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## N387: Exploration and Development in Fluvio-Lacustrine Systems

Instructor(s): Gary Nichols

### Format and Duration

Classroom - 4 Days

Virtual - 8 Sessions

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### Summary

This course considers fluvial, alluvial fan, and lacustrine depositional systems as exploration targets and in terms of field development. The controls on these systems will be assessed at a variety of scales to aid the understanding of the distribution of source rocks and reservoir units in continental basins. Topics covered include stratigraphic analysis and correlation, tectonic, climatic and base level controls on facies distributions, system-scale variations in sandstone body architecture, and dimensions and connectivity of reservoir units. Exercises based on subsurface data form a key element of this workshop.

### Learning Outcomes

Participants will learn to:

1. Understand the characteristics of alluvial fan, fluvial and lacustrine systems in sedimentary basins.
2. Evaluate and integrate the controls on lacustrine and fluvial depositional systems.
3. Develop tools for the prediction of field-scale distribution of reservoir units.
4. Analyse the variation in stratigraphic architecture of fluvial successions in terms of connectivity within a reservoir.
5. Evaluate the different scales of heterogeneity in fluvial successions and their effects on reservoir quality.
6. Use appropriate correlation techniques in fluvio-lacustrine systems.
7. Assess tectonic controls on basin margin alluvial fan characteristics.
8. Integrate different data types in the analysis of continental depositional systems.

### Training Method

This is a classroom or virtual classroom workshop comprising seminars, case study presentations, workshops discussions, and exercises of varying duration.

### Who Should Attend

The course is aimed at relatively experienced exploration and development geoscientists, petrophysicists, and reservoir engineers.

### Course Content

#### 1. Continental Rift Basins

- Controls on Sediment Accumulation in Rifts
- Sediment Supply



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### 2. Fluvial Systems

- Fluvial and Alluvial Systems
- River Forms
- Channel-filling Processes
- Trends in Fluvial Systems
- Floodplain Deposition
- Patterns in Fluvial Deposits
- Soils and Palaeosols
- Fluvial Systems Summary
- Fluvial Form in Modern Continental Sedimentary Basins: Distributive Fluvial Systems
- Ancient Fluvial Distributary Systems
- Fluvial Distributary Systems and Lakes
- Conditions for the Formation of a DFS: Tectonic and Climatic Settings
- The Stratigraphic Architecture of Fluvial Distributary System Deposits

### 3. Alluvial Fans

- Morphology of Alluvial Fans
- Processes of Deposition on Alluvial Fans
- Fluvial Deposits Forming Alluvial Fans
- Modification of Alluvial Fan Deposits
- Controls on Alluvial Fan Deposition

### 4. Lacustrine Systems

- Lake Formation
- Lake Hydrology
- Lake Margin Deposits
- Deep Lake Facies
- Saline and Ephemeral Lakes
- Controls on Lake Facies

### 5. Case Studies

- The Ebro Basin, Southern Pyrenean Foreland Basin, Cenozoic, Northern Spain
- Lacustrine Case Study: The Orcadian Basin - Old Red Sandstone
- The Clair Field, Devonian West of Shetland
- The Saltwash Fluvial System, Jurassic, USA

### 6. Reservoir Characterisation in Fluvio-lacustrine Systems



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- Basin-scale facies distributions
- Field-scale sandstone body architecture and connectivity
- Heterogeneities within successions at the scale of reservoir models
- Small-scale heterogeneities at facies scales

### 7. Exercises

- Core analysis
- Continental log analysis
- Palaeogeographic analysis
- Large scale facies correlation
- Fluvial log correlation