An Introduction to CGG GeoTraining

GeoTraining brings together the full breadth of CGG’s skill development programs to provide the E&P industry with comprehensive geoscience workforce learning path programs.

GeoTraining combines over 85 years of practical expertise training our own employees with the excellence of training provided by our Robertson, Jason, HampsonRussell and CGG University brands. The unique breadth and depth of our capability enables GeoTraining to design and deliver integrated learning path programs covering the disciplines of the global E&P geoscience community.

The GeoTraining offer covers many themes including:

- HSE
- Equipment
- Seismic Acquisition & Potential Methods
- Subsurface Imaging
- Geophysical Interpretation
- Petroleum Geology & Reservoir Engineering
- Reservoir Characterization & Modeling
- Petroleum Management & Economics
- Data Management
- Business skills
- Software

CGG GeoTraining leverages the internationally recognized geoscience training and business skill development programs of CGG to deliver customized solutions that best meet the career goals of trainees and the development needs of our global clients.

Sophie Zurquiyah
Chief Executive, CGG
Introduction

List of Courses

Learning Path ................................................................. 6
Health, Safety & Environment ........................................ 22
Equipment ........................................................................ 28
Seismic Acquisition & Potential Methods ....................... 30
Subsurface Imaging .......................................................... 44
Geophysical Interpretation ............................................... 54
Petroleum Geology & Reservoir Engineering .................... 62
Reservoir Characterization & Modeling .............................. 90
Petroleum Management & Economics ............................... 98
Data Management .............................................................. 104
Business Skills ................................................................... 114
Software ................................................................. 122
Learning Path

To know more, please contact our GeoTraining team.
GEOPHYSICS EXCELLENCE

A fully integrated Learning Path Program designed to provide an understanding of the Geophysics Exploration. Attendees will experience comprehensive solutions from classroom courses all the way to hands-on training with our software on real data sets. Field trips and workshops are offered – (30 to 75 days).

Who Should Attend
Multidisciplinary teams of geoscientists who are involved in the geophysics exploration, form acquisition to Prospect Evaluation.

GEOTRAINING: Learning Path

Problematic areas within the field of Geophysics are highlighted and participants are introduced to the basic principles of seismic imaging and interpretation. Participants are introduced to seismic inversion and its tools and techniques by means of research case studies and developments.

This course covers the theoretical principles of seismic imaging and interpretation by means of research case studies and developments.

To determine the seismic potential of the area.

Tools and techniques are introduced in order to perform detailed seismic interpretation.

This course covers the fundamentals of seismic imaging and interpretation by means of research case studies and developments.

To grasp the basic principles of seismic imaging and interpretation.

Introduction to the role of geophysical and geophysical equations.

To review the basic principles of seismic imaging and interpretation.

To understand and apply the basic principles of seismic imaging and interpretation.

An introduction to the basics of seismic imaging and interpretation.

Introduction to the basic principles of seismic imaging and interpretation.

Introduction to the basic principles of seismic imaging and interpretation.

Introduction to the basic principles of seismic imaging and interpretation.

Introduction to the basic principles of seismic imaging and interpretation.
EXPLORATION WORKSHOP
Program designed to provide an understanding of the modern concepts of assessment of a basin for hydrocarbon potential – (40 to 60 days).

Who Should Attend
Multidisciplinary teams of petroleum geologists, geophysicists & engineers who are involved in integrated regional projects, basin evaluations & prospect identification.

1. Regional Investigation
   - This module covers the data gathering & organisation phase with an introduction to the tectonic/stratigraphic development & framework. Topics covered include: Introduction to biostratigraphy, structural geology & seismic interpretation.
   - Understand the stratigraphy of the study area including identification of potential reservoir, seal & source rocks & timing, duration and depositional settings. Understand the regional stratigraphy, the tectono-stratigraphic evolution of the basin & the major structural elements of the study area.

2. Seismic Interpretation & Structural
   - This module covers the introduction to structural geology & seismic interpretation. Topics covered include:
     - Picking seismic horizons, loop tying & identifying DHFs. Use seismic data to identify the main horizons & well data to seismic. Identify & correlate faults & identify leads based on structural understanding of trap types. Time contour mapping & time/depth conversion & mapping identify split points.

3. Sedimentology 1
   - This module will continue the structural knowledge gained from the previous modules. This aims to achieve an understanding of the potential reservoir & seal distribution & characteristics within the study area. Topics covered include: Sedimentology & its role in basin studies. Types of data, uses & integration. Depositional & diagenetic models. Identifying, predicting & mapping reservoir & seal distribution. Reservoir/seal facies identification. Reservoir properties.

4. Sedimentology 2
   - This module will continue the sedimentological assessment. Topics covered include:

5. Geochemistry
   - This module will review the principles, parameters & methods of evaluating source rock kitchens & estimating migration. Topics include:

6. Play Fairway Mapping
   - This module will cover the introduction to play fairway mapping. How to integrate interpretations from the previous modules into key play fairway maps. A petroleum systems events chart will also be created. Topics covered include:
     - Introduction to play fairway mapping, including the different elements required to create one. How to draw a play fairway map. How to create a CRS map to evaluate the risk of each element. How to draw a petroleum systems events chart.

7. Prospect Evaluation
   - This module will cover how to evaluate the prospects identified during the workshop. Topics include:

8. Final Presentations
   - This course covers the theory and practical use of STRATA, an interactive program of Hampson-Russell software performing pre-stack & post-stack inversion. After convolutional models, wavelets, reflectivity and noise concepts are introduced, the theory behind recursive, sparse-splice, model-based and colored inversion are presented. Analysis of seismic and wavelet processing are covered by practical examples of seismic inversion including pre-stack simultaneous inversion and outputs such as elastic impedance and Lambda-Mu-Rho.

Key

- Classroom
- Workshop
- e-Learning
- Webinar
- On the Job
- Field Trip
- Software
UNCONVENTIONAL PLAYS
Program designed to provide an understanding of the modern concepts of assessment of hydrocarbon potential in Unconventional Plays and ways to maximize recoverable reserves and success using integrated reservoir characterization approach – (25 to 35 days).

Who Should Attend
Multidisciplinary teams of petroleum geologists, geophysicists & engineers who are involved in integrated regional projects, basin evaluations & prospect identification.

This module covers the basics of petrophysics, rock mechanics and the theory of rock physics modelling and their roles in characterizing unconventional plays.

This module will give hands-on experience using PowerLog and RockSI, interactive modules of CGG GeoSoftware to perform petrophysical evaluation and rock physics modelling. Upon completion of this course, the attendees will learn the advanced workflow of petrophysics and rock physics modelling that are related to unconventional plays.

Who Should Attend
Multidisciplinary teams of petroleum geologists, geophysicists & engineers who are involved in integrated regional projects, basin evaluations & prospect identification.

Key
- Classroom
- e-Learning
- On the Job
- Software
- Workshop
- Webinar
- Field Trip
**IN-DEPTH PETROPHYSICS**

Program designed to cover the foundations of petrophysics before addressing more advanced techniques through practical use of cutting-edge technology and dedicated mentoring by industry experts – (50 to 75 days).

**Who Should Attend**

This course is suitable for geoscientists who are looking to become skilled practitioners in petrophysics with solid knowledge and practical experience of current technology developments.

---

<table>
<thead>
<tr>
<th>Key</th>
<th>Classroom</th>
<th>Workshop</th>
<th>e-Learning</th>
<th>On the Job</th>
<th>Field Trip</th>
<th>Software</th>
</tr>
</thead>
</table>

---

**The focus of this session is to establish which rock properties are important, their geological controls and how they are measured.**


This workshop initially focuses on interpretation of core and log data to determine lithology and porosity, before shifting to the determination of permeability from cores, logs and test data.

Having established a baseline data, time is spent understanding the relationships between porosity and permeability, the nature of pore systems and their geological controls, so that the petrophysicist can be tied back to the geological models.

This workshop initially focuses on the determination of fluid saturations from simple "Archie" rocks, based on core and log analysis.

Having established the fundamentals, the focus shifts to saturation determination in non-Archie, shale reservoirs, through experimentation with a range of shaly-reservoir equations. Experimentation on various datasets is conducted to establish the most effective methods in different case.

This approach is commonly preferred by petrophysicists, as an alternative to conventional Archie-based approaches to saturation determination. Saturation-height analysis also leads naturally to determination of hydraulic flow units, which is also covered in this workshop. Trainee model saturation-height for different lithologies, create fluid zone models and calibrate their models with production data.

This advanced workshop focuses on capillary-pressure-based analysis of saturation, leading to the creation of saturation height models. The approach is commonly preferred by petrophysicists, as an alternative to conventional Archie-based approaches to saturation determination.

This advanced workshop looks at more sophisticated ways of determining mineralogy in complex lithologies using PowerLog® plugin StatMin®. Trainers have the opportunity to use a probabilistic model to calculate lithology, mineralogy, and porosity for data with complex and varied minerals.

This advanced workshop introduces the trainees to borehole image analysis. Whether electrical or acoustic, DHM can tell you a lot about your formation building planes, fractures, and borehole breakthroughs. Using PowerLog® trainees are able to interactively pick and share dips extracted with their team.

This workshop focuses on the special case of thin beds, which can be over looked with conventional methods. The equations for laminated isotropic sand–anisotropic shale depositions are well known and trainees put them in practice using PowerLog® LSSA interactive graphs and analysis.

This workshop explores the link between reservoir properties and seismic data. The aim is to build rock physics models and calibrate them to well data through the following steps: Start with a seismic-petrophysical model to define the effective elastic properties for all lithologies in non-reservoirs. Compare velocity predictions from petro-elastic models with measured/conditioned velocity logs. Derate good quality synthetic shear sonic logs to ensure success in AVO seismic analysis. Create synthetic and match to real seismic. Perform fluid substitution and invasion correction using your rock physics model. Run what if rock physics scenarios with Monte Carlo simulation.

This workshop explores how machine and deep learning algorithms can be used to solve complex multivariate problems, such as facies analysis and synthetic log generation.

This workshop explores the link between reservoir properties and seismic data. The aim is to build rock physics models and calibrate them to well data through the following steps: Start with a seismic-petrophysical model to define the effective elastic properties for all lithologies in non-reservoirs. Compare velocity predictions from petro-elastic models with measured/conditioned velocity logs. Derate good quality synthetic shear sonic logs to ensure success in AVO seismic analysis. Create synthetic and match to real seismic. Perform fluid substitution and invasion correction using your rock physics model. Run what if rock physics scenarios with Monte Carlo simulation.

Fraccing is an important part of the reservoir well completion process in many reservoirs. The design of fraccing jobs requires detailed petrophysical information. This workshop provides the opportunity to experiment taking petrophysical curve data from PowerLog and using empirical and deterministic algorithms to output the formatted rock and fluid properties required as input for frac simulation.
GEOEXPERTS
Program designed to cover the foundations of petrophysics before addressing more advanced techniques through practical use of cutting-edge technology and dedicated mentoring by industry experts – (25 to 35 days).

Who Should Attend
This course is suitable for geoscientists who are looking to become skilled practitioners in petrophysics with solid knowledge and practical experience of current technology developments.

1. Seismic Acquisition & Processing
2. Seismic Interpretation
3. Structural Interpretation & Tectonics
4. Seismic Sequence Stratigraphy
5. Prospect Evaluation & AVO Analysis

This module comprises a mixture of lectures and practical paper exercises. The emphasis is on marine seismic acquisition and processing with land data being only briefly covered.

The module will cover Basic Reflection Theory, Acquisition methods and Processing fundamentals and QC.

This module will be an introduction to seismic & workstation interpretation.

Topics include:
- Data inspection and evaluation
- Pitfalls in interpretation
- First stages of interpretation
- Further interpretation techniques
- Fault interpretation & visualisation.

This module will be an introduction to structural interpretation and tectonics.

Topics include:
- Introduction to interpreting structural features on seismic:
  - Extensional/compressional
  - Strike-slip tectonics
  - Structural inversion
  - Basement reactivation
  - Structural traps
  - Fault sealing and reservoir compartmentalisation
  - Fracture modelling and Salt tectonics.

This module will be an introduction to seismic sequence stratigraphy.

Topics include:
- Introduction and methodology
- Concept 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 and Fluvial.

This module will be an introduction to prospect evaluation & AVO analysis.

Topics include:
- Introduction to prospect analysis
- Introduction to key components of the petroleum system
  - Source, reservoir, seal, trap

- Formation & timing
- Trap identification on seismic data
  - Structural, stratigraphic & combination traps
- Identification of potential source, reservoir & seal on seismic data
- Direct Hydrocarbon Indicators
- Calculating volumes & recoverable reserves
- Risking, Ranking & Prospect Evaluation Exercise.

Key
- Classroom
- e-Learning
- On the Job
- Software
- Workshop
- Webinar
- Field Trip
RESERVOIR MODELING
Program designed to cover the foundations of petrophysics before addressing more advanced techniques through practical use of cutting-edge technology and dedicated mentoring by industry experts – (25 to 35 days).

Who Should Attend
This course is suitable for geoscientists who are looking to become skilled practitioners in petrophysics with solid knowledge and practical experience of current technology developments.

Key
- Classroom
- e-Learning
- On the Job
- Software
- Workshop
- Webinar
- Field Trip

1. Well Data Analysis And Integration
2. Reservoir Characterization From Well Data
3. Reservoir Characterization From Seismic
4. Reservoir Characterization From Dynamic Data
5. Static Reservoir Model building

This module covers Reservoir properties upscaling techniques, the Mapping reservoir properties and creation of Gross Depositional Environment (GDE) maps.

This module will be an introduction to the static model building covering Structural modelling, Stratigraphic grid building, the Use of geostatistics in reservoir characterisation (data analysis and modelling techniques), Facies (rock type) distribution, Petrophysical property modeling and Upscaling.

This module indicates how Pressure Transient Analysis (PTA) and Rate Transient Analysis (RTA) can be used to quickly identify flow types and boundaries in the reservoir. Conducted at an early stage of the workflow, PTA & RTA provide additional information on the reservoir, improving subsequent modeling stages.

This module goes through the fundamentals of logs QC and conditioning, Lithology, porosity, saturation and permeability determination, Integration of core data, Litho-classification and rock typing.

This module will be an introduction to seismic reservoir characterisation covering Well to seismic tie and forward modelling, Attributes for structural analysis, Principles and use of AVO, Acoustic and elastic inversion for rock properties prediction, Impact of seismic quality on static modeling, Seismic vertical resolution assessment and Time-to-depth conversion. It includes the application of each step with ODD software and a full reservoir scale dataset.
CGG is committed to helping our clients achieve excellence and continuously improve all aspects of their activities, including demonstrating leadership and compliance in Health, Safety, Security and Environment (HSE).

HSE training courses are an essential component of workplace HSE. Our HSE courses are aligned with a Management System based on IOGP* recommended practice.

HSE curriculum offerings include:

- **HSE-OMS (Operating Management System)** for onshore or offshore crews to develop and enhance key operational HSE management skills and HSE leadership capabilities
- **HSE for office managers** to embrace all HSE workplace situations

CGG recognizes that HSE performance ultimately lies with each employee, contractor and client, their ability to work together as a team and their commitment to take responsibility for themselves and for the team.

*I now have a clear picture of HSE policies and objectives, how they originated and their intended purpose. I know what is expected of offshore crews in terms of HSE and, most importantly, why it is expected.*

*International Association of Oil & Gas Producers*
HSE for Office Managers

Prerequisites: None
Duration(days): 0.5 day
Max Number of Participants: 12
Software Used: Info available on request
Course Format: Classroom

Audience: Office Managers.

Contents:
- This course includes an overview of HSE and its management through the corporate HSE Operating Management System. Multiple topics are included to familiarize participants further on:

Learning Objectives:
- Understand the HSE role and responsibilities of office managers.
- Understand how HSE helps them in their day-to-day management of their activities.
- Recognize the office manager's HSE responsibilities.
- Understand the importance of assessing risk.
- Identify the HSE priorities to work on how to measure and control the major risks identified.

HSE-OMS for Marine Managers

Prerequisites: None
Duration(days): 3 days
Max Number of Participants: 12
Software Used: Info available on request
Course Format: Classroom

Audience: Marine managers: Party Managers, Masters, and QHSE advisors.

Contents:
- Understand the benefits of the HSE Operating Management System (HSE OMS) and what it delivers in practice.
  - HSE-OMS introduction
  - HSE-OMS elements:
    - Commitment and Accountability
    - Policies, Standards and Objectives
    - Organization, Resources and Capability
    - Stakeholders, Clients and Customers
    - HSE Risk Assessment and Control
    - Asset Design and Integrity
    - Plan and Procedures
    - Execution of Activities
    - Reporting, Monitoring and Learning
    - Assurance, Review and Improvement
  - Fundamentals:
    - Leadership, Risk Management, Continuous improvement, Implementation
    - Suppliers and Subcontractors Management
    - Risk Assessment and Control in details
    - Definitions, Hazard, Risk, Controls with exercises
    - Asset Management in details
    - Plans and Procedures in details with change exercise
    - Monitoring, Reporting, Learning in details: 5 whys method
    - Assurance, review and Implementation in details: (Plan Do Check Act)
- Health Management: Health Risk, controls
- Environment and Social Responsibility Management
- Security Management

Learning Objectives:
- Understand the benefits of the HSE OMS and what it delivers in practice.
- Understand the structure and purpose of HSE-OMS and your role in its application and promotion.
- Apply HSE-OMS consistently across the Organization.
- Manage Risk effectively.
- Understand the purpose of Audits and Investigation.
- Manage Risk effectively.
- Apply HSE-OMS consistently across the Organization.
- Understand the structure and purpose of HSE-OMS and your role in its application and promotion.
- Identify hazards, risks and controls to implement.

HSE-OMS for Marine Senior Staff

Prerequisites: Field Experience
Duration(days): 4 days
Max Number of Participants: 12
Software Used: None
Course Format: Attendance based

Audience: Marine Senior Staff, department heads, Chief Engineer, Maritime Chief Officer.

Contents:
- Understand the benefits of the HSE Operating Management System (HSE OMS) and what it delivers in practice.
  - HSE-OMS introduction
  - HSE-OMS elements:
    - Commitment and Accountability
    - Policies, Standards and Objectives
    - Organization, Resources and Capability
    - Stakeholders, Clients and Customers
    - HSE Risk Assessment and Control
    - Asset Design and Integrity
    - Plan and Procedures
    - Execution of Activities
    - Reporting, Monitoring and Learning
    - Assurance, Review and Improvement
  - Fundamentals:
    - Leadership, Risk Management, Continuous improvement, Implementation
    - Risk Assessment and Control in details
    - Risk Assessment and Control in details:
      - Definitions, Hazard Identification, Risk Evaluation,
      - Project Risk Assessment Exercise
      - Job Safety Analysis: Description, Exercise
      - Situation Awareness
      - Plans and Procedures in details:
        - Definitions, Plans, Exercise (Plan a last minute change)
      - Execution of Activities in details:
        - Readiness review
        - Monitoring, Reporting and Learning in detail
      - Assurance, review and Implementation in details: (Plan Do Check Act)
- HSE-OMS elements:
  - Leadership, Risk Management, Continuous improvement, Implementation
- Plan and Procedures in details with change exercise
- Assurance, review and Implementation in details: 5 whys method
- Asset Management in details
- Transportation management
- Plans and Procedures in details with change exercise
- Monitoring, Reporting and Learning in details: 5 who's method
- Assurance, review and Implementation in details: (Plan Do Check Act)
- Health Management: Health Risk, controls
- Environment and Social Responsibility Management
- Security Management

Learning Objectives:
- Understand the benefits of the HSE OMS.
- Understand the structure and purpose of HSE-OMS and your role in its application and promotion.
- Have greater awareness of the company's HSE Operating Management System.
- Understand your role, obligations and responsibilities in the HSE-OMS process.
- Apply the HSE-OMS principals to your team.
- Identify hazards, risks and controls to implement.
- Understand the importance of planning and assessing a risk.
- Actively aware of the need for control of the administrative process and standards associated with the industry in each country of activity.
- Recognize the HSE responsibilities within all areas of activity.
- Identify hazards, risks and controls.
HSE-OMS for Land Senior Staff

Prerequisites: Field experience
Duration (days): 3 day
Max Number of Participants: 12
Software Used: None
Course Format: Attendance based

Audience:
Land Senior Staff and Department Heads with field experience.

Contents:
Understand the benefits of the HSE Operating Management System (HSE OMS) and what it delivers in practice. Learn how it helps you in your day-to-day management of your activities.

• HSE-OMS introduction
• HSE-OMS elements:
  - Commitment and Accountability
  - Policies, Standards and Objectives
  - Organization, Resources and Capability
  - Stakeholders, Clients and Customers
  - HSE Risk Assessment and Control
  - Asset Design and Integrity
  - Plan and Procedures
  - Execution of Activities
  - Reporting, Monitoring and Learning
  - Assurance, Review and Improvement
• Fundamentals:
  - Leadership, Risk Management, Continuous improvement, Implementation
  - Risk Assessment and Control in details:
    - Definitions, Hazard Identification, Risk Evaluation,
    - Project Risk Assessment Exercise
  - Job Safety Analysis: Description, Exercise
  - Situation Awareness
  - Plans and Procedures in details:
    - Definitions, Plans, Exercise (Plan a last minute change)
  - Execution of Activities in details:
    - Readiness review
• Learning Objectives:
  - Understand the benefits of the HSE OMS
  - Have greater awareness of the company’s HSE Operating Management System
  - Understand your role, obligations and responsibilities in the HSE-OMS processes
  - Apply the HSE-OMS principals to your team
  - Identify hazards, risks and controls to implement

HSE-Incident/Accident Investigation

Prerequisites: None
Duration (days): 2 days
Max Number of Participants: 12
Software Used: Info available on request
Course Format: Attendance based

Audience:
Line managers, supervisors, safety representatives and anyone with the responsibility of investigating incidents.

Contents:
This course will provide delegates with a broad understanding of the principles and practice of incident and accident investigation. It will focus on techniques for gathering, accurate and objective data used to determine the true root causes plus how to examine and analyze data as a means of preventing injuries, property damage and financial losses and how to put in place corrective and preventive controls.

• Investigation Theory
  - Introduction
  - Immediate Actions and notifications
  - Preparation Phase
  - Term of Reference, Toolkit, Site visit, Evidences examination
  - Reconstructing the Sequence of Event
  - Conducting interviews, approaches and method
  - Root Cause Analysis
    - Top Event, Immediate causes, root causes, 5 Why’s Method
  - Corrective Actions
    - SMART Actions, implementation, review

• Investigation Practical Exercise
  - Read the report, appoint a team leader, organize the team/ investigation, build the sequence of events, determine the root causes and corrective actions and write a 5 pages report for the management

• Learning Objectives:
  - Be prepared with a scope, team and investigation kit
  - Conduct a complete investigation, including how to assess the accident scene, collect evidence and interview witnesses
  - Conduct an analysis and find the root causes using the 5 Why’s technique
  - Develop and categorize specific remedial actions
  - Report and follow up
Sercel offers training courses for all levels of technicians, from the basic operator to the experienced field engineeer. Dedicated training facilities are available in our Nantes, Houston, Saint-Gaudens, Surgut, Dehradun and Beijing locations. The latest training aids are on hand in a user-friendly environment with guidance from fully operational field engineers. Complete seismic source and acquisition systems are available on site to simulate field production.

Sercel Marine Training
Sercel Marine training courses provide observers, electronics engineers and navigators with all the information they need to successfully conduct acquisition of seismic data using the latest generation of Sercel Marine equipment. Trainees will also learn to operate and maintain the Sercel Nautilus® system. Part of the course is dedicated to the use of the Sercel marine system.

Sercel Land Training
Sercel Land training courses provide users of Sercel’s land equipment with complete knowledge of how to set up, troubleshoot and correctly operate our systems. Our dedicated training centers provide the complete range of Sercel products in order to offer a training experience that is as close as possible to field conditions.

Sercel Repair Training
Sercel Repair training courses provide technicians with the information they need to repair and assure the maintenance of Sercel equipment. Our dedicated repair training centers in Nantes, Houston and Saint-Gaudens and our experienced repair technicians will ensure you have all the information required to repair and maintain your Sercel equipment.

Sercel Navigation Training
Sercel Navigation training courses aim to give operators, chief navigators and support engineers in-depth knowledge and an advanced understanding of the Sercel navigation system. This includes administration and troubleshooting. Navigation skills are a prerequisite.

Sercel Downhole Training
Sercel Downhole Training course provide technicians, maintenance engineers and observers all the key knowledge to properly maintain, set up and operate Sercel Downhole tools. Training is split between theory and practice on real system, including running a job in our test well with G Gun source, use of anchoring press and WTB.
As a pioneer in the advancement of geoscience education, CGG University offers the most comprehensive industry training based on years of practical experience gained by our own personnel. With proven expertise in any environment, onshore or offshore, our extensive offer ranges from programs covering the basics to the most advanced techniques in the industry today.

Our training solutions cover various programs from specific short courses such as Seismic Survey Design to long-term induction, custom-designed (with client data) and on-the-job training. Our programs are tailored to fit client specifications and match the geophysical experience of participants.
Audience:
Surveying technicians and new hires assigned to field land crews.

Contents:
This course starts with a HSE induction, and the principles of seismic acquisition. A field assignment of 3 days is then undertaken by the participants where they visit an operational seismic crew. This is followed by a theoretical training covering the following subjects:

• Seismic geometry
• Geodesy

The practical applications are demonstrated using GNSS equipment during field sessions, which assists the students in becoming more familiar with the equipment and processes used as part of their jobs. This course finishes with data management, and an introduction to mapping and geoprocessing.

Learning Objectives:
• Understand the seismic operations and positioning field methods in use, and acquire the theoretical background.
• Acquire sufficient knowledge of the GNSS Surveying equipment and processing software to be efficient upon arrival on the seismic crew.

Field Geophysicist Induction

Audience:
New employees assigned to a quality control department on land crews.

Contents:
The course begins with an introduction to UNIX. Participants become familiar with hardware and software through practice and presentations given throughout the course. A short field assignment is organized (3 weeks) to an active crew where students are able to visit every department to obtain a thorough understanding of the daily operations on the crew. Classroom presentations provide practical experience with the software where trainers are available at all times to support the participants’ learning experience. This takes place over 6 weeks and provides both theory and practical classes that include:

• Study of seismic principles
• Field tape processing
• Instrument tests
• Pre-processing
• Positioning QC
• Seismic processing and parameter analysis

Survey planning (2 weeks), mapping (1 week) are another practical aspects of the course. Health Safety and Environment are also explored within this program, and the theory is reinforced with the experience gained during the field trip.

Learning Objectives:
• Be well versed in the daily workings of the IQC department and details of a daily workflow
• Be familiar with seismic and geophysical terminology used in a field setting
• Understand the challenges of a Quality Control Department
• Gain the technical knowledge required for the position of Field Geophysicist
• Use the methods and software used in a Quality Control Department

Field and Marine Manager Induction

Audience:
New employees assigned to a party manager or deputy vessel manager position.

Contents:
Trainers spend an initial week studying the fundamentals of exploration and production, including:

• Petroleum industry overview
• Basic geological and geophysical principles
• HSE standards and common practices
• Basic seismic acquisition principles

Operations on a seismic crew They are then assigned to an acquisition crew for three weeks to gain practical experience and knowledge pertaining to acquisition operations and challenges. The basic seismic data processing concepts and sequence applied to the seismic data are covered in the following five weeks. This allows the students to practice and apply the different steps of the processing flow on real data in order to obtain a full sense of the seismic process. The remainder of the course focuses on preparing the participants for their first assignment in the Quality Control department.

Learning Objectives:
• Describe seismic acquisition principles and operation techniques
• Use the processing software to process as well as analyze the results
• Describe the results of different processing sequences
• Demonstrate initiative, presentation skills and understanding of basic processing techniques

Field Seismic Surveyor Induction

Audience:
Surveying technicians and new hires assigned to field land crews.

Contents:
This course finishes with data management, and an introduction to mapping and geoprocessing.

(Notes: the conventional surveying method is not studied to mapping and geoprocessing.) Interactive tools are explored. Practical sessions allow for experience to be gained using an Interpretation workstation. Participants will actively carry out various tasks including:

• QC data using different tools provided
• Horizon picking
• Generation of horizon maps
• Velocity picking
• Interpretation

The theory and practice of 3D SRME by conventional modelling methodology is covered. Bin centering and regularization are presented together with the workflows.

Learning Objectives:
• Know the main functionalities of the Interpretation Workstation and how to QC a 3D dataset
• Ability to pick horizons and velocities using an Interpretation Workstation
• Understand SEG-D and SEG-Y formats.
• Understand 3D SRME principles and methodology of convolutional modeling
• Be familiar with the methods used to regularize the trace distribution
• Describe the importance and method of Quality Control

Advanced Onboard Processing

Audience:
Seismic geophysicists having a basic knowledge and experience of onboard processing who wish to delve deeper and improve practice and awareness.

Contents:
This course covers various aspects of seismic processing including SEG-D, and SEG-Y formats, and their generation, reformattting, quality-controls for archival material. Interactive tools are explored. Practical sessions allow for experience to be gained using an Interpretation workstation. Participants will actively carry out various tasks including:

• Basic seismic acquisition principles
• HSE standards and common practices
• Basic geological and geophysical principles
• Petroleum industry overview

Trainees spend an initial week studying the fundamentals of exploration and production, including:

Health Safety and Environment are also explored within this program, and the theory is reinforced with the experience gained during the field trip.

Learning Objectives:
• Be well versed in the daily workings of the IQC department and details of a daily workflow
• Be familiar with seismic and geophysical terminology used in a field setting
• Understand the challenges of a Quality Control Department
• Gain the technical knowledge required for the position of Field Geophysicist
• Use the methods and software used in a Quality Control Department

For more detailed information, course dates, and registration, visit cgg.com/geotraining

Land Seismic Surveyor Induction

Audience:
Surveying technicians and new hires assigned to field land crews.

Contents:
This field assignment of 3 days is undertaken by the participants who visit an operational seismic crew. Field methods such as the role and duties of the surveyor on a seismic crew are investigated.

This is followed by a theoretical training covering the following subjects:

• Geodesy

The practical applications are demonstrated using GNSS equipment during field sessions, which assists the students in becoming more familiar with the equipment and processes used as part of their jobs.

This course finishes with data management, and an introduction to mapping and geoprocessing.

Learning Objectives:
• Understand the seismic operations and positioning field methods in use, and acquire the theoretical background.
• Acquire sufficient knowledge of the GNSS Surveying equipment and processing software to be efficient upon arrival on the seismic crew.
### Advanced Survey Planning

**Prerequisites:** Basic Field Processing or Basic Survey Planning along with at least 2 years’ field practice.

**Duration (days):** 10 days

**Max. Number of Participants:** 12

**Software Used:** Geovation, ArcGIS

**Course Format:** Software practice, classroom

**Audience:** Field geophysicists with at least one year familiarity with survey planning and mapping tools.

**Contents:**
- The course starts with an open discussion around survey design planning with a subject expert.
- The recent features of the Geoland software are overviewed.
- The participants then undertake exercises paying specific attention to the more advanced survey planning considerations. These include:
  - Zippers
  - 3D parameters
  - Shooting strategy
  - QC methods
  - Utilities for linking survey planning
  - Mapping
- Comprehensive lessons on mapping utilizing the ArcGIS software follow. This includes an overview of geodesy, symbology and the latest tools available in the software. An overview of how to use the geoprocessing tools is included. These skills are practically reinforced by undertaking a group exercise in which all the elements taught during the class are practiced and utilized in a case study.
- Finally participants share experiences and difficulties and the learning gained through these.

**Learning Objectives:**
- Understand and use geodetic information
- Be operational with survey planning tools for crew start up and operations
- Able to create advanced maps for specific types of survey operations

### Advanced Field Processing

**Prerequisites:** It is recommended that the applicants have already taken Field Geophysicist Induction

**Duration (days):** 10 days

**Max. Number of Participants:** 12

**Software Used:** Geovation

**Course Format:** Classroom

**Audience:** Field processing geophysicists with at least 1 year of experience.

**Contents:**
- The course consists of an introduction to the processing tools and methods used in various types of field setting.
- After a review of the software, an overview of basic data formats, data procedures and processing theory, the focus moves to examples of specific processing steps. These include:
  - Static corrections
  - Velocity picking
  - Post-Stack processing
  - Practical exercises
- This is followed by an introduction to multi-component processing by an experienced processing geophysicist. The workflow is demonstrated followed by practical exercises using the Geovation software.
- A subject expert demonstrates the Interactive standalone QC software used in the field. Participants are given the opportunity to gain advanced assistance for specific problems that can or have been experienced in the field.
- QC attributes are discussed together with how best to use and how to identify errors. The participants see how to program via free coding for any specific tasks that may arise in the field environment.

**Learning Objectives:**
- Understand and use geodetic information
- Know about datum’s and different types of projections
- Understand the vertical reference system
- Know the impact of geodesy on a project as a whole

### Geodesy Overview

**Prerequisites:** None

**Duration (days):** 0.5 day

**Max. Number of Participants:** 12

**Software Used:** Linux, PERL, Windows

**Course Format:** Classroom and presentations

**Audience:** Anyone who wants a better understanding of geodetic parameters and coordinate systems.

**Contents:**
- This course begins with learning the basics and advanced functions of Linux and Windows. It then moves to more specific topics such as:
  - Hardware description
  - Common desktop issues and ways to handle them
  - Maintenance in the field
  - Software configuration and common maintenance
  - Troubleshooting tips
- Network basics are covered and illustrated through practical exercises.
- This is followed by a hands-on exercise on how to understand, correctly set up, manage and monitor a QC chain. Participants will become familiar with potential problems and fixes that are commonly used in a field environment.
- In the same manner, how to understand, setup, manage and monitor a field network system is studied.
- This course ends with field-oriented programming exercise including the handling and manipulating of text files and scripting.

**Learning Objectives:**
- Understand the terminology used in an IT environment, and when communicating with IT experts.
- Know how to solve common IT issues, understand, classify and locate the issue, and initiate recovery.
- Capable of describing IT terms and concepts in systems, network, hardware, and software used by the IT Land team and on crew programs with common tasks on test files
- Be able to face troubleshooting with a positive attitude

### IT/Network for Field Geophysicists

**Prerequisites:** None

**Duration (days):** 5 days

**Max. Number of Participants:** 12

**Software Used:** Linux, PERL, Windows

**Course Format:** Presentations, exercises, group, projects, demo

**Audience:** This course is for all field geophysicists who want to improve their technical skills.

**Contents:**
- The course begins with learning the basics and advanced functions of Linux and Windows. It then moves to more specific topics such as:
  - Hardware description
  - Common desktop issues and ways to handle them
  - Maintenance in the field
  - Software configuration and common maintenance
  - Troubleshooting tips
- Network basics are covered and illustrated through practical exercises.
- This is followed by a hands-on exercise on how to understand, correctly set up, manage and monitor a QC chain. Participants will become familiar with potential problems and fixes that are commonly used in a field environment.
- In the same manner, how to understand, setup, manage and monitor a field network system is studied.
- This course ends with field-oriented programming exercise including the handling and manipulating of text files and scripting.

**Learning Objectives:**
- Understand the terminology used in an IT environment, and when communicating with IT experts.
- Know how to solve common IT issues, understand, classify and locate the issue, and initiate recovery.
- Capable of describing IT terms and concepts in systems, network, hardware, and software used by the IT Land team and on crew programs with common tasks on test files
- Be able to face troubleshooting with a positive attitude
**GEOTRAINING: Seismic Acquisition & Potential Methods**

### Land Seismic Positioning Overview

<table>
<thead>
<tr>
<th>Prerequisites:</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration(days):</td>
<td>0.5 day</td>
</tr>
<tr>
<td>Max Number of Participants:</td>
<td>20</td>
</tr>
<tr>
<td>Software Used:</td>
<td>None</td>
</tr>
<tr>
<td>Course Format:</td>
<td>Classroom and presentations</td>
</tr>
</tbody>
</table>

**Audience:**
Anyone who wants to learn more about the land seismic positioning process and organization.

**Contents:**
This course begins with a look at the importance of geodetic and seismic survey parameters in the execution of a project. There is also a focus on terrain conditions and HSE rules to apply throughout operations. Guided lessons are provided to learn more on the specific tasks of:
- Project scouting
- Preplanned line positions
- Alternative placement of seismic points
- The use of control points
- Surveying principle
- The process of seismic positioning

The GNSS network, RTK and conventional surveying methods are studied. Staking out seismic points, line clearance and office work are discussed with the course concluding by a review of the software for processing and QC and for mapping operations and finally a discussion on HSE.

**Learning Objectives:**
- Understand the importance of geodetic and seismic parameters and their impacts on a land seismic survey
- Name the chronology of the positioning process
- Choose and justify the survey steps and methods for specific seismic survey projects
- Understand the impact of the safety rules in a seismic survey

### Seismic Survey Design

<table>
<thead>
<tr>
<th>Prerequisites:</th>
<th>Basic knowledge of seismic data acquisition and processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration(days):</td>
<td>5 days</td>
</tr>
<tr>
<td>Max Number of Participants:</td>
<td>12</td>
</tr>
<tr>
<td>Software Used:</td>
<td>None</td>
</tr>
<tr>
<td>Course Format:</td>
<td>Classroom exercises, presentations and case studies</td>
</tr>
</tbody>
</table>

**Audience:**
Those who work in the fields of acquisition/operations/processing or interpretation.

**Contents:**
Review basic geometrical theories relating to survey design, in conjunction with the imaging requirements for the final product. It incorporates examples of survey design studies from both land and marine acquisition to reinforce the theoretical constraints in a practical manner.
- Theoretical review of geophysical equations commonly used in survey design.
- Land case study
- Survey design geometry exercises
- Marine case study
- Processing steps most impacted by the acquisition geometry and whether this can help or hinder the survey design planning.
- Reservoir characterization considerations when planning a seismic survey.
- Review of 3C and 4D survey requirements for success.
- Economical impacts of survey design.
- Operational considerations that affect survey cost and ways to mitigate this while preserving data quality.

**Learning Objectives:**
- Calculate theoretical parameters to obtain required resolution
- Understand the difference between spatial sampling requirements and geophysical objectives
- Provide basic survey design options that meet imaging requirements
- Understand implications of operational survey constraints on the design survey
- Be aware of other important aspects such as illumination and amplitude at target depth
- Gain knowledge of the constraints and limitations of processing techniques, and how these can impact the survey design and acquisition in both positive and negative ways

### Basic Onboard Processing

<table>
<thead>
<tr>
<th>Prerequisites:</th>
<th>Basic knowledge of seismic principles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration(days):</td>
<td>2 days</td>
</tr>
<tr>
<td>Max Number of Participants:</td>
<td>12</td>
</tr>
<tr>
<td>Software Used:</td>
<td>None</td>
</tr>
<tr>
<td>Course Format:</td>
<td>Presentations, workshops, group work, exercises</td>
</tr>
</tbody>
</table>

**Audience:**
Onboard geophysicists with some initial experience in seismic processing.

**Contents:**
This course begins with a module on seismic processing fundamentals. Following this the different QC checks required before starting a survey, during line acquisition and after the end of each shooting sequence are presented. These steps are investigated and examples of data quality and problems are discussed.
Continuing on there is an overview of the different applications making up the infrastructure of the processing software which includes:
- Project overview and setting up
- Production and data management applications
- Job deck building applications
- Interactive applications

This course concludes with an overview of batch processes, job monitoring and quality control steps, plus SEGY output and management of datasets.

**Learning Objectives:**
- Knowledge of the processing fundamentals (concepts and applications)
- Understand the structure of the processing package and how to efficiently use the tools required for onboard processing
- Develop a working knowledge of how to process data i.e. build and run job decks and monitor a processing sequence
- Analyze the quality control outputs of the various steps of a processing sequence

### Impact of Equipment on Seismic Performance

<table>
<thead>
<tr>
<th>Prerequisites:</th>
<th>A background of geophysics, physics, mathematics.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration(days):</td>
<td>20 days</td>
</tr>
<tr>
<td>Max Number of Participants:</td>
<td>12</td>
</tr>
<tr>
<td>Software Used:</td>
<td>Seovation</td>
</tr>
<tr>
<td>Course Format:</td>
<td>Presentations, classroom, exercises</td>
</tr>
</tbody>
</table>

**Audience:**
Non-geophysicists working for companies related to the seismic industry.

**Contents:**
This course looks at the relationship between equipment, survey design, acquisition operations and final seismic imaging. It begins with a review of the basics of survey design and seismic operations.
This is followed by an overview of the following topics:
- Hydrocarbons, their deposition and reservoir properties
- Positioning in seismic operations
- Operational considerations for a land or marine survey
- The impact of equipment on data quality
- Productivity
- 4D seismic

This is followed by a discussion of the challenges faced to deliver a better seismic image. Equipment versus recording needs is covered in detail, together with the environmental constraints that affect the equipment selection in different topographies.

The course concludes by examining the advances in high-density acquisition, broadband solutions and their principles, field implementation, and quality control.

**Learning Objectives:**
- Understand the impact on data quality of seismic operations, field constraints, recording, positioning, and processing
- Understand current trends in the seismic industry, high-productivity acquisition techniques, wide-azimuth / dense acquisition, broadband solutions
- Understand the impact of equipment on quality control
Audience: Anyone who would like a better understanding of the geophysical chain of activities, and what happens on a land or marine seismic crew.

Contents: This course introduces the geophysical methods of seismic and potential methods used to explore the subsurface. Basic concepts are introduced in a discussion on the basics of exploration. This provides students with an overview of the theory used from surface to subsurface. A review of the different typical geographical environments (desert, swamp, marine), are provided including examples of access problems that have been encountered on some crews. An evaluation of the different types of equipment used for different acquisition operations is provided, and some of the limitations often found during operations. Operations planning and implementation on a standard seismic crew is also discussed. An example of both a marine and land crew are provided with videos and a discussion of the day to day operations required to fulfill the geophysical objectives.

Key concepts are introduced through examples to understand acquisition methods (broadband, wide-azimuth surveys, etc.) contribute to the enhanced resolution of seismic images, while maintaining high productivity standards.

Learning Objectives:
• Describe the principles of geophysical acquisition
• Understand the need for equipment
• Living conditions in the field
• List the key criteria which determine the choice of acquisition parameters
• Understand the limitations of the seismic acquisition process

Overview of Global Navigation Satellite Positioning Systems (GNSS)

Audience: Anyone interested in knowing more about the Global Navigation Satellite System (GNSS).

Contents: This course begins with a short description of the Satellite Positioning Systems and their evolution. Further topics presented include:
• GNSS signals and measurements
• Errors related to the GNSS and how to mitigate them through differential GNSS
• The relationship between GNSS and geodesy
• Surveying methods with GNSS

Learning Objectives:
• Understand the GNSS systems
• Identify errors in the GNSS system and how to correct them
• Know about GNSS surveying methods

Production Tools and Methods for Field Geophysicists

Audience: Field geophysicists with at least one year of field experience.

Contents: In this modular course there are a number of topics that can be included depending on the requirements of the participants. The course generally contains modules on the processing software, field equipment and technologies and includes a complete field sequence. In addition to this, the course will explore the latest software used on land crews. The course goes into more depth on the following topics:
• Processing modules
• Data management tools
• Vibroseis tools, acquisition technology, equipment and monitoring tools
• Production QC tools
• Data handling procedures

The course generally contains modules on the processing software, field equipment and technologies and includes a complete field sequence. In addition to this, the course will explore the latest software used on land crews. Different case study examples are provided, allowing students to obtain experience with creating different projects for land, shallow water, vibroseis and explosive surveys. A debrief concludes the course.

Learning Objectives:
• Know how to manage QC tools effectively
• Understand how to create a complete project
• Able to confidently handle the data and monitor quality
• Learn the up to date technology that is used in the field environment

Basic Survey Planning

Audience: Any new hire QC field processor.

Contents: The course starts with an introduction to seismic survey planning and the presentation of the software. Using 2D and 3D case studies the participants will explore all facilities offered by the software. Participants will become familiar with the creation and management of an acquisition survey including:
• Preplanning a survey
• Spread creation, assignment of numbers and swamp
• Handling and manipulating SPs data
• Mapping
• Fold calculation and fold recovery
• Output of SPs data

Using basic sequence, participants will understand and generate an acquisition imprint based on the full-fold area, ensuring the respect of migration and acquisition margins. A debrief concludes the course.

Learning Objectives:
• Understand an acquisition survey design
• Be familiar with the SPS format
• Know which software to use for different field scenarios
• Know how to manipulate SPS using the software in standard and more complex cases
GEOTRAINING : Seismic Acquisition & Potential Methods

Basic Field Processing

Prerequisites: None
Duration (days): 20 days
Max Number of Participants: 12
Software Used: Geovation
Course Format: Classroom, exercises

Audience: New-hire field processing geophysicists.

Contents:
The course begins with the basics of signal processing followed by a synopsis of the software used. The participants create a project and process a simple sequence first using a 2D, and then advancing to a 3D dataset. The participants become familiar with the field sequence including:

- Loading, understanding data formats and reformatting data when required
- Geometry
- QC of SPS data using the interactive tools
- Trace header update using the geometry information from the SPS data
- Noise attenuation
- Reflection static computation
- Velocity analysis
- Generation of a stack

Interactive applications and techniques are introduced at specific phases during the course to assist with QC of the data. At each step of the processing, the relevant Quality controls using interactive applications are explained. Identifying potential issues and problems is elaborated on through the use of examples.

The course concludes with a discussion on data analysis and how to create some specific jobs from scratch if required for out of the box problems.

Learning Objectives:

- Know how to load and reformat data for processing
- Understand the data management process
- Be able to perform conventional processing on a seismic crew
- Know the standard QC procedures at each step of the processing flow and how to perform them
- Understand how to carry out interactive first break picking and velocity analysis
- Be able to produce Stack data for QC purposes

UltraSeis

Prerequisites: Preliminary fundamental courses: Field Processing and QC or Survey Planning
Duration (days): 5 days
Max Number of Participants: 12
Software Used: SynApps, Geoland
Course Format: Workshop, exercises, presentations

Audience: Field processing geophysicists with at least two years' experience.

Contents:

An outline of UltraSeis, the fully-integrated, package that includes acquisition services, in-field processing, advanced processing, imaging and reservoir characterization. The emphasis is placed on acquisition and real-time QC of the big data and the gains achieved with the method.

- Move through a land and marine geometry overview, from surface positioning to subsurface coverage, followed by a discussion of land and marine survey design parameters and field constraints, survey design optimization through waveform modeling, including the impacts of the acquisition design on the final product during processing and reservoir analysis.
- CCG's UltraSeis™, cost-effective package includes:
  - Acquisition services
  - In-field processing
  - Advanced processing and imaging
  - Reservoir characterization

Emphasis is placed here on acquisition and real-time QC of Big Data and the gains with this method. Become familiar with the hardware and software architecture used for qualitative Quality Control. Become confident in evaluating the data quality and avoiding errors that can occur on large seismic acquisition crews.

Learning Objectives:

- Understand the Ultrasise concept
- Understand the acquisition and QC process
- Be aware of the software configuration and how to set it up
- Know how to utilize the software for leading, analyzing and QCing different types of data
- Be able to evaluate the data and avoid errors
- Be able to generate reports

Non Seismic Methods

Prerequisites: None
Duration (days): 2-3 Days
Max Number of Participants: 12
Software Used: None
Course Format: Classroom exercises, presentations and case studies

Audience: Geologists, geophysicists and engineers who want to understand and use gravity and magnetic data.

Contents:

This comprehensive course covers many different aspects of practicing gravity and magnetic exploration methods. It starts with fundamentals of the gravity, magnetic and EM applications. The course covers both equipment and various techniques used during acquisition, and also goes into detail into the standard processing techniques used for each method.

The course includes:

- Formal lectures
- Graphical descriptions of theoretical terms
- A rich collection of case histories

The course also includes demonstrations of the concepts and technologies and applications that are used to merge non seismic and seismic methods.

Learning Objectives:

- Understand the fundamental theory of gravity and magnetic potential, field and gradient
- Have an understanding of the instrumentations and field acquisitions in land, marine and airborne magnetic, gravity and gradient surveys
- Understand gravity and magnetic data processing workflow
- Describe gravity and magnetic interpretation techniques
- Be aware of different scenarios for solving different geological problems

VibroTech

Prerequisites: Preliminary fundamental courses: Field Processing and QC or Survey Planning
Duration (days): 5 days
Max Number of Participants: 12
Software Used: Emphasis, SynApps, Vibro QC tools
Course Format: Workshop, exercises, presentations

Audience: Field processing geophysicists with at least 5 year experience.

Contents:

This course presents the new vibroseis source and how it addresses broadband.

A complete review of geometry definitions, acquisition parameters, vibroseis sweep definitions, survey design and the stack-less method is provided. More detail on the broadband applications will be presented and the methods to implement this on varying types of projects.

Various acquisition shooting methods are discussed to enable a more thorough understanding of the latest trends and developments. These includes:

- Wide azimuth geometry designs
- Slip Sweep
- V1, Distance Separated Shooting, and simultaneous shooting methods
- HPQA (High Productivity Vibroseis Acquisition)
- Emphasis™ & CleanSweep™
- Guidance for stackless surveys

Effective real time Quality Control measures is discussed, plus recent developments in the software is presented by subject experts.

The impact of simultaneous shooting on the workflow is discussed, along with the QC and processing implications that this requires.

The participant will explore how to jointly QC data from vibroseis and dynamite acquisition and attenuate source generated noise.

Learning Objectives:

- Understand the vibroseis source as a broadband solution
- Know complex geometry definitions and acquisition methods
- Become familiar with the vibroseis description
- Be aware of new technology and latest developments
- Understand how the vibroseis technology is implemented in a field environment

For more detailed information, course dates, and registration, visit cgg.com/geotraining
Introduction to Surveying Methods

Prerequisites: Have an idea of the components of a seismic crew, and preliminary experience in the seismic industry.

Duration (days): 1.5 days
Max. Number of Participants: 20
Software Used: GPSeismic, GrafNet
Course Format: Demo, exercises, presentations, on-the-job, workshop, group work, site visit, field practice

Audience:
Anyone who wants to have an overview of land positioning methods.

Contents:
This interactive course is divided into workshops:
- The RTK workshop begins with an overview of Global Navigation satellite Systems (GNSS) and Real Time Kinematics (RTK) method. This is followed by practical applications including:
  - Setting up an RTK base stations
  - Reviewing layout and survey seismic points
  - Relevant QC steps
- The next module explores GNSS static surveys, looking at how to set up the receiver, record data and calculate the new point position.
- Lastly, we review the so-called “conventional surveying” method with respect to surveying in a seismic line using an electronic theodolite, and calculating the points positions.

Learning Objectives:
- Understand and practice different land positioning methods
- Describe the conventional surveying method
- Understand the principles of data quality controls

Ocean Bottom Seismic

Prerequisites: Basic knowledge of seismic data acquisition and processing can be useful, but not necessary.

Duration (days): 3 Days
Max. Number of Participants: 10
Software Used: Excel
Course Format: Workshop, exercises, presentations

Audience:
Anyone interested in learning more about seismic acquisition in shallow water or the use of ocean bottom cable or node acquisition surveys.

Contents:
This course first provides a basic overview of seismic acquisition before going into more depth with Ocean Bottom Cable and Ocean Bottom Nodal systems. This includes the different equipment used for these types of operations and the methods involved in their use.

The course also covers the following topics in detail:
- Survey design and equipment
- Processing overview from and OBS point of view
- Data digitization, sampling and wave propagation
- Receiver and source arrays, ghosts and the bubble effect
- 4 component data
- Positioning and QC of equipment
- Sensors and sources

The course provides a number of practical exercises that provide an excellent understanding of the theory for every step in the processing workflow. This allows students who may not be familiar with data processing to understand the concepts of the seismic workflow.

Learning Objectives:
- Understand the equipment requirements for OBS acquisition
- Know the relationship between spatial sampling and geophysical objectives (target depth, resolution)
- Understand the impact of field constraints on acquisition parameters and the effect on processing
- Be aware of other important aspects including illumination and amplitude at target depth
- Understand the new technology and latest developments
As the recognized leader in subsurface imaging, our training programs cover the complete range of time processing and depth imaging expertise, including imaging concepts, technologies, workflows and our own state-of-the-art subsurface imaging software, Geovation.

Our training solutions cover various programs, from specific short courses such as 4D or wide-azimuth processing to long-term induction, custom-designed (with client data) and on-the-job training. Our programs are tailored to fit client specifications and match the geophysical experience of participants.

“...I’m seeing a lot of benefits, having grown my understanding of the seismic processing world and consolidated all that knowledge acquired from university, making me eager to introduce this newly enhanced skill into my daily job activities.”
Pre-Stack Time Migration Workflow

**Prerequisites:** Participants should have a geophysical background and a basic proficiency in seismic data processing.

**Duration (days):** 2 days

**Max Number of Participants:** 15

**Software Used:** Geovation

**Course Format:** Presentations, exercises, classroom

**Audience:** The course is designed for anyone wanting the practical skills to carry out a pre-stack time migration including generating the migration velocity model.

**Contents:**
- The basic concepts, types of velocities and the effect of dips are discussed. It then moves to discuss seismic anisotropy.
- The course looks at the migration velocity field modelling. Non-linear slope tomography and the concept of kinematic invariants providing the tool for velocity model building are explained. A Kirchoff pre-stack time migration workflow is carried out including the generation of the velocity model. Throughout the workflow emphasis is placed on parameter verification and QC.
- The main topics covered during the course include:
  - The basic concepts
  - Seismic anisotropy
  - 3D Kirchoff pre-stack migration and the workflow
  - Non-linear slope tomography
  - The workflow – data preparation and velocity model generation
  - Parameter testing and QC

**Learning Objectives:**
- Understand ray based Kirchoff migration
- Be able to run a simple processing sequence with pre-stack time migration
- Know the key parameters and tests
- Understand the theory behind non-linear slope tomography
- Be able to build a velocity model using tomography
- Be able to quality control the outputs

Modeling and Computation of Static Solutions

**Prerequisites:** Participants should have a basic knowledge of static correction fundamentals.

**Duration (days):** 3 days

**Max Number of Participants:** 15

**Software Used:** Geovation

**Course Format:** Presentations, exercises, classroom

**Audience:** Those involved in land processing and requiring the knowledge and skills to carry out static computation.

**Contents:**
- This program begins with a general review of statics, their types, datum planes, computation methods and application. Learn how to derive the first breaks and verify the geometry, plus calculate the different statics types in the various near surface conditions. Using the first-breaks model the weathering layer by multilayering or tomographic inversion and subsequently derive the vertical and horizontal statics.
- The main topics covered are:
  - Static overview
  - Seismic pre-conditioning and loading to the interactive package
  - First-break interactively picking
  - Linear move-out, the refactor velocity optimization and update
  - Source-receiver azimuth first-break stacks for repositioning
  - First break stacks and primary static determination and quality control (QC)
  - Building a layered velocity/depth model in complex areas. Update using linear model inversion (LMI) and alternatively tomographic inversion. Compute statics corrections
  - Incorporate the upheaval information

**Learning Objectives:**
- Able to define statics and the various types
- Know how to calculate the primary statics corrections from the refraction arrivals stacks
- Understand how to use control points, iteratively update the model using LMI and tomographic inversion and calculate the primary static corrections
- Know how to use the upheaval information to build a near surface model and calculate the primary statics

Land Wide Azimuth Processing Workflow

**Prerequisites:** Knowledge of processing land seismic data and equipped with a basic proficiency in using the software and interactive applications

**Duration (days):** 3 days

**Max Number of Participants:** 10

**Software Used:** Geovation

**Course Format:** Classroom, presentations, exercises

**Audience:** Geophysicists with moderate processing experience.

**Contents:**
- To begin, the course looks at the reason for acquiring wide azimuth (WAZ) and the complexities it helps address. Acquisition is reviewed and the difference between more traditional 2D and narrow azimuth (NAD) acquisitions is seen. Through examples the benefits are WAZ data are visualized. The processing workflow is then highlighted on the use of offset vector tiles (OVT) and common offset vectors (COV) is explained. True 3D noise and multiple suppression is focused on followed by COV binning and regularization. The benefits of applying reciprocity are discussed as is the methodology for 3D velocity model building and imaging. A typical WAZ production flow chart concludes the course.
- The main topics covered are:
  - Why WAZ, the seismic wave-field and illumination
  - WAZ acquisition
  - True 3D WAZ processing steps
  - Common offset vector tiles (OVT) and common offset vector cubes (COV)
  - COV binning, regularization and the benefits of reciprocity
  - The WAZ production flow
  - QC, spider displays and ROSE diagrams
  - Random and coherent noise attenuation
  - Velocity model building

**Learning Objectives:**
- Know what a cross-spread is and why it is used in WAZ processing
- Be capable of defining an OVT and COV and determine the fold
- Know the key step in a WAZ processing workflow
- Know how of noise attenuation is applied
- Understand binning, reciprocity and regularization
- Understand the methodology used to build the 3D velocity model

Multicomponent Processing

**Prerequisites:** Participants should have a geophysical background and a basic proficiency in seismic processing.

**Duration (days):** 3 days

**Max Number of Participants:** 15

**Software Used:** Geovation

**Course Format:** Classroom, presentations, exercises

**Audience:** Geophysicists with 3D processing knowledge embarking on a multicomponent processing course.

**Contents:**
- The course begins with an overview of ocean bottom seismic (OBS) acquisition. Sensor deployment, their sensitivities and particularities are clarified and geometry visualised. The concept of orientation is explained. Practical exercises enable huydock visualisation and understanding, component reorientation, polarity analysis and quality control. The dual sensor summation theorem is explored. The ghost and pegleg travel-paths are described plus the means of addressing the receiver ghost via P2 summation. Practically, P2 summation is carried out.
- Briefly, the other key steps of PP processing are introduced. Converted waves are discussed together with their characteristics and benefits for lithological discrimination. PS workflow processing considerations are explained and the incorporation of PP information. Radial and Traverse coordinates are clarified with discussion of the two possible processing flows, isotropic and anisotropic. PS statics, binning and creation of a 0C stack are explained. The various gamma terms are expounded throughout the process.

**Learning Objectives:**
- Explain the specificities of OBS acquisition
- Understand vector fidelity
- Be able to perform P2 summation
- Understand what converted waves are and list their characteristics
- Be familiar with PS processing and able to describe the processes within the sequence
- Understand Yn, Ym, Yv vertical and Yeff effective, how to derive
Audience: The course is designed for geophysicists with 3D processing knowledge embarking on 4D processing.

Contents:
The course begins with a general introduction on what 4D is, its value and the repeatability concept. 4D, what it brings and its significance are expounded on. Its value in understanding the reservoir, the structure, fluid and pressure changes is reviewed. Repeatability challenges, 4D noise and the requirement for qualitative and quantitative metrics are addressed. The processing workflow is presented with the driving goal of accurately maximizing the 4D signature due to production effects and minimizing all other effects, including acquisition differences and seismic noise. Beginning with sail-line processing the key 4D processes are explained in terms of driving goals leading to the 4D processing workflow. Throughout the workflow emphasis is placed on the applicability of the methods.

Learning Objectives:
- Complete a basic 3D marine sequence from reformatting, through migration and post processing
- Be able to describe the philosophy behind 4D processing
- Be able to describe the method to design and implement a testing plan
- Understand the different processing domains
- Be confident using the interactive tools
- Understand the steps of managing a processing workflow, job building, submitting, quality control and data management

Software Used: Geovation
Course Format: Classroom, presentations, exercises
Max Number of Participants: 12
Duration(days): 10 days
Prerequisites: Participants should have a geophysical background and be equipped with a basic proficiency in using the software and interactive applications

Audience: Those with little previous experience in seismic data processing, or experienced land processing geophysicists who are moving to marine processing.

Contents:
This program uses the geovation software processing package to process a 3D marine seismic dataset through a basic time processing sequence. It includes parameter testing in order to develop the processing sequence. It begins with the reformating and review of the raw seismic data and data merge with navigation data. Participants work through identifying different noise types and addressing them appropriately. Velocities and mutes are derived using suitable applications. Participants learn to manipulate the data between domains and come to understand the domain appropriate for each process. Regularization and multiple removal is carried out and a Kirchhoff prestack migration performed. The main topics covered are:
- Seismic and navigation data
- A production sequence and interactive tools
- Data reformating
- Zero-phasing
- Noise removal, parameter testing and QC
- Addressing the multiples
- Velocity picking
- Offset and angle mutes
- Offset class splitting
- Regularization
- Migration
- Angle stacks

Learning Objectives:
- Complete a basic 3D marine sequence from reformating to migration
- Be aware of the method to design and implement a testing plan
- Understand the different processing domains
- Be confident using the interactive tools
- Understand the steps of managing a processing workflow, job building, submitting, QC, data management

Software Used: Geovation
Course Format: Classroom, presentations, exercises, data
Max Number of Participants: 12
Duration(days): 10 days
Prerequisites: Participants should have a geophysical background and be equipped with a basic proficiency in using the software and interactive applications

4D Processing Workflow
Prerequisites: Info available on request
Duration(days): 2 days
Max Number of Participants: 12
Software Used: Geovation
Course Format: Classroom, presentations, exercise

3D Land Processing
Prerequisites: Participants should have a geophysical background and basic proficiency in using the software and interactive applications
Duration(days): 15 days
Max Number of Participants: 12
Software Used: Geovation
Course Format: Classroom, presentations, exercises

3D Marine Processing
Prerequisites: Understanding seismic processing fundamentals and elementary experience with the processing package
Duration(days): 10 days
Max Number of Participants: 12
Software Used: Geovation
Course Format: Classroom, presentations, exercises

3D Surface Related Multiple Elimination
Prerequisites: Participants should have a geophysical background and be equipped with a basic proficiency in using the software and the interactive applications
Duration(days): 1 day
Max Number of Participants: 8
Software Used: Geovation
Course Format: Classroom, presentations, exercise, data

Audience: Geophysicists wanting an in-depth understanding of the convolutional multiple modeling and the wave-field modeling, two 3D Surface Related Multiple Elimination.

Contents:
This course begins with a review of multiples, what they are, how and why they are generated and provides a classification for the various types.

It then provides an overview of the 3D SRME technique. The SRME method proposed by Verschuur and Berkhourt in 1992 and commonly referred to as the Delphi method is outlined theoretically and simplified graphically. The convolutional modeling methodology and workflow are discussed from the preprocessing, binning and regularization through model generation. The alternative wave-field modeling method is explained and the differences between the two methods are discussed. The applicability of the methods is put in context by reviewing the types of survey settings versus the multiple attenuation effectiveness. Adaptive subtraction is presented. Finally the participants work with a 3D dataset, moving through the data preparation, model generation and subtraction for both methods. Throughout the workflow emphasis is placed on parameter verification and QC.

Learning Objectives:
- Know what surface related multiples are
- Be able to describe the Delphi method
- Know the principle for both 3D SRME using convolution and using wave-field modeling
- Be able to list the benefits and drawbacks of the two methods
- Be able to carry out the workflow, generate a multiple model, adaptive subtract and QC

Software Used: Geovation
Course Format: Classroom, presentations, exercise, data
Max Number of Participants: 12
Duration(days): 8 days
Prerequisites: Understanding seismic processing fundamentals and elementary experience with the processing package

3D Surface-related multiple elimination
Prerequisites: Info available on request
Duration(days): 2 days
Max Number of Participants: 12
Software Used: Geovation
Course Format: Classroom, presentations, exercise
### 5D Regularization Workflow

**Prerequisites:** Participants should have a geophysical background and be familiar with a basic proficiency in using the software and interactive applications.

**Duration:** 1 day

**Max Number of Participants:** 12

**Software Used:** Geovation

**Course Format:** Classroom, presentations, exercises.

**Audience:**
The course is designed for geophysicists with some processing knowledge who want to incorporate multi-dimensional regularization into their seismic processing flow.

**Contents:**
This course begins with a review of why data regularization is needed, the expectations of many processing algorithms relative to the real spatial distribution found in recorded datasets and the impact this can have on processing results. Next regularization is presented, its approaches for both narrow azimuth and wide azimuth acquired datasets while highlighting the need for 5D dimensions. The Fourier transform and the use of Anti-leakage to minimize spectral leakage whilst allowing energy interpretation beyond aliasing is presented. The workflow concludes the course.

The main topics covered are:
- The need for regularization – what is the problem
- Regularization, the objectives, approaches and the need for 5D
- Regularization and interpolation - General considerations and pre-requisites
- The 5D interpolation algorithm
- Regularization and mapping
- Anti-leakage Fourier transform and beyond the spatial aliasing
- The workflow, modules, testing and quality control

**Learning Objectives:**
- Understand the need for data regularization
- Be able to describe the need for 5 dimensions
- Know what is meant by mapping and full 5D regularization and the difference between them
- Understand the use of anti-aliasing Fourier transform
- Know the Geovation modules and interactive applications used
- Be able to set the 5D regularization workflow

### Advanced Depth Migration Techniques

**Prerequisites:** Participants should have a practical background in depth processing and preferably have participated in the course “Basic Depth Migration Workflow”

**Duration:** 1-3 days

**Max Number of Participants:** 8

**Software Used:** Geovation

**Course Format:** Classroom presentations and exercises.

**Audience:**
Geophysicist requiring knowledge of the multiple techniques used in depth imaging.

**Contents:**
This course begins with a review of the basic principles of depth migration, isotropic and anisotropic (VTI, TTI) operators and the forward and inverse problem. This is followed by a discussion of typical imaging problems, acquisition limitations, illumination issues, offsets and interfered multiples and the evolution of ray based and wave equation migration techniques. The commonly used single arrival ray based migration; Kirchhoff, is reviewed. Extending to multi-arrival, Gaussian beam migration is presented with its benefits highlighted. The principles of operation are followed by the workflow with key parameters being explained. Reverse time migration, a method based on wave equation, is introduced through an initial look at methods of solving the wave equation. The benefits and limitation of the method are explained prior to delving into the workflow. Key parameters and consideration are highlighted together with methods of quality control. Finally, tomography is explained and the velocity model update via non-linear tomography is discussed.

**Learning Objectives:**
- Aware of the various techniques used for depth modelling
- Know the key differences and benefits of the various methods
- Able to perform a Kirchhoff, Gaussian beam and reverse time migration
- Understand the key components of the tomographic equation sequence
- Capable of generating and updating an anisotropic model using tomographic sequence

### Geophysics for Non-Geophysicists

**Prerequisites:** New

**Duration:** 2 days

**Max Number of Participants:** 12

**Software Used:** None

**Course Format:** Classroom presentations and videos.

**Audience:**
Anyone wanting a basic overall understanding of the complete Oil and Gas exploration cycle.

**Contents:**
In this course, you are introduced to the oil exploration cycle, the formation of oil and gas, and the basic principles of geophysics. The main topics covered are:
- Hydrocarbons, their deposition and reservoir properties
- Outline of the basic geophysical theory
- Review the seismic cycle
- The seismic acquisition phase in both land and marine environments
- Example of a land acquisition and marine acquisition
- The challenges presented by the diverse acquisition environments
- What is recorded? Different events are highlighted on marine and land data
- What equipment is required for emission and recording
- Geometry, positioning and single versus multifold
- Processing principles and work flows
- Seismic wave equation
- Reservoir characterization, attributes and inversion
- The role and value of non-seismic methods, gravity and magnetics and their integration with seismic data

**Learning Objectives:**
- Understand the Oil and Gas exploration cycle
- Know the conditions for hydrocarbon generation, migration and accumulation
- Have a clear understanding of the varying waves propagating through the earth
- Be aware of the various acquisition types
- Be able to list environmental issues
- Identify the recorded events on real data examples
- Gain an understanding of a processing sequence
- Understand that seismic data is used in seismic reservoir characterization
- Know the value of non-seismic methods

### Geophysicist Subsurface Imaging Induction

**Prerequisites:** Participants should have a geophysical background

**Duration:** 25 days

**Max Number of Participants:** 12

**Software Used:** Geovation

**Course Format:** Classroom, presentations, exercises.

**Audience:**
Anyone beginning their career as a processing or research geophysicist.

**Contents:**
Included is a concentrated curriculum of geophysics fundamentals and a solid introduction to working with the processing software tools. To begin, a review of the basic geophysical theories is seen, then a geological and petroleum geology overview. Land and marine acquisition, project design, planning, equipment and operations plus environmental factors are discussed. The role of seismic processing is outlined together with the major steps involved in a typical processing sequence. Interactions used for the processing and quality control (QC) are shown.

Using real data participants carry out a processing sequence to produce a final migrated product. Exercises, group discussions and question and answer sessions solidify the learning throughout.

Technical presentation scenarios enable participants to develop both their technical and presentation skills. The importance of quality control and project management is emphasized. Finally the more advanced technologies such as SRME demultiple, 4D, wide azimuth, broadband and PSDM are presented.

**Learning Objectives:**
- Have an overall knowledge of geophysics
- Obtain a basic knowledge of typical acquisition
- Understand types of data used in data processing
- Know how to view/interpret/separate data
- Understand concepts of testing processing parameters and controlling outputs
- Become familiar with project management fundamentals
- Increase communication skills
### Basic Depth Imaging Workflow

**Prerequisites:** Trainees should have background in time processing, and be familiar with the software used.

**Duration (days):** 5 days

**Max Number of Participants:** 20

**Software Used:** Geovation

**Course Format:** Classroom presentations and exercises

### Audience:
Geophysicist requiring depth imaging methodology entry knowledge.

### Contents:
- Why do we migrate? The theoretical fundamentals of imaging are reviewed with the emphasis placed on a practical understanding of migration. Participants process a dataset through a depth imaging sequence and learn how to build, modify and quality control (QC) velocity models, run and QC tomographic updates and run Kirchhoff pre-stack migrations.

The main topics covered include:
- Reflection, transmission and refraction and introduction to PSDM.
- Geometry definition and setting up the velocity zone
- Water bottom horizon picking on PSDM data using an interpretation toolbox
- Building an initial velocity model using well data
- Travel times computation and Kirchhoff migration
- Time to depth conversion
- Anisotropy concepts review
- Well calibration and delta computation
- VTI anisotropic model building and Kirchhoff migration
- Automatic RMO picking on CIG and quality factor
- Multi-layer non-linear tomographic inversion, the sediment velocity model update and QC
- STI PSDM

### Learning Objectives:
- List the different steps of depth imaging processing
- List the main elements needed to build a velocity depth model
- Build an initial velocity model using well data and an interpretation workstation
- Understand the key components of the tomographic inversion sequence
- Competently explain the anisotropy concept
- Capable of generating and updating an anisotropic model using tomographic sequence
- Be able to carry out a STI PSDM
CGG’s geophysical interpretation training programs focus on integration of geophysical concepts with geology to ensure industry relevance and emphasize practical applications. The courses cover the processes and methodologies of the complete range of geophysical surveys including 2D/3D/4D seismic, potential fields and remotely sensed imagery.

The courses are authored and delivered by trainers with considerable experience working in the geophysical industry. The courses employ extensive use of real examples, and focus on techniques and technology at the forefront of the geophysical industry.

“This has been my first introduction to electrical image logs and has provided me with a general view of what can be done with them.”
<table>
<thead>
<tr>
<th>Course</th>
<th>Audience</th>
<th>Prerequisites</th>
<th>Duration (days):</th>
<th>Max Number of Participants:</th>
<th>Software Used</th>
<th>Course Format:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geophysical Interpretation</td>
<td>Petroleum geologists, geophysicists and engineers involved in oil and gas exploration and development.</td>
<td>None</td>
<td>5-day</td>
<td>Max 20</td>
<td>None</td>
<td>Classroom exercises and presentations</td>
</tr>
<tr>
<td>Seismic Sequence Stratigraphy</td>
<td>Early-career geologists and technologists who make structure maps; those who need to judge the validity of maps and cross sections.</td>
<td>None</td>
<td>5-day</td>
<td>Max 20</td>
<td>None</td>
<td>Classroom exercises and presentations</td>
</tr>
<tr>
<td>Non-Seismic Geophysical Interpretation</td>
<td>Early-career geologists and technologists who make structure maps; those who need to judge the validity of maps and cross sections.</td>
<td>None</td>
<td>5-day</td>
<td>Max 20</td>
<td>None</td>
<td>Classroom exercises and presentations</td>
</tr>
<tr>
<td>Mapping Subsurface Structures</td>
<td>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.</td>
<td>None</td>
<td>5-day</td>
<td>Max 20</td>
<td>None</td>
<td>Classroom exercises and presentations</td>
</tr>
</tbody>
</table>

**Seismic Interpretation**
- **Prerequisites:** None
- **Duration:** 5-day
- **Max Number of Participants:** Max 20
- **Software Used:** None
- **Course Format:** Classroom exercises and presentations

**Audience:** This course is suitable for geologists, geophysicists and engineers who have a basic understanding of exploration methodologies.

**Contents:**
- Seismic Geophysics: Seismic waves, Normal Reflection, Acoustic Impedance, Reflection Coefficients, Waves, Vertical / Horizontal Resolution, Thinnest beds to be resolved
- Seismic Data: Seismic Well data, Non-seismic geophysical data
- Acquisition & Processing: Land and marine Seismic Acquisition and Processing
- Incorporating Geophysical Information: Surface geology and other geophysical methods
- Picking and Mapping Horizons: Reflection, Interpretation pitfalls, Migration effects, Mapping
- Structural Interpretation: Structural geology terminology, Classification of structures
- Sequence Stratigraphy: Controls and basic concepts, Parasequence sets and flooding surfaces, Sequences and systems tracts
- Seismic Stratigraphic Analysis: Recognition of Sequences in Seismic
- Advanced Seismic Interpretation Techniques: Post-stack amplitude analysis, Seismic attributes, Surface attributes, Other techniques, AVH, Impedance inversion
- Depth Conversion: Estimates of depth on seismic data, time / depth data from wells and stacking velocities

**Seismic Sequence Stratigraphy**
- **Prerequisites:** None
- **Duration:** 5-day
- **Max Number of Participants:** Max 20
- **Software Used:** None
- **Course Format:** Classroom exercises and presentations

**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.

**Contents:**
- The course covers the following topics:
  - Introduction: Philosophy and history
  - Geophysical Fundamentals
  - Breaking out operational sequences
  - Introduction to fault interpretation
  - Chronostratigraphy construction and interpretation
  - Sea level curves, accommodation space, and cycle orders
  - Vail sequence theory and sequence hierarchy
  - Carbonate sequences
  - Siliciclastic sequences
  - Seismic facies
  - Paleo-environmental analysis
  - Geohistory reconstruction
  - Optimizing exploration

**Non-Seismic Geophysical Interpretation**
- **Prerequisites:** None
- **Duration:** 5-day
- **Max Number of Participants:** Max 20
- **Software Used:** None
- **Course Format:** Classroom exercises and presentations

**Audience:** Non-Seismic Geophysicists: An Introduction Fundamentals:
- Rock physical properties
- Gravity vs magnetic studies
- Gravity and Magnetic Fields:
  - Physical principles
  - Gravity field of the earth
  - Geomagnetic field
- Basic processing and survey techniques
- Topography and isostasy
- Manual interpretation methods
- Summary of advanced and interpretive gravity and magnetic processing
- Summary of recent developments

**Contents:**
- Preparatory for survey specifications:
  - Objectives; physical properties; test modelling; land gravity
  - Accuracy: instrumental effects, tidal correction, latitude, Free-Air and Bouguer Correction, terrain effects, specifications for accuracy
  - Marine surveys: survey and processing
  - Aeromagnetic surveys: accuracy, data distribution, processing and interpretation
  - Quality control
  - Introduction to Advanced Non-Seismic Interpretation Techniques:
    - Electrical: Induced; Magnetotellurics; Remote sensing methods
    - Integration: Workflow and integration

**Mapping Subsurface Structures**
- **Prerequisites:** None
- **Duration:** 5-day
- **Max Number of Participants:** Max 20
- **Software Used:** None
- **Course Format:** Classroom exercises and presentations

**Audience:**
- **Optimization:** Workflow and integration
- **Electrical; Induced; Magnetotellurics; Remote sensing methods
- **Quality control**
- **Introduction to Advanced Non-Seismic Interpretation Techniques:**
  - Electrical: Induced; Magnetotellurics; Remote sensing methods
  - Integration: Workflow and integration

**Contents:**
- **Mapping sequential cross-cutting faults:**
  - Soft linked and hard linked faults
  - Fault-cutoff lines in computer mapping
  - Juxtaposition diagrams for trap and seal analysis
  - Finding faults and fault orientations with SCAT analysis
  - Multiple-surface map compatibility
  - Fault shapes and displacement distributions
  - Heave and throw from stratigraphic separation
  - Stratigraphic separation from structure contour map
  - Constructing fault-plane maps
  - Faults on isochron 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
  - Different measures of thickness
  - Thickness in deviated wells
  - Dip and true curves 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 separation from structure contour map
  - Constructing fault-plane maps
  - Faults on isochron 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
Overview of Reservoir Activities

Audience:
Anyone who wants to have a better understanding of the Geophysical chain of activities.

Contents:
Proper development of recovery strategies from oil & gas reservoirs requires a good understanding of the rock and fluid properties of which the reservoirs are made. This course introduces the reservoir activities that follow the processing of seismic data, introducing basic reservoir engineering concepts and methods to enable cross-disciplinary exchange of ideas and experience.

Learning Objectives:
- Understand how geological, petrophysical, seismic, rock properties and reservoir data are integrated in a consistent manner, using judicious techniques, to construct a reservoir model
- Provide participants with a basic understanding of porosity media fundamentals: how oil or gas are trapped or mobilized in porous media
- Introduce reservoir engineering concepts and terminology
- Create awareness of how recovery factors and reserves are being estimated and predicted
- Understand typical assumptions and simplifications required to predict reservoir performance

Seismic Reservoir Characterization

Prerequisites:
This course is for personnel who are familiar with seismic interpretation and who wish to extend their knowledge on how they can further utilise seismic data sets to constrain and characterise reservoir units. This course is suitable for geologists, reservoir engineers, stratigraphers and sedimentologists who are looking to develop skills in petroleum systems interpretation and distribution mapping.

Contents:
- Introduction to seismic reservoir characterisation
- Rock physic modelling
- Well to seismic tie and forward modelling
- Attributes for structural analysis
- Principle and use of AVO
- Acoustic and elastic inversion for rock properties prediction
- Impact of seismic quality on prospect attribute modelling
- Introduction to the use of geostatistics in reservoir characterisation
- Volumetrics

Learning Objectives:
- Use seismic data, and seismic attributes to enhance reservoir features such as subtle and small faults, lithological variations and lithological signatures, define zones of known reservoir quality and potential fluid pathways.
- Understand how to link the reservoir and elastic properties
- Quantitative interpretation with AVO and seismic inversion
- Multi-attribute analysis for specific and confined prospect characterisation
- Geostatistics and Interpolation methods and techniques.
- Refined play-fairway mapping techniques using seismic attributes.
- Volumetric definitions and constraints, regenerates calculations and certainty geostatistics.

Advanced Seismic Reservoir Characterization

Prerequisites:
Info available on request.

Audience:
This course is for personnel who are familiar with seismic interpretation and reservoir characterization using 3D seismic and who wish to extend their knowledge to the integration of more advanced seismic data sets.

Contents:
This course emphasizes the underlying geological and geophysical principles of seismic reservoir characterization, continuity and integrity, distribution and mapping.

Acoustic inversion from full stack seismic data has evolved to handle simultaneously several seismic volumes that can be pre stack, azimuthal, PP/PS or time lapse to predict reservoir properties.
- Introduction to seismic reservoir characterisation
- Acoustic and elastic inversion for rock properties prediction
- Stochastic inversion for fine scale reservoir characterisation
- Joint PP-PS inversion benefits
- 4D inversion to track fluid movement in the reservoir
- Azimuthal Anisotropy Analysis for fracture characterisation

Learning Objectives:
- Use seismic data, and seismic attributes to enhance reservoir features such as subtle and small faults, lithological variations and lithological signatures, define zones of known reservoir quality and potential fluid pathways.
- Use of multicomponent data for reservoir characterisation
- Use of azimuthal seismic to predict fracture density and orientation
- Use of time lapse information to understand fluid movement in the reservoir
- Understand how to link the reservoir and elastic properties
for more detailed information, course dates, and registration, visit cgg.com/geotraining
Petroleum geology and reservoir engineering courses incorporate industry-specific theory with practical applications for comprehensive petroleum geology and engineering solutions.

The courses include broad technical concepts such as petroleum geology and reservoir engineering and specific subject matter in a variety of geological and engineering disciplines, such as biostratigraphy and facilities engineering.

Our programs are taught by geoscientists and engineers who specialize in these fields and have extensive industry experience. Courses are offered as theory-based classes or practical workshops, or as a combination that best suits client needs.
• Structural Geology Workshop 83
• Palaeozoic Reservoirs - Key Factors in Distribution, Characterization and Controls on Reservoir Quality 84
• Introduction to the Petroleum Geology and Stratigraphy of the Arabian Gulf Basins 84
• Carbonate Petrophysics 85
• Fundamentals of Quick-Look Log Analysis 85
• Petroleum Exploration for Non-Geoscientists 86
• New Venture Team Training 86
• Oil and Gas Recovery Factors in Clastics and Carbonates 87
• Understanding Fractured Reservoirs 87
• Petroleum Engineering 88
• Applied Petrophysics 88

for more detailed information, course dates, and registration, visit cgg.com/geotraining
**Geological Characterization of Reservoirs**

**Audience:** Geologists, geophysicists and reservoir engineers responsible for evaluating reservoir quality and performance.

**Contents:**
- Reservoir properties of sandstones and carbonates at microscale
- Rock property derivation for seismic applications
- Experimental rock deformation tests and failure criteria: uniaxial, triaxial, hydrostatic and shear rock deformation, role of temperature, water, strain rate
- Deformation modes and mechanisms: cataclasis, diffusive mass transfer, crystalline plasticity, brittle-ductile transition
- Role of fluids, fluid pressure and fluid flow in hydrocarbon exploration
- Brittle rock deformation: faulting (including fault rock development, fault seal analysis and palaeostress analysis from fault slip data) and fracturing (including joint development) in the upper crust
- Ductile rock deformation: folding and shear zone development

**Learning Objectives:**
- Understand the deposition and diagenetic controls on reservoir properties
- Apply geophysical and geological evaluations of integrated data from a variety of disciplines
- Understand and quantify the uncertainties in reservoir evaluation and volumetric calculations
- Apply facies modelling and simulation techniques
- Understand the principles of recovery and stimulation techniques

**Prerequisites:** None

**Duration (days):** 5-day

**Max Number of Participants:** 20

**Software Used:** None

**Course Format:** Classroom exercises and presentations

---

**Advanced Structural Geology**

**Audience:** Geologists and structural geologists with a good basic understanding of structural geology who wish to further develop their skills in this area.

**Contents:**
- Ductile rock deformation: folding and shear zone development
- Brittle rock deformation: faulting (including fault rock development, fault seal analysis and palaeostress analysis from fault slip data) and fracturing (including joint development) in the upper crust
- Role of fluids, fluid pressure and fluid flow in hydrocarbon exploration
- Deformation modes and mechanisms: cataclasis, diffusive mass transfer, crystalline plasticity, brittle-ductile transition
- Role of temperature, water, strain rate
- Experimental rock deformation tests and failure criteria: uniaxial, triaxial, hydrostatic and shear rock deformation, role of temperature, water, strain rate
- Deformation dynamics, kinematics and structures: simple shear and pure shear
- Deformation modes and mechanisms: cataclasis, diffusive mass transfer, crystalline plasticity, brittle-ductile transition
- Role of fluids, fluid pressure and fluid flow in hydrocarbon exploration
- Brittle rock deformation: faulting (including fault rock development, fault seal analysis and palaeostress analysis from fault slip data) and fracturing (including joint development) in the upper crust
- Ductile rock deformation: folding and shear zone development

**Learning Objectives:**
- Understand the differences in the various published reserve definitions
- Apply the reserve definitions as well as published guidelines to correctly classify reserves
- Use traditional methods and supplemental techniques to estimate reserves and determine the impact of economics on those estimates
- Understand the various uses of reserves

**Prerequisites:** None

**Duration (days):** 5-day

**Max Number of Participants:** 20

**Software Used:** None

**Course Format:** Classroom exercises and presentations

---

**Oil and Gas Reserves Evaluation**

**Audience:** Geologists, geophysicists, reservoir engineers and managers involved in reserve reporting.

**Contents:**
- Purpose of reserves
- Reserve studies
- Reserve reports
- Reserve definitions - history, SEC, SPE/WPC
- Reserve estimation methods - analogies, volumetrics and performance analysis
- Supplemental techniques
- Economics and reserves
- Special topics - reserves management, software, regional uniqueness, FMV, risk, yardsticks, financing

**Learning Objectives:**
- Understand the differences in the various published reserve definitions
- Apply the reserve definitions as well as published guidelines to correctly classify reserves
- Use traditional methods and supplemental techniques to estimate reserves and determine the impact of economics on those estimates
- Understand the various uses of reserves

**Prerequisites:** None

**Duration (days):** 5-day

**Max Number of Participants:** 20

**Software Used:** None

**Course Format:** Classroom exercises and presentations

---

**Advanced Petrophysics**

**Audience:** Petroleum engineers, seismologists, petrophysical engineers, reservoir engineers, drilling engineers and geologists.

**Contents:**
- Additional to Applied Petrophysics, the advanced course will cover:
  - Comparison of shale volume, porosity, saturation and permeability methods
  - Capillary pressure curves
  - Rock property derivation for seismic applications

**Learning Objectives:**
- Understand the differences in the various published reserve definitions
- Apply the reserve definitions as well as published guidelines to correctly classify reserves
- Use traditional methods and supplemental techniques to estimate reserves and determine the impact of economics on those estimates
- Understand the various uses of reserves

**Prerequisites:** Applied Petrophysics

**Duration (days):** 5-day

**Max Number of Participants:** 20

**Software Used:** None

**Course Format:** Classroom exercises and presentations

---
Shaly Sand Petrophysics

Prerequisites: None
Duration (days): 5-day
Max Number of Participants: 20
Software Used: None
Course Format: Classroom exercises and presentations

Audience: Engineers in exploration and production departments, Geologists, seismologists and petroleum, petrophysical, reservoir and drilling engineers.

Contents:
- Rock Properties: overview of depositional systems
- Fluid - Rock-Interactions: porosity, permeability, saturation, compaction, capillary pressure
- Conventional and Special Core Analysis: laboratory techniques to measure physical properties in core
- Drilling and Logging Process: review drilling and logging process
- Conventional Logging Tools: logging tools theory
- Advanced Logging Tools: advanced downhole tools e.g. NMR log and Borehole Images

The second part of the programme will focus on an Excel-based practical exercise, which will enable attendees to work through a full petrophysical evaluation of a shaly sand sequence, and in doing so, compare and contrast a variety of methods for Vsh, measuring in relation to Shaly Sands.

Learning Objectives:
This course deals with fundamental petrophysical relations, principles, modern interpretation methods and core measurements in relation to Shaly Sands.

Reservoir Engineering for Non-Engineers

Prerequisites: Info available on request
Duration (days): 5-day
Max Number of Participants: 20
Software Used: Info available on request
Course Format: Info available on request

Learning Objectives:
- Enhanced Recovery Mechanisms
- Material balance and evolution of HIIP over time
- Decline curve analysis
- Well testing and PBUs; execution, results and usage / significance
- Full Interpretation Workflow
- Data Preparation and Quality Control
- Volume Analysis
- Permeability Analysis
- Water Saturation Analysis
- Saturation Height
- Recovery factors
- Reservoir Summation

Reservoir Engineering

Prerequisites: None
Duration (days): 5-day
Max Number of Participants: 20
Software Used: None
Course Format: Classroom exercises and presentations

Learning Objectives:
- Reservoir Assessment. Reservoir modeling, volumetric assessment and mapping, defining the oil and gas reservoirs, and will be able to apply reservoir engineering methods and appreciate the construction and use of reservoir models. They will have acquired the skills necessary for estimation of petroleum reserves, development planning and to assess uncertainties.
- Field analogues. Comparison between oil fields and exposed analogues
- Reservoir assessment. Reservoir modeling, volumetric assessment in correlation and mapping, effects of capillary pressure, interface with engineering

Audience: Petroleum engineers, team leaders, production and reservoir engineers, geologists, geophysicists and geologists involved with exploration and development of oil and gas reservoirs.

Contents:
- Enhanced Recovery Mechanisms
- Material balance and evolution of HIIP over time
- Decline curve analysis
- Reservoir heterogeneity and sweep
- Relative permeability, movable oil, mobility, drainage and imbibition
- Viscous flow, flow conditions
- Recovery factors and production forecasts
- Radial differential fluid flow equation
- Introduction to analysis and interpretation of pressure tests: drawdown and build-up
- Skin: source and how to minimize it

Reservoir Engineering for Non-Engineers

Prerequisites: None
Duration (days): 5-day
Max Number of Participants: 20
Software Used: None
Course Format: Classroom exercises and presentations

Learning Objectives:
- Enhanced Recovery Mechanisms
- Material balance and evolution of HIIP over time
- Decline curve analysis
- Relative permeability, movable oil, mobility, drainage and imbibition
- Viscous flow, flow conditions
- Recovery factors and production forecasts
- Radial differential fluid flow equation
- Introduction to analysis and interpretation of pressure tests: drawdown and build-up
- Skin: source and how to minimize it

Audience: Petroleum engineers, team leaders, production and reservoir engineers, geophysicists and geologists involved with exploration and development of oil and gas reservoirs.

Contents:
- Enhanced Recovery Mechanisms
- Field analogues. Comparison between oil fields and exposed analogues
- Reservoir assessment. Reservoir modeling, volumetric assessment in correlation and mapping, defining the oil and gas reservoirs, and will be able to apply reservoir engineering methods and appreciate the construction and use of reservoir models. They will have acquired the skills necessary for estimation of petroleum reserves, development planning and to assess uncertainties.
Unconventional Gas Exploration

Audience: Geologists, explorationists and reservoir engineers who want to improve their knowledge of Unconventional Gas exploration.

Contents:
- Introduction: Fundamentals of fluid behaviour in low permeability rocks
- What are Shale Gas, CBM, tight gas?
- Petroleum System Fundamentals: Hydrocarbon source rock characterization
- Source richness, quality and maturity
- Shale Gas generation: process and habitat
- Shale Gas systems and classifications
- CBM generation process and habitat
- CBM systems and classifications
- Tight gas generation process and habitat
- Tight gas systems and classifications

Assessment Techniques:
- Definition of workflows
- Application of geochemistry in unconventional gas assessment
- Sample analytical techniques
- Overview of petrophysical techniques
- Evaluation of reservoir potential

Integration:
- Petroleum system analysis as applied to unconventional gas
- Regional assessment of unconventional gas potential

Operational Issues:
- Overview of drilling and completion practice
- Production characteristics of unconventional gas reservoirs
- Overview of drilling and completion practice
- Commercial considerations

Exercises: Unconventional gas assessment in the Western Canada Sedimentary Basin, examining regional models, definition of unconventional play fairways and assessment of prospectivity

Rift Basins - Key Factors in Exploration, Development and Production

Audience: Geophysicists, geologists and petroleum engineers involved with exploration and development in rift basins.

Contents:
- Rift petroleum systems are particularly complex. This course aims to identify the uncertainties surrounding deposition of reservoir, seal and source facies, in relation to rift structures, formation of traps, and hydrocarbon migration paths. The objective is to provide a geologic basis for improved strategies for rift exploration and development.
- Rift basins: this is an extensive investigation of sedimentation in relation to structure in continental and marine depositional settings - across a range of climatic zones, mostly illustrated by modern systems
- Exploration: in the light of our understanding of rift basins, we examine case histories of exploration in rift basins. This includes both under-explored and developed rift settings
- Development: we follow a series of real world case studies examining development of rift system reservoirs
- Production: a review of particular production issues encountered in selected rift settings

Learning Objectives:
- Interpret clastic depositional environments using data from cores, cuttings and wireline logs
- Prepare quantitative facies maps
- Apply sequence stratigraphic concepts to clastic reservoirs
- Predict reservoir size, shape, trend and quality

Introduction to the Petroleum Geology of Sub-Saharan West Africa

Audience: This course is designed for petroleum professionals who wish to become more informed about the petroleum geology of the oil and gas-bearing basins in Sub-Saharan Africa, from Senegal to South Africa.

Contents:
- Pre-rift source rocks and reservoirs: Top-class pre-Jurassic source rocks are known along parts of the African margin and on its conjugate South American margin. Locally, oil and gas production comes from pre-rift sediments and basement rocks
- Syn-rift petroleum systems: The lacustrine to marginal marine syn-rift facies also provide world-class source kitchens that have charged the post-rift plays
- Early drift petroleum systems: Early drift source rocks, traps and seals provide tightly linked petroleum systems
- Cenozoic plays: Away from the mega-deltas, success depends upon marrying prediction of sand distribution from sedimentological modeling and seismic interpretation, with prediction of migration paths from Mesozoic kitchens

Learning Objectives:
- Develop an understanding of the petroleum geology of Sub-Saharan Africa
- Identify the key petroleum systems and basins
- Understand the role of tectonic and sedimentary processes in petroleum system development
- Learn how to apply sequence stratigraphic concepts to clastic reservoirs
- Predict reservoir size, shape, trend and quality

Sandstone Reservoirs

Audience: Geologists, geophysicists, petrophysicists, reservoir and production engineers, exploration & production managers, all team members involved in reservoir characterization, technicians working with clastic reservoirs.

Contents:
- Genetic stratigraphic analysis
- Depositional architecture
- Basins and units
- Quantitative facies mapping
- Wireline logs and conventional cores
- Reservoir engineering
- Recognition of depositional systems
- Process-response facies models
- Integrated genetic stratigraphy
- Analysis of clastic depositional systems: Alluvial fan; Fluvial; Aeolian; Lacustrine; Deltaic; Shoreline; Shelf; Scape and basin fans
- Incised sequences
- Shelf margins and linked downslope systems
- Characteristic log patterns
- Flow units
- Prediction of reservoir size, shape, trend and 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

Learning Objectives:
- Interpret clastic depositional environments using data from cores, cuttings and wireline logs
- Prepare quantitative facies maps
- Apply sequence stratigraphic concepts to clastic reservoirs
- Predict reservoir size, shape, trend and quality
### Reservoir Geochemistry

**Prerequisites:** None  
**Duration (days):** 5  
**Max Number of Participants:** 20  
**Software Used:** None  
**Course Format:** Classroom exercises and presentations

**Audience:** Petroleum geologists, reservoir geologists and engineers involved in the assessment of reservoir heterogeneity and connectivity; petroleum exploration geochemists who wish to expand their knowledge into reservoir geochemistry.

**Contents:** Introduction to general concepts:  
- Reservoir fluid properties and characteristics  
- Rate and mechanism of reservoir filling and mixing  
- Engineering versus geochemical nomenclature  
- Hydrocarbons and non-hydrocarbons  
- Relationship of hydrocarbon composition to petroleum properties  
- Analytical methods  

Applications of petroleum geochemistry to the understanding of reservoir fluids:  
- Tested oil: Interpreting gas chromatograms and GC-MS; non-hydrocarbons/interpretation; application to reservoir continuity/connectivity  
- Gas: Non-hydrocarbon gases (compositions/sources); hydrocarbon compositions/interpretations; isotopes studies  
- Water: API analysis; Stiff diagrams; action on reservoir matrix; interpreting fractionation, GC-MS; oil-saturated non-flowing reservoirs; tar mats and reservoir-reeved oils

### Petroleum Geochemistry for Explorationists

**Prerequisites:** None  
**Duration (days):** 5  
**Max Number of Participants:** 20  
**Software Used:** None  
**Course Format:** Classroom exercises and presentations

**Audience:** The course is primarily aimed at geologists and geophysicists with little previous knowledge of geochemistry, although it also includes advanced concepts of geochemistry including biomarker analysis.

**Contents:**  
- Fundamental concepts and basic applications  
- Thermal/maturity modeling  
- Relationship of hydrothermal gradients, thermal conductivities and heat flux; measured and calculated thermal maturity values; interpretation of thermal history; misapplications  
- Interpretation of pyrolysis data/source rock productivity  
- Effects of kerogen type, maturity kerogen composition; potential and hydrocarbon productivity  
- Hydrocarbon composition/oils/biomarkers  
- Control of hydrocarbons on physical properties of petroleum; source type, maturity, mixing and alteration processes  
- Reservoir geochemistry  
- Source rock/basin modeling  
- Source rock facies, palaeoenvironments and geochemical signatures; the geochemical approach to basin modeling: case histories  
- Geothermal evaluation  
- Range of geochemical analyses; organization of analytical programs; combinations of analyzes to solve specific problems; case histories

### Fluvial-Deltaic Depositional Systems

**Prerequisites:** None  
**Duration (days):** 5  
**Max Number of Participants:** 20  
**Software Used:** None  
**Course Format:** Classroom exercises and presentations

**Audience:** Exploration geologists and geophysicists involved in clastic exploration in fluvi-deltaic systems.

**Contents:**  
- Fluvial Depositional Systems:  
  - Depositional Processes  
  - Classification of Fluvial Depositional Systems  
  - Modern and Ancient Analogues  
- Deltic Depositional Systems:  
  - Depositional Processes  
  - Classification of Deltic Systems  
  - Modern and Ancient Analogues  
  - Recognition in the Subsurface  
- Petrophysical Characteristics  
- Fluvi-Deltaic Sequence Stratigraphy  
- Implications for Play Fairway Analysis, Prospect Analysis and Reservoir Modelling

**Learning Objectives:**  
- Understand fluvi-deltaic systems and their depositional controls  
- Evaluate the sequence architecture of fluvi-deltaic systems using sequence stratigraphic principles  
- Apply key paper and digital exploration analysis and modelling techniques

### Deepwater Turbidites

**Prerequisites:** None  
**Duration (days):** 5  
**Max Number of Participants:** 20  
**Software Used:** None  
**Course Format:** Classroom exercises and presentations

**Audience:** Exploration and production geologists and geophysicists, stratigraphers, reservoir engineers and petrophysicists.

**Contents:**  
- Review of Deepwater Depositional Systems: Controls on deepwater sedimentation, deepwater locations, depositional characteristics, classification of processes, bouna sequences, diapirism and tsunami, key depositional settings and models; Problems associated with modeling deep water systems, subsurface recognition;  
- Extrabasinal controls: Tectonic regimes, eustacy, circulation and currents, climate, hinterland topography.  
- Sequence Stratigraphy: Seismic character, models, analysis workflow; facies mapping.  
- Petroleum System: Hydrocarbon charge potential; models of source rock development; maturation and migration; trapping models  
- Implications for production from deepwater reservoirs.  
- Geological controls on reservoir quality and architecture: Textural controls on reservoir quality, diagentic modification of pore, depositional controls on reservoir architecture: Injectites - implications for reservoir geometries; correlation.  
- Subsurface and Outcrop Analogues and Recognition: A review of selected subsurface examples from around the world. Data sources and type.  
- Uncertainties and Exploration Risk: Key uncertainties and risks in deepwater exploration; problems with modeling.

---

For more detailed information, course dates, and registration, visit cgg.com/geotraining.
Core Logging and Description Workshop (Carbonates or Clastics)

**Prerequisites:** None

**Duration (days):** 5-day

**Max Number of Participants:** 20

**Software Used:** None

**Course Format:** Classroom exercises and presentations

**Audience:** Geologists wishing to acquire the skills necessary to effectively describe and log cores and enable their logs to be applied in the future development stages of a field or discovery well.

**Contents:**
- Introduction to the principles of core logging (theory): Extraction and reasons for coring
- Review of physical and biogenic sedimentary structures (theory)
- Introduction to core descriptions including a review of different types of core description and sampling procedures
- Core logging workshop at 1:50 scale with examples from different depositional environments (approximately 20-30m of core for each attendee)
- Core logging workshop at 1:200 scale with examples from different depositional environments (approximately 50m of core for each attendee)
- Identify facies and facies associations from core
- Implement sampling schemes based on the core intervals

**Learning Objectives:**
- Understand the principles of core logging, sampling and analysis, and review sedimentary structures.
- Learn to describe core from different depositional environments and identify facies
- Apply sampling schemes

**Carbonate Reservoir Geology**

**Prerequisites:** None

**Duration (days):** 5-day

**Max Number of Participants:** 20

**Software Used:** None

**Course Format:** Classroom exercises and presentations

**Audience:** 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.

**Contents:**
- Carbonate reservoirs: Basic principles; depositional concepts; grain types; textures and fabrics; environmental reconstruction
- The reservoir model; depositional and diagenetic characteristics: Sroupeal and flat; shelf, slope; reef; limestones and dolomites; barrier; subaqueous; slope and redeposited; granular and lacustrine; karst; plume
- Carbonate diagenesis: Primary and secondary porosity; compaction; pressure solution; cementation; dolomitization; porosity generation and destruction; fractures
- Carbonate and evaporite sequence stratigraphy: Systems tracts; key surfaces; contrasting windward and leeward stacking patterns; carbonate and evaporite cycles; seismic stratigraphy
- Log response in carbonate rocks: Gamma; sonic; neutron; density; PNP; resistivity; reservoir assessment; fracture reservoirs; reservoir modeling; volumetric assessment in correlation and mapping; effects of capillary pressure; interface with engineering

**Learning Objectives:**
- Understand carbonate depositional systems and controls
- Recognize and model controls on reservoir quality and pore systems including diagenesis and fracturing
- Understand and apply carbonate and evaporite sequence stratigraphy

**Basin Analysis**

**Prerequisites:** None

**Duration (days):** 5-day

**Max Number of Participants:** 20

**Software Used:** None

**Course Format:** Classroom exercises and presentations

**Audience:** Geologists and geophysicists involved in new ventures or exploration who require the skills to evaluate petroleum systems and their hydrocarbon potential.

**Contents:**
- This course stresses the importance of basin evolution to petroleum generation, migration and accumulation. It includes worked examples in rift basins, foreland basins and wrench basins and emphasizes the combined roles of tectonics and eustasy, palaeoecology and biotic evolution.
- Plate tectonics, lithosphere, asthenosphere and crust/mantle
- Basin formation: rift, passive margins, sag basins, foreland flexure, piggy-back basins, wrench basins and thermal evolution
- Controls on basin stratigraphy: role of tectonics, role of sea level, eustasy versus isostasy, palaeoecological influences, global tectonic influences and an introduction to sequence stratigraphy. Depositional environments
- Classification of basins; classification schemes and classification associated with evolutionary style
- Evaluation of basin stratigraphy
- The concept of megasequences
- Introduction to play fairway analysis: techniques, burial history, petroleum systems and play analysis
- Analogue basin identification

**Learning Objectives:**
- Understand basin-forming processes and basin architecture
- Evaluate controls on sediment generation, transport and deposition
- Review key analytical techniques with a focus on burial history analysis
- Apply and integrate datasets to model basin evolution

**Prerequisites:** Info available on request

**Duration (days):** 5-day

**Max Number of Participants:** 20

**Software Used:** Info available on request

**Course Format:** Info available on request

**Audience:** The course is aimed at petroleum geologists, explorationists, petrophysicists, geophysicists and engineers who are involved with exploration in carbonate provinces or the development of carbonate reservoirs. Attendees should have previous knowledge of carbonate sedimentology.

**Contents:**
- Basic concepts of carbonate deposition
- Chronostratigraphy, seismic stratigraphy, sequence stratigraphy, controls on sequence development, accommodation space, parasequences and carbonate cycles, identification of surfaces, types of bounding discontinuities
- Sequences and systems tracts: sequence boundaries and their significance, sequences in time and space, orders of cyclicity
- Integrating well data: Key data types for sequence identification, typical work flow
- Seismic Stratigraphy: Identification of boundaries and stacking patterns in carbonate sequences, attribute analysis and ‘stratal slices’
- Mixed carbonate siliciclastic sequences, mixed carbonate evaporite sequences
- Systems tracts and petroleum exploration

**Learning Objectives:**
- Understand the concepts of carbonate sequence stratigraphy at different scales
- Be able to apply sequence stratigraphic interpretation for well and seismic data in carbonate environments
- Be able to use sequence stratigraphic approach to predict seal and reservoir quality
**GEOTRAINING: Petroleum Geology & Reservoir Engineering**

**Advanced Basin Analysis and Earth Modeling**

- **Prerequisites:** None
- **Duration (days):** 5-day
- **Max Number of Participants:** 20
- **Software Used:** None
- **Course Format:** Classroom exercises and presentations

**Audience:** Exploration geoscientists who require in-depth understanding to integrated basin analysis in exploration.

**Contents:**
- The Context: Petroleum systems analysis, fundamentals of basin formation and basin classification
- Play-day analysis: source, reservoir, traps, and seal distribution
- Paleoclimatic modeling to predict source and reservoir rock distribution, analogues, plate tectonic reconstruction as a means to constrain basin configurations

- The Components and Mechanisms
  - Source Rock Presence and Potential - classification (organofacies), distribution, analysis, organic richness and potential, organic quality, kinetics, estimating UEP
  - Access to charge / source effectiveness, basin geometry, generation and expulsion history, migration styles, timing, fluid flow concepts
  - Overpressure and effective stress, compaction, effect of pressure on migration, faults, fetch and focus, lag time, structural restoration, fetch area and volume, fill and spill vs leak
  - Seal effectiveness/column capacity - presence, distribution, trap style, types of seals, effect on migration style
  - Reservoir deliverability/effectiveness - porosity and permeability, thickness, fluid viscosity, effect on burial history, development and production
  - Basin Modeling: 1D vs 2D; Concepts, 1-D modeling, map-based modeling, geological input. Maturity, thermal stress and UEP maps. Migration, fetch and focus, sensitivity analysis, 3-D modeling workflow

**Petroleum Geology for Engineers**

- **Prerequisites:** None
- **Duration (days):** 3-day
- **Max Number of Participants:** 20
- **Software Used:** None
- **Course Format:** Classroom exercises and presentations

**Audience:** Petroleum engineers and reservoir engineers with no formal geological training.

**Contents:**
- This course covers 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, and the contribution that geology can make to volumetric assessment of reserves.
  - Source Rocks and the origin of oil and gas: Depositional environment; kerogens; thermal maturation; migration of hydrocarbons; classification of natural gases and crude oil
  - Reservoir and seals: Clastic and carbonate reservoir sedimentology; Depositional environments; Sandbody geometry and connectivity; Permeability profiles; Porosity and the effects of diagenesis; Formation damage and cavings; 3-D modeling
  - Structural geology: Basin types and plate tectonics; Trap types: structural; stratigraphic; 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

**Applied Rock Mechanics**

- **Prerequisites:** None
- **Duration (days):** 3-day
- **Max Number of Participants:** 20
- **Software Used:** Crystal Ball
- **Course Format:** Classroom exercises and presentations

**Audience:** Geologists, explorationists and reservoir engineers involved in prospect analysis.

**Contents:**
- The course is aimed at all geologists, explorationists and reservoir engineers involved in exploration, appraisal and development.
  - The aim of the course is to give the participant the necessary skills to undertake a detailed evaluation of stress and strain data to improve well planning, aid understanding and prevention of borehole instability, and enhance recovery by hydraulic fracturing.
  - Introduction to rock mechanics: definitions
  - Stress and strain: tectonic stress field, normal and shear stress, effective stress
  - Pore pressure: pore pressure at depth, overpressure, effect on rock strength
  - Elasticity: elastic strains, seismic wave velocities, Poisson's ratio, elastic moduli, poroelasticity
  - Brittle failure criteria: uniaxial, triaxial, direct / indirect tensile strength rock deformation testing
  - Fracturing: fracture initiation, propagation and development, controls on fracturing
  - Ductile rock deformation: deformation mechanisms, creep tests
  - Strain analysis: determining plane and non-plane strain, volume changes, Fry method
  - Structural Geology: plate tectonic environments, regional and local stress fields
  - Reservoir planning: determining well trajectories, reservoir performance, reservoir pressure
  - Reservoir deformation: role of temperature, pore fluid pressure prediction and monitoring
  - Borehole stability: effects of principal stress directions, mud weight, borehole breakdowns
  - Fault seal: Allan diagrams, shale:grauge ratio

**Application of Uncertainty in Prospect Analysis**

- **Prerequisites:** None
- **Duration (days):** 3-day
- **Max Number of Participants:** 20
- **Software Used:** Crystal Ball
- **Course Format:** Classroom exercises and presentations

**Audience:** Geologists, explorationists and reservoir engineers involved in prospect analysis.

**Contents:**
- The course is aimed at all geologists, explorationists and reservoir engineers involved in exploration, appraisal and development.
  - The aim of the course is to give the participant the necessary skills to undertake a detailed evaluation of stress and strain data to improve well planning, aid understanding and prevention of borehole instability, and enhance recovery by hydraulic fracturing.
  - Introduction to rock mechanics: definitions
  - Stress and strain: tectonic stress field, normal and shear stress, effective stress
  - Pore pressure: pore pressure at depth, overpressure, effect on rock strength
  - Elasticity: elastic strains, seismic wave velocities, Poisson's ratio, elastic moduli, poroelasticity
  - Brittle failure criteria: uniaxial, triaxial, direct / indirect tensile strength rock deformation testing
  - Fracturing: fracture initiation, propagation and development, controls on fracturing
  - Ductile rock deformation: deformation mechanisms, creep tests
  - Strain analysis: determining plane and non-plane strain, volume changes, Fry method
  - Structural Geology: plate tectonic environments, regional and local stress fields
  - Reservoir planning: determining well trajectories, reservoir performance, reservoir pressure
  - Reservoir deformation: role of temperature, pore fluid pressure prediction and monitoring
  - Borehole stability: effects of principal stress directions, mud weight, borehole breakdowns
  - Fault seal: Allan diagrams, shale:grauge ratio

For more detailed information, course dates, and registration, visit cgg.com/geotraining
Clastic Exploration and Reservoir Sedimentology

**Prerequisites:** None

**Duration (days):** 5-Day

**Max Number of Participants:** 20

**Software Used:** None

**Course Format:** Classroom exercises and presentations

**Audience:**
The course is aimed at exploration geologists and geophysicists involved in clastic exploration studies.

**Contents:**
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.

- Clastic facies analysis and depositional environments: ancient and modern, desert, fluvial, deltaic, estuarine, marine shoreline, shallow marine shelf and deep marine environments; geometry of clastic reservoirs; depositional modeling and mapping. Integration of the models with tectonics and seismic sequence stratigraphy.
- Leg response in clastic sequences: Core logging; lithology determination from wireline logs; core to wireline log correlation; palaeoenvironmental mapping.
- Clastic petrography and diagenetic: Detrital mineralogy and texture; diagenetic petrography - recognition and quantification, cement types, porosity destruction and enhancement; diagenetic/porosity modeling and mapping.
- Exploration sedimentology in play fairway mapping and basin analysis: Methods of basin-wide correlation and layering and the production of isochore, Nig, porosity and permeability maps.
- Volumetric assessment in clastic reservoirs

**Learning Objectives:**
- Interpret clastic depositional environments using data from core 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

Applied Petroleum Geology

**Prerequisites:** Info available on request

**Duration (days):** 5-Day

**Max Number of Participants:** 20

**Software Used:** None

**Course Format:** Classroom exercises and presentations

**Audience:**
Entry level E&P professional staff and technical support staff who do not have formal training in geology, geophysics or engineering.

**Contents:**
- History of the oil industry, current issues
- Geological concepts, global distribution of hydrocarbons, nature and geometry of hydrocarbon reservoirs, geological requirements for hydrocarbon accumulation, origin of hydrocarbons, rock types and origins
- Field appraisal and static models of reservoirs
- Assessing amounts of hydrocarbons-in-place and uncertainties
- Methods and tools used for hydrocarbon exploration, including drilling, geological mapping, satellite imagery and remote sensing, gravity-magnetic surveys, seismic reflection geophysics acquisition, processing and interpretation, seismic mapping, play fairway mapping, prospect evaluation and risking
- Dynamic models and subsurface development options, surface engineering and field operations
- Project economics
- Environmental issues

**Learning Objectives:**
- Participants will develop a good understanding of the upstream oil and gas industry: how hydrocarbons are found, developed, produced and treated prior to sales. Participants work in teams on an actual field case, and go through all steps that lead to a field development plan, including an economic assessment.

Biomarkers and Carbon Isotopes in Hydrocarbon Exploration

**Prerequisites:** Info available on request

**Duration (days):** 5-Day

**Max Number of Participants:** 20

**Software Used:** None

**Course Format:** Classroom exercises and presentations

**Audience:**
The course is primarily aimed at geologists and geophysicists with little previous knowledge of petroleum geochemistry, biomarkers and carbon isotopes.

**Contents:**
- General principles of Oil-Source Correlation
- Environmental controls on source rock deposition
- Basic oil and source rock chemistry, fluid analysis, extraction, fractionation
- Gas chromatography, simple biomarkers
- Gas chromatography mass spectrometry (GCMS), geochemical fossils, complex biomarkers
- Evaluation of GCMS fragmentograms
- Application of biomarkers to maturity studies, oil-source correlation and Principal Component Analysis
- Carbon isotopes, principles and methods
- Carbon isotopes of petroleum fluids (source rocks and oils) in correlation studies Carbon isotopes of petroleum gases

**Learning Objectives:**
- Gain an understanding of key petroleum geochemistry concepts, source rocks and their depositional environments
- Understand the principles of gas chromatography-mass spectrometry, its interpretation and application to petroleum exploration
- Learn about stable carbon isotope (CIR) analysis
- Correlate petroleum-source rocks using biomarkers and CIR

Biostratigraphy: Application in Exploration, Development and Production

**Prerequisites:** Info available on request

**Duration (days):** 5-Day

**Max Number of Participants:** 20

**Software Used:** None

**Course Format:** Classroom with presentations and exercises

**Audience:**
Explorationists involved in the assimilation and use of biostratigraphic data during sequence stratigraphic studies, basin analysis and drilling, and development geologists investigating correlation of reservoir units.

**Contents:**
- Introduction: Sampling techniques/programs: types of microfossils to use; analytical techniques; integration with other disciplines
- High-resolution biostratigraphy: What it is; areas of application; identification of chronostratigraphic events; environmental reconstruction; problems and data presentation
- Horizontal wells: Biosteering Theory; development of method; creation of high resolutionzonation schemes; wellesite operations, problems and case histories
- Correlation, depositional sequences and sequence stratigraphy: Correlation and interpretation problems; precision and flexibility; grouping rocks with depositional sequences; identification of sequence boundaries and integration with chronostratigraphic control; integration of environmental data and interpretation of depositional patterns of sequences and systems tracts; integration with wireline log data

**Learning Objectives:**
- Become familiar with the range of biostratigraphic analysis available
- Understand the application of high resolution biostratigraphic data and techniques
- Apply techniques to determine age of lithostratigraphic, log and seismic units
- Interpret palaeoenvironments and recognize post-depositional alteration
Learning Objectives:

• Identify systems tracts and stratigraphic sequences from depositional facies, well logs and seismic facies
• Understand sequence stratigraphic concepts and controls
• Identify systems tracts and stratigraphic sequences from depositional facies, well logs and seismic facies
• Construct a sequence stratigraphic model by integrating lithological, biostratigraphical, seismic and well data

Contents:

• Variation on the model: Application and exploration significance
• Depositional responses to changes in relative sea level for picking sequence boundaries
• Parasequences, maximum flooding surfaces and criteria for picking sequence boundaries
• Clastic and carbonate depositional environments - Depositional responses to changes in relative sea level
• Identification of keys to sequence stratigraphy with well log sequence stratigraphy and the application of biostratigraphy to sequence stratigraphy.
• Sequence expression in well logs - Log characters of sequence stratigraphy
• Seismic expression of sequence - criteria and approach
• Introduction - Concepts; eustatic controls; assumptions; definition of key terms.
• Eustatic controls on depositional stratal patterns - accommodation and equilibrium types; systems tract boundaries
• Sequence stratigraphy and the application of biostratigraphy to picking sequence boundaries

Audience:

Petroleum geologists, geochronologists, stratigraphers and geophysicists who wish to extend their knowledge through integration of seismic sequence stratigraphy with well log sequence stratigraphy and the application of biostratigraphy to sequence stratigraphy.

Software Used:

Intro: None
Classroom exercises and presentations

Prerequisites:

Info available on request

Duration(days):

5-day

Max Number of Participants:

20

Course Format:

Classroom exercises and presentations

Integrated Sequence Stratigraphy Workshop

Introduction to Clastic or Carbonate Petrography

Audience:

Geologists with a good basic understanding of geology who wish to further develop their skills in this area.

Contents:

• An introduction to clastic / carbonate petrography
• Grain textures
• Clastic / carbonate grain types (detrital mineralogy)
• Classification
• Diagenetic mineralogy
• Porosity
• Clastic Petrology covers:
  • Thin section preparation
  • Staining techniques
  • Thin section petrography basics
  • Identification of grains
  • Texture (grain size, sorting, shape and fabric)
  • Point counting (modal) analysis
  • Classification of sandstones
  • Packing, porosity and permeability
  • Factors controlling diagenesis
  • Diagenetic processes in relation to sandstone porosity
  • Porosity enhancement
  • Environmental indicators and provenance

Carbonate Petrography covers:

• Lithology
• Depositional texture (Dunham classification)
• Grain size and texture (sorting, roundness, grain contacts)
• Present versus original rock components (e.g. grain types, mud, fossils, cements, pores, diagenetic minerals)
• Pore types and cements (Identification, distribution and relationships)
• Diagenesis and advanced petrographic techniques

Software Used:

Intro: None
Classroom exercises and presentations

Prerequisites:

None

Duration(days):

5-day

Max Number of Participants:

20

Course Format:

Classroom exercises and presentations

Course Format:

Classroom exercises and presentations

Prerequisites:

Info available on request

Duration(days):

5-day

Max Number of Participants:

20

Software Used:

None

Course Format:

Classroom exercises and presentations

Prerequisites:

None

Duration(days):

5-day

Max Number of Participants:

20

Software Used:

None

Course Format:

Classroom exercises and presentations

Audience:

Petroleum geologists, geochronologists and exploration geologists involved in the petroleum systems evaluation of frontier basins, play-fairway analysis and prospect risks.

Contents:

• Introduction: Key aspects of petroleum systems modeling and sedimentary basin analysis, petroleum system elements evaluation, benefits of 1D vs. 2D vs. 3D modeling
• Source Rocks: Depositional environments, kerogen types; geochemical parameters - TDC, Rock Eval, Pyrolysis GC; kinetic models, timing of hydrocarbon generation; petroleum properties
• Heat Sources & Heat Flow: Crustal heat flow and temperature-time histories, radiogenic heat production, heat transfer, effect of different heat flows on maturity evolution
• Calibration Parameter: Temperature data, paleo temperature data, maturity data and other calibration data
• Fluid Flow: Petroleum generation and expulsion; primary, secondary and tertiary migration; migration methods in basin modeling; migration losses; material parameters and pressure prediction
• Overview on the Workflow in 1D Modeling*: Input data and boundary conditions, burial history, temperature and maturity modeling
• 2D & 3D Migration Modeling: Case studies on real petroleum system models: facies distribution, source rock and seal distribution; hydrocarbon generation, migration, accumulation and preservation; simulation and sensitivity analysis

Audience:

Petroleum geologists and geologists involved with exploration and development of oil and gas reservoirs.

Contents:

• Planning, gathering and management of geological data
• Geological concepts, global tectonics.
• Geophysical methods, production seismic.
• Sequence stratigraphy, log correlation.
• Environments of deposition (clastic, carbonates).
• Mapping of reservoir parameters and structure.
• Structural styles, trapping conditions.
• Reservoir fluids, initial conditions.
• Reservoir architecture, geological modeling.
• Oil and gas volumetric calculations.
• Subsurface uncertainty and risk analysis.
• Case histories.
• Vertical and horizontal well applications, operational geology
• Field excursion (optional): illustration of clastic and carbonate sedimentary environments and structural geology in 3-D.

Learning Objectives:

At the end of the course participants will be able to apply geological concepts, construct maps and sections and validate computer-generated interpretations. They will be able to calculate subsurface volumes and assess their uncertainties, and review their impact on project economics. They will acquire practical experience by working on an actual field study in teams.

Course Format:

Classroom exercises and presentations

Prerequisites:

Info available on request

Duration(days):

5-day

Max Number of Participants:

20

Software Used:

None

Course Format:

Classroom exercises and presentations

Audience:

Petroleum engineers and geologists involved with exploration and development of oil and gas reservoirs.

Contents:

• Acquire practical experience by working on an actual field study and review their impact on project economics. They will calculate subsurface volumes and assess their uncertainties, • Geophysical methods, production seismic.
• Sequence stratigraphy, log correlation.
• Environments of deposition (clastic, carbonates).
• Mapping of reservoir parameters and structure.
• Structural styles, trapping conditions.
• Reservoir fluids, initial conditions.
• Reservoir architecture, geological modeling.
• Oil and gas volumetric calculations.
• Subsurface uncertainty and risk analysis.
• Case histories.
• Vertical and horizontal well applications, operational geology
• Field excursion (optional): illustration of clastic and carbonate sedimentary environments and structural geology in 3-D.

Learning Objectives:

At the end of the course participants will be able to apply geological concepts, construct maps and sections and validate computer-generated interpretations. They will be able to calculate subsurface volumes and assess their uncertainties, and review their impact on project economics. They will acquire practical experience by working on an actual field study in teams.
Shale Gas and Shale Oil Exploration

Audience: Geologists, explorationists and reservoir engineers who want to improve their knowledge of shale gas and shale oil exploration.

Contents:
- What is shale gas and shale oil?
- Shale gas generation process and environment, shale gas and oil systems and classifications, Source rock characterization, application of geochemistry in shale gas assessment
- Evaluation of reservoir potential
- How to classify evaluation of shale oil and shale gas resources and reserves based on the SPE-PRMS
- Classification of how to determine petrophysical parameters including: porosity, water saturation, FVF, brittleness, kerogen volume fraction, bulk volume hydrocarbon and sweet spot
- Estimated Ultimate Recovery (EUR)
- Reserves, Contingent Resources and Prospective Resources evaluation
- Classification based on SPE-PRMS, P/C/U, Categorization based on SPE-PRMS
- Global scenario of shale gas and oil exploration and real case studies

PVT Analysis

Audience: The target audiences for this field of training are petroleum and reservoir engineers.

Contents:
- Importance of PVT and who needs PVT
- Hydrocarbon chemistry
- Types of reservoir fluids and their phase behaviour
- Sampling of reservoir fluids
- Reservoir fluid characterization
- Wellsite testing
- PVT analysis &sand: wet and dry gases
- Detailed analysis on any one fluid: black oils or volatile oils, or gas condensate
- Detailed analysis on two fluids: black oils or volatile oils, or gas condensates
- Detailed analysis - black oils
- Detailed analysis - volatile oils
- Detailed analysis - gas condensate
- Introduction to enhanced oil recovery (EOR/IOR)
- Available equations of state (EOS)
- PVT report consistency check
- Equilibrium ratios
- Solid deposition studies (asphaltene, wax, hydrates)
- Recovery calculations
<table>
<thead>
<tr>
<th>Course</th>
<th>Audience</th>
<th>Contents</th>
<th>Software Used</th>
<th>Duration (days)</th>
<th>Max Number of Participants</th>
<th>Prerequisites</th>
<th>Course Format:</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOTRAINING: Petroleum Geology &amp; Reservoir Engineering</td>
<td>Petroleum and reservoir geologists, stratigraphers, and explorationists involved with exploration and production in Palaeozoic reservoirs of the world.</td>
<td>General introduction on the distribution of Palaeozoic reservoirs and the relevance of Palaeozoic plate configurations and palaeogeographies. Classification and recognition: extensive investigation of core, FMI and wireline logs in order to identify environmental and structural aspects of various Palaeozoic reservoirs. Reservoir quality: with recognition of key sedimentological factors, the course examines how these influence reservoir quality, with demonstrative examples taken from petrographic thin sections, scanning electron microscopy, all related to available conventional core analysis data. Exploration: a review of specific issues encountered in Palaeozoic reservoirs, the difference between Palaeozoic reservoirs and other younger plays and implications for future exploration. Case studies: all aspects of this course utilize various case studies from across the world that illustrate the variation in geological controls and implications for exploration. Examples range from the Ordovician glaciomarine sediments of North Africa to the Permian aeolian sediments of the North Sea.</td>
<td>None</td>
<td>5-day</td>
<td>20</td>
<td>None</td>
<td>Classroom exercises and presentations</td>
</tr>
<tr>
<td>Introduction to the Petroleum Geology and Stratigraphy of the Arabian Gulf Basins</td>
<td>This course is designed for petroleum professionals who wish to become more informed about the petroleum geology of the oil and gas-bearing basins of the Arabian Gulf.</td>
<td>The Tethyan petroleum realm, the Arabian Plate and its major tectonic elements, their geologic history and development. The Arabian-Danian mega-basin and the tectono-stratigraphic evolution of the Arabian Gulf petroleum systems (source rocks, reservoirs, cap-rocks and traps). The tectono-stratigraphic evolution and petroleum system of the following megasequences will be examined: - Mega-sequence One, Proterozoic, Eo-Cambrian (Vendian) to Cambrian - Mega-sequence Two, Cambrian to Carboniferous - Mega-sequence Three, the Permian-Triassic (Kupff) - Mega-sequence Four, the Jurassic to Mid Cretaceous - Mega-sequence Five, Mid Cretaceous to the Present Day - The Habitat of Oil and Gas: This section of the course describes key oilfields which hold the key to the petroleum systems of these Mega-sequences.</td>
<td>None</td>
<td>5-day</td>
<td>20</td>
<td>None</td>
<td>Classroom exercises and presentations</td>
</tr>
</tbody>
</table>

For more detailed information, course dates, and registration, visit cgg.com/geotraining.
### Petroleum Exploration for Non-Geoscientists

| Audience: | This course is designed for petroleum support staff who do not have formal training in geology, geophysics or engineering. |
| Prerequisites: | None |
| Duration(Days): | 3-day |
| Max Number of Participants: | 20 |
| Software Used: | None |
| Course Format: | Classroom exercises and presentations |

### New Venture Team Training

| Audience: | This course is designed for subsurface G&G staff and reservoir development & engineering staff. |
| Prerequisites: | None |
| Duration(Days): | 3 - 5-day |
| Max Number of Participants: | 20 |
| Software Used: | None |
| Course Format: | Workshop and presentations |

### Oil and Gas Recovery Factors in Clastics and Carbonates

| Audience: | Reservoir engineers with a few years practical experience. |
| Prerequisites: | None |
| Duration(Days): | 3 - 5-day |
| Max Number of Participants: | 20 |
| Software Used: | None |
| Course Format: | Classroom exercises and presentations |

### Understanding Fractured Reservoirs

| Audience: | Petroleum geologists, explorationists, petrophysicists, geophysicists and engineers involved with exploration, appraisal and development of fractured reservoirs. |
| Contents: | - Petroleum geologists, explorationists, petrophysicists, geophysicists and engineers involved with exploration, appraisal and development of fractured reservoirs. |
| Prerequisites: | None |
| Duration(Days): | 5-day |
| Max Number of Participants: | 20 |
| Software Used: | None |
| Course Format: | Classroom exercises and presentations |
## Petroleum Engineering

**Prerequisites:** None  
**Duration (days):** 5-day  
**Max Number of Participants:** 20  
**Software Used:** Info available on request  
**Course Format:** Classroom exercises and presentations

### Audience:
Reservoir or petroleum engineers with a few years practical experience.

### Contents:
- Reservoir drive mechanisms
- Reservoir fluid distribution
- Reservoir decline characteristics
- Fundamentals of fluid flow in porous media
- Vertical lift performance
- Nodal analysis
- Completion design
- Artificial lift selection and design
- Gas well deoilification
- Perforating practices
- Hydraulic fracturing

### Learning Objectives:
- Understand principles behind well test interpretation
- Understand different pressure build up and fall-off analysis techniques and the differences in the various published reserve definitions
- Apply these techniques for well test interpretation of oil and gas wells
- Review of modern well test methods

## Applied Petrophysics

**Prerequisites:** None  
**Duration (days):** 5-day  
**Max Number of Participants:** 20  
**Software Used:** None  
**Course Format:** Classroom exercises and presentations

### Audience:
Petroleum engineers, seismologists, petrophysical engineers, reservoir engineers, drilling engineers and geologists.

### Contents:
- This course covers fundamental petrophysical relations, tool principles, modern interpretation methods and core measurements. Depending on the petrophysical know-how of the participants more emphasis can be given to particular subjects:
  - Principles, quality, editing and responses of the major open hole logging devices
  - Lithology including shale volume, porosity, permeability and hydrocarbon content using Archie, Simandoux, Indonesia, Waxman-Smits, Dual-Water and capillary pressure curves; wileline formation testing
  - Core analysis program for exploration and development wells
  - Cutoff criteria to arrive at average reservoir properties
  - Uncertainty analysis
  - Crossplots for lithology, porosity and oil/water/gas saturations

Sessions will emphasise the importance of interaction between seismology, geology, well log analysis, reservoir engineering and other disciplines. By the end of the course a quick-look petrophysical evaluation of a typical well will have been performed.
CGG’s reservoir teams offer courses that range from basic reservoir concepts to mapping and modeling for reservoir geology. The concepts explored in these programs focus on the integration of geophysical, petrophysical and geological data to develop detailed models of reservoirs.

“I truly feel lucky to be part of the team that participated in the training. I know I’ll put my newly acquired skills to work and enact positive changes in my company.”

- Formation Evaluation & Petrophysics 92
- Subsurface Facies Analysis 92
- Wireline Log Interpretation 93
- Formation Microscanner (FMS) Log Interpretation Workshop 93
- Geological Principles of Integrated Static Reservoir Modeling 94
- Practical Reservoir Data Integration in Reservoir Characterization 94
- Seismic Reservoir Characterization for Modeling 95
Formation Evaluation & Petrophysics

Audience:
This course is designed for staff in the exploration and production department with no or limited petrophysical background: petroleum engineers, seismologists, petrophysicists, engineers, reservoir engineers, drilling engineers and geologists.

Contents:
Part 1: Background. This section reviews the geological controls on reservoir properties and the basic functions of the wireline logging tools.

Part 2: Petrophysical Methods. This section comprises a detailed description of the full formation evaluation method workflow. The full method covers the general characteristics of clastics and carbonates. Consideration is also given to special methods required for fractured reservoirs, thin beds and shaly sands.

Part 3: Further Analysis. This section introduces the integration of conventional petrophysics with more advanced petrophysical logging methods, seismic interpretation and engineering techniques.

Subsurface Facies Analysis

Audience:
Geologists, geophysicists and reservoir engineers who want to analyze and interpret subsurface data to understand exploration plays.

Contents:
- Interpretation of depositional environments
- Geochemical and isotopic analysis
- Sedimentary and tectonic structures
- Sequence stratigraphy
- Core analysis
- Wireline log correlation
- Seismic interpretation
- Log-based facies analysis
- Geophysical imaging techniques

Learning Objectives:
- Understand clastic and carbonate depositional systems and controls
- Interpret clastic and carbonate depositional environments
- Apply sequence stratigraphic concepts
- Correlate wells using knowledge of depositional environments
- Generate stratigraphic and structural cross sections and facies maps from subsurface data

Wireline Log Interpretation

Audience:
The course has been designed to enable the explorationist, development and production geologist to evaluate and integrate wireline log data.

Contents:
- The logging environment, introduction to the borehole
- Conventional wireline logs: Caliper, Tension, Gamma ray, Spectral Gamma ray, Spontaneous potential, Resistivity, Density, Neutron porosity, PEF, Sonic
- Data QA and depth matching
- Interpretation of lithologies from conventional logs
- Quick look interpretation of porosity and hydrocarbons
- Some sedimentological indications from wireline log patterns
- Zoning a section for reservoir engineering purposes
- Interwell correlation using logs and other data, including advanced techniques
- The dipmeter log
- Borehole imaging logs (FM, ATS) etc.

Learning Objectives:
- Understand tool theory, uses and limitations
- Interpret lithologies and reservoir characteristics
- Identify depositional sequences and correlate wells
- Determine porosity, saturation and reservoir fluid type
- Employ quicklook methods of formation evaluation

Formation Microscanner (FMS) Log Interpretation Workshop

Audience:
The course is intended for sedimentologists, structural geologists, petrophysicists, engineers and geophysicists who are concerned with the downhole recognition of lithological sequences, structures and reservoir characteristics.

Contents:
- Theoretical considerations of FMS and other micrologs are presented followed by interpretive aspects including the recognition of and methods of determining rock lithologies, lithological sequences, sedimentary structures and palaeocurrent measurement, tectonic structures, borehole damage and artefacts.
- FMS and other borehole micrologs e.g. CYBL, Telaviewer, DUALDIP, MDQ, principles, operating conditions, output, resolution
- FMS interpretation including recognition of structures
- Methods of determining orientation of dipping features, correction for borehole drift, orientation of cores
- Recognition of structures in cores - slab/outside surface

Learning Objectives:
- Understand tool form and function and learn about the principles of FMS image processing
- Interpret sedimentary and tectonic structures and lithology
- Recognize and assess borehole damage and other operational/processing artefacts
- Use FMS to constrain and correct data from other logs and core
Practical Reservoir Data Integration in Reservoir Characterization

| Audience: | Reservoir modellers who need to understand the diverse range and geological significance of data provided to them for the model build. |
| Contents: | The mechanics of building a static reservoir model are relatively straightforward with the sophisticated modeling software now available. However, in the headlong rush to gain software-based modeling skills, basic geological concepts are being overlooked. Reservoir modeling software provides any number of sophisticated ways of correlating wells, interpolating rock properties, creating reservoir bodies, generating maps and so on, but are they based on sound geological reasoning? After all, the reservoir modeling software is there to help us represent the geology. The course begins by describing and discussing the static reservoir modeling process which provides the basis for the subsequent sessions. The remaining sessions in the course describe the key methods and recommended approaches for each of the main input streams to the model building process and cover the following: Fault Analysis, Depositional Modeling, Determination of Geological Controls on Rock Properties, Stratigraphic Correlation, Mapping. |
| Learning Objectives: | Understand the modeling process, Identify faults and understand displacement and sealed faults, Use a variety of disciplines to conduct stratigraphic and facies analysis, Model depositional environments and sandbody architectures, Integrate petrophysical data. |

Geological Principles of Integrated Static Reservoir Modeling

| Audience: | Reservoir modellers who need to understand the diverse range and geological significance of data provided to them for the model build. |
| Contents: | The mechanics of building a static reservoir model are relatively straightforward with the sophisticated modeling software now available. However, in the headlong rush to gain software-based modeling skills, basic geological concepts are being overlooked. Reservoir modeling software provides any number of sophisticated ways of correlating wells, interpolating rock properties, creating reservoir bodies, generating maps and so on, but are they based on sound geological reasoning? After all, the reservoir modeling software is there to help us represent the geology. The course begins by describing and discussing the static reservoir modeling process which provides the basis for the subsequent sessions. The remaining sessions in the course describe the key methods and recommended approaches for each of the main input streams to the model building process and cover the following: Fault Analysis, Depositional Modeling, Determination of Geological Controls on Rock Properties, Stratigraphic Correlation, Mapping. |
| Learning Objectives: | Understand the modeling process, Identify faults and understand displacement and sealed faults, Use a variety of disciplines to conduct stratigraphic and facies analysis, Model depositional environments and sandbody architectures, Integrate petrophysical data. |

Seismic Reservoir Characterization for Modeling

| Audience: | This course is suitable for geologists, geophysicists, petrophysicists, stratigraphers and sedimentologists who are looking to develop skills in using seismic data in reservoir modeling. |
| Contents: | This course emphasises the underlying geological and geophysical principles of seismic reservoir characterisation, seismic resolution, time/depth domain of the available data, integration of different disciplines (sedimentology, petrophysics, seismic, rock physics), uncertainty assessment and the limitation of the methods discussed. This course introduces seismic inversion techniques, which deliver earth models to be integrated into the 3D static modeling workflow. Stratigraphic grid building for both seismic inversion and static model building is discussed. Time-depth conversion as well as petro-elastc model building are presented, which are necessary to link the time domain seismic data to the depth domain static model. Most common geostatistical techniques for static model building are discussed during this course. |

Audience: Reservoir modellers who need to understand the diverse range and geological significance of data provided to them for the model build. |
Contents: The mechanics of building a static reservoir model are relatively straightforward with the sophisticated modeling software now available. However, in the headlong rush to gain software-based modeling skills, basic geological concepts are being overlooked. Reservoir modeling software provides any number of sophisticated ways of correlating wells, interpolating rock properties, creating reservoir bodies, generating maps and so on, but are they based on sound geological reasoning? After all, the reservoir modeling software is there to help us represent the geology. The course begins by describing and discussing the static reservoir modeling process which provides the basis for the subsequent sessions. The remaining sessions in the course describe the key methods and recommended approaches for each of the main input streams to the model building process and cover the following: Fault Analysis, Depositional Modeling, Determination of Geological Controls on Rock Properties, Stratigraphic Correlation, Mapping. |
Learning Objectives: Understand the modeling process, Identify faults and understand displacement and sealed faults, Use a variety of disciplines to conduct stratigraphic and facies analysis, Model depositional environments and sandbody architectures, Integrate petrophysical data.
CGG GeoTraining’s multidisciplinary approach to petroleum exploration and development includes economic assessment, contracting and project management. The combination of our technical engineering and science disciplines with finance options provides our clients with a thorough understanding of the full economic lifecycle of the field. Knowledge of this aspect of the project lifecycle allows for collaborative and well-informed fiscal decisions.

Courses combine theoretical aspects of petroleum economics and management with practical applications, using examples and exercises based on real projects worldwide. Courses can be tailored to use client data if required. Location and geopolitical specifics can be incorporated into training courses on request.

All CGG trainers delivering petroleum management and economics courses are experienced economists who have careers within the petroleum industry.
Economic Aspects of Taxation & Royalty Systems

Prerequisites: Excel: working knowledge
Duration (days): 5-day
Max Number of Participants: 10
Software Used: None
Course Format: Classroom delivery with presentations, practical exercises and modelling workshop

Course Audience:
This course is designed for those working in the upstream industry who are not familiar with taxation and royalty systems and require a working knowledge and practical application of the structure, fiscal calculations and economic outputs. The course has a global outlook where numerous worldwide examples are drawn on and fiscal take comparisons made. It is suitable for delegates from all technical and commercial disciplines.

Course Contents:
- Understanding of the evolution of global fiscal systems
- The fundamentals of economic analysis (cashflow, cost of capital, NPV, rate of return etc)
- Different methods of applying government royalty
- Field-based taxes
- Calculation of taxation including allowances, depreciation and tax losses
- Taking advantage of tax ring fencing terms to add value to the assets
- Examining sliding scale fiscal mechanisms including R Factor and rates of return methods
- How to optimize fiscal terms from both investor and government perspective
- Construction of a tax/royalty spreadsheet model, the derivation of relevant economic metrics, application of sensitivities and the drawing of conclusions to aid decision-making

Introduction to Upstream Petroleum Contracts

Prerequisites: None
Duration (days): 2-day
Max Number of Participants: 10
Software Used: None
Course Format: Classroom exercises and presentations

Course Audience:
The course is designed to be at an introductory level for those new to the subject of upstream petroleum economics. It is suitable for personnel from all technical and commercial disciplines.

Course Contents:
The primary aim of this course is to equip delegates with the necessary skills to:
- Understand the theory of petroleum economics based on discounted cashflow
- Calculate with confidence the key economic metrics used in investment decision-making
- Appreciate the geological and engineering inputs to the cashflow model
- Understand oil and gas pricing
- Understand the principles and appreciate the diversity of worldwide fiscal systems
- Interpret the economic results and quantify the risks so as to put values to prospects, fields and companies

Economic Aspects of Production Sharing Contracts

Prerequisites: Excel: working knowledge
Duration (days): 3-day
Max Number of Participants: 10
Software Used: None
Course Format: Classroom delivery with presentations, practical exercises and modelling workshop

Course Audience:
The course is designed for those working in the upstream industry who are not familiar with PSCs and who require either a working or practical knowledge of the financial mechanics and economic aspects of the contracts.

Course Contents:
- Understand the principles of economic analysis (cashflow, cost of capital, NPV, rate of return etc)
- Application of sensitivity analysis to incorporate risk
- Understand the structure of the PSC contract and comparison with the tax/Royalty fiscal system
- Calculations of cost recovery and specific issues to consider
- Learn about bonuses and bonus calculations
- Examine sliding scale fiscal mechanisms including R Factor and rates of return methods
- Calculation of taxation including allowances, depreciation and tax losses
- Understand profit sharing
- Taking advantage of tax and PSC ring fencing terms to add value to the assets
- Booking of reserves in a PSC (including tax barreled)
- Contractor/Government/National Oil Companies relationship: cost carries, fiscal take
- How to optimize fiscal terms from both contractor and government perspective
- Construction of a production sharing contract spreadsheet model, the derivation of relevant economic metrics, application of sensitivities and the drawing of conclusions to aid decision-making

The Fundamentals of Upstream Petroleum Economics & Risk Analysis

Prerequisites: Excel: working knowledge
Duration (days): 5-day
Max Number of Participants: 10
Software Used: None
Course Format: Classroom delivery with presentations, practical exercises and modelling workshop

Course Audience:
The course is suitable for delegates of all technical and commercial disciplines from oil and gas companies, governments, banks, legal and accounting organizations.

Course Contents:
- Understand the theory of petroleum economics based on discounted cashflow
- Calculate with confidence the key economic metrics used in investment decision-making
- Appreciate the geological and engineering inputs to the cashflow model
- Understand oil and gas pricing
- Understand the principles and appreciate the diversity of worldwide fiscal systems
- Build Excel-based economic models in both a Tax/Royalty and PSC fiscal system
- Interpret the economic results and quantify the risks so as to put values to prospects, fields and companies
- The fundamentals of discounted cashflow including real vs nominal economics and the derivation of a company’s hurdle discount rate
- The calculation and application of economic metrics NPV, EMV, IRR, Payback and DPBR for investment decision making
- The components of an oil or gas cash flow: revenue, tariffs, costs and pricing
- Global international fiscal systems
- Government and oil company perspectives and the role of the National Oil Company
- The financial structure and mechanisms of production sharing contracts including the calculation of cost recovery and profit oil splits
- Production Sharing Contract and Tax/Royalty model building workshop sessions
- Incremental, project consolidation and ringfencing analysis
- Quantification of risk
- Workshop session

For more detailed information, course dates, and registration, visit cgg.com/geotraining

For more detailed information, course dates, and registration, visit cgg.com/geotraining
Advanced Petroleum Economics and Risk Analysis

**Prerequisites:** Economic fundamental, Intermediate Excel

**Duration (days):** 4-day

**Max Number of Participants:** 10

**Software Used:** Excel

**Course Format:** Classroom delivery with presentations, practical exercises and modelling workshop

**Audience:**
The course is suitable for delegates of all technical and commercial disciplines from oil and gas companies, governments, banks, legal and accounting organizations.

**Contents:**
The primary aim of this course is to equip delegates with an understanding, both theoretical and practical, of advanced economic techniques around valuation metrics, M&A, fiscal design and risk quantification.

It covers three main areas:
- **Cashflow and corporate valuation:** After a refresher of cashflow fundamentals the topic is expanded to cover the importance of both cashflow and accounting-based metrics in order to value assets for acquisitions/divestments. To this end the accounting fundamentals around P&L account, balance sheets and earnings are discussed, particularly where they interact with economics.
- **Fiscal Design:** After a refresher of the fundamentals of tax/Royalty, Production sharing contracts and risk service contracts, we aim to provide the delegate with an in-depth understanding of the fiscal levers particularly those that are biddable or negotiated. The last day workshop is a team based exercise: A negotiation scenario is played out where the team has to select a suitable set of fiscal terms for the production sharing contract and argue its case.
- **Risking Techniques:** The more advanced risking topics are discussed around sensitivity analysis, decision trees, Value of Information (VOI) and Monte Carlo simulation.

International Petroleum Fiscal Systems

**Prerequisites:** Excel: working knowledge

**Duration (days):** 5-day

**Max Number of Participants:** 10

**Software Used:** None

**Course Format:** Classroom delivery with presentations, practical exercises and modelling workshop

**Audience:**
The course is suitable for delegates of all technical and commercial disciplines from oil and gas companies, governments, banks, legal and accounting organizations.

**Contents:**
The aim is provide delegates with a thorough understanding of petroleum fiscal systems to enable them to interpret contracts, negotiate terms and build economic models. Delegates will:
- Understand the evolution of, and differences between, petroleum fiscal systems globally: production sharing contract (PSC), tax & royalty systems, risk service contracts and pure service contracts.
- Understand the structure of the PSC.
- Calculate with confidence cost recovery, profit sharing and bonuses.
- Examine sliding scale fiscal mechanisms including R-factor and rates of return methods.
- Carry out taxation and royalty calculations applying capital allowances and depreciation.
- Understand key differences in reserve bookings under the different systems.
- Look at examples across the globe illustrating the different concepts drawing on CGG’s extensive fiscal database.
- Construct a PSC model, derive relevant economic metrics, apply sensitivities and draw valuation conclusions to aid decision-making.
- Understand government take and the different methods of calculation.
- Design their own fiscal system to assess contractor/government take in a ‘classroom competitive bid’.
- Understand how PSC and tax ring-fencing can add value to the asset.

Delegates will be provided with electronic copies of workshop solutions and examples.
The main purpose of E&P Data Management is to make sure that the data available for analysis and interpretation are of the highest quality. In addition, the data must be kept secure and accessible without delay to authorized users.

E&P data have a wide variety of formats ranging from large-scale seismic surveys to core collected during well drilling. Specialized technologies are used to browse, manage and view selections of data.
<table>
<thead>
<tr>
<th>Contents:</th>
<th>Audience:</th>
<th>Course Format:</th>
<th>Software Used:</th>
<th>Max Number of Participants:</th>
<th>Duration(days):</th>
<th>Prerequisites:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Business continuity, including recovery from disaster  • Operational workflows and procedures essential  • The role of technology  • The role of the primary data domains  • The importance of E&amp;P data management</td>
<td>Practicing Data Managers/Information Managers. Geoscientists and Engineers from all related disciplines. Technical managers such as IT specialists. Librarians and Administrators that deal with an organization’s E&amp;P data.</td>
<td>Classroom delivery with presentations, discussions, practical exercises and activities</td>
<td>None</td>
<td>6 - 12</td>
<td>4 - 5</td>
<td>Practical working experience of the E&amp;P business sector and understanding of basic data type.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Academic qualifications related to the abovestated, experience and practical working experience of the E&amp;P business sector.</td>
</tr>
<tr>
<td></td>
<td>Learning Objectives:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• An evaluation of learning outcomes and the capture of a personal action plan finalizes the course.</td>
<td>Practicing Data Managers, Geoscientists and Engineers from all related disciplines. Technical managers such as IT specialists. Librarians and Administrators that deal with an organization’s E&amp;P data.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The importance of E&amp;P data management  • The role of the primary data domains  • The value of E&amp;P data as an asset  • Data transformation processes  • The role of technology  • Operational workflows and procedures essential for managing E&amp;P data  • Data governance requirements and standards  • Business continuity, including recovery from disaster</td>
<td>Audience: Practicing Data Managers, Geoscientists and Engineers from all related disciplines. Technical managers such as IT specialists. Librarians and Administrators that deal with an organization’s E&amp;P data.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Learning Objectives:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The logistics of well drilling and related data  • The architecture of a well  • Well completions  • Physical and digital well data management</td>
<td>Audience: Geoscientists and Engineers from all related disciplines. Practicing Data Managers. Technical assistants.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contents:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The course consists of 4 modules that examine the highlights of E&amp;P data management. Firstly, an introduction to the value of effective data management demonstrates why good data management contributes to improving business performance; secondly, a summary of best practice for physical and digital data handling is given; thirdly, a module focusing on the importance of data quality assurance and control, and finally, the topic of data governance shows how data management operations contribute to the execution of effective business processes. An evaluation of learning outcomes finalizes the course. Learning Objectives:</td>
<td>The course consists of 4 modules that examine the management of E&amp;P well data. Firstly, the logistics of well drilling are summarized, together with the relevant data generated; secondly, the architecture of a well is described in the context of the types of data related to each section of the well; and thirdly, well completion techniques are described. Lastly, details of appropriate management of physical and digital data are provided. An evaluation of learning outcomes finalizes the course. Learning Objectives:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The logistics of well drilling and related data  • The architecture of a well  • Well completions  • Physical and digital well data management</td>
<td>• Discover the capabilities and uses of GIS  • Become competent users of the functions most useful to Geoscientists  • Access, manipulate and add data  • Build presentation-quality montages  • Build project databases  • Amalgamate data types to improve understanding of plays and petroleum systems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Software Used: ArcGIS</td>
<td></td>
<td>6 - 10</td>
<td>3, plus 1 optional day</td>
<td>Academic qualifications related to the above roles; experience and practical working experience of GIS in the E&amp;P business sector is useful but not essential.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max Number of Participants: 6 - 12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Course Format: Classroom delivery with presentations, practical exercises and activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For more detailed information, course dates, and registration, visit cgg.com/geotraining
GEOTRAINING: Data Management

Contents:
- Audits and reviews
- Strategy for successful operational procedures
- The typical legal frameworks used for NDR's
- The requirements for staff resources
- The definition and purpose of a data repository

Learning Objectives:
- The principles to their own country's circumstances.

Audience:
- Practicing Data Managers, especially at senior level.
- Geoscientists and Engineers from related disciplines.
- Technical managers such as IT specialists, Librarians and Administrators that deal with the nation’s E&P data.

Software Used:
- None

Course Format:
- Classroom delivery with presentations, practical exercises and activities.

Duration (Days): 1-day
Max Number of Participants: 10 - 15

Trango Fundamentals - End User Induction Training

Contents:
- Group data into hierarchies
- Apply values to data attributes
- Creation of database dictionary
- Customize data entry screen to suit low or high volume
- Search for data via text
- Search for data via map interface

Learning Objectives:
- Additional support.

Audience:
- Trango Users, such as: Data Managers. Geoscientists and Engineers from related disciplines. Technical managers such as IT specialists. Librarians and Administrators that deal with an organization's E&P data.

Software Used:
- Trango

Course Format:
- Training provided in person, or via online tuition

Max Number of Participants: 6 - 12
Duration (Days): 5-day

Prerequisites:
- Academic qualifications related to the above roles

Trango for Administrators

Contents:
- Create key performance indicators to gauge overall data quality as well as project management
- Create drop-down lists in data-entry screens
- Maintain database dictionaries
- Create drop-down lists in data-entry screens
- Create drop-down lists in data-entry screens
- Create drop-down lists in data-entry screens

Learning Objectives:
- Select conditions for the data model
- Maintain corporate data governance policy
- Customize data entry screen to suit low or high volume data loading
- Maintain database dictionaries
- Create drop-down lists in data-entry screens
- Create key performance indicators to gauge overall data quality as well as project management

Audience:
- Trango Users, such as: Data Managers. Geoscientists and Engineers from related disciplines. Technical managers such as IT specialists. Librarians and Administrators that deal with an organization's E&P data.

Software Used:
- Trango

Course Format:
- Training provided in person, or via online tuition

Max Number of Participants: Variable
Duration (Days): Variable

Prerequisites:
- Academic qualifications related to the above roles, experience and practical working experience of the E&P business sector

Trango Enterprise - End User Induction Training

Contents:
- Order data required for use in projects
- Perform data quality checks
- Apply values to data attributes
- Browse for data via dictionaries
- Customize data entry screen to suit low or high volume
- Register data
- Select conditions for the data model
- Maintain corporate data governance policy
- Customize data entry screen to suit low or high volume data loading
- Maintain database dictionaries
- Create drop-down lists in data-entry screens
- Create key performance indicators to gauge overall data quality as well as project management

Learning Objectives:
- Additional support.

Audience:
- Trango Users, such as: Data Managers. Geoscientists and Engineers from related disciplines. Technical managers such as IT specialists. Librarians and Administrators that deal with an organization's E&P data.

Software Used:
- Trango

Course Format:
- Training provided in person, or via online tuition

Max Number of Participants: Variable
Duration (Days): Variable

Prerequisites:
- Academic qualifications related to the above roles

Trango for Administrators

Contents:
- Create key performance indicators to gauge overall data quality as well as project management
- Create drop-down lists in data-entry screens
- Create drop-down lists in data-entry screens
- Create drop-down lists in data-entry screens
- Create drop-down lists in data-entry screens

Learning Objectives:
- Select conditions for the data model
- Maintain corporate data governance policy
- Customize data entry screen to suit low or high volume data loading
- Maintain database dictionaries
- Create drop-down lists in data-entry screens
- Create key performance indicators to gauge overall data quality as well as project management

Audience:
- Trango Users, such as: Data Managers. Geoscientists and Engineers from related disciplines. Technical managers such as IT specialists. Librarians and Administrators that deal with an organization's E&P data.

Software Used:
- Trango

Course Format:
- Training provided in person, or via online tuition

Max Number of Participants: Variable
Duration (Days): Variable

Prerequisites:
- Academic qualifications related to the above roles
### GEOTRAINING: Data Management

#### Ptxus Fundamentals – Administration introduction Training

**Prerequisites:** None

**Duration:** Variable

**Max Number of Participants:** 10

**Software Used:** Web browser

**Course Format:** Classroom or Webex exercises and presentations

**Audience:** 
- Geologists
- Geophysicists
- Surveyors
- Practicing Data Managers

**Contents:** 
- Assemble data with different Coordinate Reference Systems
- Convert data using predefined EPSG transformations
- Learn the context and use of map datums and projections
- Learn the basics of Geodetic theory

**Learning Objectives:**
- Learn the basics of Geodetic theory
- Understand and use the EPSG database
- Learn the context and use of map datums and projections
- Become familiar with the effect of changing map projections
- Convert data using predefined EPSG transformations
- Assemble data with different Coordinate Reference Systems into one dataset with a common CRS for further processing

**Contents:** 
- Ptxus Users, such as: Data Managers; Geo-scientists and Engineers from related disciplines; Technical managers such as IT specialists; Librarians and Administrators that deal with an organisation’s E&P data

**Learning Objectives:**
- Select conditions for the data model
- Establish data registration process
- Maintain corporate data governance policy
- Customize data entry screen to suit low or high volume data loading
- Maintain database dictionaries
- Create drop-down lists in data-entry screens
- Create key performance indicators to gauge overall data quality as well as project management progress

---

### Ptxus Fundamentals – End User Induction Training

**Prerequisites:** Info available on request

**Duration:** 1 day

**Max Number of Participants:** 10

**Software Used:** Web browser

**Course Format:** Classroom or Webex exercises and presentations

**Audience:** Ptxus Users such as: Data Managers; Geo-scientists and Engineers from related disciplines; Technical managers such as IT specialists; Librarians and Administrators that deal with an organisation’s E&P data

**Contents:** 
- Ptxus is a new generation software platform from CGG Data Management Services. It is capable of supporting the complexities of every E&P organisation’s data management and data governance. The User Interface is easy and intuitive to use, and can be customized to suit individual requirements. New Users will learn how to carry out searches either spatially or text based. Trainees will be shown how to customize their Ptxus instance; the various search possibilities, catalogue data into the different data sets, view related data such as digital media and scan records.

**Learning Objectives:**
- Search for data via map interface
- Search for data via text
- Search using filters and download results
- Customise data entry screen to suit low or high volume data loading
- Browse for required data via dictionaries
- Group data into hierarchies
- Catalogue data into relevant data types
- Upload scan images, digital data or files

---

### Physical Asset Management

**Prerequisites:** Academic qualifications related to the above roles

**Duration:** 1 day

**Max Number of Participants:**

**Software Used:** None

**Course Format:** Classroom delivery with presentations, practical exercises and activities. This will be virtual unless course held within a short distance from one of CGG SDS’s storage facilities

**Audience:** Practicing Data Managers, Geo-scientists, Engineers, IT specialists or other technical managers. Librarians and Administrators that deal with E&P data

**Contents:**
- The course addresses the warehousing of E&P physical data assets and highlights issues such as security and quality procedures. Requirements for hardware and software are introduced. A practical session and activities based on an E&P Warehouse are included.

**Learning Objectives:**
- Understand the basics of effective management of physical E&P data assets
- Recognize the roles of data management and how data assets are handled
- Realise of the importance of security and quality procedures
- Procedures to create operational workflows, procedures, and business continuity
- Manage archives effectively, including retention and destruction strategies
- Be aware of legislative data retention requirements

---

For more detailed information, course dates, and registration, visit cgg.com/geotraining
CGG GeoTraining provides world-class Business Training, driven by a philosophy of offering the best development opportunities. It is of strategic value to be well prepared to manage the business aspects of a technology company and CGG University provides comprehensive programs, focused on performance and innovation, which enable technical managers to develop skills that are critical for success.

Our faculty has vast in-depth experience in business and soft skills development as well as in the international oil and gas industry.

Business skills curriculum offerings include:

- Development of interpersonal effectiveness, communications and presentation skills required to manage diverse, high-technology teams.
- Management & Leadership programs to develop and enhance key management skills and leadership capabilities such as leadership skills, project management, finance, first-time managers, emotional intelligence, etc.

These programs provide our clients with valuable insight and hands-on practical application of CGG’s leadership and management knowledge, enabling trainees to be better prepared to lead high-performing teams.

“Achieving ambitious goals requires ability and engagement. Peak performance, for individuals and for the company, can be reached only through strong leadership at all levels.”
<table>
<thead>
<tr>
<th>Course Title</th>
<th>Audience</th>
<th>Contents</th>
<th>Learning Objectives</th>
<th>Prerequisites</th>
<th>Duration (Days)</th>
<th>Max Number of Participants</th>
<th>Software Used</th>
<th>Course Format</th>
</tr>
</thead>
</table>
| Bridging Cultures            | Anyone whose role includes working with colleagues, customers and suppliers from different countries and cultural backgrounds. | This course is designed to help you understand and develop attributes for successful cross-border relationships. Learn how to recognize differences between key business cultures and develop strategic options to manage them proactively. The golden rules for cross-cultural communications are introduced. This program provides individuals and entire teams with a highly interactive experience that develop the skills, knowledge and personal attributes for succeeding in the global workplace. | • Appreciate the role culture plays in the global workplace  
• Utilize an understanding of cultural differences to increase effectiveness in the workplace  
• Increase cross-cultural communication skills  
• Define cultural intelligence by focusing on attitudes, awareness, knowledge and skills  
• Distinguish between attitudes and behaviors that are and those that are not culturally based  
• Develop a deeper understanding of the cultures of customers and colleagues  
• Use cultural intelligence for effective communication and build trusted relationships  
• Modify your behavior to make the most out of cultural differences  
• Work confidently with cultural differences in virtual and face-to-face environments  
• Achieve desired results by acting out of choice not habit | None | 1 day | 16 | None | Classroom exercises and presentations |
| Finance for Non-Financial Managers | Non-financial managers and functional experts who want to develop their knowledge of financial practices to complement their existing professional or technical skills. | This course is designed to help you understand and develop the skills, knowledge and personal attributes for succeeding in the global workplace. | • How to recognize differences between key business cultures and develop strategic options to manage them proactively. The golden rules for cross-cultural communications are introduced. | None | 1 day | 16 | None | Classroom exercises and presentations |
| Interpersonal Communication | Employees who need to understand the key basics of communication and want to improve their relationships at work. | This course provides participants with the fundamentals of communication necessary to become an effective communicator in the organization and the team. Additionally, participants learn how to improve their interpersonal relationships over time. Through interactive activities and discussions, participants gain awareness of their communication styles and learn strategies to resolve conflict and communicate effectively with others. Participants learn skills to listen effectively and maintain relationships through inspiring trust and giving and receiving feedback. Throughout the course participants get peer and faculty feedback and an opportunity to network. | • Determine your communication style  
• Know how to effectively handle emotionally charged situations  
• Know how to say “No” and set limits  
• Understand the role of feedback in action  
• Identify barriers to communication and strategies to overcome them.  
• Listen effectively to ensure you have received messages  
• Use nonverbal communication to express interest and demonstrate that you are actively engaged in conversations  
• Develop strategies for building and maintaining relationships | None | 1 day | 16 | None | Classroom exercises and presentations |
| Introduction to Emotional Intelligence | Employees who need to understand the key basics of communication and want to improve their relationships at work. | This course provides participants with the fundamentals of communication necessary to become an effective communicator in the organization and the team. Additionally, participants learn how to improve their interpersonal relationships over time. Through interactive activities and discussions, participants gain awareness of their communication styles and learn strategies to resolve conflict and communicate effectively with others. Participants learn skills to listen effectively and maintain relationships through inspiring trust and giving and receiving feedback. Throughout the course participants get peer and faculty feedback and an opportunity to network. | • Determine your communication style  
• Know how to effectively handle emotionally charged situations  
• Know how to say “No” and set limits  
• Understand the role of feedback in action and reactions  
• Identify barriers to communication and strategies to overcome them.  
• Listen effectively to ensure you have received messages  
• Use nonverbal communication to express interest and demonstrate that you are actively engaged in conversations  
• Develop strategies for building and maintaining relationships | None | 1 day | 16 | None | Classroom exercises and presentations |

For more detailed information, course dates, and registration, visit cgg.com/geotraining
The Essentials of Project Management

Audience: Anyone with little or no project management experience.

Contents: The Essentials of Project Management is designed to provide you with a broad understanding of project management principles, concepts, tools and techniques. It covers the theory and core methodology you will need to manage projects or participate on project teams.

This course examines the core elements of project management and emphasizes the importance of organization, communication, leadership and team development. The key processes include:

• Defining the project
• Project organization
• Project initiation
• Stakeholder involvement and contribution
• Project planning - from scope to schedule
• Project organization

Learning Objectives:

• Monitoring and controlling the project
• Project planning - from scope to schedule
• Stakeholder involvement and contribution
• Project initiation
• Project organization

The key processes include:

• Delegating
• Communicating
• Developing effective skills for giving feedback
• Actively listening and resolving conflicts
• Addressing under-performance
• Working with challenging people

Managing Teams Effectively

Audience: Newly appointed team leaders, project leaders, or supervisors.

Contents: Becoming a manager or supervisor is hard enough, but making the transition from colleague to boss can be difficult and comes with its own set of unique challenges. Participants learn to set boundaries, run successful workgroups, establish goals and expectations, give performance feedback, address general supervision issues, and motivate staff. Gain the essential skills and knowledge you need to become an effective manager, supervisor or team leader:

• Delegating
• Communicating
• Developing effective skills for giving feedback
• Actively listening and resolving conflicts
• Addressing under-performance
• Working with challenging people

Learning Objectives:

• Understand the role and challenges of a first-time team/project leader
• Make the transition from teammate to supervisor
• Establish credibility as a new supervisor
• Create a plan to develop your reports
• Manage people, time, materials and procedures
• Focus on quality results using effective feedback
• Learn to use conflict resolution techniques
• Identify potential sources of motivation and practice discovering what motivates others
• Be aware of what helps create a good team climate

Managing Teams Effectively

High Impact Presentation & Public Speaking

Audience: This course is recommended for anyone who needs to develop their presentation skills, speak in front of groups or sell ideas to others.

Contents: The experience in this presentation skills training course will provide you with the skills to communicate effectively and persuasively as well as become comfortable with your own style. You will have multiple opportunities to present in front of the class and will be videotaped and evaluated. You will receive expert coaching at the end of each presentation. The course size is kept small to ensure a supportive environment for maximum engagement and learning. After taking this course, you will be able to notice gains in effectively communicating your ideas with conviction, control and poise as well as enhancing your personal and corporate image.

Learning Objectives:

• Polish your presentation style - eye contact, gestures, voice, posture, facial expressions, emotions
• How to structure your presentation - define an effective objective, structuring your presentation around the benefits for the audience
• Create a plan to develop your presentations
• Manage people, time, materials and procedures
• Focus on quality results using effective feedback
• Learn to use conflict resolution techniques
• Identify potential sources of motivation and practice discovering what motivates others
• Be aware of what helps create a good team climate

Managing Teams Effectively

People & Performance for Managers

Audience: Supervisors, new managers or those leading projects/teams who want to improve their management skills.

Contents: The people manager has to find a new way of managing - a way of raising their own performance and that of their direct reports that is both consistent and value driven. This course allows participants to discover what a high performance team is, the impact of trust on teams, and understand the difference between leadership and management. Leadership competencies will be explored. The course facilitates discussion about thinking outside the box and the change process, the five styles of team leadership, the roles of high performance teams, and communicating and creating clarity. It also allows participants to share feedback from their action plans, draw a vision, and discuss the key success factors of motivation and how to empower people for higher performance and motivation.

Learning Objectives:

• Know who you are as a manager
• Develop strategies for effective leadership
• Build the conditions for a collaborative working environment
• Communicate effectively on a day-to-day basis
• Create value through individual performance coaching

Module: 1

• Know who you are as a manager
• Develop strategies for effective leadership
• Build the conditions for a collaborative working environment
• Communicate effectively on a day-to-day basis
• Create value through individual performance coaching

Module: 2

• Clarify target direction team roles and build team energy
• Lead your team in accordance with corporate vision and values
• Facilitate collaboration across the organization
• Know how to develop employee talent and motivation

The Essentials of Project Management

Prerequisites: None

Duration (Days): 2 days

Max Number of Participants: 12

Software Used: None

Course Format: Lecture, classroom exercises, groupwork, case study

Audience: Anyone with little or no project management experience.

Contents: The Essentials of Project Management is designed to provide you with a broad understanding of project management principles, concepts, tools and techniques. It covers the theory and core methodology you will need to manage projects or participate on project teams.

This course examines the core elements of project management and emphasizes the importance of organization, communication, leadership and team development. The key processes include:

• Defining the project
• Project organization
• Project initiation
• Stakeholder involvement and contribution
• Project planning - from scope to schedule
• Project organization

Learning Objectives:

• Monitoring and controlling the project
• Project planning - from scope to schedule
• Stakeholder involvement and contribution
• Project initiation
• Project organization

The key processes include:

• Delegating
• Communicating
• Developing effective skills for giving feedback
• Actively listening and resolving conflicts
• Addressing under-performance
• Working with challenging people

Managing Teams Effectively

Audience: Newly appointed team leaders, project leaders, or supervisors.

Contents: Becoming a manager or supervisor is hard enough, but making the transition from colleague to boss can be difficult and comes with its own set of unique challenges. Participants learn to set boundaries, run successful workgroups, establish goals and expectations, give performance feedback, address general supervision issues, and motivate staff. Gain the essential skills and knowledge you need to become an effective manager, supervisor or team leader:

• Delegating
• Communicating
• Developing effective skills for giving feedback
• Actively listening and resolving conflicts
• Addressing under-performance
• Working with challenging people

Learning Objectives:

• Understand the role and challenges of a first-time team/project leader
• Make the transition from teammate to supervisor
• Establish credibility as a new supervisor
• Create a plan to develop your reports
• Manage people, time, materials and procedures
• Focus on quality results using effective feedback
• Learn to use conflict resolution techniques
• Identify potential sources of motivation and practice discovering what motivates others
• Be aware of what helps create a good team climate

High Impact Presentation & Public Speaking

Audience: This course is recommended for anyone who needs to develop their presentation skills, speak in front of groups or sell ideas to others.

Contents: The experience in this presentation skills training course will provide you with the skills to communicate effectively and persuasively as well as become comfortable with your own style. You will have multiple opportunities to present in front of the class and will be videotaped and evaluated. You will receive expert coaching at the end of each presentation. The course size is kept small to ensure a supportive environment for maximum engagement and learning. After taking this course, you will be able to notice gains in effectively communicating your ideas with conviction, control and poise as well as enhancing your personal and corporate image.

Learning Objectives:

• Polish your presentation style - eye contact, gestures, voice, posture, facial expressions, emotions
• How to structure your presentation - define an effective objective, structuring your presentation around the benefits for the audience
• Create a plan to develop your presentations
• Manage people, time, materials and procedures
• Focus on quality results using effective feedback
• Learn to use conflict resolution techniques
• Identify potential sources of motivation and practice discovering what motivates others
• Be aware of what helps create a good team climate

People & Performance for Managers

Audience: Supervisors, new managers or those leading projects/teams who want to improve their management skills.

Contents: The people manager has to find a new way of managing - a way of raising their own performance and that of their direct reports that is both consistent and value driven. This course allows participants to discover what a high performance team is, the impact of trust on teams, and understand the difference between leadership and management. Leadership competencies will be explored. The course facilitates discussion about thinking outside the box and the change process, the five styles of team leadership, the roles of high performance teams, and communicating and creating clarity. It also allows participants to share feedback from their action plans, draw a vision, and discuss the key success factors of motivation and how to empower people for higher performance and motivation.

Learning Objectives:

• Know who you are as a manager
• Develop strategies for effective leadership
• Build the conditions for a collaborative working environment
• Communicate effectively on a day-to-day basis
• Create value through individual performance coaching

Module: 1

• Know who you are as a manager
• Develop strategies for effective leadership
• Build the conditions for a collaborative working environment
• Communicate effectively on a day-to-day basis
• Create value through individual performance coaching

Module: 2

• Clarify target direction team roles and build team energy
• Lead your team in accordance with corporate vision and values
• Facilitate collaboration across the organization
• Know how to develop employee talent and motivation
GeoSoftware offers a comprehensive solution for your integrated geophysical, geological, petrophysical, rock physics and interpretation needs. Our extensive portfolio includes HampsonRussell, Jason, InsightEarth, PowerLog, EarthModel FT and VelPro.

We offer four types of training programs:

- **Public Training Courses** – Workflow-based training classes covering the entire range of petrophysics, rock physics, AVO, deterministic inversion, geostatistical inversion and interpretation.
- **Customized training programs** – Dedicated longer-term training classes, with more time for hands-on practice using the client’s actual study data. Test, certification and final presentation of study results to management.
- **Mentoring/coaching consultancy** – Using the client’s data and projects within their own operating environment.
- **Workplacement experience programs** – Within CGG GeoSoftware’s office for selected client staff.
**EM-100 Introduction to EarthModel® FT**

**Prerequisites:** Basic knowledge about geologic modeling

**Duration (Days):** 3-day

**Max Number of Participants:** Info available on request

**Software Used:** EarthModel FT

**Course Format:** Instructor-led

**Audience:**
New EarthModel FT users that need to construct 3D models and properties.

**Contents:**
This introductory EarthModel FT course includes background information and specific examples to help you learn the software philosophy and functions of the software. EarthModel FT is a powerful, flexible, and fully integrated geological reservoir modeling and visualization software package. EarthModel FT has tools to perform the following tasks:

- Basic user interface introduction.
- Structural modeling including building the fault framework.
- Building the 3D grid mesh.
- Lithology and facies interpretation.
- Deterministic and stochastic modeling, including Sequential Indicator Simulation and Sequential Gaussian Simulation.

**Learning Objectives:**
- Understand how to load and quality control the data.
- Build complex structural and 3D model grids.
- Use or processes and assistants to rapidly build a model.
- How to do property modeling for use in volume computations.

**EM-110 Introduction to Low Frequency Modeling using EarthModel® FT**

**Prerequisites:** Basic knowledge about geologic modeling and inversion using Jason

**Duration (Days):** 3-day

**Max Number of Participants:** Info available on request

**Software Used:** EarthModel FT and Jason Workbench (Jason)

**Course Format:** Instructor-led

**Audience:**
New EarthModel FT users that need to construct 3D grids to do inversions in Jason.

**Contents:**
This course teaches Jason Workbench users how to build solid models and solid model properties that can be used for low frequency modeling in Jason. Upon completion of the course, you will be able to create finely tuned solid models that accurately represent the geologic structure of the reservoir of interest, including clean and orderly truncations of faults and horizons.

EarthModel FT breadth and basic components:
- Loading and viewing input data - data organization.
- Introduction to building complex structural models, make corner point grids.
- Velocity data preparation, conditioning and interpolating velocities.
- Transforming interval velocities to a low frequency P-impedance model.
- Merging low-frequency P-impedance model with the broadband P-impedance model.

**Learning Objectives:**
- Understand how to load and quality control the data.
- Build complex structural and 3D model grids.
- Using 3D grids in low-frequency models.

**HR-100 Foundations of HampsonRussell Software**

**Prerequisites:** None

**Duration (Days):** 1-day

**Max Number of Participants:** Info available on request

**Software Used:** All HampsonRussell software products

**Course Format:** Instructor-led courses

**Audience:**
Geophysicists, geologists, engineers and technical staff who want to understand the theory and learn how to apply these increasingly critical techniques.

**Contents:**
This course presents an introduction to the practical use of the common features of HRS, an interactive program from HampsonRussell software. It covers the theory and practical use of Strata, an interactive program that is fully linked within HampsonRussell software and performs pre-stack and post-stack inversion. Topics covered include:
- Introduction: Convolutional models, wavelets, reflectivity and noise.
- Analysis: Seismic and wavelet processing, amplitude recovery, noise attenuation and imaging.
- Practical: Examples of band-limited, sparse-spark and model-based inversion.
- Includes pre-stack Simultaneous Inversion.

**Learning Objectives:**
Explains essential operations that are common to most HampsonRussell applications, but which are not specifically taught in the specialized classes such as Strata or AVO. Includes Geoview, Well Explorer, eLog, Seisloader and View3D. Contains no geophysical theory. The theory is taught in the Strata, AVO and Emerge workshops.

**HR-210 Strata Workshop**

**Prerequisites:** None

**Duration (Days):** 1-day

**Max Number of Participants:** Info available on request

**Software Used:** Strata

**Course Format:** Workshop

**Audience:**
Geophysicists, geologists, engineers and technical staff who want to understand the theory and learn how to apply these increasingly critical techniques.

**Contents:**
This course covers the theory and practical use of Strata, an interactive program that is fully linked within HampsonRussell software and performs pre-stack and post-stack inversion. Topics covered include:
- Theory: Convolutional models, wavelets, reflectivity and noise.
- Practice: Pre-stack algorithms, model-based and colored inversion.
- Analysis: Seismic and wavelet processing, amplitude recovery, noise attenuation and imaging.
- Practical: Examples of band-limited, sparse-spark and model-based inversion.
- Includes pre-stack Simultaneous Inversion.

**Audience:**
Geophysicists, geologists, engineers and technical staff who want to understand the theory and learn how to apply these increasingly critical techniques.
GEOTRAINING: Software

**HR-210 HampsonRussell Strata Virtual Workshop**

**Prerequisites:** A basic understanding of geophysics such as knowing what seismic data is, what a wavelet is, what convolution means etc.

**Duration(days):** 1-day

**Max Number of Participants:** Info available on request

**Software Used:** Strata

**Course Format:** Virtual

**Audience:** Geophysicists, geologists, engineers and technical staff who want to understand the theory and learn how to apply this increasingly critical techniques.

**Contents:**
- Introduction: Convolutional models, wavelets, reflectivity and noise
- Theory: Recursive, sparse-spike, model-based and colored inversion
- Pre-stack methods of Elastic Impedance and Lambda-Mu-Rho
- Analysis: Seismic and wavelet processing, amplitude recovery, noise attenuation and imaging
- Practical: Examples of band-limited, sparse-spike and model-based inversion
- Includes pre-stack Simultaneous Inversion

**Learning Objectives:**
- Covers pre-stack inversion, with a largely non-mathematical overview of pre-stack and post-stack inversion, the HampsonRussell Geoview framework.
- Understands of all stages of the inversion workflow. Review all factors that influence the inversion result, from the selection of the most suitable algorithm through to combination of theory and practical exercises using the Strata software.
- Exercises comprise approximately 50 percent of the course content.

**HR-215 MapPredict Workshop**

**Prerequisites:** None

**Duration(days):** 1-day

**Max Number of Participants:** Info available on request

**Software Used:** MapPredict

**Course Format:** Info available on request

**Audience:** Geophysicists, geologists, engineers and technical staff who want to understand the theory and learn how to apply these increasingly critical techniques.

**Contents:**
- Introduction: Basic geophysical principles, convolution, wavelet and neural network.
- Introduction to the Emerge technologies (multi-linear regression and neural network). A basic understanding of geophysics such as knowing the difference between post-stack and pre-stack seismic data, what a wavelet is etc.

**Learning Objectives:**
- Includes pre-stack Simultaneous Inversion
- Mapping horizontal well data and production data.
- Producing optimal maps from sparse datasets (kriging).
- Creating isotropic and anisotropic variogram models, which are used as inputs in variogram predictions.
- Creating models for isotropic and anisotropic variograms.
- Mapping maps of variograms.
- Mapping maps of variograms using a variety of techniques.

**HR-220 AVO Workshop**

**Prerequisites:** A basic understanding of geophysics such as knowing what seismic data is, what a wavelet is, what convolution means etc.

**Duration(days):** 2-day

**Max Number of Participants:** Info available on request

**Software Used:** AVO

**Course Format:** Workshop

**Audience:** Geophysicists, geologists, engineers and technical staff who want to understand the theory and learn how to apply these increasingly critical techniques.

**Contents:**
- Introduction: Basic geophysical principles, convolution, wavelet and neural network.
- Introduction to the Emerge technologies (multi-linear regression and neural network).

**Learning Objectives:**
- Includes pre-stack Simultaneous Inversion
- Mapping horizontal well data and production data.
- Producing optimal maps from sparse datasets (kriging).
- Creating isotropic and anisotropic variogram models, which are used as inputs in variogram predictions.
- Creating models for isotropic and anisotropic variograms.
- Mapping maps of variograms.
- Mapping maps of variograms using a variety of techniques.

**eHR-220 HampsonRussell AVO Virtual Workshop**

**Prerequisites:** A basic understanding of geophysics such as knowing what seismic data is, what a wavelet is, what convolution means etc.

**Duration(days):** 1 1/2 day

**Max Number of Participants:** Info available on request

**Software Used:** AVO

**Course Format:** Virtual

**Audience:** Geophysicists, geologists, engineers and technical staff who want to understand the theory and learn how to apply these increasingly critical techniques.

**Contents:**
- Introduction: Basic geophysical principles, convolution, wavelet and neural network.
- Introduction to the Emerge technologies (multi-linear regression and neural network).
**HR-225 Seismic Lithology & AVO Workshop**

**Prerequisites:** None

**Duration (Days):** 1-day

**Max Number of Participants:** Info available on request

**Software Used:** Strata, AVO, Emerge, ProAZ & LithoSI

**Course Format:** Workshop

**Audience:** Geoscientists, explorationists, and technical staff wanting to understand the theory behind essential reservoir characterization techniques and how to implement this knowledge into practical E&P project workflows.

**Contents:**
- Theory of seismic attributes, linear, non-linear and neural network methodologies for attribute selection, cross-validation and attribute ranking.
- Application of attributes to predict seismic data volumes into geological or petrophysical volumes.
- Application of attributes to predict missing log data.
- Attributes exercises using seismic data and well logs.

**Learning Objectives:**
- A comprehensive overview of the generation of seismic attributes.
- Understanding how to recognize reliable attributes when estimating reservoir parameters.
- Application of neural network technology in well log prediction, petrophysical volume generation and seismic lithology classification.

**HR-230 Emerge Workshop**

**Prerequisites:** None

**Duration (Days):** 1-day

**Max Number of Participants:** Info available on request

**Software Used:** Emerge

**Course Format:** Workshop

**Audience:** Geophysicists, geologists, engineers and technical staff who want to understand the theory and learn how to apply these increasingly critical techniques.

**Contents:**
- Theory of seismic attributes, linear, non-linear and neural network methodologies for attribute selection, cross-validation and attribute ranking.
- Application of attributes to predict seismic data volumes into geological or petrophysical volumes.
- Application of attributes to predict missing log data.
- Attributes exercises using seismic data and well logs.

**Learning Objectives:**
- A comprehensive overview of the generation of seismic attributes.
- Understanding how to recognize reliable attributes when estimating reservoir parameters.
- Application of neural network technology in well log prediction, petrophysical volume generation and seismic lithology classification.

**HR-235 ProAZ Azimuthal Attributes Workshop**

**Prerequisites:** None

**Duration (Days):** 1-day

**Max Number of Participants:** Info available on request

**Software Used:** Info available on request

**Course Format:** Workshop

**Audience:** Geophysicists, geologists, engineers and technical staff who want to understand the theory and learn how to apply these increasingly critical techniques.

**Contents:**
- AVAZ Theory and Modeling and:
  - AVAZ: Anisotropy and Azimuthal Attributes
  - AVAZ: Anisotropy and Azimuthal Attributes
  - AVAZ: Anisotropy and Azimuthal Attributes
  - AVAZ: Anisotropy and Azimuthal Attributes
- AVAZ Theory and Modeling and:
  - AVAZ: Anisotropy and Azimuthal Attributes
  - AVAZ: Anisotropy and Azimuthal Attributes
  - AVAZ: Anisotropy and Azimuthal Attributes
  - AVAZ: Anisotropy and Azimuthal Attributes
- AVAZ Theory and Modeling and:
  - AVAZ: Anisotropy and Azimuthal Attributes
  - AVAZ: Anisotropy and Azimuthal Attributes
  - AVAZ: Anisotropy and Azimuthal Attributes
  - AVAZ: Anisotropy and Azimuthal Attributes

**Learning Objectives:**
- Discussion of the LithoSI workflow for facies and fluid classification using multiple elastic parameters from the inversion of the seismic data.
- Basic introduction to Bayesian classification, multivariate Probability Density Functions (PDFs) and their optimization through Kernel Density Estimation.
- Teaches how to design complex multi-variate probability distributions functions to ensure proper classification of lithologies and accurate definition of litho-probabilities.
- Shows how to understand the quantification of uncertainty in seismic lithology and fluid prediction.
- Practical Exercises: Defining litho-classes, selecting attributes, optimizing PDFs, validating the results and volume application.

**HR-240 Seismic LithoSI Workshop**

**Prerequisites:** None

**Duration (Days):** 1-day

**Max Number of Participants:** Info available on request

**Software Used:** Info available on request

**Course Format:** Workshop

**Audience:** Geophysicists, geologists, engineers and technical staff who want to understand the theory and learn how to apply these increasingly critical techniques.

**Contents:**
- Probability density functions (PDFs), Kernel Density Estimation (KDE), and their optimization through Kernel Density Estimation.
- Teaches how to design complex multi-variate probability distributions functions to ensure proper classification of lithologies and accurate definition of litho-probabilities.
- Shows how to understand the quantification of uncertainty in seismic lithology and fluid prediction.
- Practical Exercises: Defining litho-classes, selecting attributes, optimizing PDFs, validating the results and volume application.

**HR-225 Seismic Lithology & AVO Workshop**

**Prerequisites:** None

**Duration (Days):** 1-day

**Max Number of Participants:** Info available on request

**Software Used:** Strata, AVO, Emerge, ProAZ & LithoSI

**Course Format:** Workshop

**Audience:** Geoscientists, explorationists, and technical staff wanting to understand the theory behind essential reservoir characterization techniques and how to implement this knowledge into practical E&P project workflows.

**Contents:**
- Theory of seismic attributes, linear, non-linear and neural network methodologies for attribute selection, cross-validation and attribute ranking.
- Application of attributes to predict seismic data volumes into geological or petrophysical volumes.
- Application of attributes to predict missing log data.
- Attributes exercises using seismic data and well logs.

**Learning Objectives:**
- A comprehensive overview of the generation of seismic attributes.
- Understanding how to recognize reliable attributes when estimating reservoir parameters.
- Application of neural network technology in well log prediction, petrophysical volume generation and seismic lithology classification.
Software Used:

- Optimization, Kernel Density Estimation (LithoSI).
- Multivariate Probability Density Functions (PDFs) and their optimization, including a basic introduction to Bayesian classification, multivariate techniques, systematic methods and the wedge model.

**Contents:**

- LithoSI is a relatively new, interactive package which complements our very successful Emerge software. Together with Emerge, they both allow the transformation of seismic volumes and/or elastic attributes (from Strata and/or AVO) to geological or reservoir properties such as facies, saturation and porosity. Note that in this one-day workshop, we will not cover all of the material in our standard LithoSI and Emerge workshop.

**Learning Objectives:**

- Discussion of the LithoSI workflow for facies classification including a basic introduction to Bayesian classification, multivariate Probability Density Functions (PDFs) and their optimization, Kernel Density Estimation (LithoSI).
- The course covers the theory and practical use of Pro4D, an interactive program that is fully linked within HampsonRussell software and performs time-lapse, or 4D, modeling and analysis. Topics include:
  - Time-Lapse Modeling: Log editing and synthesis, Biot-Gassmann fluid replacement modeling, Zoeppritz and elastic techniques, systematic methods and the wedge model.
  - Seismic Comparison, Calibration and Interpretation: Survey regrading, volume comparison using correlation, difference and cross-plotting, seismic calibration with time and phase shift, application of gain, shaping filters and simultaneous phase and time matching, crossnormalization, volumetrics and interpretation.

**Contents:**

- This course covers the theory and practical use of Pro4D, an interactive program that is fully linked within HampsonRussell software and performs time-lapse, or 4D, modeling and analysis. Topics include:
  - Time-Lapse Modeling: Log editing and synthesis, Biot-Gassmann fluid replacement modeling, Zoeppritz and elastic techniques, systematic methods and the wedge model.
  - Seismic Comparison, Calibration and Interpretation: Survey regrading, volume comparison using correlation, difference and cross-plotting, seismic calibration with time and phase shift, application of gain, shaping filters and simultaneous phase and time matching, crossnormalization, volumetrics and interpretation.

**Learning Objectives:**

- Detailed, largely non-mathematical overview of current multi-component techniques.
- Highlights the benefits of MC data, such as imaging through gas clouds, lithology and fluid discrimination.
- Interpretation techniques provide Vp/Vs ratios for lithology and fluids.
- Interpretation of wave equations and interpretation of wave equations.
- Combination of both lectures and practical exercises, using the PRO4D software.
- Exercises comprise 60% of the course content.
GEOTRAINING : Software

HR-260 RockSI Workshop

Prerequisites: Info available on request
Duration (Days): 1-Day
Max Number of Participants: Info available on request
Software Used: RockSI
Course Format: Info available on request

Audience:
Geophysicists, geologists, engineers and technical staff who want to understand the theory and practice of rock physics and Petro-Elastic models and learn how to apply these increasingly critical techniques.

Contents:
This course presents an introduction to the practical use of RockSI, an interactive rock physics program from HampsonRussell, as well as an overview of rock physics theory. Topics covered include:
- Introduction to rock physics and the RockSI software program.
- Rock Physics Template (RPT) and Petro-Elastic Model (PEM) theory.
- Facies creation using Petro-Elastic Models (PEMs).
- Uncertainty analysis using Monte Carlo simulations of PEMs.
- Combining LithoSI and RockSI (Note that LithoSI is a seismic petro-facies program which is a companion program to RockSI).

Topics covered in RockSI software topics covered include:
- Introduction to the RockSI software program.
- Log analysis using RockSI.
- Rock Physics Template (RPT) and Petro-Elastic Model (PEM) theory.
- Facies creation using Petro-Elastic Models (PEMs).
- Uncertainty analysis using Monte Carlo simulations of PEMs.
- Combining LithoSI and RockSI (Note that LithoSI is a seismic petro-facies program which is a companion program to RockSI).

Learning Objectives:
Theory part:

RockSI software topics covered include:
- Introduction to the RockSI software program.
- Log analysis using RockSI.
- Rock Physics Template (RPT) and Petro-Elastic Model (PEM) theory.
- Facies creation using Petro-Elastic Models (PEMs).
- Uncertainty analysis using Monte Carlo simulations of PEMs.
- Combining LithoSI and RockSI (Note that LithoSI is a seismic petro-facies program which is a companion program to RockSI).

HR-265 GeoSI Workshop

Prerequisites: None
Duration (Days): 1-Day
Max Number of Participants: Info available on request
Software Used: Info available on request
Course Format: Instructor-led, workflow-based, classroom training.

Audience:
Geophysicists, geologists, engineers and technical staff who want to understand the theory and practice of stochastic inversion and learn how to apply these increasingly critical techniques.

Contents:
This course presents an introduction to the practical use of GeoSI, a stochastic inversion program from HampsonRussell, as well as an overview of relevant inversion theory. Topics covered include:
- Introduction to inversion methods - deterministic and stochastic.
- Log correlation and Model Building on both seismic and stratigraphic grids.
- Basic stochastic inversion theories: Sequential Gaussian Simulation, Bayesian Stochastic inversion and GeoSI inversion theory.
- Correlation and Variogram modeling.
- Facies classification theory.
- Stochastic lithology prediction.
- Stabilizing the results.
- 3D visualization.

Learning Objectives:
Explains both the theory and practice of stochastic inversion using GeoSI modules. Shows how GeoSI is fully integrated into the HampsonRussell Geoview interface. Teaches the user how to apply GeoSI using a real North Sea oil sand example.

IE-100 Introduction to InsightEarth

Prerequisites: Geoscience background recommended but not required
Duration (Days): 1-Day
Max Number of Participants: Info available on request
Software Used: Info available on request
Course Format: Instructor-led - discussion / demonstration / hands-on lab

Audience:
Geoscientists familiar with seismic interpretation and new to InsightEarth.

Contents:
Upon successful completion of this course students will be able to apply the tools available within InsightEarth to:
- Understand the advantages of using InsightEarth's 3D interpretation technology.
- Proficiently navigate the intuitive user interface within InsightEarth.
- Successfully condition data for structure and stratigraphy.
- Effectively accomplish selected interpretation goals using the workflow guide.
- Easily import and export files from/to InsightEarth.
- Effectively use InsightEarth Help.

Learning Objectives:
This course is intended to provide geoscientists and geotechnicians with an understanding of the data and visualization management tools within InsightEarth Ignition.
IE-120 Structural Interpretation of Geology with InsightEarth

**Prerequisites:** TS-100 Introduction to InsightEarth

**Duration (Days):** 2-day

**Max Number of Participants:** Info available on request

**Software Used:** InsightEarth FaultFractureSpark®, InsightEarth SaltSpark®

**Course Format:** Instructor-led

**Audience:** Geoscientists familiar with seismic interpretation and new to InsightEarth.

**Contents:** This course is intended to provide geoscientists with the skills necessary to apply InsightEarth in a structured workflow to interpret structure in a 3D seismic volume.

**Learning Objectives:**
- Understand the advantages of using InsightEarth’s 3D interpretation technology.
- Efficiently accomplish interpretation goals using the workflow guide.
- Rapidly construct 3D structural models of salt bodies, faults and horizons in seismic volumes.
- Efficiently apply InsightEarth technology including Surface Wrapping, Automated Fault Extraction and Autotracking using multiple stopping conditions.
- Accurately QC and refine structural interpretations.

IE-130 Interpretation of Depositional Systems with InsightEarth PaleoSpark

**Prerequisites:** TS-100 Introduction to InsightEarth

**Duration (Days):** 2-day

**Max Number of Participants:** Info available on request

**Software Used:** InsightEarth FaultFractureSpark®, InsightEarth SaltSpark®, InsightEarth PaleoSpark®

**Course Format:** Instructor-led - Discussion / Demonstration / Hands-on Lab

**Audience:** Geophysicists, geologists, engineers and technical staff who want to interpret stratigraphy in a 3D seismic volume.

**Contents:** Upon successful completion of this course students will be able to apply the tools available within InsightEarth to:
- Understand the advantages of using InsightEarth’s 3D interpretation technology.
- Efficiently convert a time/depth domain volume to the stratal domain.
- Rapidly create a 3D volume of depositional surfaces.
- Realistically image, interpret and analyze stratigraphic features in the stratal domain.
- Convert stratal domain interpretation back to the time/depth domain.

**Learning Objectives:**
- Use domain transformation concepts to more rapidly recognize depositional features.
- Efficiently convert a time/depth domain volume to the stratal domain.
- Efficiently navigate the intuitive user interface within InsightEarth.
- Effectively accomplish interpretation goals using the workflow guide.
- Rapidly construct 3D structural models of salt bodies, faults and horizons in seismic volumes.
- Access domain transformation concepts to more rapidly recognize depositional features.
- Efficiently convert a time/depth domain volume to the stratal domain.
- Convert stratal domain interpretation back to the time/depth domain.

IE-150 Solving Interpretation Problems with InsightEarth

**Prerequisites:** TS-100 Introduction to InsightEarth

**Duration (Days):** 1-day

**Max Number of Participants:** Info available on request

**Software Used:** InsightEarth FaultFractureSpark®, InsightEarth SaltSpark®, InsightEarth PaleoSpark®, InsightEarth Ignition®, InsightEarth FaultFractureSpark®, InsightEarth SaltSpark®, InsightEarth PaleoSpark®

**Course Format:** Instructor-led - Discussion / Demonstration / Hands-on Lab

**Audience:** Geoscientists familiar with seismic interpretation and new to InsightEarth.

**Contents:** This course is the combination of the TS-100, TS-200, and TS-300 courses. Upon successful completion of this course students will be able to apply the tools available within InsightEarth to:
- Understand the advantages of using InsightEarth for various interpretation technology.
- Efficiently navigate the intuitive user interface within InsightEarth.
- Effectively accomplish interpretation goals using the workflow guide.
- Rapidly construct 3D structural models of salt bodies, faults and horizons in seismic volumes.
- Efficiently apply InsightEarth technology including Surface Wrapping, Automated Fault Extraction and Autotracking using multiple stopping conditions.
- Accurately QC and refine structural interpretations.
- Apply domain transformation concepts to more rapidly recognize depositional features.
- Efficiently convert a time/depth domain volume to the stratal domain.
- Rapidly create a 3D volume of depositional surfaces.
- Realistically image, interpret and analyze stratigraphic features in the stratal domain.
- Convert stratal domain interpretation back to the time/depth domain.

**Learning Objectives:**
- Understand the advantages of using InsightEarth’s 3D interpretation technology.
- Accurately Q/C and refine structural interpretations.
- Effectively accomplish interpretation goals using the workflow guide.
- Rapidly construct 3D structural models of salt bodies, faults and horizons in seismic volumes.
- Access domain transformation concepts to more rapidly recognize depositional features.
- Efficiently convert a time/depth domain volume to the stratal domain.
- Convert stratal domain interpretation back to the time/depth domain.

JW-100 Basic Interpretation Techniques for Seismic Inversion

**Prerequisites:** None

**Duration (Days):** 3-day

**Max Number of Participants:** Info available on request

**Software Used:** Jason Workbench

**Course Format:** Instructor-led

**Audience:** This course is intended for those who want to learn how to interpret and analyze inversion results.

**Contents:**
- There are many benefits to using elastic properties such as P-Impedance and Vp/Vs produced with the Jason suite.
- You will learn how to achieve:
  - More accurate structural and stratigraphic interpretations.
  - More accurate maps and volumetrics.
  - Conversion of elastic properties into petrophysical reservoir properties.
  - A more effective drilling program based on the clearer interpretation of the reservoir.
  - Advanced reservoir description and characterization.

**Learning Objectives:**
- Enhanced interpretation quality and productivity using seismic inversion data, interpretation concepts for effective analysis on seismic workstations, and more effective prospect presentations to management.
### JW-101 Introduction to Acoustic Impedance Inversion

**Prerequisites:** None  
**Duration (Days):** 3-day  
**Max Number of Participants:** Info available on request  
**Software Used:** Jason Workbench  
**Course Format:** Instructor-led  

**Audience:**  
This training course is intended for people who want to start working with Jason software, or for those who want to learn more about Inversion.

**Contents:**  
You will learn the workflow and QC procedures to perform an Acoustic Impedance inversion using InverTrace®Plus. Through a combination of lectures and exercises on a 3D Gulf of Mexico data set, students will learn the following skills:  
- How to load and QC data.  
- How to perform a feasibility analysis to verify that the data is suitable for this technology.  
- How to tie wells, build low-frequency models, and estimate multi-well wavelets.  
- How to select and test parameters and generate Acoustic Impedance data.  
- How to QC, analyze, and interpret the Acoustic Impedance data.

**Learning Objectives:**  
- Effective and efficient use of the software.  
- Ability to manage QC projects.  
- Understanding of methods for improved reservoir characterization.

### JW-110 Introduction to Constrained Sparse Spike Inversion

**Prerequisites:** None  
**Duration (Days):** 4-day  
**Max Number of Participants:** Info available on request  
**Software Used:** Jason Workbench, Inversion with RockTrace. Quantitative analysis with BodyChecking and Facies and Fluid Probability (FFP)  
**Course Format:** Discussion-led  

**Audience:**  
This training course is intended for people who want to start working with Jason software, or for those who want to learn more about Inversion.

**Contents:**  
This course will teach the participants to independently run the RockTrace Simultaneous Inversion software, QC, interpret and analyze the results. You will learn the workflow and QC procedures to perform an inversion using RockTrace. Through a combination of lectures and exercises on a 3D Gulf of Mexico data set, students will learn the following skills:  
- How to load and QC data.  
- How to perform a feasibility analysis to verify that the data is suitable for this technology.  
- How to tie wells, build low-frequency models, and estimate multi-well wavelets.  
- How to select and test parameters and generate Elastic property volumes with RockTrace.  
- How to QC, analyze, and interpret the elastic property volumes.

**Learning Objectives:**  
- Acquire the ability to perform Simultaneous Inversion projects with basic settings and QC analysis. Through practice and experience, students will be able to understand the inversion workflow. Thereby the students learn to take full advantage of RockTrace functionalities and capabilities.

### JW-120 Rock Physics for Seismic Interpretation

**Prerequisites:** Basic understanding of rock physics, Experience working with the Jason Workbench, Basic knowledge of seismic reservoir characterization.  
**Duration (Days):** 2-day  
**Max Number of Participants:** Info available on request  
**Software Used:** Jason Workbench  
**Course Format:** Instructor-led - Discussion  

**Audience:**  
This course is geared towards geoscientists who wish to understand the rock physics behind reservoir characterization, reservoir delineation, hydrocarbon detection and reservoir development. It is suitable for geophysicists, geologists and petrophysicists.

**Contents:**  
This two-day course is based on a series of lectures supported by basic exercises using Jason’s Workbench running on Windows. The course is designed to provide a basic understanding of the relationships between elastic and reservoir properties of rocks, and demonstrate how rock physics is used to interpret and analyze seismic data. The course will cover the following topics:  
- Seismic wave propagation.  
- Elastic properties of rocks.  
- Empirical rock physics relationships.  
- Numerical rock physics models.  
- Fluid models.  
- Problems of scale.  
- Applying rock physics to well data.  
- Rock physics-based interpretation of seismic.  
- Seismic anisotropy.  
- Seismic attenuation.  

**Learning Objectives:**  
- Effective and efficient use of the software.  
- Ability to manage and QC projects.  
- Understanding of methods for improved reservoir characterization.

### JW-130 Basic Rock Physics Modeling in Largo

**Prerequisites:** Basic understanding of rock physics, Experience working with the Jason Workbench, Basic knowledge of seismic reservoir characterization.  
**Duration (Days):** 3-day  
**Max Number of Participants:** Info available on request  
**Software Used:** Jason Workbench  
**Course Format:** Discussion-led  

**Audience:**  
This course is intended for people who have a geophysics background and who need to perform rock physics modeling in their seismic reservoir characterization job.

**Contents:**  
This training course gives an introduction on how to perform rock physics modeling using the Largo module. It also explains some basic rock physics modeling concepts. The main focus of this course is on velocity modeling for different fluids (fluid substitution).  

**Learning Objectives:**  
Upon completion of this course, participants will have the ability to use the different Largo sheets to manipulate well curves, to perform basic velocity modeling and fluid mixture modeling, and to QC the results.
**JW-201 Introduction to Simultaneous Inversion**

**Prerequisites:** Introduction to Acoustic Impedance Inversion (JW-101)

**Duration (Days):** 4-day

**Max Number of Participants:** Info available on request

**Software Used:** Jason Workbench

**Course Format:** Instructor-led

**Audience:** This training course is intended for people who have experience with acoustic impedance inversion projects and need to learn more about simultaneous inversion.

**Contents:**
- Seismic data responds to both the acoustic impedance and the shear impedance contrasts in the subsurface. This additional information within the seismic data can be exploited using the variation in seismic reflection amplitude with angle or offset.
- Jason's Simultaneous Inversion overcomes most of the disadvantages of standard AVO analysis and integrates the best tools such for well-tying, wavelet estimation and pre-stack inversion in an anisotropic environment. You can use existing inversion in an anisotropic environment. You can use existing tools such as RockTrace® and experience, you will be able to understand the Azimuthal Anisotropy (AAV) domain. The result is three volumes of absolute rock properties tightly calibrated to the well log data: P-impedance, S-impedance and Density.

**Learning Objectives:**
- Acquire the ability to perform simultaneous Inversion projects with basic settings and QC analysis. Through practice and experience, you will be able to understand and take full advantage of RockTrace functionalities and capabilities.

**JW-203 Anisotropic Inversion in the Jason Workbench**

**Prerequisites:** You will gain the next from this course if you are attending the concluding Jason Simultaneous Inversion (JW-201) or completed 20-10 Introduction to Constrained Sparse Spike Inversion or JW-201 Introduction to Simultaneous Inversion.

**Duration (Days):** 1-day

**Max Number of Participants:** Info available on request

**Software Used:** Jason Workbench, SEG Y loader, FunctionMod, CoCa View, Elastic Volumes Evaluator, Synthetics Toolbox, Inversion with RockTrace®

**Course Format:** Instructor-led

**Audience:** This training course is intended for experienced RockTrace® people who want to invert Wide Azimuth (WAZ) seismic data in a quantitative manner, or for those who want to learn more about azimuthal inversion.

**Contents:**
- CGG has a novel patented method to calculate effective elastic parameters in a variety of anisotropic media. These effective elastic parameters allow you to use isotropic modeling and inversion in an anisotropic environment. You can use existing tools such as RockTrace® Plus full stack inversion technology by extending it to the AAV domain. The result is three volumes of absolute rock properties tightly calibrated to the well log data: P-impedance, S-impedance and Density. This course uses a synthetic WAZ data set that contains several HTI (Anisotropic) features. On these data several hands-on exercises are offered to acquaint yourself with the available HTI-related functionality in the Jason workbench.

**Learning Objectives:**
- Acquire the ability to perform simultaneous Inversion projects with basic settings and QC analysis. Through practice and experience, you will be able to understand and take full advantage of RockTrace functionalities and capabilities.

**JW-220 Introduction to Geostatistical Inversion**

**Prerequisites:** Introduction to Acoustic Impedance Inversion (JW-101), Experience performing inversion projects

**Duration (Days):** 5 Days

**Max Number of Participants:** Info available on request

**Software Used:** Jason Workbench, SEG Y loader

**Course Format:** Instructor-led, workflow-based, hands-on training

**Audience:** This course is intended for those who want to learn how to interpret and analyze geostatistical inversion results.

**Contents:**
- This course covers the basic theoretical concepts and software components necessary to perform geostatistical inversion in the Jason® Workbench. Since knowledge of various geostatistical principles such as multivariate distributions and variograms is necessary, pertinent introductions to these topics are included in the course lectures.

**Learning Objectives:**
- Upon completion of this course, participants will have the ability to run basic StatMod projects, in conjunction with other modules of the Jason Workbench, to perform geostatistical inversion, QC the parameters and analyze the results with minimal expert supervision.

**JW-310 Deterministic Inversion - Advanced**

**Prerequisites:** Introduction to Simultaneous Inversion, 201, Knowledge of modeling (with EarthModel® FT), Working experience with Jason and performing deterministic inversion projects.

**Duration (Days):** 3-day

**Max Number of Participants:** Info available on request

**Software Used:** Jason® Workbench

**Course Format:** Instructor-led

**Audience:** This training course is intended for people who already have gained experience with Jason’s deterministic inversion projects and need to work on more complex projects.

**Contents:**
- The advanced course for deterministic inversion captures different techniques that can be added to and used as part of the standard OSS/ workflow. The proposed methods are recommended in cases where the results of the conventional approach are not satisfactory. Course modules include:
  - AVO—provides instruction on classification of AVO responses based on the lithology and type of substituting fluid.
  - Multi-Attribute Well Interpolator—provides instruction on how to apply attribute-guided well log interpolation in Jason.
  - LFM Trend Update—provides instruction on the role the low-frequency model plays in deterministic inversion.
  - 4D Inversion—consists of lectures on workflow for performing 4D deterministic inversion.
  - Wavelet Variations—measures the effect of O & attenuation and to compensate for it during deterministic inversion.
  - Spectral Decomposition—provides instruction on the basics of spectral decomposition and how to perform in Jason.

**Learning Objectives:**
- Knowledge of how to use some of the more advanced techniques with the Jason software.
- More flexibility in solving problems in deterministic inversion projects.
JW-320 Partial Stack Geostatistical Inversion and Advanced Workflows  
Prerequisites:  Introduction to Geostatistical Inversion (JW-220), Experience performing (partial stack) inversion projects in Jason
Duration(Days): 2-day
Max Number of Participants: Info available on request
Software Used: RockMod®
Course Format: Instructor-led

Audience:  
This course is intended for those who want to learn how to interpret and analyze inversion results.

Contents:  
Students will learn to independently run the RockMod®: Partial Stack GeostatisticalInversion software, QC, interpret and analyze the results. Advanced options are also presented in lectures and exercises, such as incorporating geological trends and taking into account spatially-varying seismic quality.

Learning Objectives:  
Upon completion of this course, participants will have the ability to run basic RockMod®:projects, in conjunction with other modules of Jason, to perform partial stack geostatistical inversion, QC the parameters and analyze the results with minimal expert supervision.

---

JW-420 Modeling Reservoir Properties Using Geostatistical Inversion  
Prerequisites:  Partial Stack Geostatistical Inversion and Advanced Workflows (JW-320), Introduction to Geostatistical Inversion (JW-220), Experience performing (partial stack) inversion projects in Jason
Duration(Days): 3-day
Max Number of Participants: Info available on request
Software Used: RockMod®
Course Format: Instructor-led

Audience:  
This course is intended for those who want to learn how to interpret and analyze inversion results.

Contents:  
Students will learn how to run RockMod®: Partial Stack Geostatistical Inversion to generate engineering properties for subsequent usage in flow simulation. Special emphasis is placed on integrating more geological constraints into reservoir models, particularly in terms of imposing prior facies distributions and including rock physics models to link engineering properties to seismic data.

Learning Objectives:  
Upon completion of this course, participants will have a grasp of the key aspects of the workflow required for generating semantically-constrained engineering properties on a geocellular grid using RockMod.

---

PL-100 PowerLog® Basic Training  
Prerequisites:  None
Duration(Days): 3-day
Max Number of Participants: Info available on request
Software Used: PowerLog
Course Format: Instructor-led

Audience:  
This course is intended for new PowerLog users.

Contents:  
This two-day course introduces you to PowerLog’s extensive capabilities from data loading and initial evaluation to interactive editing, PowerLog offers robust tools for every phase of well log analysis and easy-to-use interface.

Topics Include:  
• Loading log data.
• Creating tops and zones.
• Using the viewers to QC and analyze data (Logplot, Crossplot, Histogram, Tabular Listing, Basemap).
• Interactive parameter picking.
• Interactive depth shifting and log editing.
• Normalizing curves.
• Pore pressure prediction.
• Write and run your own user programs.
• Using PowerBatch.
• Generate synthetic curves.
• Calculate clay volumes.
• Pore pressure prediction.
• Splicing, baseline shifting, and patching curves.
• Composing image logs and picking dips.
• Interactive depth shifting and log editing.
• Normalizing curves.
• Performing basic log calculations, generating TVD curves, computing crossplot porosities, etc.
• Using StatMin to analyze data.
• Rock Physics modeling.
• Performing multimineral analysis.
• Interactive parameter picking.
• Write and run your own user programs.
• Using PowerBatch.
• Generate synthetic curves.
• Cloring and patching curves.
• Using PowerBatch.
• Splicing, baseline shifting, and patching curves.
• Composing image logs and picking dips.
• Interactive parameter picking.
• Write and run your own user programs.
• Normalizing curves.
• Using PowerBatch.
• Interactive parameter picking.
• Write and run your own user programs.
• Normalizing curves.
• Interactive depth shifting and log editing.
• Normalizing curves.
• Performing basic log calculations, generating TVD curves, computing crossplot porosities, etc.
• Using StatMin to analyze data.
• Rock Physics modeling.
• Performing multimineral analysis.
• Using PowerBatch.
• Generate synthetic curves.
• Calculate clay volumes.
• Splicing, baseline shifting, and patching curves.
• Composing image logs and picking dips.
• Interactive parameter picking.
• Write and run your own user programs.
• Normalizing curves.
• Interactive depth shifting and log editing.
• Normalizing curves.
• Performing basic log calculations, generating TVD curves, computing crossplot porosities, etc.
• Using StatMin to analyze data.
• Rock Physics modeling.
• Performing multimineral analysis.
• Using PowerBatch.
• Generate synthetic curves.
• Calculate clay volumes.
• Splicing, baseline shifting, and patching curves.
• Composing image logs and picking dips.
• Interactive parameter picking.
• Write and run your own user programs.
• Normalizing curves.
• Interactive depth shifting and log editing.
• Normalizing curves.
• Performing basic log calculations, generating TVD curves, computing crossplot porosities, etc.
• Using StatMin to analyze data.
• Rock Physics modeling.
• Performing multimineral analysis.
• Using PowerBatch.
• Generate synthetic curves.
• Calculate clay volumes.
• Splicing, baseline shifting, and patching curves.
• Composing image logs and picking dips.
• Interactive parameter picking.
• Write and run your own user programs.
• Normalizing curves.
• Interactive depth shifting and log editing.
• Normalizing curves.
• Performing basic log calculations, generating TVD curves, computing crossplot porosities, etc.
• Using StatMin to analyze data.
• Rock Physics modeling.
• Performing multimineral analysis.
• Using PowerBatch.
• Generate synthetic curves.
• Calculate clay volumes.
• Splicing, baseline shifting, and patching curves.
• Composing image logs and picking dips.
• Interactive parameter picking.
• Write and run your own user programs.
• Normalizing curves.
• Interactive depth shifting and log editing.
• Normalizing curves.
• Performing basic log calculations, generating TVD curves, computing crossplot porosities, etc.
• Using StatMin to analyze data.
• Rock Physics modeling.
• Performing multimineral analysis.
• Using PowerBatch.
• Generate synthetic curves.
• Calculate clay volumes.
• Splicing, baseline shifting, and patching curves.
• Composing image logs and picking dips.
• Interactive parameter picking.
• Write and run your own user programs.
• Normalizing curves.
• Interactive depth shifting and log editing.
• Normalizing curves.
• Performing basic log calculations, generating TVD curves, computing crossplot porosities, etc.
• Using StatMin to analyze data.
• Rock Physics modeling.
• Performing multimineral analysis.
• Using PowerBatch.
• Generate synthetic curves.
• Calculate clay volumes.
• Splicing, baseline shifting, and patching curves.
• Composing image logs and picking dips.
• Interactive parameter picking.
• Write and run your own user programs.
• Normalizing curves.
• Interactive depth shifting and log editing.
• Normalizing curves.
• Performing basic log calculations, generating TVD curves, computing crossplot porosities, etc.
• Using StatMin to analyze data.
• Rock Physics modeling.
• Performing multimineral analysis.
• Using PowerBatch.
• Generate synthetic curves.
• Calculate clay volumes.
• Splicing, baseline shifting, and patching curves.
• Composing image logs and picking dips.
• Interactive parameter picking.
• Write and run your own user programs.
• Normalizing curves.
• Interactive depth shifting and log editing.
• Normalizing curves.
• Performing basic log calculations, generating TVD curves, computing crossplot porosities, etc.
• Using StatMin to analyze data.
• Rock Physics modeling.
• Performing multimineral analysis.
• Using PowerBatch.
• Generate synthetic curves.
• Calculate clay volumes.
• Splicing, baseline shifting, and patching curves.
• Composing image logs and picking dips.
• Interactive parameter picking.
• Write and run your own user programs.
• Normalizing curves.
• Interactive depth shifting and log editing.
• Normalizing curves.
• Performing basic log calculations, generating TVD curves, computing crossplot porosities, etc.
• Using StatMin to analyze data.
• Rock Physics modeling.
• Performing multimineral analysis.
• Using PowerBatch.
• Generate synthetic curves.
• Calculate clay volumes.
• Splicing, baseline shifting, and patching curves.
• Composing image logs and picking dips.
• Interactive parameter picking.
• Write and run your own user programs.
• Normalizing curves.
• Interactive depth shifting and log editing.
• Normalizing curves.
• Performing basic log calculations, generating TVD curves, computing crossplot porosities, etc.
• Using StatMin to analyze data.
• Rock Physics modeling.
• Performing multimineral analysis.
• Using PowerBatch.
• Generate synthetic curves.
• Calculate clay volumes.
• Splicing, baseline shifting, and patching curves.
• Composing image logs and picking dips.
• Interactive parameter picking.
• Write and run your own user programs.
• Normalizing curves.
• Interactive depth shifting and log editing.
• Normalizing curves.
• Performing basic log calculations, generating TVD curves, computing crossplot porosities, etc.
• Using StatMin to analyze data.
• Rock Physics modeling.
• Performing multimineral analysis.
• Using PowerBatch.
• Generate synthetic curves.
• Calculate clay volumes.
• Splicing, baseline shifting, and patching curves.
• Composing image logs and picking dips.
• Interactive parameter picking.
• Write and run your own user programs.
• Normalizing curves.
• Interactive depth shifting and log editing.
• Normalizing curves.
• Performing basic log calculations, generating TVD curves, computing crossplot porosities, etc.
• Using StatMin to analyze data.
• Rock Physics modeling.
• Performing multimineral analysis.
• Using PowerBatch.
• Generate synthetic curves.
• Calculate clay volumes.
• Splicing, baseline shifting, and patching curves.
• Composing image logs and picking dips.
• Interactive parameter picking.
• Write and run your own user programs.
• Normalizing curves.
• Interactive depth shifting and log editing.
• Normalizing curves.
• Performing basic log calculations, generating TVD curves, computing crossplot porosities, etc.
• Using StatMin to analyze data.
• Rock Physics modeling.
• Performing multimineral analysis.
• Using PowerBatch.
• Generate synthetic curves.
• Calculate clay volumes.
• Splicing, baseline shifting, and patching curves.
• Composing image logs and picking dips.
• Interactive parameter picking.
• Write and run your own user programs.
• Normalizing curves.
• Interactive depth shifting and log editing.
• Normalizing curves.
• Performing basic log calculations, generating TVD curves, computing crossplot porosities, etc.
• Using StatMin to analyze data.
• Rock Physics modeling.
• Performing multimineral analysis.
• Using PowerBatch.
• Generate synthetic curves.
• Calculate clay volumes.
• Splicing, baseline shifting, and patching curves.
• Composing image logs and picking dips.
• Interactive parameter picking.
GEOTRAINING: Software

PL-230 PowerLog®: Capillary Pressure Training

Prerequisites: PL-100 PowerLog Basic Training, also some background experience is required on Petrophysics and Capillary Pressure

Duration (days): 2-day

Max Number of Participants: Info available on request

Software Used: PowerLog, Capillary Pressure Importer, Capillary Pressure Module

Course Format: Workshop

Audience: Petrophysicists.

Contents: This is a 2-day course that teaches students how to build a saturation model for calculating water saturation based on porosity, permeability and height above free water level using Capillary Pressure data. The students learn how to load capillary pressure data, create laboratory measurements to equivalent reservoir properties, correct the data for reservoir conditions, compute J-functions, and construct models of saturation vs pressure and saturation vs height.

Learning Objectives: The student will learn how to use the Capillary Pressure Module in PowerLog.

PL-210 PowerLog® StatMin Training

Prerequisites: PL-200 PowerLog Advanced Training or extensive experience using PowerLog

Duration (days): 2-day

Max Number of Participants: Info available on request

Software Used: PowerLog, StatMin

Course Format: Instructor-led

Audience: This course is intended for experienced PowerLog users who need to delineate formation components in complex environments quickly and reliably, using statistical log analysis.

Contents: StatMin is a statistical program that calculates lithology, mineralogy, and porosity. It is especially useful for modeling complex environments such as those containing sandstones of various mineralogies or carbonate environments in general. In this two-day course, the theory and principles behind StatMin are discussed first; then students set up and run StatMin jobs for two wells.

Learning Objectives: This is a 2-day course that teaches students how to build a saturation model for calculating water saturation based only on porosity and permeability and height above free water level using Capillary Pressure data. The students learn how to load capillary pressure data, create laboratory measurements to equivalent reservoir properties, correct the data for reservoir conditions, compute J-functions, and construct models of saturation vs pressure and saturation vs height.

Learning Objectives: The student will learn how to use the Capillary Pressure Module in PowerLog.

PL-220 PowerLog®: Rock Physics Module (RPM) Training

Prerequisites: PL-200 PowerLog Advanced Training or extensive experience using PowerLog

Duration (days): 2-day

Max Number of Participants: Info available on request

Software Used: PowerLog, Rock Physics Module

Course Format: Instructor-led

Audience: This course is intended for advanced PowerLog users who want to effectively use the Rock Physics Module.

Contents: Rock Physics Module is a calculation engine for computing rock physics models. It works in conjunction with PowerLog, using log curves from a PowerLog well as input and generating output curves that are written back to the PowerLog project. Topics include:

- Conventional petrophysics vs. seismic petrophysics.
- Building a simple Rock Physics Module workflow, checking the Rock Physics Module results in PowerLog.
- Using predefined workflows to calculate bulk density, compressional velocity, shear velocity, fluid properties, and Gassmann fluid substitution.
- Integrating petrophysics and rock physics.
- Calculating a workflow for multiple wells and zones the display and printing workflows.

Learning Objectives: Learn how a rock physics model can help integrate petrophysical data and seismic data to arrive at a consistent inversion and accurate rock property volumes.

VP-101 VelPro Velocity Modeling

Prerequisites: None

Duration (days): 1-day

Max Number of Participants: Info available on request

Software Used: VelPro

Course Format: Instructor-led course

Audience: Geophysicists, Geologists, and technical staff who are interested in the theory and practical applications of velocity modelling.

Contents: This course provides a workflow for basic velocity modeling using VelPro. Providing the user with the ability to combine all available velocity data into a single, comprehensive model.

This hands-on course provides the student the knowledge to:

- Load data into a project.
- QC and correct data loaded data.
- Create simple, structure independent models.
- Understand the structure and behavior of a VelPro project.
- Add in structure to a velocity model.
- Analyze the velocities of the different layers.
- Create a layered velocity.

Learning Objectives: This course is intended to provide the user with an understanding of the data and processes involved in generating a calibrated velocity volume using VelPro.
GeoTraining
The CGG Integrated Training Offer

• Abu Dhabi
• Al Khobar
• Beijing
• Cairo
• Calgary
• Conwy
• Crawley
• Dubai
• The Hague
• Houston
• Kuala Lumpur
• Llandudno
• Massy
• Moscow
• Muscat
• Nantes
• Singapore
• Villahermosa

Please contact our GeoTraining team:

Houston
Francois Riff
Cell: +1 713 423 9725
Office: +1 832 351 8155
Email: francois.riff@CGG.com

Massy
Dominique Boitier
Cell: +33 6 8442 5084
Office: +33 1 6447 3797
Email: dominique.boitier@CGG.com

Llandudno
Daniel Kay
Office: +44 1492 563636
Email: daniel.Kay@CGG.com

Visit cgg.com/training for the latest updates on our courses