

Resource Estimation and Conditional Simulation



Objectives of the course:

This course is aimed at equipping attendees to improve understanding of their orebody and its variability through the appropriate application of resource estimation, conditional simulation and geostatistical study.

The course covers key theoretical and practical aspects of estimation and simulation from domaining through to resource classification. Geostatistics is explained simply and with the minimum necessary mathematics. Time will be available for questions and meeting specific needs of the attendees.

Who should attend?

The training is suitable for technical people directly involved in resource evaluation. Geologists, mining engineers, and metallurgists who either manage the resource estimation process, use the outputs or provide data inputs would also benefit by attending selected training sessions.

Training outline:

- **Overview of sampling and QA/QC**
- **Domaining**
 - A practical understanding of creating good domains for resource estimation.
 - Probability theory and stationarity (theoretical explanation of what makes good domains).
 - Overview and comparison of explicit and implicit modelling.
 - What to do when explicit or implicit domains are not appropriate – Creating domains via geostatistics.
 - Methods for assessing uncertainty in domain shapes.
- **Compositing methods and validation**
- **Exploratory data analysis**
 - Validating data and domains (a review of tools and their application).
 - Domain boundary topographic and contact analysis.
 - Principal component analysis, factor analysis, discriminant analysis and cluster analysis.
 - Testing validity of assumptions underlying all common estimation and simulation approaches.

Level:

Basic to intermediate

Duration:

3 days or shorter depending on requirements

Type:

On site classroom style training

Prerequisites:

None

Cost:

Contact us for an onsite training proposal.

Inclusions:

Bound copy of presentations

Trainer:

Chris De-Vitry is a geologist and geostatistician with 25 years' experience. Chris also has significant practical experience working in open pit and underground mining operations.



Training outline continued:

- **Outliers**
 - Characterising outliers from a geological and geostatistical point of view.
 - How to deal with outliers - From simple techniques such as top cutting through to advanced geostatistical techniques.
- **Variography**
 - Theoretical and practical understanding of variograms.
 - Generating and interpreting variograms.
 - Uses and applications of variograms, cross-variograms, correlograms, relative variograms, pairwise relative variograms etc.
- **Kriging**
 - Theoretical understanding of ordinary kriging, simple kriging, kriging with a trend etc.
 - Properties of kriging (string effect, negative weights etc).
 - Quantitative kriging neighbourhood analysis and alternatives for selecting search neighbourhoods.
 - Cross-validation and its uses.
 - An introduction to non-stationary geostatistics.
- ***Incorporating secondary data e.g. combination of imprecise and biased data with precise unbiased data***
 - Co-kriging, collocated co-kriging, kriging with a variance of measurement error etc.
- ***Methods for selecting an appropriate block size and constructing block models***
- ***Validating resource estimates***
- ***Assessing smoothing in a kriged estimate using the discrete Gaussian change of support and incorporating the Information Effect***
- ***Review of declustering methods***
- ***Description of non-linear estimation and conditional simulation approaches***
 - Multiple indicator kriging.
 - Uniform conditioning.
 - Localised uniform conditioning and multiple indicator kriging.
 - Gaussian based point and direct block conditional simulation methods.
 - Non-parametric simulation.
 - Simulated annealing.
 - Validation and postprocessing.
 - Assumptions behind non-linear methods/conditional simulation and how to choose the appropriate technique.
- ***Review of all common methods for drill hole spacing analysis***
- ***Working with, estimating and simulating non-additive variables e.g. RQD and metallurgical variables.***
- ***Resource classification***
- ***How to add value and prioritise tasks***