Mining Geostatistics
Resource Estimation
Drill Hole Spacing Analysis
Conditional Simulations
Localized Multivariate Uniform Conditioning
Dear Colleagues

Geovariances is proud to present its latest edition of its mining course catalog. The document offers a structured presentation of all training courses dispensed by Geovariances for the mining sector. As usual the catalog offers a blend of software-oriented training sessions revolving around the use of Isatis in particular, and geostatistical training sessions aimed at giving participants a practical handle on key geostatistical notions that impact their day to day activities.

You will notice the presence of new, shorter modules in the catalog. These shorter sessions (1 day, 2 days) are there to provide either a much focused presentation of niche topics that can help practitioners rapidly acquire a high value adding skill (kriging neighbourhood analysis, domain analysis, local uniform conditioning etc.), or propose a high level presentation of key geostatistical processes impacting the resource estimation value chain, as is the case for modules that are destined for technical group leaders, business managers and financial analysts.

That flexibility in the offer is accessible for our world-wide client base that is now serviced from two locations (our head office in Fontainebleau, France and our subsidiary in Brisbane, Australia).

We trust that whichever need you may have for an adapted and pragmatic presentation of important geostatistical concepts you will find the product you’re looking for in this catalog, to help you in the end better manage what remains one of mining companies’ primary resources: what’s in the ground!

Best Regards

Geovariances Deputy Managing Director
**Summary of our offer**

**Geovariances** offers a complete set of high quality training programs in mining geostatistics for beginners and experienced users.

**Geovariances** courses cover basic and advanced Geostatistics and provide participants with plenty of hands-on practice with real mining data. All courses are led by our highly experienced consultants.

**Geovariances** offers public courses around the world and throughout the year in English, French and Spanish. Our consultants also provide in-house training and mentoring focused on your own needs.

**Isatis**, the geostatistical software solution from **Geovariances**, is regarded as the reference in mining geostatistics.

Leading mining and consulting companies around the world rely on **Geovariances** and **Isatis** for genuine expertise in geostatistics.

*Go to Geovariances website clicking through the picture*
Summary

Introductory .......................................................................................................................... 6
  Introduction to Geostatistics for Managers (1 day) ......................................................... 7
  Key Issues in Resource Estimation—Module 1: Data Analysis and Block Kriging (2 days) ................................................................. 8
  Key Issues in Resource Estimation—Module 2: Recoverable Resource and Classification (2 days) ........................................................................ 9

Fundamentals ...................................................................................................................... 10
  Geostatistics for Resource Estimation (5 days) ............................................................... 11
  Geostatistics Fundamentals For Coal Resource Estimation (2 days) ............................ 12
  Drill Hole Spacing Analysis and Product Variability in Coal (1 day) ......................... 13
  Kriging Neighbourhood Analysis (1 day) ..................................................................... 14
  Domain Analysis in Isatis (1 day) ................................................................................. 15

Advanced ............................................................................................................................. 16
  Conditional Simulations (5 days) .................................................................................. 17
  Multivariate Recoverable Resource Estimation (3 days) .............................................. 18
  2D Resource Estimation (2 days) .................................................................................. 19
  Localized Multivariate Uniform Conditioning in Isatis (1 day) .................................... 20
  Geostatistics Approach for Uncertainty Assessment and Resource Classification (1 day) .............................................................. 21

Software ............................................................................................................................ 22
  Best Practice in Isatis (5 days) .................................................................................... 23
  Variography in Isatis (1 day) ....................................................................................... 24
  Scripting and Automatic Procedures in Isatis (1 day) ................................................. 25

Training Calendar ............................................................................................................. 27

Terms and Conditions ..................................................................................................... 29

Our Trainers ....................................................................................................................... 30

Geovariances .................................................................................................................... 32

Contacts ............................................................................................................................ 33
Introductory
This course is aimed at project managers and business decision makers wanting to develop their understanding of the concepts, applications and benefits of geostatistical concepts for mining resource estimation.

By the end of this seminar, participants should have a high level understanding of key geostatistical evaluation concepts.

Key features

This one-day seminar aims at providing attendees with a clear and concise overview of key geostatistical concepts used in mining resource estimation so that they can better appraise the geostatistical work they supervise or receive from external parties. It will provide:

- An understanding of key geostatistical concepts necessary for mining resource estimation
- Do’s and don’ts of geostatistical resource estimation based on practical examples
- An introduction to how to account for project risk

Course content

- Resource estimation theory: the geostatistical framework
- The prevalence of data quality, sound geological interpretation and domaining
- Variography and Kriging
- Metallurgical geomodelling and estimation
- Notion of recoverable resource estimation
- Which model for my deposit?
- How to build simulations and use them
- Scenario analysis and real options

On-line registration


Duration: 1 day

Including: Training material & one full Isatis License valid for one month
The course is aimed at geologists, engineers and project managers who want to consolidate their know-how of Linear Geostatistics.

**Objective**

This module offers a complete insight into how applied geostatistics can provide a rigorous approach to in-situ resource estimation procedures from mining data analysis to block kriging. This seminar may be complemented by a second module (see page 9) that delves into some of the most advanced geostatistical techniques, giving hints and pitfalls on how to use them. The second module includes an additional day for practising on real data with Isatis (workshop format).

**Key features**

The course offers an optimum blend of theoretical concepts and examples demonstrating the results of these methods using Isatis software. No Isatis manipulation of the software is required from the participants.

**Course content**

- Expert tools for data analysis: border effects and contact analysis
- Data compositing
- Top Cut Analysis
- Kriging Neighbourhood Analysis, Ordinary Kriging vs Simple Kriging
- Defining an adapted Estimation Strategy (2D-3D)

**On-line registration**


**Duration:** 2 days

Including: Training material & one full Isatis License valid for one month
The course is aimed at geologists, engineers and project managers who want to consolidate their know-how of Geostatistics beyond variograms and kriging.

Key features

The course offers an optimum blend of theoretical concepts and examples demonstrating the results of advanced geostatistical methods implemented using Isatis software. No Isatis manipulation of the software is required from the participants except for the final day (workshop).

Course content

- Which model for Multiple Indicator Kriging (MIK) or Uniform Conditioning (UC)
- Multiple Indicator Kriging (MIK) practice
- Global recoverable resources: support and information effects
- Local recoverable resources with Uniform Conditioning (multivariate case);
- Localization post-processing
- Resource Classification from simple criteria to confidence intervals from simulations
- One day dedicated to a workshop on users data with Isatis

The first part of this short course Key Issues in Resource Estimation Module 1: Data Analysis and Block Kriging covers the fundamental concepts of geostatistics for in-situ resource estimation and provides an ideal basis for this Module 2. (see page 8)

On-line registration


Duration: 2 days

Including: Training material & one full Isatis License valid for one month
Fundamentals
This course is aimed at geologists, engineers and people who want to learn mining geostatistics fundamentals, seeking a sound theoretical and practical knowledge of the discipline.

Get acquainted with the essential concepts of mining geostatistics.

Key features

This course is an introductory mining geostatistics course with advanced topics. It is ideal for newcomers to geostatistics or for someone wanting a refresher. It covers in detail variography and kriging (univariate and multivariate) and recoverable resource estimation (Simulation, Uniform Conditioning and indicator approaches).

- Fundamental geostatistical concepts
- Demonstrations and examples using Isatis
- Plenty of hands-on exercises with Isatis to reinforce and explore concepts.

Course content

- An introduction to mining geostatistics: what is geostatistics and why use it?
- The framework for geostatistics
- Geostatistical concepts
- The limitations of classical statistics
- Spatial data analysis: experimental variograms, clouds, maps
- Variogram models
- The theory and properties of kriging
- Kriging in practice
- Multivariate geostatistics
- In situ resource estimation
- Global and local recoverable resource estimation
- Conditional Simulation
- Mini-project: Using geostatistical techniques in an exploration, evaluation or production study

On-line registration

GEOSTATISTICS FUNDAMENTALS FOR COAL RESOURCE ESTIMATION

Who should attend
This course is aimed at resource geologists and project managers wanting to develop their understanding of the concepts, applications and benefits of geostatistics in coal resources.

Objective
Find out the benefits of geostatistical methods applied to coal resource estimation.

Key features
- Fundamental geostatistical concepts explained in a clear and concise way
- Demonstrations and examples using Isatis
- Hands-on exercises to reinforce concepts and gain autonomy

Course content
- An introduction to coal mining geostatistics: what is it and why use it?
  - In which framework do we use geostatistics
  - Geostatistical concepts
  - Classical statistics and their limitation
- Spatial data analysis
  - Experimental variograms, clouds, maps
  - Variogram modeling
  - Domaining
- Resource estimation
  - Kriging
  - Glimpse at multivariate geostatistics
  - Introduction to uncertainties

On-line registration

Duration: 2 days
Including: Training material & one full Isatis License valid for one month
**Who should attend**

This course is aimed at resource geologists and project managers wanting to gain confidence in their drilling plan, using their data to define a spacing meeting their quality and classification expectations.

**Objective**

Learn how a drill hole spacing can be defined from your data using your quality and classification standards to quantitatively defend your classification decisions.

**Key features**

This 1-day course offers a complementary understanding of the use of geostatistics in coal mining to the course "Geostatistics Fundamentals for Coal Resources". This course is a great introduction to discover how you can gain confidence in your JORC declaration.

Learn how a drill hole spacing can be defined from your data using your quality and classification standards to quantitatively defend your classification decisions.

**Course content**

- A refresher to coal mining geostatistics: Spatial Analysis, Variography, Domaining and Kriging
- Drill Hole Spacing Analysis

**On-line registration**


**Duration:** 1 day

Including: Training material & one full Isatis License valid for one month
Kriging Neighborhood Analysis

Who should attend

This course is aimed at resource geologists wanting to develop their understanding of the concepts, applications and benefits of quantitative kriging neighborhood analysis.

Objective

Learn how to optimize estimation search neighbourhoods.

Key features

This 1-day course is a sound and complete presentation to the notion of quantitative optimisation of estimation search neighbourhoods.

Defining a neighbourhood for estimation involves specifying the orientation and dimensions of the three dimensional volume used to select the samples used in estimation as well as specifying the actual number of samples to be utilised in the estimation process.

Correctly defined search neighbourhoods are essential to the estimation process as they help reduce the risk of conditional bias (overestimation of high grades and underestimation of low grades). The course looks at how the quantitative measures provided by the geostatistical framework to quantify the quality of estimation may be used to help optimise the definition of the search neighbourhoods.

Course content

- An ultra rapid reference on linear geostatistics
  - Exploratory Data Analysis
  - Experimental Variography
  - Variogram Modeling

- Using the variogram model to optimise:
  - The block size
  - The orientation and dimensions of search volumes
  - The number of samples

- Automation of testing and reporting in Isatis
  - Journal Files
  - Summary Graphs

On-line registration


Duration: 1 day

Including: Training material & one full Isatis License valid for one month
**Domain Analysis in Isatis**

**Who should attend**

This course is aimed at resource geologists wanting to gain an appreciation of how the geostatistical framework can help validate their domaining decisions.

**Objective**

Understand the use of geostatistics as a tool to question and validate the domaining decisions taken to guide the estimation process.

**Key features**

This 1-day course offers a complementary understanding of the use of geostatistics as a tool to question and validate the domaining decisions taken to guide the estimation process.

Exploratory Data Analysis (‘EDA’) refers to the various geostatistical analyses used to describe the spatial and statistical characteristics of a variable’s underlying distribution. EDA may include univariate or multivariate analysis, and/or plotting of histograms, base maps, scatter plots, Q-Q plots, h-scatter plots, variograms, variogram maps, etc.

EDA is used to help validate the domaining decisions underlying the production of a resource estimate.

Border effect and Contact Analysis are complementary tools used to help qualify how these domains should be treated at estimation stage (hard/soft boundary, definition of transition domains etc.).

**Course content**

- **Exploratory Data Analysis:**
  - Univariate or multivariate analysis,
  - Plotting of histograms
  - Base maps
  - Scatter plots
  - Q-Q plots
  - H-scatter plots
  - Variograms
  - Variogram maps, etc

- **Contact Analysis**

- **Border Effect**

**On-line registration**


**Duration:** 1 day

Including: Training material & one full Isatis License valid for one month
Advanced
**Conditional Simulations**

**Who should attend**
This course is aimed at geologists, engineers and others seeking a sound theoretical and practical knowledge of conditional simulation for mining applications.

**Objective**
Gain a sound understanding of the concepts and techniques of conditional simulations for application to common mining issues.

**Key features**
Geostatistical simulation techniques provide robust and valuable tools for helping to solve mining problems associated with risk and uncertainty. This course will provide you with a sound understanding of the concepts and techniques of conditional simulation for application to common mining issues, whatever your software package.

This course is focused on mining issues:
- Simulation for continuous and categorical variables
- Simulation concepts and theory explained in a clear and concise way
- Demonstrations and examples using Isatis
- Plenty of hands-on exercises with Isatis to reinforce and explore concepts

**Course content**
- **Reminders of linear and non-linear geostatistics and their role in assessing uncertainty**
  - Dispersion variance
  - Change of support
  - Information effect
- **Simulating continuous variables:**
  - Turning bands
  - Sequential Gaussian simulation
- **Simulating categorical variables:**
  - Sequential indicator,
  - Truncated Gaussian and pluri-Gaussian simulation
- **A comprehensive guide to simulation using Isatis**
- **Case studies**
  - Assessing risk and uncertainty of grade estimates
  - Optimising sampling strategies
  - Tools for grade control

**On-line registration**

**Duration:** 5 days
Including: Training material & one full Isatis License valid for one month
**MULTIVARIATE RECOVERABLE RESOURCE ESTIMATION**

**Who should attend**
Managers, resource and exploration geologists and mining engineers involved in feasibility studies or medium to long term planning.

**Objective**
To be at the forefront of mining geostatistics and learn how to improve your resource evaluation with innovative multivariate non-linear geostatistics.

**Key features**
This advanced course focuses on multivariate extension for recoverable resource estimation.

These new tools include:

- **Multivariate Uniform Conditioning** to compute metal and ore tonnages for secondary variables with cut off applied to the primary variable.

- **Direct Block Simulation** which opens new opportunities for applying simulations thanks to an outstanding reduction in computing time.


This course deals with the [extension of change of support model](http://www.geovariances.com/en/mining-quantifying-risk-and-uncertainty-with-geostatistical-simulations-co244) (discrete gaussian model) to multivariate case and its application to:

- Fundamental multivariate non-linear geostatistics concepts
- Global recoverable resource calculation
- Local recoverable resources estimation by Uniform Conditioning
- Direct block simulation with Turning Bands methods.
- Demonstrations and examples using Isatis

**Course content**

- **Day 1**
  - Reminders on non-linear Geostatistics
  - Gaussian Anamorphosis
  - Support Correction
  - Information Effect

- **Day 2**
  - Multivariate Uniform Conditioning

- **Day 3**
  - Direct Block Simulations used in the framework of the Discrete Gaussian Model

**Duration:** 3 days
Including: Training material & one full Isatis License valid for one month

2D RESOURCE ESTIMATION

Who should attend

This course is aimed at resource geologists and mining engineers wanting to develop their understanding of the concepts, applications and benefits of 2D Estimation.

Objective

Narrow vein precious metal deposits (Gold, Silver), tabular deposits (Manganese, Coal, Bauxite, Uranium…) are by definition geometries where one dimension (across strike) plays a particular role as its order of magnitude is smaller than the other two (along strike and down dip) and generally not amenable to selective mining. In these situations, resorting to sound 2D estimation proves particularly adapted to produce robust estimates to evaluate the mining project.

Several aspects must then be considered: preparation of the dataset, generation of the estimates and localisation of the results in 3D.

Key features

The course focuses on all aspects specific to the geostatistical resource estimation of 2D geometries (definition of the study variables, variography, estimation set-up, neighbourhood analysis) with minor emphasis on the geometrical aspects of the problem.

Practical application will be illustrated using Isatis software and a tutorial based on real mining data set.

Course content

- Refresher on linear geostatistics
  - Exploratory data analysis
  - Variography and linear estimation
- Definition of the study variables and estimation
- Defining Ore thickness and Accumulation variables
- Exploratory data analysis to decide on the estimation strategy:
  - Independent kriging of the study variables;
  - Co-kriging of study variables; or
  - Approximation via kriging of thickness and residuals.
  - Variography and estimation
  - Reconstruction of grade estimates and standard deviation
  - Mapping of results
- Automation of testing and reporting in Isatis
  - Journal Files

On-line registration


Duration: 1 day

Including: Training material & one full Isatis License valid for one month
**Localized Multivariate Uniform Conditioning in Isatis**

**Who should attend**

Resource geologists, exploration geologists and mining engineers involved in feasibility studies or medium to long term planning.

**Objective**

Get a sound understanding of the Uniform Conditioning concepts for application to recoverable resource estimation.

**Key features**

Multivariate Uniform Conditioning allows the recoverable resource estimation of main and secondary minerals according to a cut-off applied to the main economic mineral. This course aims at handing out at understanding of the methodology and benefits of Uniform Conditioning through its application in Isatis. Univariate and multivariate uniform conditioning coupled with localisation of the results will be addressed during the session.

This course is based on exercises using case studies provided in the release of Isatis.

**Course content**

- **Theory**
  - A succinct reminder of the theory behind uniform conditioning will be addressed

- **Application in Isatis**
  - Hands-on exercises
  - Global workflow
  - Good practices
  - Batch procedures
  - Last innovations

**On-line registration**


**Duration:** 1 day

Including: Training material & one full Isatis License valid for one month
**Geostatistics Approach for Uncertainty Assessment and Resource Classification**

**Who should attend**

The course is aimed at geologists, engineers and project managers who want to deeply understand what is really at stake in reporting resources and gather practical information on geostatistical capabilities in that matter.

**Objective**

Understand in one day what is really at stake in reporting resources and gather practical information on geostatistical capabilities in that matter.

**Key Features**

At the different stages of the resource evaluation of mining projects, the best estimates of tonnages and grades from the available drill holes data have to be delivered. It is also required to attach to these estimates indications of their confidence. Geostatistical models are developed in a probabilistic framework, so they are particularly adapted to offer a satisfactory solution to that issue, keeping in mind the following:

- One cannot be satisfied by only using criteria based on kriged blocks estimates, like the kriging variance because of the difficulty of combining them on bigger volumes.
- What shall we do when non-linear estimates like MIK or UC are used to estimate tonnages and grades above cut-offs but do not provide error variances?

The close link between the resource classification and the support is a key point that cannot be ignored. Additional efforts must be made to obtain meaningful confidence intervals at different scales. Practical solutions to calculate confidence intervals from Gaussian transforms or from conditional simulations are presented and discussed.

**Course content**

- Geostatistical measures of the quality of kriged block estimates;
- Uncertainty on recoverable resources estimates;
- How to report resources according to mining code;
- Resource classification from simple criteria to confidence intervals from simulations.

**On-line registration**


**Duration:** 1 day

Including: Training material & one full Isatis License valid for one month.
Software
This course is aimed at geologists, engineers and others seeking a comprehensive overview of the essential geostatistics tools available in Isatis. Gain the skills you need to start using Isatis with confidence for your essential tasks in mining geostatistics.

Key features

Isatis provides a complete set of geostatistical tools and powerful 3D graphics for analyzing, interpreting and modeling your data. This course will teach you how to use Isatis for the essential tasks in Mining Geostatistics, from data analysis to grade estimation, but also how to go beyond and apply non-linear geostatistics for resource evaluation.

This course, Taught by experienced practitioners, is based on practical exercises using Isatis and real mining data.

Course materials (documentation, journal files, training data, worked examples) for use in your work place.

Course contents

- Overview of Isatis tools and concepts
  - User interface and data management
  - Data import
  - Use of wireframes
  - Data compositing, de-clustering
  - Working with block models
  - 3D viewer
  - Batch capabilities with journal files

- Data analysis
  - Classical statistics and analysis tools
  - Computing experimental variograms, maps and clouds
  - Variogram modelling

- Estimation
  - Neighbourhood analysis
  - Ordinary Kriging
  - Evaluating the results

- Introduction to Recoverable Resource Estimation
  - Change of support models
  - Conditional Simulations (TB, SGS)
  - Post-processing
  - Indicator Kriging and Uniform Conditioning
  - Reporting

Duration: 5 days

Including: Training material & one full Isatis License valid for one month

On-line registration

VARIOGRAPHY IN ISATIS

Who should attend
The course is aimed at geologists and engineers who want to consolidate their know-how in Isatis for variography (experimental, modelling, validation).

Objective
This one-day course is aimed at giving participants a detailed presentation of experimental variography and variography modelling capabilities of Isatis. A strong focus is placed on the practical choice of parameters and illustrated with applications on real data.

Key features
The course offers an optimum blend of theoretical grounding and practical exercises on real mining data using Isatis software. The art of variography should be more accessible and embedded in a coherent resource modelling perspective at the end of the session.

Course content
- Ultra rapid refresher on geostatistical framework;
- Experimental variography: 2D and 3D calculations demystified;
- The importance of domaining re-emphasised;
- Impact of clustering on experimental calculations;
- Impact of extreme values;
- Inference of nugget effect;
- Gaussian transforms;
- Variogram modelling;
- Cross-validation; and
- Multivariate models.

On-line registration

Duration: 1 day
Including: Training material & one full Isatis License valid for one month
SCRIPTING AND AUTOMATIC PROCEDURES IN ISATIS

Who should attend
This course is aimed at Isatis users seeking a comprehensive overview of the different scripting procedures in Isatis.

Objective
Gain the skills you needed to build efficient automatic workflows and audit trails in Isatis.

Key features
Isatis provides a complete set of geostatistical applications and tools for analyzing, interpreting and modeling your data. Even more, it offers an integrated environment in which all operations can be combined in automatic procedures that make it easy to set-up production workflows, automate their execution and efficiently update models.

Also, task workflows can be saved in Audit files allowing full traceability of the computations. Sequence scripting is achieved through Isatis powerful batch processing capabilities making use of “journal files” which memorize the different steps and parameters of your working session.

This course will teach you how to build efficient automatic procedures for Isatis and gain productivity in your day-to-day work.

This course, taught by experienced practitioner, is based on simple exercises using Isatis and synthetic data.

Course contents
- Journal file recording
- Journal file editing
- Key words usage
- “If, else” conditional actions
- Loop actions
- Questions and other Run options
- Journal file templates
- Exploratory Data Analysis and Automatic Variogram Fitting in batch
- Graphics & Displays

On-line registration

Duration: 1 day
Including: Training material & one full Isatis License valid for one month
Check [www.geovariances.com](http://www.geovariances.com) for up-to-date course offerings.

All Geovariances training sessions listed below are in English, unless otherwise specified.

<table>
<thead>
<tr>
<th>Course heading</th>
<th>Location</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Geostatistics for Managers</td>
<td>Avon, Fr</td>
<td>June 27</td>
</tr>
<tr>
<td>Key Issues in Resource Estimation Module 1: Data Analysis and Block Kriging</td>
<td>Avon, Fr</td>
<td>June 16-17</td>
</tr>
<tr>
<td></td>
<td>Johannesburg</td>
<td>June 17-18</td>
</tr>
<tr>
<td>Key Issues in Resource Estimation Module 2: Recoverable Resource and Classification</td>
<td>Avon, Fr</td>
<td>June 18-19</td>
</tr>
<tr>
<td></td>
<td>Johannesburg</td>
<td>June 19-20</td>
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<tr>
<td>Geostatistics for Resource Estimation</td>
<td>Lima (in spanish)</td>
<td>June 23—27</td>
</tr>
<tr>
<td>Geostatistics Fundamentals for Coal Resource Estimation</td>
<td>Brisbane</td>
<td>June 9—10</td>
</tr>
<tr>
<td></td>
<td>Newcastle, Au</td>
<td>August 18-19</td>
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<tr>
<td>Drill Hole Spacing Analysis and Product Variability in Coal</td>
<td>Brisbane</td>
<td>June 11</td>
</tr>
<tr>
<td></td>
<td>Newcastle, Au</td>
<td>August 20</td>
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<tr>
<td>Kriging Neighborhood Analysis</td>
<td>Perth</td>
<td>May 7</td>
</tr>
<tr>
<td></td>
<td>Mount Isa</td>
<td>June 6</td>
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<tr>
<td></td>
<td>Kalgoorlie</td>
<td>August 6</td>
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<td></td>
<td>Perth</td>
<td>September 5</td>
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<tr>
<td></td>
<td>Sydney</td>
<td>November 5</td>
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<tr>
<td></td>
<td>Melbourne</td>
<td>December 3</td>
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<td>Course heading</td>
<td>Location</td>
<td>Date</td>
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<tr>
<td>Domain Analysis in Isatis</td>
<td>Perth</td>
<td>May 5</td>
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<td>Mount Isa</td>
<td>June 4</td>
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<td>Avon, Fr</td>
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<td>Kalgoorlie</td>
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<td></td>
<td>Melbourne</td>
<td>December 1</td>
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<tr>
<td>Conditional Simulations</td>
<td>Perth</td>
<td>August 11-15</td>
</tr>
<tr>
<td>Multivariate Recoverable Resource Estimation</td>
<td>Avon, Fr</td>
<td>June 23—25</td>
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<td>Johannesburg</td>
<td>June 23—25</td>
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<tr>
<td>Geostatistics approach for uncertainty assessment and resource classification</td>
<td>Avon, Fr</td>
<td>June 26</td>
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<tr>
<td>Variography in Isatis</td>
<td>Perth</td>
<td>May 6</td>
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<td>Mount Isa</td>
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<td>Sydney</td>
<td>November 4</td>
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<td>Perth</td>
<td>November 28</td>
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<tr>
<td></td>
<td>Melbourne</td>
<td>December 2</td>
</tr>
<tr>
<td>Scripting and Automatic Procedures in Isatis</td>
<td>Perth</td>
<td>May 8</td>
</tr>
</tbody>
</table>
Terms and conditions

Registration Fees
Class fees include one set of course materials and one full Isatis License valid for one month.

Attendees are invited to use their own laptop for computer exercises. A temporary demo version of ISATIS will be freely supplied by GEOVARIANCES for this purpose.

For courses to be held in GEOVARIANCES only, if you are unable to bring your own laptop during the training session, be sure to inform your sales contact and GEOVARIANCES will provide you with a computer as far as possible.

Please note that admission will be only confirmed on receipt of your formal purchase order and after full payment.

Payment
Geovariances will invoice your company for the approved course cost amount in full unless cancellation notice has been given 10 working days before the course date.

Payment is required prior to the course to confirm the registration.

Payment options: credit card (American Express is not accepted - please provide with your card details) or wire transfer to BRED Fontainebleau HDV - IBAN number: FR76 1010 7003 2700 0302 7055 623.

Venue
Courses can be organized in or outside GEOVARIANCES premises (hotel, client premises). Please refer to the course description for more details.

Training hours are from 9:00 am to 5:00 p.m. unless otherwise specified.

Accommodation
Fee does not cover hotel accommodation. Attendees should make their own reservations directly (for courses to be held in GEOVARIANCES, see the included hotel list).

Cancellation
No refund will be made for cancellation notified by a registered participant to GEOVARIANCES within 2 weeks (10 working days) prior to the course or for ‘no shows’.

Attendee can be substituted.

Geovariances reserves the right to cancel a session if the minimum number of registrations is not reached and to schedule an additional session if the number of registrations is in excess of the maximum number of attendees.

Queries
Should you have any question or need further information, feel free to contact us.
Our trainers

Dr Jacques DERAISME, Scientific Adviser - Principal Consultant

Jacques co-founded Geovariances and has almost 40 years experience in mining geostatistics. He is presently Scientific Adviser & Principal Consultant. After graduating as a Mining Engineer (Ecole des Mines de Nancy, 1969) he worked from 1972 to 1986 at the Centre de Géostatistique de l’Ecole des Mines de Paris where PhD research focused on stochastic and mining simulations. Jacques has conducted numerous geostatistical studies world-wide and has extensive experience in technical management and targeted geostatistics training for Oil & gas or Mining industries. Jacques provides technical input to develop systems and processes for incorporating geostatistics into resource modelling procedures and processes and provides specialist QA/QC expertise.

Olivier Bertoli, Consulting and Training Manager

Olivier’s high-level training in applied mathematics, mining engineering and Geostatistics from Mines ParisTech is broadened by 15 years practical experience as a professional geostatistician. These include five years as technical director of Tenzing Pty Ltd. Olivier who specializes in staff training in the form of hands-on co-piloting sessions, has specific expertise in advanced Geostatistical modeling including non-linear methods, conditional simulations, multivariate analysis and non-stationary modeling. Olivier also has extensive experience in the application of Geostatistical techniques to coal resource modeling, gained through project work for Anglo Coal, BMA, BHP Billiton, Rio Tinto and Xstrata Coal since 2003.

Lucia ROBLES-STEFONI, Consultant

Lucia is a mining engineer from the University of Chile, with a master of mining engineering from McGill University (Canada). Whilst being active as a young mining professional since 2006 Lucia has been involved in several applied research projects including one on the critical analysis of multiple-points statistics methods applied to the simulation of Diamond Pipe geometries carried out in 2009. Lucia has a strong background in geostatistics, ore reserve evaluation, risk analysis and mine planning. She acquired work experience in Canada and important mining operations in Peru and Chile. She is fluent in English, Spanish and French. Beside her strong knowledge of Isatis, she has a working knowledge of mining software (Geomodel, Miner, GEMCOM, GEMS, Datamine and Whittle).

Christophe Bessin, Consultant

Christophe is a geologist engineer with a master in Raw Material Management from the Ecole Nationale Supérieure de Géologie de Nancy. He joined Geovariances in 2012. He learned the use of Isatis in Kazakhstan while working on the estimation of a polymetallic deposit. Christophe contributes to Mining consulting projects and trainings.
Our trainers

**Clare Mawdesley, Resource Evaluation, Principal consultant**

Clare has 18 years experience in mining geology, planning and geotechnical engineering roles. She has specific expertise in geotechnical and geological characterization, numerical modelling, and medium to long-term mine design and scheduling.

Clare has a B.Eng (Hons) in Geological Engineering from RMIT University and a PhD from the University of Queensland. Her PhD work involved the application of a statistical approach to evaluate and improve empirical design methods for predicting instability and caving. She is a member of the AusMM and AIG.

**David BARRY, Consultant, Resource Evaluation**

David joined the team in February 2009 as a specialist Mathematical Analyst. David obtained a BSc with Honours at the University of Queensland, achieving First Class Honours and being awarded a University Medal. On completion of this degree he undertook a Master of Philosophy degree in Physics.
Geovariances is a French independent software vendor, world leader in Geostatistics. It was founded in 1986 by three engineers from the Geosciences Research Department/Geostatistics Group at Mines ParisTech.

Geovariances has developed a real know-how and a professional expertise confirmed by more than 25 years of experience in applying geostatistics to address mine exploration, oil exploration or environmental issues.

The company develops and sells two software packages: ISATIS, the industry benchmark software for geostatistics and KARTOTRAK, integrated software solution for contaminated site characterization.

Geovariances primary strength is its human resources. Our consultants are versatile highly qualified and experienced engineers offering the industrial solutions our customers need. They also provide training programs in geostatistics for beginners and skilled geostatisticians.

Geovariances is tailored to its customers' needs constantly improving its software products and technology. The company invests in research and development through research consortia or partnerships with research leaders in their respective industries. In addition to the collaboration agreement with Mines ParisTech for the development of ISATIS, it has partnered with CEA to develop KARTOTRAK.

Geovariances is responsible of the implementation of many significant technical advances over the past 25 years and provides regular contributions to international industry and academic conferences and journals.

Geovariances current CEO is Yves Touffait. Geovariances headquarter is based in Fontainebleau. The company has also an office in West Perth (Australia) and a representative in Brazil.

**Key figures:**

- Number of employees : **40**
- **1 subsidiary office** in Australia
- Turnover : **+5 M€**
- **+500** company customers over the world
- **+3500** software users over the world

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