

Training Opportunities for 2024

Resource Modeling Solutions Ltd. in partnership with the Centre for Computational Geostatistics (CCG) have developed two public training opportunities for 2024: (1) a series of short course modules that will be streamed online, and (2) an advanced four day in-person training session.

Online Modules

Three hours of lectures, and two hours of pre and post course material including data and complete solutions will be provided for each module. The lectures will be presented live from 8:30 to 12 noon Mountain time. Each participant will have access to the recorded lecture for personal use. *See detailed syllabus at end of document.*

May 17	Introduction: high level overview of modern geostatistics including workflows
May 31	EDA and outliers: exploratory data analysis including multivariate and outlier management
June 14	Variograms: calculation, interpretation, and modeling for continuous and categorical variables
July 12	Kriging: estimation including validation and setup for different model applications
August 2	Simulation fundamentals: Gaussian background, normal score transform, simulation

In Person Workshop

Four full days of lectures and hands-on sessions are planned. These will be presented in Calgary, Alberta, Canada by senior staff. Optional pre course and post course materials will be made available. Participants with basic geostatistics training and some experience will gain the most from these in person sessions. *See detailed syllabus at end of document.*

September 30	Practical simulation: simulation with a trend, parameter uncertainty, multiple variables and categories
October 1	Workflows: simulation workflows for disseminated porphyry and tabular deposits
October 2	Classification and drillhole spacing workflow: optimize drill hole spacing with local factors and VOI
October 3	Machine learning for geometallurgical modeling: practical techniques and applications

Pricing

Case study examples using the Resource Modeling Solutions Platform (RMSP) software, including a temporary license for participants to run the workflows after the class are provided. A series of pre-recorded and optional videos that introduce Python and RMSP, will be provided to all course attendees.

The pricing per online module is CAD \$500. The pricing per day for the in-person workshop is CAD \$1000. The following discounts are cumulatively applied:

Early Registration (by April 12, 2024)	10%
RMSP Licensee	20%
CCG Member	10%

Contact Resource Modeling Solutions at contact@resmodsol.com with any questions. Detailed course descriptions and course registration are available at <https://resourcemodelingsolutions.com/training>

Terms

To cancel your registration, please email support@resmodsol.com. Resource Modeling Solutions Ltd reserves all rights regarding courses and may cancel registrations at our discretion. In the event of a canceled course or registration, Resource Modeling Solutions Ltd will issue a 100% refund for course fees but is not responsible for any other fees incurred by registrants.

Online Modules: Syllabus

Introduction: high level overview of modern geostatistics including workflows for long range resources, drill hole spacing and classification, grade control and geometallurgical modeling. This is suitable for a wide audience including managers, staff from other disciplines who want to know about geostatistics and those that want a refresher.

EDA and outliers: exploratory data analysis including multivariate and outlier management, statistical displays and summary statistics for univariate and multivariate continuous and categorical variables. Outlier management by visual, statistical and geostatistical simulation based methods are presented with examples.

Variograms: calculation, interpretation, and modeling for continuous and categorical variables. The practical steps to obtain a geologically realistic and suitable variogram for all required variables are covered. Combining general geological knowledge with sparse drill data for the best possible variogram is reviewed. Change of support will be summarized.

Kriging: estimation including validation and setup for different model applications (implicit modeling/visualization, final estimates/ore control, interim estimates/resource models, and probabilistic prediction). The theory will be briefly reviewed. Attention will be given to practical application, parameter selection and validation of the results. Measures of performance are reviewed.

Simulation fundamentals: the fundamental principles of simulation and, in particular, Gaussian simulation are covered including prerequisite steps such as the normal score transform. Unconditional simulation and conditioning by kriging are presented. Alternative implementations such as turning bands, sequential, and spectral will be reviewed.

In Person Workshop: Syllabus

Day 1 – Practical simulation: trend modeling and removal for the simulation of non-stationary variables has emerged as a staple of modern geostatistics. The theory, implementation details and examples of optimizing trend models and modeling with a trend will be covered. The use of Gaussian mixture models and stepwise conditional transform is presented. The multivariate spatial bootstrap will be presented for quantifying and transferring parameter uncertainty. The second half of the module will focus on checking simulated realizations including the assessment of accuracy and precision. Other checks such as statistical reproduction and swath plots are reviewed.

Day 2 – Workflows: the practice and a full worked case study will be presented for categorical and continuous simulation of a porphyry deposit with HTPG and PPMT. The solution will include all steps of EDA, trend modeling, model construction, model validation, classification, and post processing through to probabilistic resources. The practice and a full worked case study will be presented for geometric and continuous property simulation with flattening transformations. The solution will include all steps of EDA, surface and geometry modeling, boundary modeling, model construction, model validation, classification and resource calculation.

Day 3 – Classification and drillhole spacing workflow: the practice and a full worked case study to optimize drill hole spacing (and placement) considering local factors and value of information are presented with examples. The solution will include all steps of resampling and resimulation, model construction, model validation and analysis of uncertainty versus drill hole spacing.

Day 4 – Machine learning for geometallurgical modeling: practical techniques and applications for machine learning applied to metallurgical property modeling are covered with an emphasis on regression using many data types (assays, scans, geochemistry, geologic logs). Techniques to manage non-additive variables, unequally sampled data, and managing limited test work are presented. Appropriate workflows are developed and presented to integrate geometallurgical predictions into a probabilistic or deterministic resource model. The majority of this day does not require a background in geostatistics and is suitable for geoscientists, metallurgists, and engineers engaged in analyzing geometallurgical data.

In Person Workshop: Details

The in-person workshop is intended to provide an intensive overview of the theory and practice relating to advanced geostatistical tools and workflows. Attendees are encouraged to participate in the fundamental Online Modules if not familiar with those topics, as they serve to introduce prerequisite concepts. Similarly, although individual days of the workshop may be selected and attended, it is strongly recommended that the first day (Practical Simulation) be attended at a minimum if attending subsequent days and unfamiliar with its listed topics.

Each topic (day) will be divided into a morning and afternoon session. All days are expected to follow a similar planned schedule.

Session	Start	End	Duration	Description
Morning	8:45	9:00	15 min	Coffee
	9:00	10:20	80 min	Theory and concepts
	10:20	10:35	15 min	Break
	10:35	11:30	55 min	Theory and application of workflow with RMSP
	11:30	12:00	30 min	Hands-on session and Q&A
	12:00	13:00	1 hour	Lunch break
Afternoon	13:00	14:20	80 min	Theory and concepts
	14:20	14:30	10 min	Break
	14:30	15:30	1 hour	Theory and concepts
	15:30	15:40	10 min	Break
	15:40	16:30	50 min	Theory and application of workflow with RMSP
	16:30	17:00	30 min	Hands-on session and Q&A

The theory and application sessions would use RMS datasets relevant to each topic. In the hands-on sessions, attendees would have the option of experimenting with the provided datasets from the demonstrations, or extending methods to their own datasets and work. The latter approach would be recommended for students when feasible.

A continental breakfast, coffee, snacks and lunch would be catered for all days of the workshop. The final venue will be subject to attendance requirements but would be in reasonable proximity to the Calgary downtown (hotel center) and international airport. Note that cancellation of workshop registration will lead to the following refunds:

- Prior to May 1 (75%)
- After May 1 (50%)
- After September 20 (50% credit for future courses)

This refund schedule reflects financial commitments to venues and other logistical requirements.