

# Mining CFSG

"Cycle de Formation Spécialisée en Géostatistique"  
Post-graduate training program – Degree program



Learn best practices in mining geostatistics  
and become operational after 5 weeks course

**Face-to-face** May 31 – July 2, 2021

**Online** July to December 2021

**Learn, practice and return to work** with a solid understanding of the theory and application of geostatistics for resource estimation. Come with your data and leave with results.

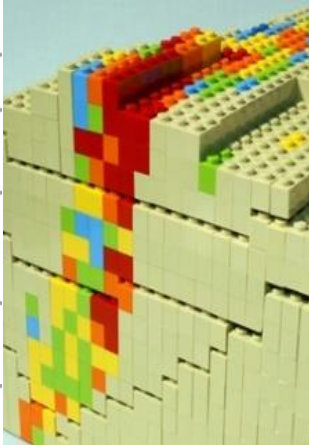
**Develop your skills in a few weeks.** Quickly get the technical level required to build the block models that your company needs for confident mine planning. Expand your know-how by exploring original techniques.

**Benefit from the label *Ecole de Géostatistique de Fontainebleau*.** It means that you get the support of top-level geostatisticians who gained their know-how from decades of experience working for major mining companies worldwide.



**Mining Geostatistics** – a particular branch of *spatial statistics* – aims at predicting valuable quantities from partial information like grades measured or facies observed at samples along drillholes. The main issue is the *block model*, which guides the mining process throughout the mine life.

## Block modeling, at the heart of mining geostatistics practices

Sorting in units, facies or mineralogy classes		Predicting metallurgical recovery
Designing envelopes		Predicting rock strength
Quantifying geological uncertainty		Accounting for extreme values
Evaluating global and local resources above cutoffs		Accounting for directionality of measurements in geotechnics
Predicting several grades (e.g. copper, gold)		Optimizing open pit design
Analyzing sensitivity to sampling		

## Choice of format

### ■ Face-to-face classroom – 5 consecutive weeks

**Mornings:** methods and supported theory.

**Afternoons:** practice with Geovariances' **Isatis.neo Mining Edition** on a provided case study supervised by a senior geostatistician.

**Tuesday evenings and Fridays:** dedicated to the attendee's individual specific case study.

### ■ Online classroom – One week per month for 5 months – Four 1,5-hour time slots per day.

Sessions alternating theory and practice with Isatis.neo. Held the first week of each month (no course scheduled in September).

Homework on the course case study between training weeks.

## Course content

Main techniques covered	Week 1 Fundamentals I	Week 2 Fundamentals II	Week 3 Global and local resources I	Week 4 Global and local resources II	Week 5 Advanced methods
Acquired practices	Block model for a monometallic deposit	Block model for a multi-element deposit, accounting for the geology	Block model using stochastic outcomes of geology and grades	Recoverable resource calculation for selective mining	<ul style="list-style-type: none"> <li>– Extreme values</li> <li>– Open-pit optimization</li> <li>– Geological unit layout</li> <li>– Directionality and geotechnics</li> </ul>
Methods	<ul style="list-style-type: none"> <li>– Univariate analyses</li> <li>– Variogram calculation and modeling</li> <li>– Stationary and non-stationary kriging</li> </ul>	<ul style="list-style-type: none"> <li>– Multivariate analyses</li> <li>– Cokriging</li> <li>– Indicator geostatistics</li> <li>– Transition analysis</li> <li>– Geology and grade estimation</li> </ul>	<ul style="list-style-type: none"> <li>– Gaussian anamorphosis</li> <li>– Multigaussian simulation by spectral and turning bands methods</li> <li>– Plurigaussian simulation</li> </ul>	<ul style="list-style-type: none"> <li>– Selectivity</li> <li>– Change of support</li> <li>– Information effect</li> <li>– Conditioning Expectation</li> <li>– Uniform Conditioning</li> </ul>	<ul style="list-style-type: none"> <li>– Top cut modeling</li> <li>– Disjunctive kriging</li> <li>– Multi-pit methods</li> <li>– Potential methods</li> <li>– 5D geostatistics for geotechnical variables</li> </ul>

**The course content is identical for face-to-face and online sessions. Face-to-face training:** The 5-week program can be extended by 1 or 2 additional weeks if the attendee's individual case study requires it. **Online training:** Course case study only, no individual specific project will be carried out. Point-based reward system.

## CFSG

Since 1979, the *Cycle de Formation Spécialisée en Géostatistique* (CFSG) has been a reference training program for the mining industry professionals to learn how to apply this set of concepts, tools, methods and practices incepted by Georges Matheron and his team in the 60's - the prestigious **Ecole de Géostatistique de Fontainebleau** - a discipline which has spread all over the world.



Georges Matheron  
1981, Fontainebleau

After 40 years and 400 attendees from around the world, the CFSG format changes to better meet today's needs of the mining industry. It is now reduced to five weeks and attendees will develop an individual case study all along this period. This case study could typically be grade estimation for long or short-term mine planning block model.

## WHO SHOULD ATTEND

To make this training beneficial, it is highly recommended to have knowledge in geology or mining engineering.

Course sessions, guidance and case study tutorials will be delivered in English. You will also be given a reference book either in English, French or Spanish.