysis. Case studies for exploration and development incorporate 2-D and 3-D seismic data with well data from diverse tectonic settings and a wide variety of carbonate and clastic depositional environments: Alaska, the Gulf Coast, South America, the North Sea, Africa, and Southeast Asia. Each participant should bring a hand-held calculator to class.

TARGET AUDIENCE

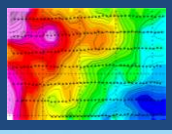
Geophysicists, Geologists, and Explorationists who have completed the Introduction to Seismic Stratigraphy Program before: An Exploration Workshop program or have comparable Training and desire a challenging workshop, which will improve Exploration and Development Skills

TARGETED COMPETENCIES

- Stratigraphy Processing and Interpretation
- Reservoir Rocks and their Fluids
- 3-D Seismic Stratigraphy
- Intra-Basin Reservoir and Seal Quality

PROGRAM OBJECTIVES

- How to separate fact from artifact in Seismic Stratigraphy Processing and Interpretation
- How to Characterize Reservoir Rocks and their Fluids from stacked and un-stacked (AVO) Data
- How to Apply 3-D Seismic Stratigraphy to Field Development
- How to interpret salt Structures and their associated Hydrocarbon Potential
- How to predict intra-basin Reservoir and Seal Quality as a Function of sea level Positioning
- How to generate Seismic Stratigraphy Regional Play concepts for a variety of Tectonic-depositional settings



ANALYZING SEISMIC STRATIGRAPHY THROUGH MODELING

UETMT-GEOPH-C-115

Program Duration: 3 days | Program Level: Advanced

PROGRAM OBJECTIVES

Includes material on geophysical modeling techniques in use on PC and workstation computers.

Examines seismic data from a stratigraphic viewpoint using forward based modeling with emphasis on the design of appropriate forward models to meeting exploration and exploitation objectives.

Combines computer presentations with lectures and workshops where presentation material is applied to real data situations.

Presents an overview of current software capabilities.

Combines lectures, software demonstration, exercises and case studies. Approximately 20% is dedicated to exercises and workshop sessions.

This three-day course focuses on those skills needed to perform basic and advanced seismic response modeling. The result is an integrated approach to seismic modeling that ensures meaningful model development in both exploration and development.

TARGET AUDIENCE

Experienced geophysicists and geotechnical specialists who will be conducting seismic response modeling.

TARGETED COMPETENCIES

- Geophysical Modeling Techniques
- Seismic Stratigraphy Through Modeling

PROGRAM CONTENT

Introduction:
Course overview, philosophy. Brief introduction to geophysical theory: Wavelet concepts, effects of phase and frequency.

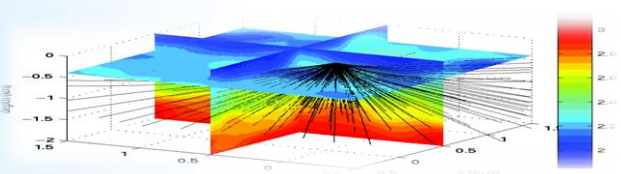
Integrating Well Data with Seismic:
Log analysis, log editing, zero offset synthetics.

Seismic Sequence Analysis:
Sequence analysis concepts, modeling depositional sequences.

Modeling Reservoir Environments:
Reservoir geometry, 2-D versus 3-D modeling, interpolation versus ray trace modeling.

Using attributes as aids to Modeling:
Basic attribute concepts, choosing the right attribute, direct hydrocarbon indicators.

Amplitude versus Offset (AVO):
Basic concepts of AVO, phase versus offset (PVO), selection of model parameters. Summary and integration of concepts.



SEISMIC SURVEY DESIGN, DATA ACQUISITION, AND PROCESSING

UETMT-GEOPH-C-116

Program Duration: 10 days | Program Level: Fundamental

PROGRAM OVERVIEW

This course lays a strong foundation in design, acquisition and processing--the essential ingredients of successful oil and gas exploration. As a result, participants will improve their effectiveness in planning, execution, and quality control of seismic data acquisition and processing.
Key elements of the course include:
Imparting equal importance to acquisition and processing through a presentation of fundamental principles
Appreciation of the limitations and pitfalls through case histories and calculations of design parameters
Discussion of seismic survey design and processing flow for AVO or attribute analysis
Explanation of proper use of amplitude scaling and deconvolution for AVO and attributes
Demonstration of data improvement with static and dynamic corrections
Presentation of the fundamentals of correlation, convolution, decon, filtering, and frequency spectra
Explanations of seismic attributes, VSP, and Tau-P

EXERCISES: Step by step 3-D survey design calculation, groundroll, P and S waves, aliasing, vibroseis sweep, correlation and convolution, absorption, migration aperture, CMP scatter, fold, FK, velocities, and DMO

TARGET AUDIENCE

Geologists, geophysicists, engineers, supervisors, executives and managers who will be involved in the design/ execution and monitoring of seismic data acquisition and processing

TARGETED COMPETENCIES

- Design 2-D and 3-D Surveys
- Acquisition of Seismic Data
- Processing of Seismic Data
- Seismic Processing Flow Optimization

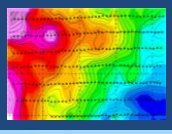
PROGRAM OBJECTIVES

- Design 2-D and 3-D surveys
- Calculate, execute, and quality control design parameters
- Quality control acquisition and processing of seismic data
- Optimize seismic processing flow
- Process data for AVO and attributes
- Overcome limitations and pitfalls

PROGRAM CONTENT

- Data acquisition Operations
- Fundamental of P, S, R Waves
- Acoustic impedance and reflectivity, reflection amplitudes and diffractions
- Sources: Marine and vibroseis sweeps
- Source and receiver array patterns
- 3-D survey design and patterns
- Recording geometry, CMP method NMO velocity and stacking, aliasing
- Concepts of convolution & correlation
- Time and depth migration, DMO
- VSP processing

Participants should have taken Basic Geophysics course or equivalent.
Participants are encouraged to bring data examples or displays related to this course for group and one-on-one *discussion.*



THE VELOCITY MODEL AND SEISMIC DEPTH CONVERSION

UETMT-GEOPH-C-117

Program Duration: 3 days | Program Level: Intermediate

TARGETED COMPETENCIES

- Velocity Model Fundamentals
- Seismic Depth Conversion
- Velocity and Exploration Cycle
- Well Velocities

TARGET AUDIENCE

Exploration geologists and geophysicists with a solid understanding of seismic methods and seismic data interpretation. Also of interest to personnel involved in seismic data modeling.

PROGRAM CONTENT

- **Introduction:**

  Velocity and Exploration Cycle; Some Velocity Definitions: detailed look at common types of velocities so that that differences and commom misuses are understood; Modeling Fundamentals: model building, ray-trace modeling, wave-equation modeling, connected and unconnected macrovelocity models. The Velocity Domain: understanding the key controls on, and relationships between, the various velocities used;

- **Well Velocities:**

  Sonic logs, check shots and core measurements; use in macrovelocity model building; Heirarchy of Velocities from Seismic Data: from optical stack via stacking velocity to velocities from depth gathers and tomography. Stacking Velocities: the most common form of seismically derived velocity; factors affecting stacking velocities; possible corrections; Other Seismically Derived Velocities: refraction analysis, model-driven stacking velocities, depth gathers, residual velocity analysis and tomography;

- **Macrovelocity Model Uses:**

  acquisition design, on-board processing, depth conversion, image ray (event and map) migration, pre-and post-stack depth migration, pressure and lithology prediction;

- Summary: a new paradigm.

THE VELOCITY MODEL & SEISMIC DEPTH CONVERSION

UETMT-GEOPH-C-118

Program Duration: 10 days | Program Level: Advanced

PROGRAM OBJECTIVES

The participants will be able to understand an overview of the Rock Properties that affect Velocity Data, Time – Depth Conversion Methods, Detailing the Normalized Interval Velocity Technique, Emphasis on the need for reliable Maps when making Exploration and Drilling Decisions.

TARGET AUDIENCE

Exploration Geologists and Geophysicists with a solid understanding of Seismic Methods and Seismic Data Interpretation, and Personnel involved in Seismic Data Modeling.

TARGETED COMPETENCIES

- Rock Properties
- Velocity Data
- Conversion Methods

PROGRAM CONTENT

Introduction

- Velocity and Exploration Cycle

Velocity Definitions:

- Detailed Look at Common Types of Velocities

Modeling Fundaments

- Model Building, Ray-trace Modeling, Wave-equation Modeling, Connected and Unconnected Macrovelocity Models.

The Velocity Domain

- Understanding the key Controls on, and relationships between, the various Velocities used

Well Velocities

- Sonic Logs
- Check Shots
- Core Measurements
- Macrovelocity Model Building

Hierarchy of Velocities from Seismic Data:

- From Optical Stack via Stacking Velocity to Velocities from Depth Gathers and Tomography.

Stacking Velocity

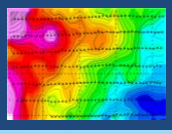
The most common Form of Seismically Derived Velocity
Factors affecting Stacking Velocities
Possible Corrections

Other Seismically Derived Velocities

Refraction Analysis, Model-driven stacking Velocities, Depth Gathers, Residual Velocity Analysis and Tomography

Macrovelocity Model Uses

Acquisition Design, on-board Processing, Depth Conversion, Image Ray (event and map) Migration, Pressure and Lithology Prediction



VELOCITY AS AN INTERPRETATION TOOL

UETMT-GEOPH-C-119

Program Duration: 5 days | Program Level: Advanced

PROGRAM OBJECTIVES

The participants will be able to understand Physical factor that Influence Seismic Velocity, Concentrates on Velocity Measurements from reflection Data, Pre-processing, choice of Analysis Variables and Interpretation of results.

TARGETED COMPETENCIES

- Seismic Velocity
- Velocity and Exploration Cycle
- Well Velocities
- Stacking Velocity

TARGET AUDIENCE

Designed for the explorationist in need of accurate Depth Maps. Particularly helpful for the Geoscientist Investigating the spatially variable differences between Well Depths and Seismic Depth Maps.

PROGRAM CONTENT

- Velocity Terminology, Definitions, and Formulae.
- Model Studies of NMO versus Velocity Types and NMO versus offset.
- Normalized Interval Velocities are related to lithology using the work of Pennebaker
- Acheson, and Byun.
- Utilization of Well Data for Compaction Studies, Normalized Velocity versus Lithology, Construction of a Picking Template or Nomograph to guide the repicking of seismic velocities and sonic editing after Fischer.
- Depth Conversion Techniques; Time-line method, using both check shot times and seismic times; "layer cake" method, using both interval and normalized interval velocities.
- Using the normalized velocities requires depth compaction measurements and an iterative depth algorithm.
- In the average Velocity method using seismic velocity, systematic errors are studied.
- The Technique for detecting, measuring, and removing these system errors is presented along with a method of quantifying the accuracy of the process.
- Course includes Case Studies and Exercises.
- Work in small Groups is involved.

SEISMIC VELOCITY ANALYSIS

UETMT-GEOPH-C-120

Program Duration: 5 days | Program Level: Intermediate

PROGRAM OBJECTIVES

The participants will be able to understand an overview of the

- Rock Properties that affect Velocity Data
- Time – Depth Conversion Methods
- Detailing the Normalized Interval Velocity Technique
- Emphasis on the need for reliable Maps when making Exploration and Drilling Decisions

TARGET AUDIENCE

Exploration Geologists and Geophysicists with a solid understanding of Seismic Methods and Seismic Data Interpretation, and Personnel involved in Seismic Data Modeling.

TARGETED COMPETENCIES

- Rock Properties
- Velocity Data
- Conversion Methods

PROGRAM CONTENT

Introduction

- Velocity and Exploration Cycle

Velocity Definitions:

- Detailed Look at Common Types of Velocities

Modeling Fundaments

- Model Building, Ray-trace Modeling, Wave-equation Modeling, Connected and Unconnected Macrovelocity Models.

The Velocity Domain

- Understanding the key Controls on, and relationships between, the various Velocities used

Well Velocities

- Sonic Logs
- Check Shots
- Core Measurements
- Macrovelocity Model Building

Hierarchy of Velocities from Seismic Data:

- From Optical Stack via Stacking Velocity to Velocities from Depth Gathers and Tomography.

Stacking Velocity

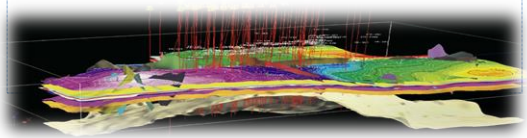
- The most common Form of Seismically Derived Velocity
- Factors affecting Stacking Velocities
- Possible Corrections

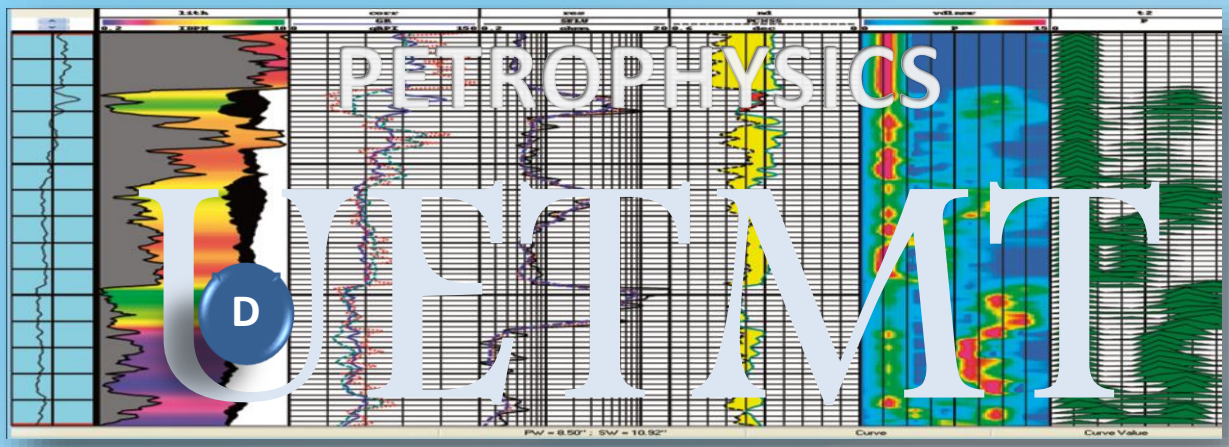
Other Seismically Derived Velocities

- Refraction Analysis, Model-driven stacking Velocities, Depth Gathers, Residual Velocity Analysis and Tomography

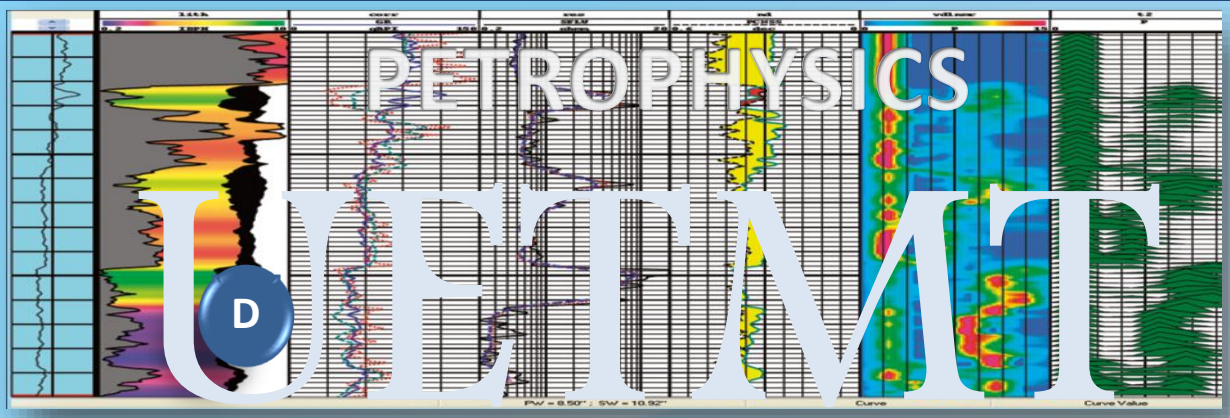
Macrovelocity Model Uses

- Acquisition Design, on-board Processing, Depth Conversion, Image Ray (event and map) Migration, Pressure and Lithology Prediction





NO/CODE	COURSE TITLE	COURSE DURATION
UETMT-PET-D-101	Introduction to Petrophysics	3 days
UETMT-PET-D-102	Petrophysics and Fundamentals of Well Logs Interpretation	5 days
UETMT-PET-D-103	Petrophysics for Drilling Engineers	3 days
UETMT-PET-D-104	Basic Production Logging	3 days
UETMT-PET-D-105	E&P Core Program	10 days
UETMT-PET-D-106	Well Placement	4 days
UETMT-PET-D-107	Log Analysis for Engineers	5 days
UETMT-PET-D-108	Carbonate Reservoirs	5 days
UETMT-PET-D-109	Open Hole Logging & Formation Evaluation (Using Petrophysical Application)	5 days
UETMT-PET-D-110	Dip-meter and Borehole Image Logging	5 days
UETMT-PET-D-111	Nuclear Magnetic Resonance (NMR)	4 days
UETMT-PET-D-112	Well Log Interpretation	5 days
UETMT-PET-D-113	Coring and Special Core Analysis	5 days
UETMT-PET-D-114	Applied Core Analysis & Interpretation	4 days
UETMT-PET-D-115	Borehole Image Log Interpretation	5 days
UETMT-PET-D-116	Reservoir Geology (Open & Closed) Log Analysis	5 days
UETMT-PET-D-117	Wireline Formation Testing and Interpretation	5 days
UETMT-PET-D-118	Capillarity in Rocks	5 days
UETMT-PET-D-119	Formation Evaluation in Carbonates, Clastics and Basement Rock	5 days
UETMT-PET-D-120	Formation Evaluation	5 days
UETMT-PET-D-121	Applied Reservoir Petrophysics and Characterization	5 days
UETMT-PET-D-122	Cased Hole Logging and Formation Evaluation	5 days



NO/CODE	COURSE TITLE	COURSE DURATION
UETMT-PET-D-123	Well Log Analysis and Interpretation	5 days
UETMT-PET-D-124	Log Interpretation	5 days
UETMT-PET-D-125	Formation Evaluation in Sandstone	5 days
UETMT-PET-D-126	Core Log and Log Interpretation	5 days
UETMT-PET-D-127	Petrophysics & Structural Analysis using FMI/ Dipmeter Log using Interactive Petrophysics "IP" Software	5 days
UETMT-PET-D-128	Special Core Analysis	5 days
UETMT-PET-D-129	Formation Damage	5 days
UETMT-PET-D-130	Carbonate & Fracture Petrophysics	5 days
UETMT-PET-D-131	NMR Logging, Petrophysics and Practical Application	5 days
UETMT-PET-D-132	Structural and Stratigraphic Interpretation of Dipmeters and Borehole-imaging Logs	5 days
UETMT-PET-D-133	Carbonate Reservoirs and Borehole Image Analysis	5 days
UETMT-PET-D-134	Shaly sand Petrophysics	5 days
UETMT-PET-D-135	Image Log Interpretation	5 days
UETMT-PET-D-136	Petrophysical Studies of the Shaly sand Reservoirs	5 days
UETMT-PET-D-137	Integrated Petrophysics for Reserves and Simulation	5 days
UETMT-PET-D-138	Integrated Petrophysics for Reservoir Characterization	5 days
UETMT-PET-D-139	Applied Rock Mechanics	5 days
UETMT-PET-D-140	Reservoir Characterization & Log Interpretation	5 days
UETMT-PET-D-141	Integration of Rocks, Log and Test Data	5 days
UETMT-PET-D-142	Deepwater Sandstones	5 days
UETMT-PET-D-143	Carbonate Petrophysics	5 days

INTRODUCTION TO PETROPHYSICS

UETMT-PET-D-101

Program Duration: 3 days | Program Level: Fundamental

PROGRAM OVERVIEW

Petrophysics is fundamental to all aspects of the petroleum business. Principles, applications, and integration of petrophysical information for reservoir description will be discussed in depth. Through a combination of class discussion and exercises/ workshops, participants will learn how to conduct competent quick-look evaluations. Using data from open hole logs, logging-while-drilling, and core data you will evaluate porosity, permeability, and saturation in a variety of reservoirs. Knowing how to integrate petrophysical information with other data sources will improve participants' ability to assess technical risk when examining hydrocarbon opportunities.

PROGRAM OBJECTIVES

Upon completion of this course you will be able to know how to:

- Understand and apply at a basic level the theory and operation of major petrophysical tools
- Calibrate porosity and permeability values from core and log sources for improved saturation calculations
- Apply basic cased-hole logging, borehole seismic, image, and LWD/MWD
- Analyze and integrate log, core, geosciences, and engineering well data for well and field development projects
- Select petrophysical tool combinations for specific applications
- Assess the impact of petrophysical analyses on technical uncertainty estimates of reservoirs

TARGET AUDIENCE

Geoscientists and engineers with less than twelve months experience using petrophysical data, and other technical staff at all experience levels wanting a fundamental background in the Petrophysics discipline.

TARGETED COMPETENCIES

- Petrophysical Tools
- Porosity
- Permeability
- Log Analysis and integration

PROGRAM CONTENT

- Fundamental concepts of Petrophysics
- Depositional systems and petrophysical rock parameters
- Nature of porosity and permeability
- Basic rock properties; theory and quick look techniques
- Mud logging
- Core analysis, acquisition, interpretation, and quality checks
- Theory and basics of resistivity, radioactivity, acoustic tools
- LWD/MWD versus open hole logging
- Determination of rock types using core and logs
- Cased hole logging
- Petrophysical impact on economic uncertainty
- Evolving petrophysical technologies

PETROPHYSICS AND FUNDAMENTALS OF WELL LOGS INTERPRETATION

UETMT-PET-D-102

Program Duration: 5 days | Program Level: Fundamental

PROGRAM OVERVIEW

The most universal, comprehensive and concise descriptive documents on Oil and Gas Wells are Logs. They impact the work of almost every Oilfield Group from Geologists to Roustabouts to Bankers. Familiarity with the purposes and optimum applications of Well Logs is therefore essential for people forging their careers in the Oil Business.

Our proposed instructor will uses a novel approach to help participants to develop a good grounding in understanding and applying Well Logging Techniques. General principles of Physics are developed to explain the functioning of Modern Logging Tools. Wherever possible, the physics of Logging Measurements is related to everyday tools and appliances. Participants develop an appreciation for the constraints and Limitations of Operating in the Borehole Environment.

A number of actual Log Examples are related to basic principles in the description of Reservoir Properties such as Porosity, Mineralogy, Formation Factor, Saturation, and Hydrocarbon Type, for essentially Clean Reservoirs. Cross-plotting and Reconnaissance Techniques, the eyes of the part-time Log Interpreter, discriminate between Water, Oil, and Gas, quickly and efficiently. Error minimization Techniques, applicable only to computerized Log Analysis produce optimal results. Participants gain realistic experience by working in teams on a comprehensive Log Interpretation Exercise.

Participants are welcome to bring examples from their company for Analysis in the class as one of the Demonstration exercises.

TARGET AUDIENCE

- Petrophysicists, Geologists, Geophysicists, Engineers, Technicians, or Anyone interested in a Solid understanding of the Principles of Borehole Geophysics

TARGETED COMPETENCIES

- Borehole Geophysics
- Electrical Properties of earth Materials
- Reservoir/Non-reservoir Discrimination
- Borehole Calipers

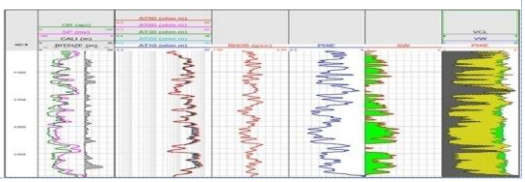
PROGRAM OBJECTIVES

By the end of this program, participants will be able to:

- Identify Reservoirs
- Determine Mineralogy, Porosity and Saturation in Various Lithogies
- Recognize the importance of Electrical Properties of earth Materials
- Highlight Oil Mobility
- Interpret Pressure Profiles
- Develop optimum Tools and Logging Programs

PROGRAM CONTENT

- Logging Objectives
- Invasion Profile
- Challenge of Borehole Geophysics
- Passive Electrical Properties of Earth Materials
- Resistivity Measuring Tools, Normal, Induction, Laterolog
- Reservoir/Non-reservoir Discrimination
- Matrix-sensitivity Logs, GR, SGR, PE
- Depth Measurements and Control
- Borehole Calipers
- Porosity-mineralogy Logs, Density, Neutron, Sonic
- Porosity determination in clean Formations
- Formation resistivity Factor
- Conductivity of Shales
- Porosity Log Crossplots and Mineralogy Identification
- Partially Saturated Rock Properties and Archie Equation
- Linear Movable Oil Plot
- Reconnaissance Techniques, Rwa, FR/FP, Logarithmic Scaler
- Logarithmic MOP
- Porosity-resistivity Crossplots
- Permeability Relationships
- Nuclear Magnetic Resonance
- Use of Pressure Measurements
- Computerized Log Evaluation
- Sidewall Coring
- Recommended Logging Programs



PETROPHYSICS FOR DRILLING ENGINEERS

UETMT-PET-D-103

Program Duration: 3 days | Program Level: Fundamental

PROGRAM OBJECTIVES

This course covers wireline logging, MWD-LWD and their specific applications for wellbore stability. This course will be suitable for all drilling engineers, directional drillers and other geoscientists associated with drilling.

TARGET AUDIENCE

This course will be suitable for all Drilling Engineers, Directional Drillers and other geoscientists associated with drilling.

TARGETED COMPETENCIES

- Reservoir Rock
- Tool Conveyor
- Well Bore Stability

PROGRAM CONTENT

- Reservoir Rock and Life of a well
- Tool Conveyance, Depth Control
- Well bore stability and filtrate diameter of invasion
- The mud log and its applications
- Basics of Logging
- Log Quality Control
- GR Spectroscopy and its application to determine clay type
- The Spontaneous Potential and its applications to estimate water salinity and volume of shale
- Acoustic Log: secondary porosity, rock mechanical properties and wellbore stability
- The density and photoelectric cross section
- The Neutron Log, neutron spectroscopy and sigma neutron capture cross-section
- Density-Neutron applications for lithology, shale volume and effective and total porosities
- Density-Neutron applications for lithology, shale volume and effective and total porosities
- Basics of Resistivity and the Archie Equation
- The concept and applications of the Formation Factor (FF) as a variable –m emulator
- Resistivity measurements in the invaded zone (Rxo)
- Resistivity measurements in the uninvaded zone using Induction and Laterolog
- The concept and applications of array resistivity measurements
- Wireline Formation Testing
- Measurement While Drilling (MWD) and Logging While Drilling (LWD)
- Data acquisition of porosity, lithology, Pulsed Neutron Sigma and resistivities
- Formation Pressure
- Geosteering basics
- Seismic
- Acoustic
- Shale Volume (Vsh, Vcl) evaluation and clay type- Dispersed or laminated shales
- Estimating the parameters of “m” and “n” in the Archie Equation,
- Quick look techniques to estimate the oil / water, gas/water and oil/gas contacts,
- Salinity estimations of formation water and filtrate water,
- Estimation of porosity, lithology and water saturations in clean and in shaly-sands

BASIC PRODUCTION LOGGING

UETMT-GEOPH-D-104

Program Duration: 3 days | Program Level: Fundamental

PROGRAM OBJECTIVES

This course teaches you the use and limitations of a variety of production logging tools including spinner, temperature, noise, fluid injections and others tools. You will learn what results these tools yield, the interpretation assumptions that are integral to their designs, and how quality is affected by the acquisition process. You will also learn the fundamentals of production log interpretation with hands-on examples and an in-class workshop on interpreting single and two phase flow using production logs. You will learn how production logs can be used for the measurement of 3 phase fluid flow.

TARGET AUDIENCE

Geoscientist or Engineers who are responsible for interpreting production logs.

TARGETED COMPETENCIES

- Well Completion
- Well Productivity Optimization
- Pressure Control System

PROGRAM CONTENT

- Inflow performance and productivity index for oil wells and gas wells.
- Outflow performance: matching inflow with outflow to optimize well productivity
- Tool conveyance using tractors and coiled tubing
- Depth control in cased hole wells using GR and CCL
- Well completions applied to vertical, deviated, horizontal, and multi-laterals
- Pressure control system for rigless operation
- Reservoir Fluids: fluid properties: GOR, Bubble point Pressure; three phase diagram
- Reservoir drive mechanisms and associated production problems
- Justifying acquiring production logs
- Flow Regimes in vertical and deviated wells and slippage velocities
- Defining slippage velocities and using charts to obtain slippage velocities of oil and gas.
- Standard production logging tools
- Various techniques of measuring fluid of oil, water, gas using spinners, oxygen activation, phase velocity logging and gas bubble velocity
- Measurements of three phase holdups.
- Spinner calibrations to obtain fluid velocities and hence production rates.
- Single phase and 2-phase and 3 phase production log interpretations.

E&P CORE PROGRAM

UETMT-PET-D-105

Program Duration: 10 days | Program Level: Fundamental

PROGRAM OVERVIEW

More than three-quarters of current additions to the world's reserves come from better Management of existing Reserves. Core-based Measurements offer the most Tangible and Direct means of determining Critical Reservoir Parameters. Core Analysis can play a vital role in field Equity or Unitization and is often considered to be the ground truth to which other measurements are compared, e.g. Wireline Logging. Using a Multidisciplinary Approach, Participants are taken through the steps necessary to obtain reliable Core Analysis Data and Solve Formation Evaluation Problems. Throughout the program, participants are given Hands-on Problems and Practical laboratory (if available in the company) and field Examples, which Reinforce the Instruction.

TARGET AUDIENCE

- Reservoir Engineers
- Exploration and Development Geologists
- Core and Log Analysts
- Geophysics
- Drilling and Completion Engineers
- and Oil Company Research and Development Staff

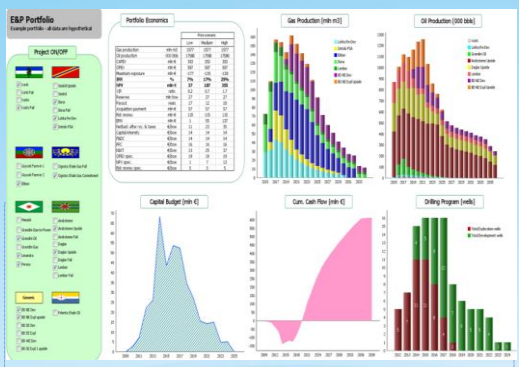
TARGET COMPETENCIES

- Design Coring Programs
- Side Wall Cores Analysis
- Pressure, and Reservoir Fluid
- Reservoir Engineering and Petrophysical Evaluation

PROGRAM OBJECTIVES

By the end of this Program, participants are expected to learn how to:

- Design Coring Programs and Maximize Recovery
- Preserve Code to Minimize Rock Alteration
- Take and Analyze Side Wall Cores
- Use Cores to estimate Porosity, Permeability, and Fluid Saturation(Basic Core Analysis) Pressure, and Reservoir Fluid Distribution for Reservoir Engineering and Petrophysical Evaluation
- Prevent /Spot Errors in Core Analysis Vendor Reports (Quality Control)
- Select Samples for Special Core Studies
- Correlate Core and Log Data



PROGRAM GOALS

- Knowing How to determine the Hydrocarbon present in a Reservoir
- Ability to Describe accurately the Revision Rocks and their Contained Fluids
- Ability to Correlate Core and Log Data
- Understand Core- based Measurements represent the most Tangible and direct means of determining Reservoir Parameters

PROGRAM CONTENT

Reservoir Critical Parameters

- Basic Data
  - Texture
  - Mineralogical
  - Permeability and Textual Relationships
  - Porosity
  - Relative Permeability's
  - Capillarity Pressure and Fluid Saturations
- Coring Hardware and Maximizing Core Recovery
- Core-handling, Wellsite Procedures, and Preservation Methods
- Sidewall Coring & Analysis
- Organizing Effective Laboratory Programs
- Porosity, Permeability and Fluid Saturation
- Quality Control in Core Analysis
- Petrography and Mineralogy
- Special Core Analysis sample selection and Statistical Data Analysis
- Core-log Correlation (includes NMR Log Calibration, Acoustic, Nuclear, and Electrical Properties) an introduction to Rock Mechanics
- Data Integration in Reservoir Simulation
- Quality Control in Core Analysis
- Water Correlation Method
- Wettability, Relative Permeability, Capillary Pressure, and Reservoir Fluid Distribution
- Final Problem: Design of Coring and Core Analysis Program
- Updating Information ...

WELL PLACEMENT

UETMT-PET-D-106

Program Duration: 4 days Program Level: Fundamental

PROGRAM OBJECTIVES

The main purpose of high angle and horizontal wells is to maximize reservoir contact and enhance well productivity. To plan and construct such wells requires real-time collaboration between geologists (who need quality formation evaluation data), drillers (who require considerable input from the geologists), and petrophysicists (who interpret the formation evaluation data during the drilling process in order to optimize well placement). This process is generally facilitated by the well placement coordinator.

TARGET AUDIENCE

This course is aimed toward members of multi-disciplinary asset teams of operating companies comprising mainly of drilling engineers, reservoir engineers, and geoscientists who need to make decisions regarding the applicability and benefits of implementing a geological well placement process for drilling horizontal and high-angle wellbores.

TARGETED COMPETENCIES

- Maximize Reservoir Contact
- Enhance Well Productivity
- Direction Drilling Concepts
- MWD Position and Drilling-related Data
- MWD Techniques and Tools

PROGRAM CONTENT

Geological Well Placement and Reservoir Geology

Basic concepts and application
Technologies, processes, and methods
Essential elements of reservoir geology
Structural features

Directional Drilling and Measurement While Drilling (MWD)

Direction drilling concepts
MWD position and drilling-related data
MWD techniques and tools

Formation Evaluation and Logging While Drilling (LWD)

LWD tools and techniques
Formation evaluation techniques
Practical examples

Applications of LWD Measurements

Influence of LWD on high angle wells
Practical examples
LWD images, acquisition, and application

Applying Well Placement Methods

Model-compare-update method
Incorporating real-time dip analysis
Remote boundary detection

LOG ANALYSIS FOR ENGINEERS

UETMT-PET-D-107

Program Duration: 5 days Program Level: Fundamental

PROGRAM OVERVIEW

This course describes the principles and methods associated with the Petrophysical Interpretation of Well Logs, with emphasis on Petroleum Engineering applications. Well-established and recently introduced measurements are discussed, showing how open-hole Log Data can be used to determine Porosity and Hydrocarbon Saturation.
Cased-hole topics include thru-casing Measurements for Fluid-movement Monitoring, Casing-Integrity Measurements, Cement-bond Logs, Skin effect and Perforation Penetration issues and an overview of Production Logging.

TARGET AUDIENCE

The course is intended for entry-level and experienced Engineers, as well as for Geoscientists and Technical Assistants working with, or needing to understand better, the principles of Log Interpretation and/or to update themselves on the range of Log Measurements and Techniques now available to them

TARGET COMPETENCIES

- Basic Petrophysical Models
- Formation Interpretation
- Wireline and LWD Resistivity Measurements

PROGRAM OBJECTIVES

participants completing this course will be able to:

- Construct Basic Petrophysical Models; use them in “clean” Formation Interpretation.
- Use Wireline and LWD Resistivity Measurements to calculate Rt, Rxo and invasion Profiles and use Density, Neutron and Sonic measurements to determine Porosity and Lithology. Differentiate zones of potential interest using SP, GR, Resistivity and Porosity Measurements.
- Illustrate the physical principles of Photo Electric, Spectral GR and Elemental Capture Spectroscopy tools and how they can be used to enhance mineralogy determination in Complex Lithology.
- Demonstrate the concept of Formation Factor as the key link between Resistivity and Porosity/Mineralogy Measurements.
- Use the empirical Logic leading to the Archie Water Saturation Equation and be able to determine Water Saturation in both virgin and Flushed Zones.
- Appraise the Basic Functions of Formation Tester hardware and use the resulting Pressure Measurements to calculate Formation Pressure Profiles, Fluid Contacts and Densities.

PROGRAM CONTENT

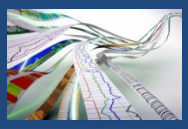
Day 1:
- General Topics and Resistivity Measurements

Day 2:
- Porosity and Mineralogy/Lithology Measurements

Day 3:
- Linking Resistivity with Porosity/Mineralogy Measurements

Day 4:
- Topics for Petroleum Engineering and Geological Interpretation

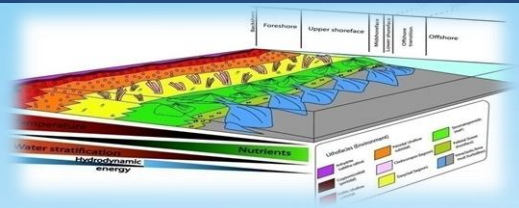
Day 5:
- Log Quality Control, Interpretation of Final Example



CARBONATE RESERVOIRS

UETMT-PET-D-108

Program Duration: 5 days | Program Level: Fundamental



PROGRAM OVERVIEW

- This rigorous workshop is a must for geologists, geophysicists, exploration and production managers and engineers dealing with exploration for and exploitation of carbonate reservoirs.
- The course starts with a comprehensive overview of the basic characteristics of the carbonate depositional system important to carbonate reservoir development.
- The application of sequence stratigraphic concepts to carbonates as a predictive tool in exploration for and modeling of carbonate reservoirs will be stressed.
- The engineering and geologic aspects of carbonate pore systems will be explored.
- A geologic-based porosity classification useful in exploration will be developed and contrasted with an engineering-based porosity classification useful for detailed reservoir characterization and reservoir simulation.
- Carbonate porosity modification and evolution will be discussed in a sea level driven sequence stratigraphic framework. Problems of reservoir heterogeneity and carbonate reservoir modeling will be discussed. Case histories from around the world will be utilized throughout to illustrate important concepts.
- A major component of the workshop is a series of practical exercises utilizing actual subsurface data sets that include geophysical logs, core data, biostratigraphic data and seismic. These exercises will give the participant hands on experience in developing viable explora1ion and exploitation strategies for carbonate terrains.

TARGET AUDIENCE

- Exploration and Development Geologists, Exploration and Development Managers and Geophysicists Engineers with some Geologic background will benefit.

TARGET COMPETENCIES

- Carbonate Depositional System
- Carbonate Reservoir
- Carbonate Pore Systems

PROGRAM OBJECTIVES

- Basic Characteristics of the carbonate depositional system important to Carbonate Reservoir development
- How Sequence Stratigraphy can be applied to carbonates and mixed Carbonate-siliciclastic systems
- Geologic and Engineering Characteristics of Carbonate pore systems
- The nature of Carbonate Porosity modification by diagenesis and the role of sea level and climate in porosity modification and gross reservoir heterogeneity
- How to develop viable Exploration and Exploitation Strategies In a Carbonate terrain by working with actual subsurface data sets

PROGRAM CONTENT

- The basic nature of carbonate sediments and sedimentation
- The efficiency of the carbonate factory and its influence on cyclicity and platform development
- Carbonate platform types
- Carbonate facies models
- Basic concepts of sequence stratigraphy including eustasy, relative sea level, accommodation model, and sequence stratigraphy as a predictive tool
- Relationship of stratigraphic patterns to changes in subsidence rates as driven by regional and earth scale tectonic processes
- Sequence stratigraphic models including the ramp, the rimmed shelf, the escarpment margin, the isolated platform and the mixed carbonate-siliciclastic shelf
- The characteristics of carbonate pore systems and their geologic and engineering classifications including petrophysics and rock fabric
- Sea level, diagenesis, porosity evolution and its distribution at the time of burial
- The fate of early formed porosity during burial in a hydrotectonic framework
- Carbonate reservoir modeling
- Case histories from the Americas, Africa, Europe and Asia
- Exercises from the US and Europe based on actual data sets
- Exploration and exploitation strategies in carbonate terrains

OPEN HOLE LOGGING & FORMATION EVALUATION (USING PETROPHYSICAL APPLICATION)

UETMT-PET-D-109	Program Duration: 5 days	Program Level: Intermediate

PROGRAM OVERVIEW

This course is designed to introduce types of Wireline logs and the simple analysis of the data they provide. The following sections cover the theory behind the operation of each tool, how each tool operates its advantages and limitations, and its main applications.

TARGET AUDIENCE

Petrophysicists, Geoscientists, Geophysicists, Engineers, Managers and Supervisors.

TARGETED COMPETENCIES

- Petroleum System
- Well Logging
- Caliper (CAL)
- Lithology Tools
- Gamma Ray
- Porosity Tools

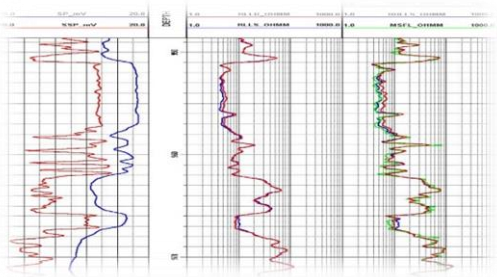
PROGRAM OBJECTIVES

There is a huge number of tools available in the industry, lots to be covered individually. As follows:

- Principles, log presentation, environmental corrections and applications of SP and GR logs.
- Classification and principles of resistivity logs (conventional resistivity, induction, and Laterologs).
- Environmental corrections and general application of all resistivity logs.
- Types, principles and environmental corrections of porosity logging tools; Density, Sonic and Neutron logs.
- General applications of Neutron, Density and Sonic Logs.
- Principles and applications of LDT and NGS logs.
- Principles and applications of Caliper logs.
- Principles and applications of Temperature logs.

PROGRAM CONTENT

- Introduction to Geology:
- Petroleum System – Elements & Processes.
- Basic Concepts.
- Introduction to well logging:
- Basic log interpretation concepts & Logging Evolution.
- Basic Logging Setup.
- Data types and Integration.
- Mechanical Tools:
- Caliper (CAL).
- Lithology Tools:
- Temperature Log.
- Spontaneous potential.
- Gamma Ray.
- Porosity Tools:
- Sonic tools.
- Density tools & LDT.
- Neutron tools.
- Lithological Identification Using (Neutron-Density) Combination.
- Resistivity Tools:
- Induction logs.
- Laterologs.
- Micro logs.
- High-Resolution Induction Tools.
- Array Induction Tools.
- Software Applications (Techlog)
- Project setup and Loading well data
- View well data in log plot.
- Environmental Correction.
- Depth Match.
- Curve Splicing.
- Lithology identification.
- Reservoir zonation.
- Create temperature curve & temperature gradient.
- Determination of fundamental parameters.
- Shale volume calculations.
- Determination of clay minerals.
- Porosity models & calculation methods.
- Saturation models & calculation methods.
- Cut-off and Summation.
- Cross plots for Lithology, porosity and oil/water/gas saturation.
- Reserve estimation & recoverable Sh calculations.
- Quanti.Elan (Mineral solver analysis).
- Geometric framework of the reservoir interpretation.
- Qualitative and quantitative description of rock and fluid properties.
- Flow surveillance – monitoring of reservoir saturation and pressure.
- Seismic Reservoir characterization Data:- seismic interpretation, seismic inversion, AVO, multicomponent , 4-D seismic, seismic stratigraphy, seismic reservoir evaluation, shared earth modeling (static & dynamic model), rock properties, reservoir fluid properties, oil and gas reserves .



DIPMETER AND BOREHOLE IMAGE LOGGING

UETMT-PET-D-110

Program Duration: 5 days | Program Level: Intermediate

PROGRAM OBJECTIVES

Borehole imaging tools provide an image of the borehole wall that is typically based on physical property contrasts. There are currently a wide variety of imaging tools available, though these predominately fall into two categories: resistivity and acoustic imaging tools. The application of image logs in our industry has long been undervalued or not fully appreciated. The interpretation of images is a skill that needs to be learned and the best way to do so is with some of the industries' leading interpreters. Borehole images, both wireline and LWD can fill a vital data gap between core and seismic data.

TARGET AUDIENCE

Petrophysicists, reservoir engineers, exploration and development geologists, core and log analysts, geophysicists, drilling and completion engineers, and oil company research and development staff.

TARGETED COMPETENCIES

- Dipmeter and Borehole Images
- Image Processing and Quality Control
- Stratigraphic Interpretation
- Sedimentologic Interpretation

PROGRAM CONTENT

- Definitions, Tools, theory of the dipmeter and borehole images.
- Types of the borehole images.
- Image Processing and quality control.
- Interpretation techniques.
- Petrophysical interpretation of borehole images.
- Structural interpretation of the dipmeter and borehole images.
- Fracture description from borehole images and dipmeter data.
- Stratigraphic, Sedimentologic interpretation and facies creation based on borehole images and dipmeter.
- Facies association and depositional modeling.

NUCLEAR MAGNETIC RESONANCE (NMR)

UETMT-PET-D-111

Program Duration: 4 days | Program Level: Intermediate

PROGRAM OBJECTIVES

NMR Petrophysics course will provide geoscientists and engineers with a basic to intermediate skill-level for using NMR data in reservoir characterization workflows. Course design is a balance between information transfer, discussion, training, and practical exercise. The expectation is that participants will return to their jobs with the skill-set shown on the slide below.

TARGET AUDIENCE

Geoscientists and engineers interested in learning how NMR technology fits within the reservoir characterization/reservoir modelling workflow and how to use the data to best advantage.

TARGETED COMPETENCIES

- NMR Technology
- NMR Core Analysis
- NMR Data Interpretation
- NMR Logs

PROGRAM CONTENT

- Basics of NMR technology.
- NMR Core Analysis.
- Rock typing from NMR core data and its relationship to logs.
- Pore geometry and what it means for the interpretation of NMR Data.
- NMR Logs.
- Job Planning.
- Log Quality Control.
- Working with NMR data (various exercises throughout the course).

WELL LOG INTERPRETATION

UETMT-PET-D-112

Program Duration: 5 days | Program Level: Intermediate

PROGRAM OVERVIEW

- The most universal, comprehensive and concise descriptive documents on oil and gas wells are logs. They impact the work of almost every oilfield group from geologists to roustabouts to bankers. Familiarity with the purposes and optimum applications of well logs is therefore essential for people forging their careers in the oil business.
- The instructor uses a novel approach to help participants develop a good grounding in understanding and applying well logging techniques. General principles of physics are developed to explain the functioning of modern logging tools. Wherever possible, the physics of logging measurements is related to everyday tools and appliances. Participants develop an appreciation for the constraints and limitations of operating in the borehole environment.
- A number of actual log examples are related to basic principles in the description of reservoir properties such as porosity, mineralogy, formation factor, saturation, and hydrocarbon type, for essentially clean reservoirs. Cross-plotting and reconnaissance techniques, the eyes of the part-time log interpreter, discriminate between water, oil, and gas, quickly and efficiently.
- Error minimization techniques, applicable only to computerized log analysis, produce optimal results. Participants gain realistic experience by working in teams on a comprehensive log interpretation exercise.

TARGET AUDIENCE

- Petrophysicists, Geologists, Geophysicists, Engineers, technicians, or anyone interested in a solid understanding of the principles of borehole geophysics

TARGET COMPETENCIES

- Electrical Properties of Earth Materials
- Oil Mobility
- Optimum Tools and Logging Programs
- Formation Evaluation

PROGRAM OBJECTIVES

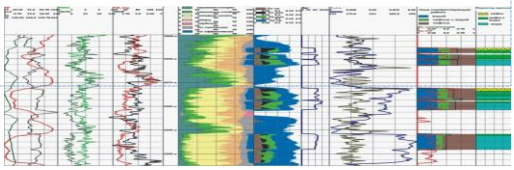
- Identify reservoirs
- Determine mineralogy, porosity and saturation in various lithogies
- The importance of electrical properties of earth materials
- Highlight oil mobility
- Interpret pressure profiles
- Develop optimum tools and logging programs
- Apply quick book methods of formation evaluation

PROGRAM CONTENT

- Logging objectives
- Invasion profile
- Challenge of borehole geophysics
- Passive electrical properties of earth materials
- Resistivity measuring tools, normal, induction, laterolog
- Reservoir/non-reservoir discrimination
- Matrix-sensitivity logs, GR, SGR, Pe
- Depth measurements and control
- Borehole calipers
- Porosity-mineralogy logs, density, neutron, sonic
- Porosity determination in clean formations
- Formation resistivity factor
- Conductivity of shales
- Porosity log crossplots and mineralogy identification
- Partially saturated rock properties and Archie Equation
- Linear movable oil plot
- Reconnaissance techniques, Rwa, FR/FP, logarithmic scaler
- Logarithmic MOP
- Porosity-resistivity crossplots
- Permeability relationships
- Nuclear magnetic resonance
- Use of pressure measurements
- Computerized log evaluation
- Sidewall coring
- Recommended logging programs

EXAMPLES

- The instructor of this course is willing to accept examples from your company for analysis in the class as one of the demonstration exercises.
- Please content UETMT training for a list of the information and support data required, as well as the necessary lead-time.



CORING AND SPECIAL CORE ANALYSIS

UETMT-PET-D-113

Program Duration: 5 days | Program Level: Intermediate

PROGRAM OVERVIEW

The extensive use of Reservoir Simulation in the Evaluation, Development and Management of Oil fields is placing increased importance on the correct use of results from special Core Analysis. Correct use of these data requires knowledge of the history of the Core. This course covers such topics as Coring Operations and Core Preservation Techniques. Laboratory Measurement methods are addressed, since results are affected by the techniques used and the Test conditions. Results that are considered valid require adjustment and refinement, and an understanding of Laboratory Techniques is needed to do this since each method has its own strengths and weaknesses. The reasons why steady state and unsteady state Waterflood results are often different are explained in this way. There is emphasis throughout the course on identifying invalid or questionable data and making the necessary refinements to the data which are considered to be valid.

TARGET AUDIENCE

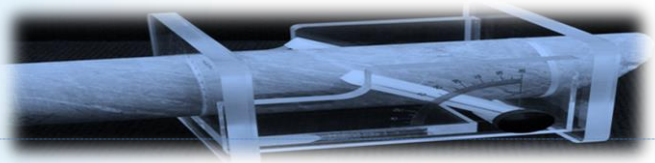
Reservoir Engineers; Supervisors and Managers who review Simulation Results; Laboratory personnel involved with SCAL Measurements; Production Geologists and Petrophysicists working in integrated teams.

TARGET COMPETENCIES

- Coring Operations
- Core Preservation Techniques
- Side Wall Cores Analysis
- Pressure, and Reservoir Fluid

PROGRAM OBJECTIVES

- Carry out a systematic review of a Laboratory report and differentiate results that are clearly invalid from those that may be reliable.
- Define the strengths and weaknesses of the various Laboratory Measurement techniques and identify which Portions of reported relative Permeability curves are likely to require refinement.
- Analyze and evaluate reported relative Permeability curves and make necessary adjustments and refinements.
- Relate relative Permeability results to rock types.
- The course will also prepare participants to formulate a special Core Analysis program for a new well or field.



PROGRAM CONTENT

Introduction

- Uses and Importance of accurate special Core Analysis results in Reservoir Engineering Calculations; key challenges in using results

Validating SCAL Data

- What to look for during review of SCAL Reports
- A systematic approach to data validation; review Checklists

Wettability

- Wettability Concepts, Measurement techniques, Types of Wettability
- Factors which effect Reservoir Wettability and How Wettability can Inadvertently be altered during Core Handling; Wettability Restoration

Using of Capillary Pressure to define Connate Water Saturation

- Measurements Techniques. Systematic Analysis of Results
- Adjusting Laboratory Data to Reservoir Conditions
- Relating Capillary Pressure data to height above Original OWC

Water-oil relative Permeability

- Measurement methods and Techniques. Wettability Considerations
- Importance of test Procedures and Test Conditions
- Special problems with Intermediate Wettability Reservoirs
- Refining Laboratory results. Integrating, Grouping and Averaging
- Hysteresis in Water-oil relative Permeability

Gas-oil relative Permeability

- Measurements Techniques
- Difference between Gas-oil and Water-Oil Data. Critical Gas Saturation
- Gravity Drainage Mechanism and extending relative Permeability Curves

Reservoir Characterization

- Examples of relationships between relative Permeability and other Rock Characteristics
- Characterization Techniques for differentiating Rock Types

Residual Oil Saturation

- Ambiguity and alternative definitions. Difficulties in determining
- Estimating from relative Permeability Data. Effect of Wettability

APPLIED CORE ANALYSIS & INTERPRETATION

UETMT-PET-D-114

Program Duration: 4 days Program Level: Intermediate

PROGRAM OBJECTIVES

This course is designed to provide deep understanding of core analysis and well logging for better reservoir characterization. Accurate measurements of routine and special (RCAL&SCAL) rock properties using core analysis and well logging reveal good evidence of hydrocarbon presence, reservoir storage capacity and flow capability. Coring and well logging offer the most tangible and direct means of determining critical reservoir parameters for making important and critical decisions about reservoir management and/or development plus enhanced oil recovery projects

TARGET AUDIENCE

Petrophysicists, reservoir engineers, exploration and development geologists, core and log analysts, geophysicists, drilling and completion engineers, and oil company research and development staff.

TARGETED COMPETENCIES

- Coring and Core Analysis
- Sidewall Coring and Analysis
- Porosity
- Permeability
- Fluid Saturation

PROGRAM CONTENT

- Coring and core analysis objectives
- Coring hardware and maximizing core recovery
- Core-handling, wellsite procedures, and preservation methods
- Sidewall coring and analysis
- Organizing effective laboratory programs
- Porosity, permeability, and fluid saturation
- Unconventional Reservoir Analytical Protocol
- Quality control in core analysis
- Petrography and mineralogy
- Special core analysis sample selection and statistical data analysis
- Core-log correlation (includes nmr log calibration, acoustic, nuclear, and electrical properties) an introduction to rock mechanics
- Wettability, relative permeability, capillary pressure, and reservoir fluid distribution
- Data integration in reservoir simulation
- Final problem: design of coring and core analysis program

BOREHOLE IMAGE LOG INTERPRETATION

UETMT-PET-D-115

Program Duration: 5 days Program Level: Intermediate

PROGRAM OVERVIEW

- Borehole Image Logs provide high-resolution Directional Data Sets and are powerful tools in Subsurface Reservoir Characterization. They span the scale Gap between Core and Seismic Observations and although do not replace core, provide key Sedimentological and Subseismic Structural Information, allow Quantification of Subsurface Fracture networks and are inputs to Geomechanical and Petrophysical Studies. A wide range of imaging tools are available, with LWD Imaging tools becoming increasingly important compared to the 'Traditional' wireline tools.
- Commonly the Datasets from these tools are under-utilized due to a lack of awareness; whilst incorrect tool choice may provide data that is not fit for purpose.
- The aim of this course is to provide participants with an understanding of current Borehole Imaging tools and Modern Interpretation Techniques.
- On Completion of the course participants should understand the Strengths and Limitations of the Various Imaging Tools, be able to make an informed tool choice based on Drilling Parameters and Reservoir objectives, QC Image Datasets and perform a Basic Structural and Sedimentological Interpretation. Interpretation exercises are an important part of the course and will be a mixture of paper and Workstation-based examples using the latest Interactive Petrophysics (IP™) Imaging Module

TARGET AUDIENCE

Geologists, Geophysicists and Petrophysicists who are interested in developing a deeper understanding of Borehole Image tools and their application in Reservoir Characterization. No previous experience of IP is necessary.

TARGET COMPETENCIES

- Bore Hole Image log Interpretation
- Bore Hole Image Acquisition
- Petrophysical Applications in Clastic and Carbonate Reservoirs

PROGRAM OBJECTIVES

- Borehole Image Log Measurement principles, Data QC, Identification of Faults and Fractures from Image Logs, determination of in-situ Stress Directions, Recognition of Sedimentary Features from Image Logs, Petrophysical applications in Clastic and Carbonate Reservoirs & How to make correct tool choices.

PROGRAM CONTENT

Introduction to Borehole Image Logs

- What is a Borehole Image Log
- Understanding Dip Data

Borehole Image Tools, Data Processing and QC

- Borehole Image Log Acquisition Technologies and their Evolution
- Borehole Image Log Processing and Data QC
- Automatic and Manual Dip Analysis

Structural Interpretation

- Structural Dip and Structural Zonation
- recognition of Zone Boundaries – Unconformities, Faults Interpretation of Horizontal Wells
- Fracture/Fault Characterization from Image Log Data open vs. closed Fractures
- Borehole bias in-situ stress determination from Borehole Breakout and Drilling induced Tensile Factors

RESERVOIR GEOLOGY (OPEN & CLOSED) LOG ANALYSIS

UETMT-PET-D-116

Program Duration: 5 days | Program Level: Intermediate

TARGET AUDIENCE

This course is should be attended to Geoscientists, Petroleum and Reservoir Engineers who wish to improve their understanding of the potential of Reservoir Geology and Log Analysis tools.

TARGET COMPETENCIES

- Wireline Formation Testing
- Wireline Testing Programs
- Geophysical Well Logs

PROGRAM CONTENT

Objectives of Reservoir Geology

- What does the Reservoir Geologist have to work with?
- What is the Reservoir Geologist's role?
- From source to Reservoir
- Source Rock Types, Maturation and Migration
- Main Types of Traps

Reservoir Rocks

- Depositional Parameters Controlling Petrophysics of Reservoir Rocks
- Reservoir Properties:
- Definition of the Porosity, Porosity vs. depth, net-pay, Permeability, Capillary Pressure, Water Saturation, Pore Geometry
- Pressure vs. Depth and Overpressures
- Fracture Porosity
- Water Distribution
- Porosity vs. Permeability relationships

Fluid Distribution

- Wetting and non-wetting Fluids
- Capillary Pressure, Pressure vs. depth, Fluid Contacts

Reservoir Geometry

- Example from a Deltaic Environment
- Sedimentology, impact on Reservoir Characteristics

Oil/Gas in Place Evaluation

- Principles of Mapping and Contouring Reservoir Parameters
- Hydrocarbons in place Evaluation (if time allows)
- The Reserves Concept

The Logging Tools

- The main Logging tools, as used in the l industry will be reviewed such as SP, Gamma Ray, Neutron Porosity Tool, Bulk Density Tool, Sonic Log and Electrical Resistivity Tools
- Examples (Analysis to be carried out by the students)

Log Analysis – Theory and Practice

- Practical Applications will allow the student to work with the Rock Model, Lithology identification on Porosity Tools, Rw determination, Hydrocarbons effect and Sw Computations. Examples (Analysis to be carried out by the students).

WIRELINE FORMATION TESTING AND INTERPRETATION

UETMT-PET-D-117

Program Duration: 5 days | Program Level: Intermediate

PROGRAM OVERVIEW

During the past fifteen years wireline formation testing (WFT) has emerged as one of the critical formation evaluation means in the upstream hydrocarbon exploration activities. While old RFT tools are still frequently used primarily for pressure measurements, modern wireline testers (MDT, RDT, MFT and, RCI) have gradually but increasingly claimed some of the duties of conventional drill-stem test programs, as a result of high drilling cost, environmental protection, operational safety, and WFT technology advances. Discussions on the "WFT vs. DST" topic have widely been held in a variety of professional and technical arenas, from pressure applications to fluid typing and sampling.

TARGET AUDIENCE

- Geologists, Petrophysicists, Wellsite Supervisors, Hydrodynamic specialists, Reservoir Engineers, Geophysicists, and Geodata Interpretation Technologists of Multidisciplinary Formation Evaluation and Development teams that are actively engaged in G&G Operations for Hydrocarbon discovery and Reservoir Management

TARGET COMPETENCIES

- Wireline formation testing
- Wireline testing programs

PROGRAM OBJECTIVES

- Understand wireline formation testing technologies, applications, and limitations
- Assemble wireline testing programs, tool configurations
- QC pressure and fluid ID tests in the wellsite for the best quality data
- Interpret pressure gradient data for in-situ fluid densities, fluid contact levels
- Compare two gradient lines for reservoir connectivity/continuity
- Perform error analysis and quantify uncertainties of P/D slopes and free water levels
- Design and interpret pressure transient data for permeability

PROGRAM CONTENT

- Review of wireline formation testers and technologies
- Measurement principles
- Test types (probe pretest, extended flow with probes and dual packers), testing depleted zones
- Drawdown mobility and its significance
- Data quality coding and screening
- Pressure gradient analysis principles, surface and subsurface fluid density/pressure gradient, error analysis
- Free water level interpretation and uncertainty quantification, gas/oil/water contact hydrodynamics
- Gradient line comparisons for single well and multiple wells
- Mud filtration phenomena (wettability/capillary effect, supercharging)
- Fluid identification with optical sensors and NMR, fluid sampling procedures
- Permeability test and interpretation from short and extended flows
- Other measurements
- Test program design
- Class exercises

CAPILLARITY IN ROCKS

UETMT-PET-D-118

Program Duration: 5 days | Program Level: Intermediate

PROGRAM OVERVIEW

This course provides a detailed knowledge of how capillarity affects hydrocarbon distribution in a reservoir rock, and how the magnitude of capillary forces can be used to deduce valuable information about sizes of pore throats and the geometry and volume of the pore network. Several in-class exercises reinforce the course learnings. Students should bring a scientific calculator or laptop computer (with spreadsheet software) to use during the exercises.

TARGET AUDIENCE

Geoscientists, petrophysicists, reservoir engineers and research and development staff who want to gain fundamental insight into the capillary properties and hydrocarbon distribution in reservoir rocks

TARGET COMPETENCIES

- Pore Throat Sizes
- Hydrocarbon/Water Capillary Pressure Curves
- Petrographic Analysis

PROGRAM OBJECTIVES

- To calculate pore throat sizes from a capillary pressure curve
- How to convert mercury/air capillary pressure curves to hydrocarbon/water capillary pressure curves
- How to determine irreducible water saturation
- To estimate the length of a transition zone
- How to obtain values for interphase tension
- How to determine the maximum column of hydrocarbon that a specific “sealing” layer can sustain without leaking
- How to determine saturation distribution in a single-pore system rock or in a multiple-pore system rock
- How to determine the representativeness of a set of capillary pressure curves compared to a zone of interest
- How to estimate permeability from a mercury/air capillary pressure curve
- From a petrographic analysis, how to create a synthetic capillary pressure curve and estimate the air permeability

PROGRAM CONTENT

- Surface phenomena, capillarity, and interphase tension
- Pressure difference across a surface film
- Capillary forces in reservoir rocks; their measurement
- Mercury/air capillary pressures
- The competition between capillary and gravity forces
- The equation relating mercury/air capillary pressure and bulk volume occupied by mercury
- Relationships between initial and residual saturations
- Seal capacity
- Calculation of saturation from capillary curves
- Interpretation of double curves (multiple pore system rocks)
- Representing a large number of capillary curves (averaging)
- Permeability from capillary pressure curves and petrography

FORMATION EVALUATION IN CARBONATES, CLASTICS AND BASEMENT ROCK

UETMT-PET-D-119

Program Duration: 5 days | Program Level: Advanced

TARGET AUDIENCE

This course will be suitable for all Geoscientists and Engineers who will benefit greatly from exposure to Advanced Knowledge and expertise in Formation Evaluations in Clastics. The course reviews the various shaly Sand Equations and their applications

TARGET COMPETENCIES

- Geology of Carbonates
- Geology of sandstones
- Shale Analysis
- Log Evaluations in Carbonates

PROGRAM CONTENT

Day 1

- Geology of Carbonates
- Geology of sandstones
- Dolomitization
- Core analysis to obtain porosity, permeability and capillary pressure

Day 2

- Shale Analysis using Elemental Capture Spectroscopy (ECS)
- Evaluations of Laminated and Dispersed Shale
- Evaluations of Cation Exchange Capacity (CEC) from Cores and Logs
- Thin Bed Evaluations and Low Resistivity Pay Zones

Day 3

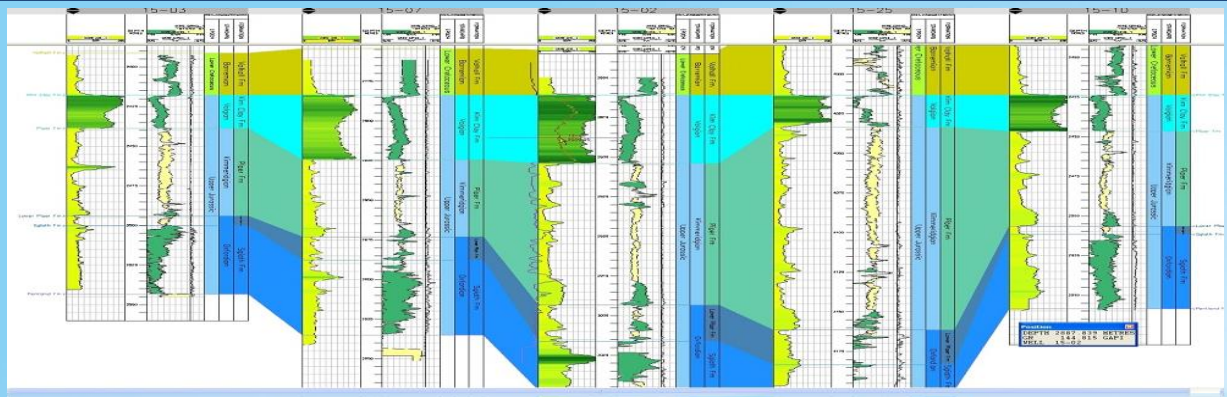
- Water Saturation Computations in Shaly-sand
- Empirical Shaly-sand Equations
- Excess conductivity Equations: Waxman-Smits (WS), dual Water, modified W-S.
- Permeability Estimations in Clastics

Day 4

- Log Evaluations in Carbonates
- Variable M and N
- Formation Factor Applications
- The effects of micro-porosity
- Permeability Estimations in Carbonates

Day 5

- The concept of Probabilistic interpretations (e.g. ELAN, TECHLOG)
- Flow units using modified Lorenz Plot
- Rock- Pore type



FORMATION EVALUATION

UETMT-PET-D-120

Program Duration: 5 days | Program Level: Advanced

TARGET AUDIENCE

- Petrophysicists
- Geologists
- Geophysicists
- Reservoir Engineers
- Petroleum and Drilling Engineers whose job requires a more extensive

TARGET COMPETENCIES

- Basic Open-Hole Well Logs
- Graphical Interpretation Techniques
- Lithology-Porosity Crossplots
- Evaluation of Shaly Formations
- Evaluation of Gas-Bearing Formations

PROGRAM CONTENT

Introduction

Measurement Environment:

- Borehole Diameter
- Filtrate Invasion
- Formation Temperature
- Mud, Mud Filtrate, and Mud Cake Resistivity
- **Problems**

Basic Open-Hole Well Logs:

- Recording Formats-grid Csales
- Depth Scales
- Magnetic tape Recording
- The Spontaneous Potential(SP) Log-Rw from the SP Log
- Gamma-Ray Log
- Resistivity Logs-conventional Electrode Resistivity Logs
- Focused current Resistivity Logs
- Induction Logs, Micro-resistivity Logs
- Determination of RT and Rxo from Resistivity Logs
- Porosity Logs-density Logs, Neutron Log, Sonic Log
- Conventional Interpretation-two Examples
- **Problems**

Reconnaissance Interpretation Techniques:

- Apparent Water Resistivity, Rwa, F and Ro Logs
- Rxo/Rt Method
- **Problems**

Graphical Interpretation Techniques (Crossplots):

- Concepts of Graphical Interpretation Techniques (Cross plots)
- Hingle Resistivity-Porosity Crooplot-concepts
- Plotting Procedure, MOS Plot
- Example, Advantages and Limitations of Hingle cross plot
- Pickett Resistivity-porosity Crossplot-concepts
- Plotting Procedure
- Example, effects of Changes in Water Resistivity and Rock Type
- Advantage and Limitations of the PICKET crossplot (Matrix Properties, “Zeroing” Type Calibration or Quality Control Problems, “Sensitivity” Type Quality Control Problems)
- **Problems**

Lithology-Porosity Crossplots:

- Lithology-Porosity Interpretation using two Porosity Tools-density-neutron Crossplot, sonic-Neutron Crossplot, Density-sonic Crossplot, Effect of Shale on Crossplots, Effect of Hydrocarbons on Crossplots, Effect of Secondary Porosity on Crossplots, Porosity Overlays
- Lithology-porosity Interpretation using three Porosity Tools-M-N Plot, Matrix Identification Plot (MID Pot)
- **Problems**

Evaluation of Shaly Formations:

- Shale Content Evaluation-gamma Ray
- Spectralog Potassium
- SP Log
- Lithology-Porosity Crossplots
- Porosity Logs in Shaly determination in Shaly Formations
- **Problems**

Evaluation of Gas-Bearing Formations:

- Gas Effect on Porosity Logs-Gas effect on Neutron Log
- Gas effect on Density Log
- Gas Effect on Sonic Log
- Gas effect on Lithology-porosity Crossplots
- Visual Gas detection(Porosity Overlays)-density neutron overlay
- Sonic Neutron Overlay
- Sonic-density overlay
- Porosity and Water Saturation
- Determination in Gas-bearing Formations
- Shaly Gas-bearing Formations
- **Problems**.

APPLIED RESERVOIR PETROPHYSICS AND CHARACTERIZATION

UETMT-PET-D-121

Program Duration: 5 days Program Level: Advanced

PROGRAM OBJECTIVES

In this course you will learn how to exploit interpretation techniques to spot exploration opportunities, such as bypassed pay and new resources in existing fields. You will learn how to improve dynamic simulation modelling through integration of petrophysical data. You will study advanced permeability and capillary saturation models, and construction.

Through dynamic modelling, you gain an advanced understanding of applied reservoir petrophysics and characterization using integration of data at the pore scale. You learn how to exploit interpretation techniques to spot exploration opportunities, such as bypassed pay and new resources in existing fields. You learn how to improve dynamic simulation modelling through integration of petrophysical data. You study advanced permeability and capillary saturation models, and construction.

TARGET AUDIENCE

Petrophysicists, Geoscientists, Geophysicists, Engineers, Managers and Supervisors.

TARGETED COMPETENCIES

- Petrophysical Rock Types
- Water Saturation
- Capillary Pressure
- Rock Electrical Properties.
- Saturation Workflows

PROGRAM CONTENT

- Petrophysical rock types.
- Water saturation (Sw) and impact of capillary pressure and rock electrical properties.
- Comparison of log-based Sw relationships.
- Permeability prediction and capillary saturation workflows with example model construction.
- Height function and Thomeer approaches.
- Drainage and imbibition relative permeability curves and their relationship to wettability.
- Wellbore simulation using petrophysical rock types, facies, and flow units.
- Recovery factor simulation based on petrophysical data.
- Application of field-study flow units.

CASED HOLE LOGGING AND FORMATION EVALUATION

UETMT-PET-D-122

Program Duration: 5 days Program Level: Advanced

PROGRAM OBJECTIVES

This course teaches skills necessary to practice the art and science in accurately determining remaining hydrocarbons using modern dual-detector and emerging multi-detector pulsed neutron (PN) tools. The latter can compute multiple petrophysical parameters simultaneously and delineate gas better, especially in low porosity, but add to data and interpretation complexity. The course discusses measurement-to-interpretation techniques used by various players and thus offers an insight into their effectiveness in conditions of increasing wellbore and formation complexities. The user will gain a better understanding of why tools from different service companies, often recording similar raw data in near-identical conditions, may differ significantly in their predictions. The course will help users of the technology make targeted tool choices, plan logging jobs better, and perform in-house interpretation if needed.

TARGET AUDIENCE

- Geologists, formation evaluations specialists, completion, reservoir and production engineers, and managers who may be making technology- and tool-choice decisions.

TARGET COMPETENCIES

- Pulsed Neutron Capture (PNC) Logs
- Petrophysical Calculations
- Log-inject-log Methods
- Carbonate Rocks
- Conventional Hydrocarbon Reservoirs
- Carbonate Reservoirs

PROGRAM CONTENT

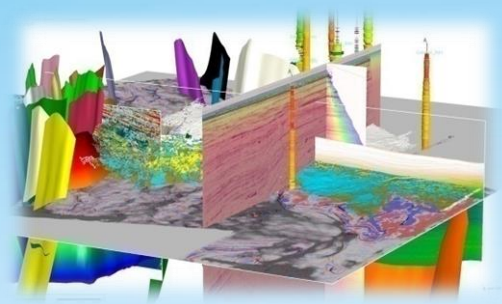
Participants will learn How to

- Determine adequacy of PNC capture vs. C/O logging methods for saturation calculation, especially through complicated well bores and in complex formations
- Calculate water and steam saturations from Pulsed Neutron Capture (PNC) Logs
- Correct petrophysical calculations for the influence of shaliness
- Distinguish gas/steam from liquids
- Compute oil saturation directly from Carbon/Oxygen technique
- Locate water entry and judge zonal communication
- Judge where specialty methods, such as Log-Inject-Log to estimate remaining oil vs. residual oil saturation, pseudo-density, etc., may not work
- Make appropriate tool choices
- Perform interpretation QC and plan logging jobs

WELL LOG ANALYSIS AND INTERPRETATION

UETMT-PET-D-123

Program Duration: 5 days | Program Level: Advanced



PROGRAM OBJECTIVES

The course is designed for E&P Professionals with background and experience in Petrophysics
Formation Evaluation and Log Interpretation.

TARGET AUDIENCE

- Petrophysicist
- Well Log Analyst
- Geoscientist
- Geologist & Geophysicist
- Reservoir & Petroleum Engineers Production
- Exploration Manager
- Project Engineer

TARGET COMPETENCIES

- Introduction to Petrophysics
- Logging Operations and Quality Control
- Advanced Formation Evaluation

PROGRAM CONTENT

Introduction to Petrophysics

- What is Petrophysics?
- What are the Rock Physical Properties?
- What is Well Logging?
- Introduction to Open-Hole Logging Tools
- Definition, Measurements, Applications & Equations of the following tools:
- Lithology Tools: GR, NGT, SP
- Porosity Tools: BHC, FDC, CNL
- Resistivity Tools: DLL, DIL, MSFL
- Other Tools: EPT, Dipmeter, RFT
- Exercises: Calculations of GR, SP, Sonic, etc.
- Introduction to Logging While Drilling (LWD)
- Lithology Tools
- Resistivity Tools
- Porosity Tools

Logging Operations and Quality Control

- Logging Tools Operation
- Log Quality Control
- Quick Look Well Log Interpretation
- Lithology Interpretation
- Porosity Calculation
- Rw Determination
- Petrophysical Parameters (a, m, n)
- Vshale Estimation
- Fluid Saturation
- Permeability
- Practical Exercises
- Cased-Hole Logging Tools
- Definition, Measurements, Applications & Equations of the following tools:
- Thermal Decay Time (TDT, RST)
- Cement Bond (CBL-VDL)
- Production Logging (PLT)

Recent and Advanced Tools

- Definition, Measurements, Applications & Equations of the following tools:
- Geological Tools: FMS, FMI
- Resistivity Tools: HRLA, ARI, AIT
- Porosity Tools: APS, LDT, DSI
- Other Tools: NMR, CMR, MDT, ECS
- Formation Evaluation
- Rock Physics (from Core and Log)
- Porosity Types
- Permeability
- Permeability and Porosity Relationships
- Fluid Saturation
- Lithology Interpretation
- Vsh Calculation
- Rw determination methods
- Petrophysical Parameters (A,M,N)
- Archie's Relationship
- Core Analysis and Core-Log Relationships

Advanced Formation Evaluation

- Reservoir Petrophysical Model Evaluation
- Modern Approaches and Techniques in Petrophysics
- Multi-Well Bases Study Using:
- Multi-Well Data-Base
- Key Well Study
- Data Normalization
- Variable Petrophysical Parameter Values
- Standardization of Petrophysical Parameters
- Lithology Determination
- Lithology Model
- Lithological Parameters
- Petrophysical Parameters Determination
- Archie's Parameters
- Most Problematic Parameters
- Old Methods (Constant Value)
- New Methods (Variable Values)

Introduction to Computer Processed Interpretation

- Hydrocarbon Quality
- Fluid Contacts (GOC-GWC-OWC-ODT-WUT-FWL)
- Reservoir Summations
- Practical Training Exercises on & Case Studies Including:
- Carbonate reservoir (Limestone) from Gulf area
- Clastics reservoir (Sandstone) from Egypt
- Gas Sandstone reservoir from South Africa

LOG INTERPRETATION

UETMT-PET-D-124

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

- General principles of Physics are developed to explain the functioning of Modern Logging Tools. Wherever possible, the Physics of Logging Measurements is related to everyday tools and appliances. Participants develop an appreciation for the constraints and limitations of Operating in the Borehole Environment.
- A number of Actual Log Examples are related to basic principles in the description of Reservoir Properties such as Porosity, Mineralogy, Formation Factor, Saturation, and Hydrocarbon Type, for essentially clean Reservoirs.
- Cross-plotting and Reconnaissance Techniques, the eyes of the part-time Log Interpreter, Discriminate between Water, Oil, and Gas, quickly and efficiently.
- Participants gain realistic experience by working in teams on a comprehensive Log Interpretation Exercise.

TARGET AUDIENCE

Petrophysicists, Geologists, Geophysicists, Reservoir Engineers, or anyone interested in Log Interpretation obtained from Modern Logging Tools.

TARGET COMPETENCIES

- Reservoir/non-Reservoir Discrimination
- Depth Measurements Control and Borehole Calipers
- Natural Radiation and GR Logs
- Porosity Measuring Tools

PROGRAM OBJECTIVES

By the end of this program, you will learn how to

- Identify Reservoirs
- Determine Mineralogy, Porosity and Saturation in various Lithogies
- Interpret Pressure Profiles
- Develop Optimum Tools and Logging Programs
- Apply Quick book methods of Formation Evaluation

PROGRAM CONTENT

- Logging Objectives
- Reservoir/non-Reservoir Discrimination
- Depth Measurements Control and Borehole Calipers
- Natural Radiation and GR Logs
- Porosity Measuring Tools
- Porosity Log cross-plots and Mineralogy Identification
- Invasion Profile
- Resistivity measuring Tools, Induction, Laterolog
- Formation Resistivity Factor
- Porosity-Resistivity Cross-plots
- Saturation Calculations
- Permeability Relationships
- Formation Pressure Measurements
- Quality Control
- Recommended Logging Programs

FORMATION EVALUATION IN SANDSTONE

UETMT-PET-D-125

Program Duration: 5 days | Program Level: Advanced

TARGET AUDIENCE

This course will be suitable for all Geoscientists and Engineers who will benefit greatly from exposure to Advanced knowledge and expertise in Formation Evaluations in Clastics. The course reviews the various Shaly Sand Equations and their applications.

TARGET COMPETENCIES

- Geology of Clastics Reservoirs
- Density-Neutron Application
- Acoustic Measurements and Acoustic Scanner
- Shaly Sand Equations
- Rock Pore Type and Flow Units

PROGRAM CONTENT

Day 1

- Geology of Clastics Reservoirs
- The Gamma Ray and Spontaneous Potential Logs
- Defining the Clay Type
- Core Analysis to obtain Porosity and Permeability

Day 2

- Applications of the density-neutron Cross Plot to determine effective Porosity, Shale Volume and Total Porosity
- Acoustic Measurements and the Acoustic Scanner to determine Sand Compaction and Mechanical Properties
- Shale Analysis: to define Lithology in Complex Environments.
- Obtaining an Aluminum Emulator for Accurate Shale Evaluation

Day 3

- Definition and Measurement of the Cation Exchange Capacity (CEC). This is needed for the Waxman-Smits Equation is using Lab and Log Data
- Evaluations of dispersed and Laminated Shale using Thomas-Stieber and Poupon- Jahasz approach.

Day 4

- Shaly Sand Equations using Empirically derived Equations
- Detailed outline of the Excess Conductivity Shaly Sand Equations: Waxman-Smits (WS), Dual-Water, Modified W-S
- Comparison of the results from the various Equations

Day 5

- Rock Pore Type and Flow Units
- Capillary Pressure Analysis
- Rock-pore Type in Clean Sands
- Flow units and the use of the Loren plot

CORE LOG AND LOG INTERPRETATION

UETMT-PET-D-126

Program Duration: 5 days | Program Level: Advanced

TARGET AUDIENCE

This course will be suitable for all Geoscientists and Engineers who will benefit greatly from exposure to Advanced knowledge and expertise in Formation Evaluations in clastics. The course reviews the various shaly Sand Equations and their applications

TARGET COMPETENCIES

- Core/Log Integration Workflow Process
- Textural Core Analysis
- Petrophysical Rock Types

PROGRAM CONTENT

Day 1

- Introduction to the Core/Log Integration Workflow Process
- Explain Core/Log Integration Importance
- Fundamentals of Log Analysis using Next 4-Line Interpretation Method
- 4- Line Interactive Evaluation Workshop

Day 2

- Textural Core Analysis and Integration with the Geologic Framework
- Determination of Porosity - total and Effective
- Porosity Evaluation Workshop
- Using Rw, Ro, and Rwa
- Log Evaluation of Sw
- Evaluating Sw Workshop

Day 3

- Overview of Petrophysical Rock Types and Water Saturation....it is not an Accident
- Petrophysical Rock Type Workshop
- Applied capillary Pressure and Calibrating Water Saturation
- Capillary Pressure Workshop

Day 4

- Core/Log Integration Workshop
- Reservoir Facies Characterization Workshop
- Overview of Pore Geometry, Clays, and the relationship to Water Saturation Methods from Logs
- Introduction to Flow units and Permeability Prediction
- Permeability Prediction Workshop
- Flow unit Workshop

Day 5

- Well Evaluation Workshop Integrating Lithology, Core/Log Porosity, Sw and Capillary Pressure and Permeability Prediction Calibrated to Logs

PETROPHYSICS & STRUCTURAL ANALYSIS USING FMI/ DIPMETER LOG USING INTERACTIVE PETROPHYSICS "IP" SOFTWARE

UETMT-PET-D-127

Program Duration: 5 days | Program Level: Advanced

TARGET AUDIENCE

Reservoir, Development and Exploration Geologists; Geophysicists; Junior Petrophysicists; Log Analysts; Petroleum Engineers; and Experienced Technicians

TARGET COMPETENCIES

- Basic Rock Properties
- Borehole Geophysics
- Electrical Properties of Earth Materials

PROGRAM CONTENT

- Basic Rock Properties; theory and quick look Techniques
- Fundamental Concepts of Petrophysics
- Invasion Profile
- Challenge of Borehole Geophysics
- Passive Electrical Properties of Earth Materials
- Resistivity measuring tools, Normal, Induction, later log
- Reservoir/non-reservoir Discrimination
- Matrix-sensitivity logs, GR, SGR, PE
- Depth measurements and Control
- Borehole Calipers
- Porosity-mineralogy Logs, Density, Neutron, Sonic
- Porosity determination in clean Formations
- Formation Resistivity Factor
- Conductivity of Shale
- Porosity Log Crossplots and Mineralogy Identification
- Partially Saturated Rock Properties and Archie Equation
- Porosity-resistivity Crossplots
- Permeability relationships
- Interactive Petrophysics Software Appling
- Nuclear Magnetic Resonance
- Use of Pressure Measurements
- Computerized log Evaluation
- Sidewall Coring
- Recommended Logging Programs
- Interpret dipmeters and borehole-imaging logs and understand the Physical principles behind them
- Detect and quantify Faults and Fractures, determine in situ stress orientations, improve Horizontal Well Placement, provide input into Flow Simulations
- Determine Paleocurrent orientations, define Stratigraphic compartments, quantify vuggy Porosity, detect thin beds, apply image data in Reservoir Characterization Applications and Types of dipmeters and Borehole Images
- Data Acquisition and Processing
- Quality Control and Artifacts
- Oil Based Mud and Logging While Drilling Applications
- Application of image data in Sequence Tratigraphy
- Sedimentology from Borehole Images: Burrows, Cross beds, Scoured Surfaces, Slumps
- Determination of paleo current Directions
- Interpretation of Borehole images in various Depositional Settings
- Reservoir Characterization using Electric logs

SPECIAL CORE ANALYSIS

UETMT-PET-D-128

Program Duration: 5 days | Program Level: Advanced

PROGRAM OBJECTIVES

- Explore the concept of Flow Zone Units and how it helps selecting core plugs for special Core Analysis Tests
- Discuss Core handling Techniques
- Understand the concepts of Special Core Analysis covering Relative Permeability Capillary Pressure and Wettability
- Learn about different Laboratory experimental Techniques for all Special Core Properties.
- Review in details different theoretical and mathematical models to measure Special Core Properties
- Benchmark your current Special Core Analysis
- Network with your peers in the Industry

TARGET AUDIENCE

- Petrophysists
- Reservoir Engineers
- Petroleum Engineers
- Geologists
- Geoscientist
- Geophysists

TARGET COMPETENCIES

- Core Plugs
- Core Analysis Tests
- Special Core Properties Measurements (Theoretical and Mathematical models)

PROGRAM CONTENT

Day 1: Introduction

- Why Core Analysis in Oil and Gas
- Reserve Estimation
- Recovery Prediction
- Enhanced Oil Recovery
- Core Analysis Programs
- Core Analysis and different formations

Core Handling and Preparation

- Core handling on Arrival
- Process at the Laboratory
- Conducting Tests
- Core Damage
- Core Cleaning and Drying

Group Discussion & Exercises

Day 2: Routine Core Analysis

Porosity

- Definitions
- Types of Porosity
- Measuring Porosity
- Equations

Permeability

- Definitions
- Measuring Permeability
- Permeability Prediction
- Permeability Averaging
- Equations

Fluid Saturation

- Definitions
- Measuring Fluid Saturation
- Archie Law
- Archie Parameters

Group Discussion & Exercises

Day 3: Flow Zone Units (RQI and PG)

- Kozeny-Carman Equation for Permeability
- Flow Zone Units (Using Permeability and Porosity)
- FZUs and SCAL

Examples & Exercises

Day 4: Special Core Analysis

Capillary Pressure

- Definition of Capillary Pressure
- Forces and Factors Controlling Capillary Pressure
- Laboratory Experiments
- Using Capillary Pressure Data
- Models and Prediction

Wettability

- Definition of Wettability
- Laboratory Experiments
- Common Wettability Indicators
- Models and Prediction

Examples & Exercises

Day 5: Special Core Analysis

Relative Permeability

- Definition of Relative Permeability
- Core Consideration
- Factors Affecting Relative Permeability
- Laboratory Experiments
- Theoretical Models
- Empirical Models
- Averaging Relative Permeability Data

Examples & Exercises

FORMATION DAMAGE

UETMT-PET-D-129

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

Formation Damage seems to be inevitable and it is costing you and your company money! Whether it can be prevented or removed economically or must be accepted as the price for drilling and producing a well will depend upon many factors. The activity with horizontal and multilateral wells has brought about a renewed interest in this subject. Many are trying to prevent Formation Damage during Drilling and Completion through the application of under balanced Drilling.

This approach cannot work for everyone and some are beginning to question the validity of expecting no Formation Damage when under balanced drilling is used.

Others are using the newer drill-in/completion fluids in hopes of getting the Formation Damage Problem under Control. This renewed interest points out that the industry realizes we have a long way to go to overcome Formation Damage.

PROGRAM DESCRIPTION

- This program provides Techniques for Testing, Diagnosing, Preventing and Treating near wellbore Formation Damage Problems. These problems include: Fines Migration, Inorganic Scales, Paraffin and Asphaltene Precipitation, Sand Production, Perforation Plugging, Clay Swelling, Water Reinjection and Invasion of Mud Solids, Cement Filtrates and Completion Fluids. The mechanisms of Damage and the methods used to Test and Diagnose Problem Wells are emphasized.
- The attached program Content tends to be more of Practical rather than Theoretical nature. The program will be based direct discussion of actual operational Formation Damage Problems.

TARGET AUDIENCE

- Production and Completion Engineers responsible for Well Maintenance and Production Performance.
- Drilling and Reservoir Engineers interested in minimizing the Formation Damage impact of Drilling, Completion, Production, Injection and Stimulation Operations.
- Also, Geologists concerned with Well Performance and Production Enhancement; and field Supervisors.

TARGET COMPETENCIES

- Geological/Depositional Environment
- Reservoir Properties
- Reservoir Geology and Characteristics
- Formation Damage

PROGRAM OBJECTIVES

The program aims at familiarizing the participants with all aspects of the Formation Damage during different phases of the well life. The program topics will be presented and discussed with special emphasis on Actual Field Cases as experienced by the Company Staff:

PROGRAM CONTENT

- Geological/Depositional Environment Review: How homogeneous or heterogeneous are these formations from which we produce and what the influence on formation damage is.
- Reservoir Properties Review: What properties most influence the effect of formation damage? Is your reservoir performance influenced by stress sensitivity?
- Damage Mechanisms: How are sandstones and carbonates damaged, how does formation mineralogy and clay chemistry influence damage? What about fines migration, scale, paraffin and asphaltenes?
- Damage Prevention: Drilling, completion, and production methods, drilling/completion fluid and additive selection, clay control.
- Evaluation of Damage: Production performance, logging, pressure analysis review.
- Damage Removal: Acidizing materials and methods, non-acid approaches, such as wellbore washes, perforating techniques, and hydraulic fracturing to bypass damage.

Reservoir Geology and Characteristics:

- Background
- Porosity of a rock
- Formation Permeability
- Oil Reservoirs
- Causes of Low Productivity
- Skin Effect
- Reservoir Drive Mechanism

Formation Damage:

- Basic Causes of Damage
- Classification of Damage Mechanisms
- Diagnosis of Formation Damage

Formation Damage During Drilling Phase:

- Introduction
- Functions of Drilling Fluids
- Drilling Fluid Properties Related to Formation Damage
- Drilling Fluids Composition
- Protection of Formation Productivity
- Causes of Damage during Drilling
- Ways to avoid / minimize Formation Damage during Drilling

Formation Damage During Completion Phase:

- Introduction
- Causes and Types of Formation Damage During Completion
- Prevention of Formation Damage in Well Completion

Formation Damage During Workover Operations

- Introduction
- Causes of Damage while Remedial and Workover Operations
- Corrective Procedure to avoid formation Damage during Workover

Formation During Production Phase:

- Introduction
- Production Operations Causes Formation Damage
- Treatment and Prevention
- Asphaltine and Paraffin Problems
- Scale Deposition, Removal and Prevention

Actual Case Studies

CARBONATE & FRACTURE PETROPHYSICS

UETMT-PET-D-130

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

Approximately one half of the world's proven reserves of oil and gas lie in carbonate or fractured reservoirs. The main elements of fractured evaluation are incorporated into this course because carbonates, basement and tight clastics are often fractured. Log analysis in these reservoirs is often completely misleading . so, more than in any other reservoir type, training and data integration is essential if expensive operational mistakes are to be avoided.

The same fundamental petrophysical principles apply to all reservoirs but carbonates and fractures are far more problematic. Different features dominate the petrophysical data, like the extremely diverse pore geometries of micro bio porosity, vugs, fractures and the absence of clay minerals as the controlling factor for effective porosity. Such characteristics force a back to basics, first principles approach if economic decisions are to be securely grounded on fit for purpose petrophysical results.

This intermediate course details the primary problems of carbonate and fracture evaluations and how to optimize data acquisition and data integration for useful output. A wide variety of examples from high porosity/low permeability carbonates, detrital carbonates, low porosity fractured carbonates and basement fractured reservoirs are employed to demonstrate the often severe shortcomings of conventional approaches. Conventional approaches are juxtaposed with the purpose designed, core-log-test, data gathering and evaluation techniques which have proven successful in providing certainty for reserves and simulation in these difficult reservoirs. Classic problems are circumvented or reduced by these key uncertainties, objectives driven information flow, demonstrated via practical, worked examples. All theory is closely interleaved with short, simple exercises to clarify and consolidate the principles under discussion. The role of all conventional logs as well as important special purpose logs is covered in this context, including Nuclear Magnetic Resonance.

Basic petrophysical principles and log analysis are reviewed in this course, however a years experience in general petrophysics or log analysis is advisable. This course has an excess of material from numerous fields and is rooted in the real world of operating energy companies, not the university lecture theatre. It includes numerous 'real world' useful tips and a practical reference manual to work from after the course. The course will provide a new found familiarity, understanding and confidence for geoscientists faced with the daunting prospect of managing these confusing reservoirs. A calculator and post 1994 chart book are useful.

TARGET AUDIENCE

All Petrophysicists, Wellsite Geologists, Operations Geologists, Carbonate or Fracture Reservoir Geologists or Reservoir Engineers, Core Analysts. Anyone involved with the formation evaluation of carbonates or fractured reservoirs or who use their petrophysical results for reserves or reservoir simulation.

TARGET COMPETENCIES

- Carbonates & Sands and Their Differences
- Mudlogs and Ancillary Data
- Carbonate & Fracture Integrated Petrophysical Evaluations

PROGRAM OBJECTIVES

The physical differences between carbonates and sands and their data response implications

Why low porosities, extreme pore geometries, fractures and oil wetness are more prevalent in carbonates and how to recognize and treat them

- Why well tests (DSTs) are usually misleading in fractured reservoirs and what critical other data you need
- The importance of using mudlogs and other ancillary data effectively in Carbonate & Fracture reservoirs
- The key points to be aware of to achieve an optimized, cost effective data acquisition program
- Special features of Carbonate & Fracture quicklook log evaluation
- The common problems with Carbonate & Fracture petrophysical development studies and how to avoid them
- Essential features of Carbonate & Fracture integrated petrophysical evaluations and how these differ from clastics
- Variable cementation exponents and how to treat them
- What you need to watch for as a Non-Petrophysicist when using Carbonate or Fracture petrophysical results
- How to quickly asses if Carbonate or Fracture log data and petrophysical results are 'fit for purpose'

PROGRAM CONTENT

- Review of carbonate and fracture pore geometries and important other factors
- Implications for coring, logging, wireline testing and routine and special core analysis
- Examples of good and bad carbonates and fracture evaluation data sets
- Improved carbonate and fracture quick look log analysis techniques
- Essential features and work flow of a carbonate or fracture integrated Petrophysical evaluation
- Checklists for logs and Petrophysical results before their use in reserves or reservoir simulation (geological Modeling)
- Evaluation spreadsheet templates and Key Equations List
- Daily morning recaps and questions
- Final Course Recap and Key Recommendations.
- Live PC examples using Terra Sciences and Geology software
- Micropracticals, Morning and Afternoon Workshops, Experience and Debate!

NMR LOGGING, PETROPHYSICS AND PRACTICAL APPLICATION

UETMT-PET-D-131

Program Duration: 5 days | Program Level: Advanced

PROGRAM OBJECTIVES

This is a comprehensive summary of NMR Logging including Basic Physics, Signal Processing, practical considerations and tool selection, Job Design, Data Processing, Interpretation, Quality Control and Log/Core Integration. Emphasis is on practical application and building of Interpretation Skills with dozens of real-world examples, day five will be a Computing Lab to include Processing of NMR Datasets using some Software (If available).

TARGET AUDIENCE

This course is recommended for Senior Petrophysicists, Senior Exploration Geologists, Operations Geologists, Senior Reservoir Geologists, Senior Reservoir Engineers, Senior Geophysicists, Core Analysts or anyone with high experience years in creating or using Formation Evaluation results.

TARGET COMPETENCIES

- NMR Logging
- Signal Processing
- NMR Datasets Processing

PROGRAM CONTENT

- Introduction, Why NMR??
- NMR Physics
- T1, T2 and diffusion, T2 Interpretation, Pore size and Fluid effects
- Signal Processing, Inversion, Averaging, Signal to Noise
- NMR Porosity, Bound Fluid Models
- Permeability Models
- NMR Log Integration with Resistivity based Analysis
- Commercially used NMR Fluid Identification Methods
- Practical considerations of NMR Logging including Environment effects, MRX, MRIL B and C, MRIL prime, MRIL-XL
- Quality Control of NMR Logs
- NMR Shale Application
- Log-core Integration
- Job Planning and Design, Parameter Selection
- NMR Data Processing Capabilities of Commercial Software
- Effect of various bound Fluid and Permeability Models.
- Use of NMR Fluid Identification Methods
- NMR Petrophysics provides complete Petrophysical Services, including:
- Producibility Prediction, Estimates of relative Flow Rate of Water, Oil and Gas.
- Petrophysical Data Management
- Consistent, Reliable net pay Tabulation
- Data editing, Synthetic Curves such as RHOB & DT

STRUCTURAL AND STRATIGRAPHIC INTERPRETATION OF DIPMETERS AND BOREHOLE-IMAGING LOGS

UETMT-PET-D-132

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

Dipmeters are microresistivity logs that detect the orientations of bed boundaries and borehole elongations. Borehole-imaging logs provide video, acoustic and/or electrical images of the borehole face. They are used to detect, orient, and quantify natural, induced, and healed fractures, faults, fold axes, unconformities, paleocurrent directions, bounding surfaces, thin beds, net-sand counts, in situ stress, and secondary porosity. Dipmeters and borehole images can be run in water-based or oil-based muds. The key objective of dipmeter and borehole-image interpretation is to describe structural and stratigraphic features encountered by a wellbore, commonly in the absence of core. This course provides numerous hands-on exercises and case studies that emphasize sedimentologic, stratigraphic, and structural applications of these widely run, but generally underutilized logging tools.

TARGET AUDIENCE

Petrophysicists, geologists, geophysicists, reservoir engineers, and research scientists

TARGET COMPETENCIES

- Dipmeters and Borehole-Imaging Logs
- Stratigraphic Compartments

PROGRAM OBJECTIVES

- Interpret dipmeters and borehole-imaging logs and understand the physical principles behind them
- Detect and quantify faults and fractures, determine *in situ* stress orientations, improve horizontal well placement, provide input into flow simulations
- Determine paleocurrent orientations, define stratigraphic compartments, quantify vuggy porosity, discover by-passed pay, detect thin beds, increase proven reserves

PROGRAM CONTENT

- Types of dipmeters and borehole images
- Data acquisition
- Data processing
- Artifacts
- Bed boundaries
- Fractures
- Faults
- Microfaults
- Stereonets
- Rose diagrams
- Cumulative dip plots
- Vector plots
- Scat plots
- Fracture spacing
- Fracture porosity
- Sub-seismic scale faults
- *In situ* stress
- Borehole breakouts
- Net-sand counts
- Thin beds
- Sequence stratigraphy
- Unconformities
- Bounding surfaces
- Stacking patterns
- Sedimentology
- Burrows
- Cross beds
- Scoured surfaces
- Slumps
- Vugs
- Carbonates
- Paleocurrents
- Eolian sandstones
- Fluvial sandstones
- Shoreface sandstones
- Incised valley fills
- Deltaic sandstones
- Deep-water sandstones LWD
- Downhole video
- Integration with seismic, NMR, production logs
- Future directions

CARBONATE RESERVOIRS AND BOREHOLE IMAGE ANALYSIS

UETMT-PET-D-133

Program Duration: 5 days | Program Level: Advanced

PROGRAM OBJECTIVES

- Carbonate Rocks Form about 40% of Sedimentary Rocks, yet store 60% of Conventional Hydrocarbon Reservoirs. Although many aspects of their Sedimentology are comparable to those of Siliciclastic Sediments, they contain many features that are unique to Carbonates.
- In general and in detail, Carbonate Rocks are more varied than siliciclastic Rocks. Despite this variety patterns can be detected at all scales. The course will deal with features recognizable at the scale of a Borehole or at a Reservoir scale that can be interpreted from Borehole Image Data, rather than the minutiae of Carbonates.
- Carbonate Reservoirs can consist of Reservoir Rock-types with complicated Pore Systems that are not seen in siliciclastic Reservoirs. Although many of these features are present at a Resolution finer than that of Borehole Images, Clues to their Presence are present in Borehole Images when combined with and input to Geological Models of the Reservoir.

TARGET AUDIENCE

- This course is intended as a combination of a refresher on Carbonates in general and a more detailed look at recent ideas for Geologists, Geophysicists, Petrophysicists and Reservoir Geologists.

TARGET COMPETENCIES

- Sedimentary Rocks
- Conventional Hydrocarbon Reservoirs
- Borehole Image Data

PROGRAM CONTENT

- Introduction to Carbonates:
- A review of Carbonates and their Terminology
- Carbonates and Biology:
- Life and death, Reservoirs and Tombstones
- Carbonates and Physics:
- The Mechanisms of Sediment re-distribution
- Carbonates and the Atmosphere/Hydrosphere:
- Blowing hot and cold, Wet and Dry
- Carbonates and Chemistry:
- Simple Reactions with complex results
- Carbonates and Sequence Stratigraphy:
- The ups and downs of Carbonate Sediments
- Carbonates and Reservoir Properties:
- Put all the above together and perhaps you explain Reservoir Behaviour!
- Carbonates and Borehole Images:
- What images might tell us, and how can we use the Information.

SHALY SAND PETROPHYSICS

UETMT-PET-D-134

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

This course tackles the important and nontrivial problem of practical formation evaluation in shaly sand provinces. The presence of shale strongly affects the physical properties of the reservoir rock and induces a significant effect on the response of most logging tools. This results in low resistivity/low contrast pay zones that can be significant hydrocarbon producers. A properly designed analytical program (cores and logs) for the evaluation of shaly sands can add significant reserves in existing fields and can allow for the rapid identification of potential by-passed pay zones in exploration wells. The course is practical and participants are given laboratory and field problems to emphasize the instruction. At the end of the course, the participants will be able to identify and evaluate pay intervals in shaly sands.

TARGET AUDIENCE

Petrophysicists, geologists, geophysicists, engineers and explorationists involved in all phases of reservoir evaluation in shaly sand provinces

TARGET COMPETENCIES

- Reservoir Evaluation in Shaly Sands
- Shaly Sand Reservior optimum logging programs

PROGRAM OBJECTIVES

- Determine the nature, volume and distribution of clays and shales, and their impact on the analysis of cores and logs
- Integrate petrographic, core and log data to significantly improve reservoir evaluation in shaly sands
- Evaluate effective porosity and saturation and producibility of shaly sands using specific methods
- Develop optimum logging programs in different types of shaly sand reservoirs
- Evaluate the strengths and weaknesses of advanced logging tools in shaly sand

PROGRAM CONTENT

- Review of log interpretation techniques in clean formations
- Core analysis and applications of specific core tests
- Petrographic analysis (thin section, X-ray diffraction SEM/EDS) for shaly sand evaluation
- The nature of shale and clay
- Clay minerals: Influence of clay/shale on petrophysical properties
- Clay/shale occurence in resrvoir rocks related to depositional environment and diagenesis
- Integration of petrographic, core and log data for evaluation
- Effects of shale on log responses in shaly sands: Various methods of shale content evaluation
- Models for porosity and saturation determination: Single and double layer models: CEC comparison with Archie saturation and with core measurements
- Prediction of permeability and producability from logs in shaly sands: identification of bypassed pay
- Use of advanced logs- NMR, FMI, Array Induction-integrations for purposes of evaluation

IMAGE LOG INTERPRETATION

UETMT-PET-D-135

Program Duration: 5 days | Program Level: Advanced

TARGET AUDIENCE

Geologists, Petrophysicists, Geophysicists, Reservoir Engineers, and Exploration & Production Managers

TARGET COMPETENCIES

- Dip-meter
- Data Integration into Geologic and Geophysical Models
- Wireline Images
- Modern LWD Images

PROGRAM OBJECTIVES

The dip-meter is unfortunately one of the least utilized Interpretation tools available to the Geoscientist, Despite widespread Structural and Stratigraphic Applications. Thus, this course is designed to provide participants with a detailed understanding of dip-meter and Bore hole Image Acquisition, Interpretation Techniques, and Data Integration into Geologic and Geophysical Models. Applications of both Wireline Images (e.g., FMI/FMS-type Images and Ultrasonic Acoustic) and Modern LWD Images (e.g., Electrical, Density, PEF, Acoustic, Gamma Ray, etc.) Form the primary backbone of the course. Using an applied "hands-on" approach, participants will be exposed to a diversity of world-wide case examples with Complementary exercises, both of an individual and group nature. Course is designed from an applied Standpoint, with numerous **examples** and **hands-on exercises** from the Petroleum Industry.

By attending this training course you will be able to:

- Explore the available Image Log types and current State of Technology
- Exploit the Fundamentals of Dip Determination and Analysis
- Understand the application of Image Logs in Structural and Stratigraphic Studies
- Appreciate the Role of Image Logs in Geomechanical and Wellbore Stability Analysis
- Integrate Image Log Data into Multidisciplinary Studies

PROGRAM CONTENT

- Image Log Types – Stuck on wireline FMI? Try full 360° LWD high-resolution electrical, azimuthal resistivity, gamma ray, density, acoustic, and photoelectric logs.
- Visualization – Simple Manipulations to Advanced 4D Visualization maximizes Interpretation and understanding, from the Technical Analysts to Managerial Levels.
- Structure and Stratigraphy – Get the most of those Dipmeter Logs and Image Logs, including Advanced Structural Analysis and Stratigraphic/Sedimentalogical Investigation.
- Wellbore Stability – Understand the Pressure System and Borehole response to Safely guide the bit to the target.
- Geosteering and Reservoir Navigation – Take the guess work out of Reservoir Navigation by understanding the full Capabilities of modern full 360° LWD Image Logs.
- Data Integration – Incorporation of both modern LWD Image Logs and wireline Images into the overall data Stream of other Geological, Geophysical, Petrophysical and Engineering Data sets is a must for truly understanding the Petroleum System.

PETROPHYSICAL STUDIES OF THE SHALY SAND RESERVOIRS

UETMT-PET-D-136

Program Duration: 5 days | Program Level: Advanced

TARGET AUDIENCE

E&P staff with limited & intermediate background in Petrophysics and Formation Evaluation.

TARGET COMPETENCIES

- Petrophysical Properties
- Petrophysical Calculations
- Fundamentals of Log Interpretation and Formation Evaluation

PROGRAM OBJECTIVES

- Petrophysics is a key discipline in Petroleum Exploration and Production. The main objectives of this course are to understand:
- The Petrophysical Properties and corresponding Logging methods,
- The Fundamentals of Log Interpretation and Formation Evaluation,
- The link between Petrophysics and Seismic Reservoir Characterization Tools

PROGRAM CONTENT

- Introduction
- Reservoirs, Reservoir Analysis, Reservoir Models
- Reservoir Processes and Properties
- Petrophysics as a key-discipline in Integrated Reservoir Analysis
- Petrophysical Properties of Reservoir Rocks
- Reservoir Rocks and Types
- Porosity, Permeability, relative Permeability
- Capillary Pressure, Water Saturation, Fluid Contacts
- Basic Rock Models
- Fundamentals of Well Logging
- The Borehole and its Environment
- Open hole and Cased Hole Logging
- Electric and Electromagnetic methods
- Acoustic methods
- Nuclear methods
- Nuclear Magnetic methods
- Imaging methods
- Technical Logs
- LWD and MWD Techniques
- Coring and Core Investigations, Core-Log Integration
- Log Analysis – Formation Evaluation
- Fundamental Problems of Formation Evaluation Profile Description and Reservoir Detection Reservoir Characterization
- Basic Interpretation methods Vshale, Porosity, Water Saturation Permeable Zones
- Advanced Interpretation methods
- Combined determination of Porosity and Rock Composition Cross Plot methods
- Shaly Sand Interpretation Fractured Reservoirs
- Saturation determination, movable Fluids Permeability Estimation
- Thin bed Evaluation and Anisotropic Reservoirs Integrating the information; the Reservoir model

INTEGRATED PETROPHYSICS FOR RESERVES AND SIMULATION

UETMT-PET-D-137

Program Duration: 5 days | Program Level: Advanced

TARGET AUDIENCE

Petrophysicists, exploration geologists, operations geologists, reservoir geologists, reservoir engineers, geophysicists, core analysts or anyone with a year or more of experience with creating or using formation evaluation results.

TARGET COMPETENCIES

- Basic Core-log Integration
- Basic Seismic-petrophysics Integration

PROGRAM OBJECTIVES

- How to drill, core, log and test for clear formation evaluation results
- How to critically review petrophysical reserves input and identify flawed results quickly using simple, logical checks
- How to perform basic log analysis, basic core-log integration and basic seismic-petrophysics integration
- How to de-mystify petrophysics, reduce uncertainty and clarify decisions at all stages of field life
- How to integrate modern hi-tech logs simply and powerfully with core, conventional logs and seismic data
- How to deliver what really matters to energy companies (and your boss!)

PROGRAM CONTENT

Participants will teach you how to evaluate reservoirs!

Robust, minimum error reserves and simulation are achieved by a logical, systematic integration of all relevant data. Interpretation costs are small compared with data acquisition or inefficient developments so using all data is secure and cost effective. Proper integration will often replace the need to run expensive logs and is essential when logs, cores or tests disagree. "Stand-alone" log analysis, and other part uses of data result in bad economic decisions and bad personal reputations. By contrast, integration provides the right answer faster, minimises uncertainty, and precludes criticism.

This course demonstrates through an experienced and innovative consultant how robust evaluations are best achieved by integrating diverse data. Basic energy company requirements are addressed head-on by logical procedures which optimise the interpretation of Porosity, Saturation, Netpay, Permeability and Fluid Contacts - the basis of Reserves. Low contrast pay, clastics and carbonates are evaluated by simple, powerful techniques which integrate core, logs and hi-tech logs to surpass any stand-alone log analysis. Modern logs including MWD, NMR, MDT/RCI/RDTs and Image-logs are brought innovatively but simply together for the interpretation of difficult exploration wells, improved reservoir simulation and typically, significant reserves increases. The basic steps of inter well seismic-petrophysical integration are then explained. This course is packed with useful tips and its comprehensive and highly regarded manual is a lasting benefit to novice and experienced students. Do not be fooled by imitations! A calculator and post 1994 chart book are useful.

INTEGRATED PETROPHYSICS FOR RESERVOIR CHARACTERIZATION

UETMT-PET-D-138

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

- This course will teach you How to Evaluate Reservoirs and quickly identify Flawed Results. This course demonstrates How robust answers are achieved by the Integration of Diverse Data.
- Basic Economic questions are addressed head-on by a disciplined, Logical Process which optimizes the Interpretation of Porosity, Permeability, Saturation, Netpay, and Fluid Contacts - the basis of Reserves. Low Contrast Low Resistivity Pay Clastics and Carbonates are evaluated by simple Integration Techniques which surpass Stand-alone Log Analysis.
- LWD, wireline, NMR, Image Logs, Routine Core, special Core and MDTs are brought innovatively together to interpret difficult Exploration Wells, improve Reservoir Simulation and typically Increase Reserves.

TARGET AUDIENCE

Petrophysicists, Exploration Geologists, Operations Geologists, Reservoir Geologists, Reservoir Engineers, Geophysicists, Core Analysts or anyone with high experience years in creating or using Formation Evaluation results.

TARGET COMPETENCIES

- Integration of Diverse Data
- Interpretation of Porosity
- Permeability
- Saturation
- Netpay
- Fluid Contacts

PROGRAM OBJECTIVES

- How to Drill, Core, Log and test for clear Formation Evaluation results
- How to review Petrophysical Studies & quickly identify Flawed results
- How to perform basic Log Analysis, Core-log Integration and Seismic Petrophysics Integration
- How to reduce uncertainty and clarify field Management decisions
- How to integrate Logs with Core, LWD, Logs and Seismic Data

PROGRAM CONTENT

- Basic Log Analysis, Basic core-Log Integration
- Porosity: Total or effective? Gas zones and complex Lithologies, Calibrating Porosity
- Sw100 zones and Rwa's: Their derivation and effective use
- Sw: Improving the inputs which really matter: Rt/Ro, Rw, m, n, Sw: OBM/WBM Core, Capillary Pressure, Magnetic Resonance, Facies and Wettability, defined, explained AND put to good use! Calibrating Sw
- Shaly Sands: Defined & explained, Integrating Resistivity with non resistivity Data, FMI/NMR/Pc. Using Waxman Smits
- Qv, m*, n* with or without Core
- Fluid contacts and capillary Pressure: Using MDT/RCI/RDTs effectively, Distinguishing the mobile phase
- The Reservoir master equation: What is it? How do I use it?
- Permeability: Rock-types, NMR, Conventional Logs, bound Fluid volume, Permeability, Well Tests, Producibility, the Sw decision tree and how to use it. Useful Simulation input
- Netpay: What is Netpay? Definition, proper criteria and evaluation
- Seismic-petrophysical work flow, Fluid Substitutions
- Recommendations for Drilling, Coring and Logging, Evaluation Templates

APPLIED ROCK MECHANICS

UETMT-PET-D-139

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

Delegates are provided with basic theory, laboratory demonstrations, hands-on exercises, computer modeling demonstrations, and a one-day field trip to examine rock outcrops that demonstrate Geomechanical concepts. In addition to a comprehensive manual, software is provided for the student to perform wellbore stability Calculations. The practical application of rock mechanics is emphasized. ***Applied Rock Mechanics*** is designed to familiarize engineers and geoscientists with the necessary tools for immediate field application.

TARGET AUDIENCE

Drilling Engineers, Completion Engineers, Exploration and Development Geologists, Reservoir Engineers, Core and Log Analysts, Geophysicists, and Oil Company R&D staff

TARGET COMPETENCIES

Stress, Strain, and Failure Mechanics of Rocks
Rock Mechanics Concepts

PROGRAM OBJECTIVES

- Determine the stress, strain, and failure mechanics of rocks
- Apply rock mechanics concepts and generate economic benefits in all phases of reservoir development

PROGRAM CONTENT

- Rock Mechanics and Geomechanical Principals
- Rock Mechanical Properties
- Pressure, Stresses, and Loads, Principal stresses, in-situ stresses, total- and effective-stress, temperature effects, nature and origin of pore pressure
- Geomechanics and Structural Geology
- Wellbore and field measurement of in-situ (earth) stresses
- Introduction to coring
- Basic rock properties
- Common Rock Mechanics tests (lab demo)
- Stress Orientation Techniques
- Elastic, Plastic, and viscous models of rock behavior
- Borehole Stability: borehole stresses, wellbore placement, shale characterization, borehole stability models, high angle and horizontal drilling, pilot hole evaluation, multi-lateral wellbores, borehole breakouts, fluid-related instability, drilling through depleted zones and casing shoe decisions, stuck pipe, and case histories (software demo)
- Sand control: review of sand production mechanisms, gravel pack design, and case histories
- Fracture mechanics
- Reservoir engineering applications: compaction drive, reservoir compaction and compressibility factors, surface subsidence, depletion and effective stress, case history
- Log predicted mechanical properties, biot theory, seismic data and amplitude versus offset (AVO), and shear- and compressional wave anisotropy
- Data integration

RESERVOIR CHARACTERIZATION & LOG INTERPRETATION

UETMT-PET-D-140

Program Duration: 5 days | Program Level: Advanced

PROGRAM OBJECTIVES

- To make participants who are users of Geophysical Well Logs.
- To enable participants to communicate Intelligibly with Geophysical Well Log users.
- To ensure that participants realize the limits of their abilities so that they know when to call for help from specialists.
- To show participants how to correct and interpret the principal kinds of Geophysical Logs.
- To show participants how to use Geophysical Well Logs in an Integrated Fashion for application in Porosity and Petroleum Evaluation, Lithological and Sedimentological Interpretation and in Stratigraphy.

TARGET AUDIENCE

All Geoscientists & Petrophysicists who use or are likely to use Geophysical Well Logs.

TARGET COMPETENCIES

- Geophysical Well Logs
- Porosity and Petroleum Evaluation
- Lithological Interpretation
- Sedimentological Interpretation

PROGRAM CONTENT

- Reservoirs, Reservoir Analysis, Reservoir Models
- Reservoir Processes and Properties
- Petrophysics as a key-discipline in Integrated Reservoir Analysis
- Petrophysical Properties of Reservoir Rocks
- Reservoir Rocks and Types
- Porosity, Permeability, relative Permeability
- Capillary Pressure, Water Saturation, Fluid Contacts
- Basic Rock Models
- Fundamentals of Well Logging
- The Borehole and its Environment
- Open hole and cased hole Logging
- Resistivity Logs, Nuclear, Sonic and other Logs and the Dip-meter
- Electric and Electromagnetic methods
- Acoustic methods
- Nuclear methods
- Nuclear Magnetic methods
- Imaging methods
- Technical Logs
- Coring and Core Investigations, Core-log Integration
- Log Analysis Formation Evaluation
- Fundamental Problems of Formation Evaluation Profile description and Reservoir detection Reservoir Characterization
- Basic Interpretation methods V shale, Porosity, Water Saturation Permeable Zones
- Advanced Interpretation methods
- Combined determination of Porosity and Rock Composition Cross Plot methods
- Shaly Sand Interpretation Fractured Reservoirs
- Saturation determination, movable Fluids Permeability Estimation
- Thin bed Evaluation and Anisotropic Reservoirs Integrating the information; the Reservoir Model
- Evaluation of Fluid Contents
- Evaluation of Stratigraphy

INTEGRATION OF ROCKS, LOG AND TEST DATA

UETMT-PET-D-141

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

This course provides the background necessary to solve complex reservoir evaluation and productivity problems faced in Exploration, Field Appraisal and Field Development. The key fundamentals of rock properties, logging tools and engineering data needed to solve these problems are reviewed. The concepts are illustrated with a series of real world problems that become increasingly complex as knowledge is gained in the class. Emphasis is placed on solving problems in a workshop format.

TARGET AUDIENCE

- Petrophysicists, petroleum reservoir engineers, geologists and geophysicists who have a basic understanding of petrophysics, geology and engineering and need a more advanced understanding of how to integrate the different data sets together to more completely understand reservoir performance.
- *The participants should have a basic knowledge of well logs evaluation.*

TARGET COMPETENCIES

- Clastic and Carbonate Rock Types
- Reservoir Rock Parameters
- Porosity Logs in Complex Lithologies

PROGRAM OBJECTIVES

- Identify clastic and carbonate rock types based on productivity differences
- Determine the key reservoir rock parameters needed for a more accurate reservoir evaluation
- Learn how to use cuttings, sidewall cores and cores to determine reservoir parameters
- Design an integrated interpretation
- Calculate Vclay
- Calculate porosity using porosity logs in complex lithologies.
- Determine what percentage of porosity contributes to production
- Calculate Sw using different methods
- Determine pay and pay classes
- Tie rock and well log information to production performance

PROGRAM CONTENT

- Objectives of integration
- Key rock properties for formation evaluation
- Impact of depositional environment and rock properties
- Petrophysical rock type
- Texture and porosity and permeability
- Clay impact
- Summary of basic logging tools
- Subsurface rock sampling
- Use of subsurface pressure data and evaluation
- Capillary pressure application to pay determination
- Basic methodology for an integrated interpretation
- Rock typing
- Catalog approach
- Clastic and carbonate rock types
- Relative permeability
- Important reservoir rock parameters
- Cementation and saturation components - CEC - fluid sensitivity
- Calculation of VClay/Vshale calibration of core and logs
- Calculation of porosity using porosity Logs in complex lithologies
- What is effective porosity?
- Calculation of SW using different methods
- Determining pay and pay classes
- Review of production profiles
- Overview of pressure transient analysis

DEEPWATER SANDSTONES

UETMT-PET-D-142

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

Deepwater turbidite reservoirs are widely believed to be the main reservoirs for most of the undiscovered giant hydrocarbon fields, including many of those under appraisal. This course aims to bring participants up to date with knowledge of deepwater turbidites by providing information from a variety of sources that help support exploration, evaluation and production from these reservoirs. Through a combination of lectures, practical exercises, and tutorials, the course will give students an historical perspective of turbidites and guidelines to their distinctive characteristics, in particular how to differentiate between turbidites and other sedimentary facies. We review turbidite reservoir models and make an assessment of their value in exploration and production. Particular emphasis is given to the value of integrating data from the subsurface with outcrop and modern seafloor data. Exercises with all types of data are given together with instruction and guidelines for data integration. We will continuously pose the question "which data is most significant?" when constructing subsurface models. Through use of tutorials we encourage debate and discussion and demonstrate the added value of collective learning. Proven techniques and case studies selected from a worldwide search for excellence in team practices are reviewed. Emphasis is placed upon maximizing the performance of existing teams through innovative approaches to the oil and gas industry. Each team experiences a predictable sequence of the five stages throughout its progression from startup to being self-directed, its ultimate capability. Understanding this natural life history clarifies expectations between the team and its management and enables the team to succeed. Highlighted are the diverse ways in which team issues can be solved.

TARGET AUDIENCE

Geologists, Geophysicists, Reservoir Engineers, Petrophysicists, Stratigraphers, Exploration/Production Managers

TARGET COMPETENCIES

Turbidite Reservoir Models
Reservoir Geometry and Flow Units
Porosity Logs in Complex Lithologies
Outcrop data
Modern seafloor Data

PROGRAM CONTENT

- Review of turbidite reservoir models
- Reservoir distribution in turbidite systems
- Reservoir geometry And flow units
- Outcrop data
- Modern seafloor Data
- Petrophysical characterization
- Mineralogy and textural features
- Seismic characteristics
- Trapping styles
- Sand injections
- Data integration
- Practical involving interpretation of subsurface, modern seafloor and outcrop data

CARBONATE PETROPHYSICS

UETMT-PET-D-143

Program Duration: 5 days | Program Level: Advanced

PROGRAM OVERVIEW

Carbonate rocks contain more than half of the world's oil and gas supply. Rock properties include unique pore types, permeability heterogeneity, variable Archie exponents (m and n), and distinctive capillary pressure, wettability, and nuclear magnetic resonance behavior. Conventional and specialized logging tools are used to identify and evaluate complex carbonate reservoirs. Participants work with examples from oil and gas fields of the Middle East, North Africa, North and South America, and Europe. Special emphasis is placed on borehole-image logs and their applications in faulted, fractured, and vuggy carbonate reservoirs. Other topics include sequence-stratigraphic correlations, flow-unit definition, and upscaling of petrophysical data for 3D models and flow simulation.

TARGET AUDIENCE

Petrophysicists, geologists, reservoir engineers, geophysicists, and research scientists

TARGET COMPETENCIES

- Petrophysical Properties of Carbonate Rocks
- Carbonate Rocks and Sediments
- Rock Properties
- Borehole Environment

PROGRAM OBJECTIVES

- Understand, recognize, and quantify distinctive petrophysical properties of carbonate rocks.
- Maximize the value of commercially available well logs using practical illustrations, exercises, and case studies.
- Improve estimates of proven reserves discover bypassed pay, and upscale log data for 3D models and flow simulation.

PROGRAM CONTENT

- Carbonate Rocks and Sediments
- Rock Properties
- Borehole Environment
- Openhole Logs – Lithology, Porosity, Resistivity
- Data Acquisition, Correction
- Complex Lithologies
- Pressure Measurements
- Sequence Stratigraphy
- Borehole images - sedimentologic, stratigraphic, and structural interpretation
- Fractured/Faulted Reservoirs
- Present-Day Stress
- Horizontal Wells
- VUG Detection
- Flow-Unit Determination
- Sonic logs in Carbonates
- Integrated Studies
- Nuclear Magnetic Resonance
- Chalk Reservoirs
- Karsted Reservoirs
- Emerging Technologies/Innovative Applications

- 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)

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