Summary
This advanced course takes an in-depth, quantitative look at the sources of error and uncertainty in the construction of depth maps from seismic data, and the resulting impact on reservoir volumetrics. The course will start from basic geostatistical theory and work through the depth conversion elements toward a stochastic simulation and probabilistic volumetric maps. Worked examples will illustrate the issues encountered at various stages of the asset life-cycle, from data-sparse exploration settings to the relatively data-rich appraisal and development phases.

Learning Outcomes
Participants will learn to:

1. Construct depth maps that include accompanying uncertainty measures.
2. Perform geostatistical workflows, with the ultimate goal of providing a more tightly-constrained volumetrics calculation.
3. Integrate well-constraints into the process of depth conversion.
4. Validate and rate objectively depth maps and volumetric estimates generated by others.

Duration and Training Method
A three-day classroom course. Training is conducted with a combination of lectures, demonstrations and hands-on practical worked exercises.

Who Should Attend
This course should be of interest to all geophysicists and interpreters working in areas with demanding depth conversion challenges and complex imaging problems.

Prerequisites and Linking Courses
This is a Skilled Application course, which builds on the core depth conversion techniques taught on N172 (Depth Conversion Methods and Pitfalls) and the grounding in seismic velocities given on N002 (Velocities for Depth Conversion). It may be seen as complementary to N217 (Seismic Imaging and Velocity Model-Building Techniques: Concepts, Examples and Pitfalls).

Course Content
Day 1
- Background and geostatistical theory
- Stationarity, trends and residuals
- Variogram analysis
- Estimation, uncertainty and kriging
- Worked example: Rank exploration setting (little or no well data)
Day 2

- Applied depth conversion, including geostatistics
- Single-layer depth and time
- Multivariate methods
- Velocity, time or depth
- Stacking velocities
- Multilayer depth conversion
- Incorporating deviated wells
- 2-D seismic issues
- Worked example: Appraisal phase (including limited well data)

Day 3

- Volumetric bias and stochastic simulation
- Volumetrics, probability maps and connectivity
- Worked example: Development phase (with dense well control)