

Advanced Multivariate Geostatistics Certification

5 days
Overview

RCM/MGEOSTAT

LEVEL

Expert

PURPOSE

This course provides participants with a comprehensive technical knowledge and to get familiar with geostatistical methods used in Geophysics, Reservoir Characterization and Modeling studies.

LEARNING OBJECTIVES

Upon completion of the course, participants will be able to:

- acquire a practical approach to the industrial methodology of reservoir characterization and modeling, in particular with geostatistical tools and methods,
- use geostatistical tools and methods (variograms, kriging, cokriging, external drift, simulations),
- use geostatistical methods for seismic data filtering and Time-to-Depth conversion,
- use geostatistical methods for enhancing classification for ElectroFacies determination,
- choose ways for property simulations using geostatistical algorithms: facies (pixel and object methods); petrophysics (gaussian methods),
- constrain 2D or 3D properties distribution using various information (e.g. geology, seismic and dynamic data) of different nature and accuracy,
- use industrial software dedicated for geostatistics.

WAYS AND MEANS

Lectures and hands-on activities. Practical examples and laboratory exercises will be performed using dedicated software: Isatis™.

Software used during workshops: with courtesy of Geovariance.

LEARNING ASSESSMENT

Knowledge assessment with multiple choice questions and open explanatory questions.

PREREQUISITES

No prerequisites for this course.

WHY AN IFP TRAINING CERTIFICATION?

- An international recognition of your competencies.
- A Advanced Certificate delivered.
- An expertise confirmed in Advanced Multivariate Geostatistics Certification.
- Ready-to-use skills.

Agenda

MULTIVARIATE DATA ANALYSIS

Statistics: distributions, mean, variance, correlation coefficient, linear regression.

1 d

Multivariate statistical analysis: PCA, Min-Max autocorrelation factor.
Variograms and cross-variogram: the linear model of coregionalization.

COKRIGING & ITS VARIATIONS

1 d

Kriging theory: building the kriging system of equations, kriging weights behavior, cross-validation.
Generalization of kriging to the multivariate case: cokriging.
Particular case of collocated cokriging.

KRIGING WITH AUXILIARY VARIABLES

0.5 d

Kriging with trend: universal kriging formalism.
Kriging with external drift.
Comparison between collocated cokriging and kriging with external drift.
Kriging with Bayesian drift.
Kriging with fuzzy data.

GEOSTATISTICS & CLASSIFICATION

0.5 d

Clustering methods for ElectroFacies calculation.
Enhancing clustering by integrating spatial constraints.
Pitfalls in ElectroFacies calculation and characterization.

FACTORIAL KRIGING & FACTORIAL COKRIGING

1 d

Multi-components variograms (univariate and multivariate cases).
Factorial kriging theory.
Application to data filtering.
Seismic filtering with multiple acquisitions.

GEOSTATISTICAL SIMULATIONS IN THE MULTIVARIATE CASE

0.5 d

Reminder about geostatistical simulations, comparison with kriging.
Theoretical overview of co-simulations of continuous variables.
A multivariate facies simulation method: truncated Pluri-Gaussian Simulations (PGS).
Complex sedimentary patterns modeling with PGS.

SUMMARY & TEST

0.5 d

Summary of the studied methods and their applications: Q&A session.
Final examination.