



Integrated Structural Geology – Standard Course

Target Audience:

This course is intended for those that: (i) work with geological models in the exploration or production domain and need to become familiar with structural geology tools/analysis; (ii) attended the course already some time ago, and require a refresher, or; (iii) are in other disciplines trying to understand how structural geology is integrated into the exploration or production context (e.g. accountants, project managers, etc.).

Overall Objectives:

- 1/ Learn structural geological theory
- 2/ Discuss the limitations of the theory
- 3/ Apply the theory and become familiar with **MOVE**

Course Agenda

Day 1 Introduction to integrated structural geology modelling and MOVE

- Importance of integrated structural geology modelling for reducing uncertainty in the reservoir model.
- Geological model components – Terminology, assumptions, rock properties, describing shapes.
- Input data for geological models – Data types, collection methods, projection of data.
- Stress and Strain – Calculating in-situ stress, elastic properties, deformation, Andersonian faulting.
- **Exercises** – Introduction to **MOVE**; setting up a Stratigraphy Table; importing data; stereonet analysis; interpreting sections & calculating apparent dip.

Day 2 Limitations in geological data and reducing uncertainty

- Constrained model building using basic geometric principles – Kink-band method.
- Material Balance – Assumptions, Simple depth-to-detachment, Area-depth calculation.
- Constrained model building using mass balance and geological principles – Constant Heave.
- Kinematic Models – Simple Shear, Fault Parallel Flow, Trishear.
- **Exercises** – Kink-band method to constrain fold shape; geometric fault construction; forward modelling deformation in 2D; geometric restoration.

Day 3 Modelling deformational processes

- Sedimentary basins – Extensional, compressional, strike-slip.
- Evolution of rift basins – Tectono-stratigraphic observations, geological processes.
- Isostasy, mechanical compaction, thermal subsidence.
- Sequential Restoration – Introduction to technique.
- **Exercises** – Airy isostasy model, Sclater-Christie compaction model & McKenzie thermal subsidence model; Sequential Restoration in **MOVE**.

Day 4 Predicting subsurface flow pathways, buffers and barriers

- Strain and fracture prediction – Relationship between strain and shear plane orientations
- Critical failure – Mohr Diagram and Coulomb failure.
- 3D model building – Techniques available in **MOVE**.
- Fault Displacement Analysis – Learn techniques to understand and validate fault displacement.
- Fault Seal Analysis – Fault Rock Seal, Shale Gouge Ratio.
- **Exercises** – Forward modelling deformation in 3D and calculating strain associated with deformation; generating Discrete Fracture Network (DFN); 3D model building; fault displacement and seal analysis.

Day 5 Reservoir structural geology modelling workshop

- Use learnings from first four days to build a model and carry out integrated structural analysis in **MOVE**.