Training Class Syllabus
to be adapted for
different levels. Can be
offered at the “Basic”
level (3 days) or
“Advanced” level (5
days)

The main objective of this
course is to offer to the
attendants the basic information
required for understanding the
role of Gravity, Magnetic and
Electromagnetic methods in the
exploration, reservoir
description and reservoir
management for O & G.
Emphasis will be given to the
need of integration of these
techniques with Reflection
Seismic and Geology,
especially for regional studies.

Participants will gain a solid
foundation in the understanding
of the applications and the role
of Gravity, Magnetics and
Electromagnetics on integrated
multidisciplinary studies.

When are these techniques
applicable? In which cases can
they replace Seismic
information? How to integrate
them to Seismic Reflection?

We will guide participants
through recent examples, case
studies and relevant exercises
to efficiently convey the concept
that the integration of all
available data adds value to the
predictions that result from
seismic interpretation models.

The modular design of this
course allows quickly adapt to
full or reduced versions,
meeting the requirements,
profiles and interests of different
groups of participants.

Course Objective

1. To understand the role of Gravity, Magnetics and Electromagnetics for Hydrocarbon
   Exploration,
2. To understand the basic principles of these techniques,
3. Economic impact of using these techniques for regional reconnaissance,
4. How can them be used together,
5. Applications for Reservoir Description and Reservoir Management,
6. Classification of the geophysical techniques based on costs, resolution and effort
   required.

Learning Objectives

Attendants that will complete successfully this course will be able to:

1. Understand the theoretical basis of the potential and EM methods,
2. Understand when these techniques can bring complementary information to seismic,
3. Acquire a solid knowledge about practical applications and its limitations,
4. Work in the preparation of a Gravity, Magnetic and Electromagnetic campaigns,
5. Use the information obtained from these techniques in a geological integrated
   context together with seismic data and well logs,
6. Know about the most recent technical publications and actual research.

Participants

- Developed for University graduates, can be customized for technical support staff,
- Project Leaders of service companies, NOC or IOC related to the Hydrocarbon
  Exploration,
- Geophysicists and geologists members of integrated Exploration Teams,
- Exploration Managers.
Course Contents

1. Introduction
   Physical properties of materials and their geophysical response, Densities and magnetic susceptibilities of rocks, Differences between Gravity and Magnetic Methods, Potential Methods role, Planning of a geophysical campaign, Airborne Vs. Land surveys

2. Theoretical Foundations of Gravity Method
   Newton Gravitational Law, Gravity acceleration, Potential Field main equations, Equivalent layer, Gravity anomalies of simple bodies, Elements that shape gravity anomalies, Measurement devices, Exercises

3. Field operations and data processing
   Time variations, Positioning and elevation requirements, Base and ordinary stations, Data reduction, Gravity crew composition, Error calculation in a Gravity measurements, Exercises

4. Theoretical foundations of the Magnetometric Method
   Basic concepts, Elements of the Earth Magnetic Field and its variations, Magnetic anomalies of simple bodies, Elements that shape Magnetic Anomalies, Measurement devices, Exercises

5. Field operations and data reduction
   Time variations, Positioning and elevation requirements, Base and ordinary stations, Magnetic crew composition, Exercises

6. Potential Anomalies separation
   Resolution, Spectral content of potential data, Filter types, Regional-Residual separation, Derivative filters, Directional filters, Euler Deconvolution, Exercises

7. Electrical Methods
   Resistivity in Porous media, Geoelectrical Prospecting, Direct Current, Three categories of field techniques for DC measurements, Quantitative Interpretation of electrical soundings (VES), Limitations of Resistivity Interpretation, Planning of a Geoelectrical project is a challenge, Further reading

8. Electromagnetic Methods

Class Exercises

Several class exercises will be presented