Advanced Training in Geophysics

**PG1**

**Who Should Attend:** Aimed at geophysicists who have a basic understanding of principles and practices in geophysics.

**Objectives:** This course aims to increase and consolidate the geophysics knowledge of the participants through a mixture of theoretical lectures and practical hands-on sessions.

**Content:**

**Module 1 - Seismic Acquisition and Processing**
- Basic Reflection Theory
- Acquisition methods
- Processing fundamentals and QC

**Module 2 - Introduction to Seismic Interpretation and Workstation Interpretation**
- Before starting to interpret
- Data inspection and evaluation
- Data display
- Seismic versus log resolution
- Well tops and check shot surveys
- Synthetic seismograms
- Choice of reflections
- Horizon selection
- Pitfalls in interpretation
- Acquisition footprints
- Sideswipe and migration problems
- Multiples
- Tuning effects
- Velocity effects
- Digeneric surfaces and gas hydrates
- Limits of interpretation packages
- First stages of interpretation
- Creating horizons
- 2D auto tracking
- Character correlation
- Flattening
- Tying loops
- Gridding and extrapolating
- Further interpretation techniques
- Basic 3D methodology
- 3D auto tracking (ASAP) - including paint brushing
- Grid libraries
- Attributes
- Variance cubes and multi versions
- Fault interpretation and visualization
- Fault cuts, contacts and boundaries
- Gridding faults
- Interpretation from attributes and other grid manipulations
- Visualisation packages

**Module 3 - Structural Interpretation and Tectonics**
- Introduction to interpreting structural features on seismic
- Extensional/Compressional/Strike-slip tectonics
- Structural inversion
- Basement reactivation
- Structural traps
- Fault sealing and reservoir compartmentalization
- Fracture modelling
- Salt tectonics

**Module 4 - Seismic Sequence Stratigraphy**
- Introduction and Methodology, Seismic Facies mapping
- Sequence Stratigraphy - Principles and Concepts
- How to identify sequences on seismic data
- Systems Tract identification
- Sequence development in various depositional settings: Paralic, Deep Marine, Carbonate, Fluvial

**Module 5 - Prospect Evaluation and AVO/Inversion analysis**
- Introduction to prospect analysis
- Introduction to the key components of the petroleum system - source, reservoir, seal, trap formation and timing
- Trap identification on seismic data - structural, stratigraphic and combination traps
- Identification of potential source, reservoir and seal on seismic data
- Direct Hydrocarbon Indicators
- Calculating volumes in place and recoverable reserves
- Risking and Ranking
- Prospect Evaluation Exercise
- AVO and Inversion Analysis

**Duration:** 5 Weeks

**Venue:** Beirut, Cairo, Istanbul, Malaysia, Dubi.
Carbonate Reservoir Geology

Who should attend?
Petroleum geologists, explorationists, petrophysicists, geophysicists and engineers involved with exploration of carbonate plays and development of carbonate reservoirs. Previous knowledge of carbonate sedimentology is not required.

Content:
Carbonate reservoirs:
- Basic principles
- Depositional concepts
- Grain types
- Textures and fabrics
- Environmental reconstruction

The reservoir model — depositional and diagenetic characteristics
- Sabkha/tidal flat
- Lagoon
- Shelf
- Reef (rudist and coral/algal)
- Barrier/shoal
- Slope and redeposited
- Aeolian and lacustrine
- Karst plays

Carbonate diagenesis:
- Primary and secondary porosity
- Compaction
- Pressure solution
- Cementation
- Dolomitisation
- Porosity generation and destruction
- Fractures

Carbonate sequence stratigraphy:
Log response in carbonate rocks:
- Gamma
- Sonic
- Neutron
- Density
- FMS

Reservoir assessment:
- Fracture reservoirs
- Reservoir modelling
- Volumetric assessment in correlation and mapping
- Effects of capillary pressure
- Interface with engineering

Duration: 2 Weeks
Venue: Beirut, Cairo, Istanbul, Malaysia, Dubi.
Field Development and Planning

PG3

Who Should Attend
Multidisciplinary teams (4-5 persons with a maximum of 20 per workshop) of petroleum geologists, geophysicists and engineers (from 0-10 years experience) who are involved in integrated regional projects, basin evaluations and prospect identification.

Objectives
The attendees will develop skills to:

- Assess reservoir productivity and ultimate oil recovery based on reservoir geological model, rock and fluid properties and stipulated drive mechanism(s)
- Identify and manage uncertainties in terms of hydrocarbon volumes, reservoir variability, productivity, and drive mechanism
- Calculate well inflow performance, design completion in accordance to well deliverability, consider environmental and facilities issues, and assess economic benefits
- Come up with field development and further appraisal/data gathering strategy to develop a robust plan that minimises exposure, and maintains flexibility (so as to adjust/revise plan as new data become available)
- Address field/reservoir management surveillance issues

Content
Groups will conduct the project work themselves under the supervision and guidance of lecturer

- Module 1 - Project Management and Field
- Module 2 - Reservoir Modelling, dynamic model
- Module 3 - Economic analysis and scenario design
- Module 4 - Development drilling
- Module 5 - Production Operations
- Module 6 - Final Presentation

Duration
5 weeks

Venue
Baghdad, Amman, Beirut, Cairo, Istanbul, Malaysia, Dubi.
Petroleum Geology for Engineers

Who should attend?
Petroleum engineers and reservoir engineers with no formal geological training.

Overview:
Hydrocarbon-bearing basins and reservoirs are often far more complex than is appreciated by the non-geologist. This course is designed to provide petroleum and reservoir engineers, who are unfamiliar with geological concepts and work practices, with a background to structural development and the characteristics of source rocks, reservoirs and seals.
It will cover the following key issues:
- Problems of predicting reservoir geometry and connectivity in three dimensions in heterogeneous rocks penetrated by a limited number of widely spaced wells
- Problems associated with mineral composition on the pore scale
- The contribution that geology can make to volumetric assessment of reserves

Content
Source rocks and the origin of oil and gas:
- Depositional environment
- Kerogen
- Thermal maturation
- Migration of hydrocarbons
- Classification of natural gases and crude oil

Reservoirs and seals:
- Clastic and carbonate reservoir sedimentology
- Depositional environments
- Sandbody geometry and connectivity
- Permeability profiles
- Porosity and the effects of diagenesis
- Formation damage and clays
- 3-D modeling

Structural geology:
- Basin types and plate tectonics
- Trap types, structural, stratigraphic, and combination
- Geological maps
- Reservoir, structure and isopach maps Seismic mapping

Generating cross-sections
- Exploration geology: Wireline logs
- Play fairways and prospects
- Seismic stratigraphy
- Volumetrics: Geological input to reserves estimates

Duration: 4 Weeks
Venue: Beirut, Cairo, Istanbul, Malaysia, Dubai.

Tel: 00964 7270000003-00964 7270000002 -P.O Box :6037 Al-Tajiyat-Baghdad –Iraq- E.Mail : aptiaopec@yahoo.com
Well- Site Geological Control

Objectives: To deepen geologists knowledge on the geological control and better evaluation of the drilled well.

Who should Attend
This course is designed for geologists and well-site operators.

Contents
- General information about drilling rig and drilling fluids.
- Construction of the geological-work plan.
- On-site description of cores and means of their sorting.
- Significance of drilling – rate data and effecting factors.
- Formation tests and geological and reservoir interpretation.
- Report writing (daily, weekly, and final reports).

Duration
6 days

Venue
Baghdad, Amman, Beirut, Cairo, Istanbul, Malaysia, Dubi.
Biostratigraphic
Palaeontolog Correlation
تطبيقات المضادات البيوستراتغرافية والمايلولوجية

PG6

Objectives: To inform participants about biostratigraphic means to determine fancy changes, and in the oil-trap.

Who should Attend
This course is designed for geologists and geological-laboratories workers

Contents
➢ Introduction on fossils and biostratigraphy.
➢ Classification of micro fossils (age – indicators).
➢ Classification of foraminiferas.
➢ Classification of palynological fossils and their geological distribution.
➢ Depositional environment of rocks by palynological data.
➢ Training on means of sample preparation for bio stratigraphic studies.
➢ Preparation of rock slices for paleontological studies.

Duration
6 days

Venue
Baghdad, Amman, Beirut, Cairo, Istanbul, Malaysia, Dubi.
Remote Sensing and Its Applications

التحسس الناني وتطبيقاته
PG7

Objectives: To explain the principles of remote sensing and its applications in oil exploration and subsurface rock – properties.

Who should Attend
This course is designed for geologists and other technical people involved in oil exploration activities.

Contents
- Introduction.
- Related physical principles.
- Electromagnetic spectrum and effect of the atmosphere.
- Data acquisition by satellites.
- Land -sat imagery and its properties.
- Active and passive remote sensing and application.
- Natural resources exploration, oil and mineral exploration.

Duration
6 days

Venue
Baghdad, Amman, Beirut, Cairo, Istanbul, Malaysia, Dubi.
3D Seismic Exploration

المشح النزلالي المجسم 3D

PG8

Objectives: Presentation and clarification of basic principles underlying the method 3D seismic surveying

Who should Attend

This course is designed for all technical people involved in seismic exploration method for oil exploration

Contents

➢ Definition of 3D technique
➢ The need of the 3D survey
➢ Survey design
➢ Data acquisition
➢ Data processing

Duration

6 days

Venue

Baghdad, Amman, Beirut, Cairo, Istanbul, Malaysia, Dubi.
Gravity Surveying Technique
تقنية المسح الجزيئي
PG9

**Objectives**: To explain the basic theory applied in gravity exploration and to clarify the procedures normally followed in application of the technique to conduct the field work and data reduction and interpretation.

**Who should Attend**: This course is designed for geophysical-exploration personnel working in oil exploration.

**contents**

- Earth gravitation field.
- Gravity measuring instruments.
- Field data acquisition.
- Data reduction.
- The gravity anomaly.
- Interpretation of gravity data.
- Concept of isostasy.

**Duration**
6 days

**Venue**
Baghdad, Amman, Beirut, Cairo, Istanbul, Malaysia, Dubi.
Exploration and Exploration of Oil Deposit

PG10

Objective: To deepen the knowledge and experience of participants in the field of oil exploration techniques and information evaluation, oil reserves computations

Who should Attend

This course is designed for geologist and petroleum engineers.

content

- Basic methods in prospecting techniques.
- Sedimentary rocks, types and changes.
- Identification of sedimentary environments.
- Earth tectonics and plate theory.
- Oil reservoirs and connate water.
- Oil fields and reserve computation.
- Electrical logs.
- Productivity tests.
- Practical applications and examples.

Duration

6 days

Venue

Baghdad, Amman, Beirut, Cairo, Istanbul, Malaysia, Dubi.
Geological Formation Evaluation

*Taqimi al-takwimatin al-jibaliana*

**Objectives:** To give detailed account on evaluation of geological formations for purpose of determining of the oil system elements (generation, reservoir and seal – rocks).

**Who should Attends:** This course is designed for geologists, workers in oil – field exploration and development activities.

**contents**

- Method of evaluation of geological formations.
- Role of well – logs in formation evaluation
- Well logs of porosity, sonic Neutron, and density.
- Resistivity logs.
- Logs of gamma ray and formation dip.
- Core analysis and its importance.
- Analysis of drilling fluid data.
- Formation tests and multi – phase testing.

**Duration**

6 days

**Venue**

Baghdad, Amman, Beirut, Cairo, Istanbul, Malaysia, Dubi.
Integration of geological, Geophysical, and Reservoir Data

**Objectives**: Development of participations knowledge on potentialities and means of integrating geological, geophysical and reservoir information.

**Who should Attend**: This course is designed for geologists and other personnel working in exploration and developments of oil – fields.

**Contents**

- Importance of integration of geological, geophysical and reservoir data.
- Maximum efficiency of data – integration results.
- Importance of parameter – specifying in each phase of the prospecting process.
  - Exploration.
  - Delineation and evaluation.
  - Production.
  - Production increasing.
  - Intensification of integration system.
  - Gathering and sorting of the basic data.
- Data analysis.
- Result evaluation.
- Capability updating.

**Duration**

6 days

**Venue**

Baghdad, Amman, Beirut, Cairo, Istanbul, Malaysia, Dubi.

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Geochemistry and Its Role in Oil Exploration
الجِيُوِكِمِيَّةِ وَدُورُهَا فِي عَمَلِيَّاتِ الإِسْتِكْشَافِ النَفْطِي

PG13

Objectives: To deepen and develop participants knowledge on the science of geochemistry and its applications in oil exploration and field development

Who should Attend: This course is designed for geologists and petroleum engineers and reservoir engineers.

Contents

➢ Development of the geochemistry science.
➢ Properties of organic matter in recent sediments.
➢ Changes of the organic materials.
➢ Analysis techniques for evaluating organic seepages.
➢ Migration of hydrocarbons.
➢ Crude oils and factors affecting their composition.
➢ Role of geochemistry in oil exploration.
➢ Techniques of evaluation of source rocks development.
➢ Analysis of produced oil and reservoir rocks.

Duration

6 days

Venue

Baghdad, Amman, Beirut, Cairo, Istanbul, Malaysia, Dubi.
Sequence Stratigraphy

**Objectives**: To introduce the concept of sequence stratigraphy and its role in formation analysis and determine the oil – system elements (source, reservoir and seal rocks).

**Who should Attend**: This course is designed for reservoir engineers and geologists.

**Contents**
- Definition of sequence stratigraphy.
- Theory and models of seismic stratigraphy.
- Seismic stratigraphy and seismic facies analysis.
- Elements of sequence stratigraphy.
  - Factors affecting sedimentary formations.
  - Subsidence of basin floor.
  - Sea level changes.
  - Supply of sedimentary materials.
  - Shape of the sedimentary basin.
- Sea level relative and absolute position.
- Sea level relative change and its role in sedimentation distribution.
- Divisions of cyclic sedimentary deposition and their causes.
- Exxon model: sedimentary sequences and system tracks.
- Cross model.

**Duration**
6 days

**Venue**
Baghdad, Amman, Beirut, Cairo, Istanbul, Malaysia, Dubi.
Geodynamic Factors Affecting Oil Reservoirs’

تأثير العوامل الجيوديناميكية على الكامن النفطية

**Objectives**: To introduce basin architectures and geological deformations leading to oil-traps also to inform participants on influence of these deformations on oil migration and accumulation.

**Who should Attends**
This course is designed for geologists and petroleum engineers.

**contents**

- Definitions
- Deformation activities occurring to rocks.
- Description of geological structures
- Types of structural foldings.
- Types of fault systems.
- Influence of structural folds.
- Influence of folds and hydrocarbon migration and accumulation.
  - Geometrical shape effect.
  - Deformation systems effect.
- Present architecture of sedimentary basins and ways determine them.
- Types of faces and their relations to deformation severity
- Types of connate water and their role in hydrocarbon preservation, and effects on physiochemical properties of oil deposits.
- Methods applied in classification of connate water.

**Duration**
6 days

**Venue**
Baghdad, Amman, Beirut, Cairo, Istanbul, Malaysia, Dubi.
Objectives: To introduce well-logging techniques and their applications in geological and geophysical studies.

Who should Attend: This course is designed for geologists and petroleum engineers, and for workers involved in petro-physical studies.

Contents:
- Definition of well logging and its historical development.
- Oil well drilling.
- Electrical logging.
- Radio activity logging.
- Sonic logging.
- Well velocity surveying and seismic velocity computation.
- Interpretation of well log.

Duration
6 days

Venue
Baghdad, Amman, Beirut, Cairo, Istanbul, Malaysia, Dubi.
Seismic Stratigraphy
الطبقية الزلزالية

**Objectives**: To give participants an introduction to seismic stratigraphy and clarify its concepts and applications in stratigraphic interpretation of seismic sections.

**Who should Attend**

This course is designed for geophysicists working in stratigraphic interpretation and oil-exploration geologists.

**Contents**

- Introduction to reflection seismology.
- Structural and stratigraphic exploration.
- Oil traps and sedimentary basins.
- The seismic velocity.
- Stratigraphic phenomena in the seismic section.
- Interpretation of seismic sections.

**Duration**

6 days

**Venue**

Baghdad, Amman, Beirut, Cairo, Istanbul, Malaysia, Dubai.
Geophysical Methods Used in Oil Exploration

الطرق الجيوفيزيائية في الاستكشاف النفطي

**Objectives**: to present a general over-view of the geophysical methods involved in oil exploration activities.

**Who should Attend**: This course is designed for geophysicists and petroleum engineers and geologists working in the field of oil exploration.

**Contents**

- The exploration process.
- Seismic method.
- Gravity method.
- Magnetic method.
- Electrical and electromagnetic methods.
- Radio - metric method.
- Geophysics of the well logging.

**Duration**

6 days

**Venue**

Baghdad, Amman, Beirut, Cairo, Istanbul, Malaysia, Dubi.
Petroleum: Generation, Migration and Accumulation

Objectives: General presentation of the complete story of the oil-deposit generation, migration, and accumulation.

Who should Attend: This course is designed for a wide sector of technical people working in the oil industry. In particular geologists, geophysicists, and petroleum engineers.

Contents:
- Basic definitions
- Chemistry of oil.
- Migration of oil deposits.
- Geological environments and sedimentary basins.
- Oil accumulation and oil traps.
- Oil reserve determination.
- Oil exploration techniques and drilling.
- Oil production and development of oil fields.
- World-wide distribution of oil reserves.

Duration
6 days

Venue
Baghdad, Amman, Beirut, Cairo, Istanbul, Malaysia, Dubai.
Seismic Attributes and AVO analysis

**Objective**: To acquaint participants with the application of AVO and attributes analysis to seismically driven exploration programs

**Who Should attend**

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

**Contents**:

- Fundamentals of rock physics and seismic interpretation
- Seismic attributes for reservoir characterization
- AVO Concept and related factors
- Hydrocarbon detection using AVO
- AVO Analysis for reservoir characterization
- Techniques for interpretation of AVO
- AVO Cross-plotting techniques
- LMR, EEI and Simultaneous inversion for reservoir characterization
- AVO/LMR/EEI inversion for fluid and fracture identification in carbonate
- Seismic attributes and wave factors
- Decon and scaling effect on attributes
- Time and frequency domain attributes
- Case studies of AVO

**Duration**

6 days

**Venue**

Baghdad, Amman, Beirut, Cairo, Istanbul, or any place suitable for client.
Fault Seal Analysis in Exploration
تحليل حالات احكام الصدع في عملية الاستكشاف

**Objective**: To understand and mitigate risk factors of fault sealing character.

**Who Should attend**
Structural geologists and Geophysicists

**Contents**:
- Fundamentals of fault systems
- Fault mapping techniques
- Mechanical stratigraphy and seal analysis
- Fault prediction, Modeling, and risk assessment
- Reservoir dynamics and fault seal/non-seal relations
- Case studies

**Duration**
6 days

**Venue**
Baghdad, Amman, Beirut, Cairo, Istanbul, or any place suitable for client.
Basin system analysis

PG22

Objective :-

To enhance the knowledge of geologists, geoscientists in the integrated approach to basin analysis in exploration.

who Should attend:-

Geologists and geophysicists involved in new venture exploration

Contents

- Plates tectonics.
- Basin formation.
- Classifications of basins.
- Analogue basin identification.
- Petroleum system analysis.
- Source rock presence and potential.
- Access to charge /source effectiveness.
- Seal effectiveness /column capacity
- Reservoir deliverability / effectiveness

Duration

6 days

Venue

Baghdad, Amman, Beirut, Cairo, Istanbul, Malaysia, Dubi.
Objective :-

To enhance Capabilities of participants in evaluating and modeling various types and hydrocarbon basins.

who Should attend:-

Geologists and geophysicists involved in now venture exploration

Contents

- Introduction to prospect and play assessment.
- Application of volumetric prospect assessment.
- The statistical fundamentals for risk and volume assessment.
- The difference between risk and uncertainty.
- Risk analysis.
- Calculating volume range for prospects.
- Hydrocarbon charge assessment.
- Play assessment techniques.
- Play recognition and mapping.

Duration

6 days

Venue

Baghdad, Amman, Beirut, Cairo, Istanbul, Malaysia, Dubi.
Objective:
To enhance the knowledge of geologists, petro physicists in main elements of petroleum geology such as (sedimentary basin analysis, reservoir rocks characterization ...etc)

Who should attend:
Exploration and development geologists and petro physicists

Contents
- Fundamentals of petroleum geology.
- Natural reservoirs of oil and gas.
- Oil and gas migration.
- Applied petroleum geology fundamentals.
- Structure concepts.
- Traps and seals.
- Sedimentary processes and rock faces.
- Carbon sediments.
- Reservoir rocks (pourous and fractures media).
- Reservoir and rock characterization

Duration
6 days

Venue
Baghdad, Amman, Beirut, Cairo, Istanbul, Malaysia, Dubi.