

# Workshop 1

## Uncertainties in petrophysics: Methods of statistical analysis

**Instructors:** **Michel Claverie** (*Imperial College London*)  
**Lalitha Venkataramanan** (*Schlumberger Doll*)  
**Marco Pirrone** (*ENI*)  
**Laurent Mosse** (*Schlumberger Wireline*)  
**David Allen** (*Schlumberger Interpretation Engineering*)  
**Andrea Valori** (*Independent*)  
**Jean-Etienne Jacolin** (*Schlumberger Interpretation Engineering*)

### About the Course

Subject matter experts will conduct short and interactive sessions on the definitions, calculation methods, applications, and visual display of uncertainty in petrophysics

*They will cover the following topics:*

- Uncertainties of machine learning processes, with petrophysics application (**Lalitha Venkataramanan**)
- Applications of value of information to petrophysics (**David Allen**)
- Sensitivity analysis for petrophysical models; PCA techniques for reducing petrophysical model uncertainty (**Jean-Etienne Jacolin**)
- Uncertainty propagation (measurements, methods, models) along petrophysical interpretation (**Laurent Mosse**)
- Log and core NMR uncertainties (**Andrea Valori**)
- Reservoir facies uncertainties: Laminated reservoirs and petro-elastic models (**Marco Pirrone**)
- Common petrophysics uncertainties examples (**Michel Claverie**)

We will start and finish on time – plus/minus the tiniest possible standard deviation – guided by the principle that smaller uncertainties are better



# Workshop 2

## Petrophysics role in the energy transition

**Organizers:** **Robert (Bob) Gales** (Halliburton)  
**Kelly Skuce** (Core Petrophysical Consulting)  
**Katerina Yared** (SM Energy)

**Instructors:** **Jamie Beard** (Executive Director, The Geothermal Entrepreneurship Organization, University of Texas)  
**Jim Hollis** (Founder, Geothermal Technologies, Inc.)  
**Manika Prasad** (Professor, Colorado School of Mines)  
**Hamed Soroush** (CEO, Petrolern, LLC.)

### About the Course

Carbon Net Zero by 2050 is a major goal of countries that have signed the Paris Accord. To accomplish this, it will take a continued shift of the energy mix and CO<sub>2</sub> capture and storage. Although there is activity in rare earth mining and hydrogen storage, we will focus on resurgence in Geothermal and Carbon Capture Utilization and Storage

#### Day 1

- Introductions and high-level overview (Katerina Yared, Kelly Skuce, Bob Gales)
- Geothermal: Status of industry (Jamie Beard; alternative Will Pettit)
- Geothermal: subsurface challenges (Jim Hollis)

#### Day 2

- CCUS: Status of the industry (Manika Prasad)
- CCUS: Subsurface challenges (Hamed Soroush)
- CCUS: Monitoring, verification, and accounting (t.b.d.)



# Workshop 3

## Machine learning & Artificial intelligence

**Instructors:** **Lalitha Venkataramanan** (Schlumberger Doll)  
**Chicheng Xu** (Aramco)  
**Andy McDonald** (Lloyd's Register)  
**Vikas Jain** (Schlumberger)

### About the Course

This workshop will focus on the applications of Artificial Intelligence (AI) and Machine Learning (ML) to the upstream O&G industry. Consisting of two half-days, the workshop will provide an introduction to machine learning, lay out sample workflows and steps for ML applications and summarize some of the used cases in the industry

The workshop will cover both supervised and unsupervised learning and highlight applications such as QA/QC, outlier detection, facies mapping and learning complex functional mapping

Hands-on tutorials with Python codes to analyze a publicly available data set will also be provided



# Workshop 4

## Petrophysical rock typing from empirical to probabilistic methods including validation

**Instructors:** Gary W. Gunter (Schlumberger)  
David F. Allen (Schlumberger)  
Mohamed Y. Sahar (Schlumberger)  
Eduardo J. Viro (Consultant)

### About the Course

This remote delivered short course/workshop presents a practical overview of “Rock Typing” including empirical based methods, deterministic, statistical, probabilistic and automatic predictive methods. The course also includes single well and multi-well examples. This short course includes two core-log examples, with documented workflows, applied calculations, references, and the corresponding Excel solutions for a typical single well analysis and a multi-well analysis.

