



COURSE OVERVIEW DE0954
Fundamentals of Petroleum Geology
(E-Learning Module)

Course Title

Fundamentals of Petroleum Geology
(E-Learning Module)

Course Reference

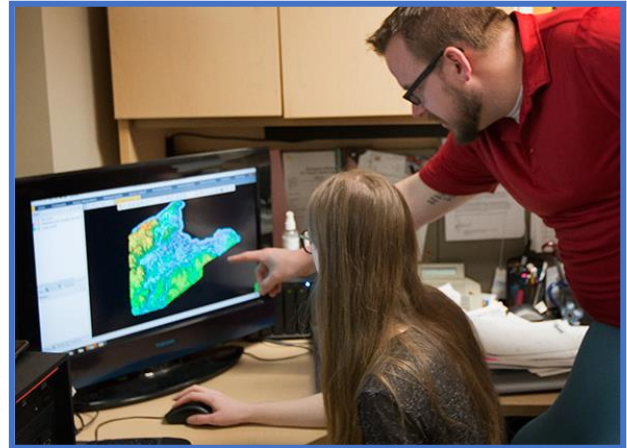
DE0954

Course Format & Compatibility

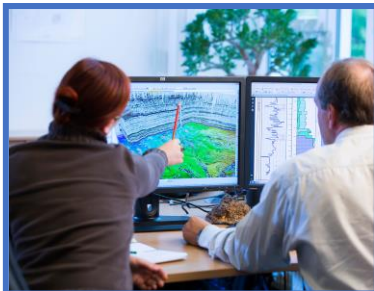
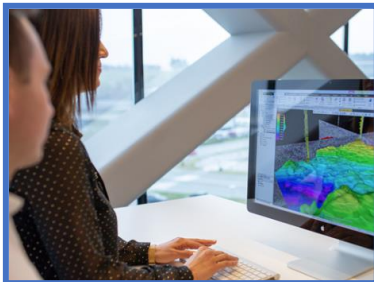
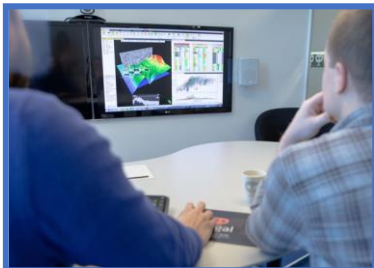
SCORM 1.2. Compatible with IE11, MS-Edge, Google Chrome, Windows, Linux, Unix, Android, IOS, iPadOS, macOS, iPhone, iPad & HarmonyOS (Huawei)

Course Duration

30 online contact hours
(3.0 CEUs/30 PDHs)



Course Description



This E-learning course is designed to provide participants with a fundamental overview of petroleum geology. It covers the petroleum products, refining petroleum and the energy sources of world demand; the oil and gas production reservoir types including the origin of petroleum, sour rock for petroleum, types of petroleum and petroleum system elements and processes; the reservoir sandstone, global oil and gas fields, projected world energy supplies and largest hydrocarbon basins; the geologic mapping and stratigraphy; and the importance of combining outcrop and modern analogs.

Further, the course will also discuss the seismic imaging, petroleum system and classification of rocks; the effect of clays on reservoir quality; the carbonate types, hydrocarbon generation, migration and accumulation; the interpretation of total organic carbon based on early oil window maturity; the plate tectonics, structural geology, sedimentary basin and stress fields; the geophysical methods on petroleum exploration including gravity surveys, magnetic surveys and seismic surveys; the marine acquisition system, exploration – visualizing and testing the subsurface; and the stratigraphy and volumetric prospect analysis.





During this course, participants will learn the fundamentals of petroleum geology; the evolution of kerogen in petroleum formation and the principal forms of petroleum; the types of stresses, behavior of rocks under stress, fault terminology and components of fault displacement; the various types of folds, types of petroleum traps, rock types and physical characteristics of a reservoir; the exploration techniques, magnetic survey using a proton magnetometer, geochemical exploration methods and direct exploration methods; and the exploration and production sequence, funds flow in upstream operations, seismic surveys and prospect evaluation.

Course Objectives

After completing the course, the employee will:-

- Apply and gain a fundamental knowledge on petroleum geology
- Discuss petroleum products, refining petroleum and the energy sources of world demand
- Identify the oil and gas production reservoir types including the origin of petroleum, sour rock for petroleum, types of petroleum and petroleum system elements and processes
- Recognize reservoir sandstone, global oil and gas fields, projected world energy supplies and largest hydrocarbon basins
- Illustrate geologic mapping and sampling and stratigraphy as well as discuss the importance of combining outcrop and modern analogs
- Carryout seismic imaging, petroleum system and classification of rocks as well as identify the effect of clays on reservoir quality
- Identify the carbonate types, hydrocarbon generation, migration and accumulation
- Interpret total organic carbon based on early oil window maturity as well as plate tectonics, structural geology, sedimentary basin and stress fields
- Apply geophysical methods on petroleum exploration including gravity surveys, magnetic surveys and seismic surveys
- Recognize marine acquisition system, exploration – visualizing and testing the subsurface, stratigraphy and volumetric prospect analysis
- Discuss fundamentals of petroleum geology, the evolution of kerogen in petroleum formation and the principal forms of petroleum
- Identify the types of stresses, behavior of rocks under stress, fault terminology and components of fault displacement
- Recognize the various types of folds, types of petroleum traps, rock types and physical characteristics of a reservoir
- Apply exploration techniques, magnetic survey using a proton magnetometer, geochemical exploration methods and direct exploration methods
- Illustrate exploration and production sequence, funds flow in upstream operations, seismic surveys and prospect evaluation





Who Should Attend


This course provides an overview of all significant aspects and considerations of the Fundamentals of Petroleum Geology for geoscientists, geologists, geophysicists and reservoir engineers.

Course Certificate(s)

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

Certificate Accreditations


Certificates are accredited by the following international accreditation organizations:-

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

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

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

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

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British Accreditation Council (BAC)

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





Training Methodology

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

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

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

Course Fee

As per proposal

Course Contents

- Fundamentals of Petroleum Geology
- Preface
- History of Petroleum
- What is Petroleum?
- The Goal – Black Gold
- Petroleum Products
- Refining Petroleum
- World Demand for Energy - Source (currently)
- Oil and Gas Production Reservoir Types
- The Origin of Petroleum
- Sour Rock for Petroleum
- Types of Petroleum
- Petroleum System Elements
- Petroleum System Processes
- Reservoir Sandstone
- Anticlinal Theory
- Directional Drilling Avoids Surface Hazards





- Global Oil and Gas Fields
- Projected World Energy Supplies
- Largest Hydrocarbon Basins
- Geologic Mapping and Sampling
- Stratigraphy
- Importance of Combining Outcrop and Modern Analogs
- Seismic Imaging
- Seismic Imaging of Anticline
- Introduction
- Outline
- Petroleum System
- Cross Section of a Petroleum System
- Basic Geologic Principles
- Cross Cutting Relationships
- Geologic Time Chart
- Rocks
- Classification of Rocks
- The Rock Cycle
- Igneous Rocks and Reservoirs
- Metamorphic Rocks
- Sedimentary Rocks
- Rock Classification
- Sedimentary Rock Types
- Depositional Environments
- Clastic Reservoirs
- Clastic Sedimentary Rocks
- Average Detrital Mineral Composition of Shale and Sandstone
- Clastic Rocks
- Sedimentation
- Clastic Sedimentary Environments
- Depositional Environment – Delta
- Rivers
- Fan Deposition





- Sandstone Composition Framework Grains
- Porosity in Sandstone
- Effect of clays on Reservoir Quality
- Carbonate Reservoirs
- Carbonate types
- Depositional Environment Carbonates
- Diagenesis
- Hydrocarbon Generation, Migration, and Accumulation
- Source Rocks
- Hydrocarbon Migration
- Organic Matter in Sedimentary Rocks
- Interpretation of Total Organic carbon (TOC) – (based on early oil window maturity)
- Plate Tectonics and Structural Geology
- Sedimentary Basin and Stress fields
- Structural Features
- Folded Structures
- Fold Terminology
- Faults
- Faulting (normal faults)
- Strike Slip Fault
- Heterogeneity
- Geologic Reservoir Heterogeneity
- Scale of Geological Reservoir Heterogeneity
- Hydrocarbon Traps
- Traps General
- Structural Hydrocarbon Traps
- Faults Traps
- Stratigraphic Traps
- Petroleum Exploration: Geophysical Application to Petroleum Geology
- Petroleum Exploration – Geophysical Methods
- Principle of Gravity Surveys
- Principle of Magnetic Surveys
- Seismic Surveys





- Pre-Drilling Knowledge Exploration
- Marine Acquisition System
- Crossline 470 (East)
- Applications of Seismic Data
- Seismic Amplitude Map of a Horizon
- 4-D Seismic Surveys
- Exercises: Petroleum Geology
- Exercise 1
- Exercise 2
- Exercise 3
- Exercise 4
- Fundamentals of Petroleum Geology
- Exploration
- Exploration – Visualizing and testing the subsurface
- Global – basin – play- prospect – reservoir
- Data
- Datasets: Seismic Acquisition
- 2D Seismic Acquisition
- 2D regional seismic line
- 3D Seismic Acquisition
- Basic Principles of Exploration Geology
- Source
- Stratigraphy – History of depositional environments
- Source Rocks
- Kerogen types
- Maturation of organic material
- Reservoir Rocks
- Reservoir
- Clastic Reservoirs: Alluvial fans and deltas
- Clastic Reservoirs: Fluvial (river) Sandstones
- Carbonate Reservoirs
- Reservoir Properties (Clastic)
- Seal





- Trap
- Trap Types
- Trap Types – Seismic Sections
- Prospect Analysis: Volumetric
- Basin, play and prospect interrelationship
- Play Risk: Critical Risk maps (Traffic Light Maps)
- Prospect Analysis: Risking
- Prospect Analysis: Volumetric output from Montecarlo simulation
- Technical & economical evaluation
- The exploration value chain
- The exploration funnel
- Process in a license round
- Summary
- Ultimate aim: Exploration Success
- Unconventional Hydrocarbons
- Fundamentals of Petroleum Geology
- PETROLEUM
- Petroleum Industry
- The Origin and Generation of Petroleum
- Kerogen
- Evolution of Kerogen in Petroleum Formation
- Kerogen in Petroleum Formation
- Bitumen in Petroleum Formation
- Principal forms of Petroleum
- Crude Oil
- Asphalt
- Natural Gas
- Petroleum System
- Petroleum System Elements
- Petroleum System Processes
- Generation, Migration, and Accumulation of Hydrocarbons
- Buoyancy
- Hydrodynamics





- Capillary Action
- Petroleum Source Rocks
- Types of Source Rocks
- Structure Geology
- Stress and Strain
- Types of Stresses
- Behavior of rocks under stress
- Responses to Stress
- Primary Structures
- Primary Structures of Igneous Rocks
- Secondary Structures
- Joints - Fractures
- Secondary Structures
- Joints - Fractures
- Faults
- Fault Terminology
- Components of Fault Displacement
- Stress Types and Faults
- Faults Description
- Dip-slip Faults
- Strike-slip Faults
- Fault Associations
- Faults in the Field
- Evidence of Faulting
- Indirect Evidence of Faulting
- Folds
- Folds Terminology
- Types of Folds
- Anticline Fold
- Syncline Fold
- Tight Fold
- Over Fold
- Recumbent Fold





- Nappe Fold
- Description of Folds
- Folds
- Plunging Folds
- Folds in the field
- Folds and Faults in the field
- PETROLEUM TRAPS
- Types of Petroleum traps
- Anticline Trap
- Anticlinal element of trap
- Structural Trap
- Salt Dome and Shale Structure Trap
- Unconformity Trap
- Limestone Reef Trap
- Facies Change Trap
- Different Stratigraphic Traps
- Combination Stratigraphic / Structural Trap
- Sediments to Rock to Traps
- Rocks
- Rock Types
- Igneous Rocks
- Common Igneous Rocks
- Sediment
- Sedimentary Rocks
- Weathering and Erosion
- Physical Erosion
- Chemical Erosion
- Organic Erosion
- Transportation
- Deposition
- Lithification Processes (diagenetic process)
- Compaction
- Cementation



- Detrital (clastic) sedimentary rocks
- Chemical sedimentary rocks
- Organic sedimentary rocks
- Clastics Rocks
- Chemical Rocks
- Organic Rocks
- Metamorphism
- Common Metamorphic Rocks
- Slates
- Gneiss
- Schist
- Quartzite
- Reservoir Rocks
- Rock Types
- Metamorphic Rocks
- Marble
- The Rock Cycle
- Structures of Sedimentary Rocks
- Sedimentary Rocks Interpretation
- Plate Tectonics and Sedimentary
- Reservoir Rock and Petroleum
- Reservoir Rocks
- Porosity
- Sorting
- Well Sorted Rock
- Poorly Sorted Rock
- Grain Packing
- Compaction
- Cementation
- Permeability
- Examples of variations in permeability and porosity
- Physical Characteristics of a Reservoir
- Exploration Techniques for Petroleum





- Exploration Techniques
- Geological Concepts
- Geophysical Exploration
- Seismic Refraction
- Gravity
- Magnetic survey using a proton magnetometer
- Surface Exploration
- Geochemical Exploration Methods
- Down hole logging surveys
- Resistivity
- Direct exploration methods
- Exploration and Production Sequence
- Funds flow in Upstream Operations
- Oil Traps
- Reservoir Rocks
- Seismic Surveys
- Prospect Evaluation
- Drilling the well
- Enhanced Recovery
- Transport
- Uses of Crude Oil and Natural Gas
- At the Refinery

