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Training Catalog **2024**

Geovariances – Europe, Africa

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About Geovariances

Who we are

Geovariances is a globally recognized provider of premium geostatistics software solutions, consulting, advisory, and training services. Our company was established in 1986 as a spin-off from the Centre for Geostatistics at the Paris School of Mines, and we have been leading the market by continually innovating and employing cutting-edge techniques to provide innovative solutions to real-world problems.

Our unwavering commitment to exceptional reliability and scientific rigor is evident in our exclusive technical partnership with the Centre. We are dedicated to helping mining companies enhance their production performance by integrating premium geostatistics into their business processes. This enables our customers to make well-informed, data-driven decisions by looking at different possible scenarios, better understanding complexities, and mitigating business risks.

At Geovariances, we understand the challenges mining companies face in achieving their production goals while managing risks. That's why we work closely with our clients to tailor our solutions to their needs, ensuring they get the most out of our services. Our team of experts is committed to delivering reliable, rigorous solutions designed to optimize our clients' business processes.

Global offer

Isatis.neo, the powerful and technologically advanced geostatistics software solution from Geovariances, is trusted by industry leaders worldwide for providing high-level insights into mineral resource projects. With an intuitive user interface, pre-configured workflows, and cutting-edge algorithms, Isatis.neo delivers maximum performance and puts the power of geostatistics at your fingertips. Isatis.neo offers the broadest range of estimation and simulation functions available on a single desktop application in the market, emphasizing reproducibility and transparency of results to ensure compliance with audit processes and give customers confidence in making informed decisions.

Geovariances provides comprehensive training in applied geostatistics, and consulting and mentoring services delivered by highly specialized consultants with expertise in resource estimation, risk analysis, estimation routines, and drill hole spacing optimizations. Our services can be conducted on-site, online, or at our offices worldwide, providing our customers with excellent options for quickly acquiring relevant knowledge and practical skills.

For more information about our geostatistics solutions and services, please visit our website at https://www.Geovariances.com/en/technical-resources/.

Travel policy

To ensure the safety of our employees, Geovariances has the following travel policies:

Preference to regular passenger aircraft for travel, and if charter planes are necessary, they must meet a minimum standard of twin-turbo engine with at least two crew members. We reserve the right to refuse travel on planes that do not meet this standard, and any resulting delays will be charged to the customer. We will travel in business class or its equivalent for international flights over six (6) hours.

Rental vehicles must be full-size sedans with ABS brakes and at least four airbags. We may upgrade rental vehicles provided by the customer to meet our minimum standard, and any associated costs must be paid by the contracting party.

The maximum daily driving time is 10 hours, and the contractor will be charged any additional costs associated with complying with this limit. Helicopter flights will be evaluated on a case-by-case basis.

Team

Discover about our experts. Our team members are dedicated professionals with a proven track record of delivering outstanding results in the mining industry. From exploration and resource estimation to project management and optimization, our consultants have the skills and knowledge to help you achieve your goals. Get to know our team and see how we can support your mining projects:

Pedram MASOUSI, MSc. – Senior Consultant in Geostatistics

A geophysicist and geostatistician specializing in mineral resource estimation, domain modeling, and resource classification compliant with the JORC code of mining reporting. His Ph.D. thesis applied machine learning methods to interpret petroleum well logs, and his postdoctoral project applied geostatistics to contamination characterization. He is an expert in the Isatis.neo and Python programming languages and is experienced in teaching numerical methods.

Roberto ROLO, PhD. – Data Science and Resource Expert

A Mining Engineer from UFOP, with a master's and Ph.D. in geostatistics from UFRGS. Expertise in implicit geological modeling, ore grade estimation, and simulation workflows that adhere to international mineral reporting codes. Strongly proficient in Python and machine-learning techniques applied to geosciences.

Jean LANGANAY, Ph.D. – Geostatistician, Data Science Expert, and Scientific Developer

A geoscientist specialized in geological modeling (MSc), and a research engineer with a Ph.D. in mining geostatistics. Strongly skilled in advanced geostatistics and geostatistical algorithm implementation. Experience in mineral resource evaluation and classification, geological modeling, flow simulations in porous media (oil, mineral leaching, pollutant), and uncertainty quantification.

Start your journey in geostatistics

Mineral resource estimation

Learn the fundamental concepts of geostatistics to estimate your resources confidently.

OBJECTIVES

This course is an introductory mining geostatistics course for resource estimation. It is ideal for newcomers to geostatistics or someone wanting a refresher. It covers in detail variography and kriging (including kriging neighborhood analysis).

WHO SHOULD ATTEND

Professionals seeking a sound theoretical and practical knowledge of mining geostatistics.

COURSE CONTENT

- Overview of mineral resource estimation procedures.
- The key advantage of integrating geostatistics: why use it?
- Quantification of grade spatial variability: calculation and interpretation of the variogram (experimental variogram, variogram cloud, variogram map).
- Variogram modeling.
- Kriging (2D/3D). Principles and properties. Map uncertainty.
- Kriging in practice, including Kriging Neighborhood Analysis (KNA) and cross-validation.
- In situ resource estimation.
- Validation

PREREQUISITES

None. This course is an ideal introduction to practical mining geostatistics.
We recommend attending the complementary advanced short course *Recoverable resource estimation* to extend your knowledge.

DURATION

12 hours / 2 days

LEVEL

Fundamental

TYPE

Theory and practice

MODE

Online or in-person course

Open or in-company sessions

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Improve your skills in geostatistics

Drill hole spacing analysis

Master the concepts and practice of drill hole spacing analysis to understand the uncertainties associated with mesh spacing.

OBJECTIVE

Learn to define the relationship between sample spacing and grade uncertainty. The result will help you determine an acceptable drilling mesh based on its uncertainty and the associated production volume. This can be related to the resource classification.

WHO SHOULD ATTEND

This course is aimed at professionals who want to understand the theoretical and practical aspects of drilling spacing based on grade uncertainty.

COURSE CONTENT

- Practical guide to the conditional simulation process using Isatis.neo.
- Risk and uncertainty assessment using conditional simulations.
- Creation of virtual drillholes, with different spacing, from reference models.
- Quantification of grade uncertainty associated with different drill hole spacing.
- Definition of the ideal grid based on the grade uncertainty associated with each drill hole spacing.
- Intensive use of batch files.

PREREQUISITES

This course will address advanced geostatistical concepts. For this reason, it is recommended that participants know variography and kriging.

DURATION

12 hours / 2 days

LEVEL

Advanced

TYPE

Theory and practice

MODE

Online or in-person course

Open or in-company sessions

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Recoverable resource estimation

Be at the forefront of mining geostatistics and learn how to estimate recoverable resources and assess the risks of your mining project using uniform conditioning and multiple indicator kriging.

OBJECTIVES

To acquire solid geostatistical knowledge for mineral resource estimation using non-linear methods for robust recoverable resource estimation and uncertainty analysis.

WHO SHOULD ATTEND

Professionals involved in feasibility studies or medium to long-term planning who wish to deepen their theoretical and practical knowledge of mining geostatistics.

COURSE CONTENT

- Review of linear geostatistics and its limitations.
- Gaussian anamorphosis.
- Support correction: its importance for global recoverable resource estimation.
- Quantification of grade spatial variability: calculation and interpretation of the variogram (experimental variogram, variogram cloud, variogram map).
- Local or global recoverable resource estimation: Localized uniform conditioning (UC and LUC) and multiple indicator kriging (MIK).

PREREQUISITES

Prior knowledge of linear geostatistics is recommended.

DURATION

12 hours / 2 days

LEVEL

Advanced

TYPE

Theory and practice

PRICE

In-company (online):
CAD 4 000/group
USD 3 000/group
Up to 6 attendees

Open session (online):
CAD 1 400/person
USD 1 000/person

* Please ask us the rates if you wish to enroll more than 6 people in in-company courses, for face-to-face sessions, or to use the company data during the training.

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Conditional simulation and grade uncertainty in Isatis.neo

Strengthen your risk assessment skills by learning to implement Isatis.neo simulations on your mineral resource projects.

OBJECTIVES

- To improve understanding of applying simulations for confident uncertainty assessment and risk analysis of your resource projects.
- To get more familiar with using advanced features in Isatis.neo.

WHO SHOULD ATTEND

Professionals who want to improve their skills in Isatis.neo and gain autonomy and confidence to solve practical mining problems using conditional simulations.

COURSE CONTENT

1| OVERVIEW OF ISATIS.NEO MINING TOOLS AND CONCEPTS

- User interface and data management, 3D viewer, reports, calculator.
- Import, statistics, and variographic analysis.

2| GEOSTATISTICAL SIMULATIONS

- Data pre-processing, including Gaussian transformation and declustering.
- Variographical analysis in the Gaussian space.
- Simulations: run Turning Bands and Sequential Gaussian Simulations. Get a set of realizations for regionalized variables.
- Post-processing: learn how to calculate statistics and uncertainties to aid decision-making.
- Simulation validation.

PREREQUISITES

It is recommended that participants already have geostatistical knowledge.

DURATION

6 hours / 1 day

LEVEL

Advanced

TYPE

Theory and practice

MODE

Online or in-person course

Open or in-company sessions

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Geostatistical inputs to resource classification

Learn about geostatistical techniques to assess mineral resource confidence and classify resources.

OBJECTIVE

- Find out about resource reporting and classification according to Mining codes (specific example of JORC).
- Familiarize yourself with the various geostatistical techniques available to assess estimates' confidence levels and their advantages and disadvantages.
- Learn to classify resources using various criteria applied to kriging or simulation results, or advanced techniques.

WHO SHOULD ATTEND

This course is designed for mining professionals who wish to familiarize themselves with the various geostatistical techniques that can be used to assess resource confidence levels and classify mineral resources accordingly.

COURSE CONTENT

- Review of JORC definitions regarding mineral resource classification: Competent Person, inferred-indicated-measured resources, resource reporting, resource classes.
- Resource classification using the kriging neighborhood parameters.
- How to enhance the accuracy of resource estimates through Kriging Neighborhood Analysis and cross-validation to improve confidence levels.
- Resource classification using linear geostatistics: exploration of various classification criteria that can be applied to kriging outputs, such as standard deviation, variance, kriging efficiency, relative variance, variance of estimator, variance of interpolation, and risk index.
- Resource classification using conditional simulations: exploration of various classification criteria that can be applied to simulation outputs, such as conditional variance, relative conditional variance, probability of deviation from the mean, and coefficient of variation.

DURATION

15 hours / 2,5 days

LEVEL

Advanced

TYPE

Theory and practice

MODE

Online or in-person course

Open or in-company sessions

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– Resource classification using advanced quantities such as the global estimation variance, the Spatial Sampling Density Variances (SSDV), and the related specific volume, coefficient of variation, and risk index.

PREREQUISITES

As the course refers to advanced geostatistical concepts, it is strongly recommended that participants have a sound knowledge of variography, kriging, and simulations. Alternatively, participants may have completed the “Mineral Resource Estimation” or the “Conditional Simulation and Uncertainty Analysis in Isatis.neo Mining” training course.

Theory and practice of Multiple-point Statistics with Isatis.neo

Get a complete overview of the theoretical aspects of the Multiple-point Statistics technique and learn how to apply it to geological and soil property modeling.

OBJECTIVES

Multiple-point Statistics (MPS) is a geostatistical simulation technique based on training images. MPS can address many areas like hydrogeology, mining, remote sensing, or hydrocarbon reservoirs. It has its origins in geological facies modeling but can potentially be employed in any field requiring simulating complex spatial variability, categorical or continuous.

The course, developed in collaboration with the University of Neuchâtel, aims to familiarize you with the fundamental aspects of the Multiple-point Statistics approach and give you a hands-on experience through a series of practical exercises on a variety of case studies.

At the end of the course, you will be able to:

- select the appropriate training image according to your knowledge of the study area and the expected results.
- produce realistic subsurface models.
- prepare data and run MPS with Isatis.neo that integrates DeeSse, the advanced MPS code from the Swiss University of Neuchâtel.

WHO SHOULD ATTEND

This course aims at any scientist wishing to delve into MPS: academics, agricultural engineers, air quality engineers, climatologists, environmental consultants and engineers, epidemiologists, foresters, geologists, geophysicists, geotechnical engineers, hydrogeologists, hydrologists, mining resource specialists, reservoir engineers, soil scientists, etc.

COURSE CONTENT

DAY 1 - MORNING

General introduction

- Overview of the geostatistical approach

DURATION

15 hours / 3 days

LEVEL

Intermediate

TYPE

Theory and practice

MODE

Online or in-person course

Open or in-company sessions

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– The underlying concept of training data set and training image
– General principle and introduction to the direct sampling algorithm

Laboratory exercises

– Fundamentals of Isatis.neo
– A first simple application of DeeSse for a stationary case categorical and continuous

DAY 1 - AFTERNOON

From stationary to non-stationary simulation

– Understanding DeeSse parameters
– Requirement of a training image: how to get it and what should be its properties
– Dealing with non-stationarity in the simulation grid
– Multivariate simulations

Laboratory exercises

– A simple practical case study: the Areuse delta
– How to generate a training image and a trend of orientation to control the simulation
– Joint simulation of two variables

DAY 2 - MORNING

MPS using actual data for training

– How to deal with non-stationarity when using analog data
– Discussion of examples, the use of secondary attributes: climate data, bauxite mine in Australia, bedrock topography, and geophysics
– Time-series simulation using the Direct Sampling technique

Laboratory exercises

– A 2D practical case study with secondary variables: the Herten aquifer (fluvioglacial deposit)
– Multivariate, multitemporal satellite image gap-filling

DAY 2 - AFTERNOON

Modeling with elementary training images

– Elementary training images and invariances
– Example of application for a mining site in South Africa
– Multiscale simulations with Gaussian Pyramids

Laboratory exercises

– Simple examples with elementary training images and invariances

– Exploring pyramids
– An initial example with a 2D fluvioglacial facies model (the Herten aquifer)

DAY 3 - MORNING

Laboratory exercises: Modeling a fluvioglacial deposit

– Construction of elementary training images
– Introduction to Python scripting to automatize the tasks
– Construction of the stratigraphical model
– Modeling the fluvioglacial aquifer from borehole data

DAY 3 - AFTERNOON

A glimpse at advanced methods

– Cross-validation
– Multiscale simulations on unstructured grids
– Inequality and block conditioning
– Connectivity conditioning

PREREQUISITES

None.
A theoretical knowledge of geostatistical approaches is a plus.

Machine learning applied to geosciences and mining

Learn the concepts and practices of machine learning applied to the mining industry to assist in decision-making at every phase of mineral resource modeling.

OBJECTIVE

The course aims to familiarize you with Machine Learning techniques so that you will be able to build routines for:

- Optimizing processes by automating lithological classification.
- Definition of geological or geometallurgical domains.
- Advanced exploratory analysis of multivariate databases.
- Adding missing information to heterotopic databases.

WHO SHOULD ATTEND

This course is aimed at professionals who want to acquire theoretical and practical knowledge about Machine Learning and its applications to geosciences and the mining industry.

COURSE CONTENT

- Module I: General aspects of Machine Learning and introduction to the Python language.
- Module II: Unsupervised learning: clustering techniques and data transformations.
- Module III: Supervised learning: predictive models and process optimization in geosciences.

** If you are interested, the course can be compressed into two days if modules II or III are dismissed.

PREREQUISITES

Previous knowledge in statistics, basic geostatistics, and geological modeling is recommended. Basic knowledge of Python is optional.

DURATION

18 hours / 3 days

LEVEL

Intermediate

TYPE

Theory and practice

MODE

Online or in-person course

Open or in-company sessions

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Improve your skills in Isatis.neo

Isatis.neo fundamentals

Learn how to get started with Isatis.neo and quickly get to grips with software use.

OBJECTIVE

Isatis.neo is Geovariances' comprehensive software solution in geostatistics. Designed for every business dealing with spatialized data, the software enables thorough data analysis and visualization, produces high-quality maps and models, and allows you to carry out extensive uncertainty and risk analyses that optimize your decision-making process.

By attending this course, you will:

- Be introduced to Isatis.neo functions for data analysis and estimation.
- Understand how to get started with the software and quickly get to grips with its use.

WHO SHOULD ATTEND

Anyone wishing to gain the skills to start using Isatis.neo with confidence or learn more about the software's many capabilities.

COURSE CONTENT

- Isatis.neo overview: user interface, 3D viewer, calculator (based on Python syntax), and automation workflow.
- Data import: points, block models, and wireframes.
- Data analysis: calculation of various statistical graphs, identification of outliers, anisotropies, trends, and variographical analysis.
- Estimation: kriging neighborhood analysis, kriging, cross-validation, and validation.
- Introduction to conditional simulations of numerical data.

PREREQUISITES

This course is dedicated to practical exercises with Isatis.neo, and no theoretical reminders about geostatistics will be provided. Participants are, therefore, required to have a fundamental knowledge of geostatistics.

DURATION

6 hours / 1 day

LEVEL

Fundamental

TYPE

Practice

MODES

Online or in-person course

Open or in-company sessions

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Isatis.neo scripting

Learn how to capitalize on Isatis.neo's batch and Python capabilities to create repeatable workflows and perform customized calculations.

OBJECTIVE

Isatis.neo is Geovariances' comprehensive software solution in geostatistics. Designed for every business dealing with spatialized data, the software enables thorough data analysis and visualization, produces high-quality maps and models, and allows you to carry out extensive uncertainty and risk analyses that optimize your decision-making process.

By attending this course, you will:

- Learn how to use Isatis.neo's batch functionality to record, reproduce, and automate calculations.
- Learn how to use the embedded Python calculator for more detailed transformation, analysis, or post-processing of your data.

WHO SHOULD ATTEND

Any geoscientist wishing to gain the skills needed to automate their Isatis.neo routines or to build on them with more detailed calculations in Python.

COURSE CONTENT

1 | WORKING WITH BATCH FILES

- Batch structure and recording of software tasks.
- Variables and arrays.
- Control flow. Creating loops for automation over different domains or variables.

2| THE ISATIS.NEO PYTHON CALCULATOR

- General aspects of Python and operating modes within the calculator.

PREREQUISITES

It is recommended that you have some background with Isatis.neo. This can be achieved by completing the Isatis.neo Fundamentals training course. Knowledge of scripting or Python is optional.

DURATION

12 hours / 2 days

LEVEL

Intermediate

TYPE

Theory and practice

MODE

Online or in-person course

Open or in-company sessions

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For any questions or to register, contact us at:

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