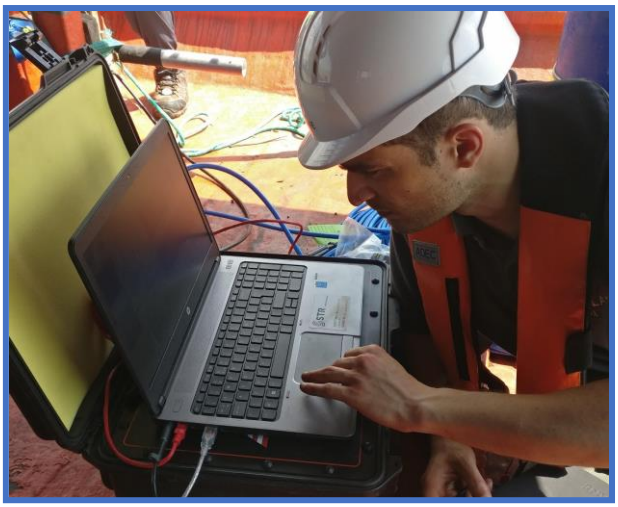
# COURSE OVERVIEW DE0951
# Geophysics for Other Disciplines (E-Learning Module)

**Course Title**
Geophysics for Other Disciplines
(E-Learning Module)



**Course Reference**
DE0951

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

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

**Course Description**

This E-Learning course is designed to provide participants with a detailed and up-to-date overview of geophysics. It covers the pure (academic) geophysics and applied (geological) geophysics; the exploration techniques for petroleum and geological concepts; the seismic reflection, seismic refraction and seismic data showing structural variation; the magnetic survey using a proton magnetometer, surface exploration, down hole logging surveys and seismic surveys; the geology, geophysics, what is the Earth made of and what the Earth does; the geophysical methods in hydrocarbon exploration; and the objectives of geophysics.

During this course, participants will learn the exploration workflow, topography from SRTM and gravity map with seismic lines; the gravity with differential GPS positioning; the Geosoft GM-SYSTM profile model of salt structure integrating seismic reflection; the FTG gravity and magnetic data; the seismic overlay with subsurface magnetic map overlay with seismic lines; the disturbances in the acceleration; the gravity and magnetics in oil and gas exploration; the unique added value, electrical resistivity, electromagnetics and electromagnetic conductivity; and the resistivity survey, electromagnetic surveying and the schematic of electrical resistivity.

## Course Objectives

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

- Apply and gain an in-depth knowledge on geophysics
- Discuss pure (academic) geophysics and applied (geological) geophysics
- Apply exploration techniques for petroleum and explain the geological concepts
- Illustrate seismic reflection, seismic refraction and seismic data showing structural variation
- Carryout magnetic survey using a proton magnetometer, surface exploration, down hole logging surveys and seismic surveys
- Discuss geology, geophysics, what is the Earth made of and what the Earth does
- Apply geophysical methods in hydrocarbon exploration and explain the objectives of geophysics
- Describe the exploration workflow, topography from SRTM and gravity map with seismic lines
- Measure gravity with differential GPS positioning as well as describe Geosoft GM-SYSTM profile model of salt structure integrating seismic reflection, FTG gravity and magnetic data
- Recognize seismic overlay with subsurface magnetic map overlay with seismic lines
- Identify the disturbances in the acceleration including the gravity and magnetics in oil and gas exploration
- Discuss unique added value, electrical resistivity, electromagnetics and electromagnetic conductivity
- Perform resistivity survey and electromagnetic surveying as well as review the schematic of electrical resistivity

## Who Should Attend

This course provides an overview of all significant aspects and considerations of geophysics for geoscientists, engineers and other company staff interested in geophysics.

## Course Fee

As per proposal

## Course Certificate(s)

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

## Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

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

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

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

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

- British Accreditation Council (BAC)

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

## Training Methodology

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

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

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

## Course Contents

- What is Geophysics?
- Pure (Academic) Geophysics
- Applied (Geological) Geophysics
- Exploration Techniques for Petroleum
- Geological Concepts
- Geophysical Exploration
- Seismic Reflection
- Seismic Refraction
- Seismic Data Showing Structural Variation
- Gravity
- Gravity Map: The First Indication
- Magnetic Survey Using a Proton Magnetometer
- Surface Exploration
- Down Hole Logging Surveys
- Resistivity
- Seismic Surveys

- Why is Geophysics Useful?
- How do Geophysicists “Look at” Rocks
- Geology vs Geophysics
- What is the Earth Made of?
- What does the Earth do?
- Themes
- Geophysical Methods in Hydrocarbon Exploration
- What is Geophysical Exploration
- Geophysical Methods
- Passive
- Active
- The Objectives of Geophysics
- Magnetic, Gravity, Seismic
- Exploration Workflow
- Topography from SRTM
- Gravity Map with Seismic Lines
- Gravity Measurement with Differential GPS Positioning
- Geosoft GM-SYSTM Profile Model of Salt Structure Integrating Seismic Reflection, FTG Gravity, and Magnetic Data
- Seismic Overlay with Subsurface
- Magnetic Map Overlay with Seismic Lines
- Gravity
- Disturbances in the Acceleration
- Magnetics
- Magnetism
- Gravity & Magnetics in Oil & Gas Exploration
- Technologies Include
- Unique Added Value
- Electrical Resistivity
- Resistivity Survey
- Electromagnetics

- Electromagnetic Surveying
- Electromagnetics – Sea Bed Logging
- Electrical vs Seismic
- Electromagnetic Conductivity
- Schematic of Electrical Resistivity
- Typical Result Chart from Electrical Resistivity Investigation
- Wenner Array
- The Seismic Exploration Method
- Seismic Exploration Categories
- Introduction to the Seismic Exploration Method
- Seismic Geophysical Survey
- Sound as a Tool
- Activity
- Procedure
- Reflection Seismology
- Remote Sensing and Geophysical Methods – Purpose
- Hydrocarbon Seepage Detection
- 3D Visualisation
- Radar vs Optical Data
- Heat Flow
- Geophysics and Geology
- These Methods are Complementary
- Magnetic Anomalies Due to Shallow Sand Channel and Salt Structures in the Gulf of Mexico
- Megahertz Scale Studies of Bones (Ultrasound Imaging)
- Data Integration
- Applications of Magnetic Methods in Oil and Gas Exploration
- Geophysics
- Waves
- Seismic Waves – Generation
- Wavefronts

- Raypaths
- Wavefronts and Raypaths
- The Seismic Experiment
- Parameters Associated with a Wave
- Wave Types
- Body Waves
- Surface Waves
- P Waves
- S Waves
- P and S Waves
- Rayleigh and Love Waves
- Particle Motion
- Elastic Deformations
- Wave Energy
- Wave Velocity
- Typical P-Wave Velocities
- Huygens Principle
- Interfaces
- Reflections and Refractions
- Critical Refraction
- Mode Conversion
- Interfaces - Mode Conversion
- Reflection and Transmission Coefficient
- Critical Angle
- Energy Arrivals
- Refracted Waves
- Multiples
- Ghosts
- Diffractions
- Geophysical Sciences

- Study Topic Examples in Geophysical Sciences
- Applied Geophysics
- Examples in Applied Geophysics
- Introduction to Geophysical Methods – Techniques and Targets
- Remote Sensing
- Active and Passive
- Our Scale
- Planning a Survey
- Target Identification
- Seismic Reflection
- Ground Penetrating Radar
- Techniques and Targets
- Profiling vs Mapping
- Station Spacing
- Limitations
- Multiple Methods
- Summaries and Examples of Other Methods
- Seismic Refraction
- Electrical Resistivity
- Resistivity Survey
- Electromagnetic Surveying
- Gravity – Theory and Measurement
- Theory of Gravity
- Variations in G
- The Geoid
- Gravity and Potentials
- Relating g to U
- Gravity Anomalies
- Units for g
- Rock Density

- Factors Influencing Rock Density
- Table of Rock Densities
- Absolute and Relative
- Absolute Gravity
- Stable Gravimeter
- Unstable Gravimeter
- Survey Design
- Gravity Surveying – Drift
- Gravity Surveying – Correcting for Drift
- Gravity – Corrections and Analysis
- Gravity Corrections
- Latitude Correction
- Free-Air Correction
- Bouguer Correction
- Terrain Correction
- Hammer Correction
- Free-Air Anomaly
- Bouguer Anomaly
- Field Determination of Density
- Analysis and Interpretation
- Buried Sphere
- Gravity Anomaly Map
- Simple Shape Anomalies
- 2D Vertical Column
- Ambiguity
- Gravity – Analysis and Examples
- Isolating Gravity Anomalies
- Regional Trend Removal
- Removing Noise
- Wavelength Filtering

- Spatial Domain
- Wave Number Domain
- Continuation Filters
- Derivative Filters
- Methodology of Interpretation – General Approach
- Methodology of Interpretation – Forward Modeling
- Methodology of Interpretation – Inverse Modeling
- Example – Salt Dome
- Example – Salt Dome – Seismic Line
- Examples – Salt Dome – Density Contrasts
- Examples – Fault Location
- Examples – Mapping Basin Depth
- An Introduction to Applied Geophysics Magnetic Methods
- Magnetic Methods: Concepts and Rock Properties
- History of the Magnetic Method
- Applications
- Definitions: Magnetic Potential
- Definitions: Magnetic Field or Flux Density
- Definitions: Magnetic Field Strength or Intensity
- Dipole Nature of Magnetic Materials
- Magnetization or Magnetic Polarization
- Magnetic Moment
- Units
- Basic Comparison of Magnetic and Gravitational Potential
- Earth Dipolar Field
- Total Force, Inclination and Declination
- Geomagnetic Reference Field
- Secular Variation: Slow Changes in Polar Location
- Induced Magnetization (JI) and Magnetic Susceptibility
- Cause of Magnetic Susceptibility

- Classifications of Magnetic Materials
- Magnetic Properties
- Remanent Magnetization (RM)
- Total Magnetization
- Magnetic Properties of Materials of Interest
- Instruments and Surveying
- Induced Magnetization (JI) and Magnetic Susceptibility
- Cause of Magnetic Susceptibility
- Classifications of Magnetic Materials
- Magnetic Properties
- Concept of Hysteresis
- Remanent Magnetization (RM)
- Total Magnetization
- Magnetic Properties of Materials of Interest
- Acquisition of Magnetic Data
- Flux Gate Magnetometer
- Proton Precession Magnetometer
- Alkali Vapor Magnetometer
- Magnetic Gradiometer
- Ground Surveys
- Magnetic Cleanliness
- Airborne Surveys
- Data Processing
- Diurnal Correction
- Normal Field Correction
- Elevation and Terrain Corrections
- Removal of Regional
- General Guidelines
- Derivatives
- Reduction to Pole

- Analytic Signal
- An Introduction to Applied Geophysics – Magnetic Methods
- Interpretation and Applications
- Qualitative Interpretation
- Other Analysis or Filters
- Total Field Anomaly
- Monopole Field
- Interpretation Aspects of a Dipole Field
- Sphere's as Dipoles
- Slightly more Complex Response – Faults
- Response Due to Simple Shapes
- Depth Determination
- Forward Modeling
- Inverse Modeling
- Biggest Problems in Interpretation
- Ore Body Applications
- Landfill Investigations
- Archeology
- Magnetic Field Anomaly
- Bouguer Anomaly