amec foster wheeler

# Advantage Training:

## Practical Geostatistics for Mineral Resource Estimation, from Sampling to Reconciliation

11-15 September 2017 | Vancouver, BC

This five-day course will give you a clear understanding of **geostatistics, exploratory data analysis** and **validation tools** to facilitate and improve resource estimation. >>>

## Through in-depth presentations, discussion and practical exercises, participants will learn state-of-the-art resource estimation procedures, such as:

- Dealing with data of variable quality, e.g. legacy data
- Testing the character of geological domains and their boundaries
- Different tools for assessing top-cuts
- Spatial analysis including correlogram and Gaussian reconstructed variogram
- Estimation with ordinary kriging, simple kriging, multiple indicator kriging and uniform conditioning
- Block model validation including selectivity checks
- Drill hole spacing study and simulation as a guide for classification
- Securities regulatory compliance
- Reconciliation
- Conditional simulation, and applications

## About the instructors

**Georges Verly**, Ph.D., P.Eng., is Chief Geostatistician at Amec Foster Wheeler. Georges has close to 40 years of experience in consulting, operations and academic experience on gold, copper, nickel, uranium and other mineral properties and mines worldwide. His areas of specialization include geostatistics, conditional simulation of geological and grade models, mineral resource estimation, grade control, resource audits and training. Before joining Amec Foster Wheeler, Georges was a Consulting Geostatistician with Placer Dome/Barrick, where he developed practical applications of simulations to resource estimation and grade control for a number of operations and projects, and participated to the development of Placer Dome's standards for geological and resource modeling processes. He has taught geostatistics courses at the University of Nevada's MacKay School of Mines, UBC, Concordia University and Université de Québec à Chicoutimi, as well as to a number of private-sector organizations. Georges has authored and co-authored more than 20 technical papers in the industry.

**Greg Gosson,** Ph.D., P.Geo., is Technical Director for Geology and Compliance at Amec Foster Wheeler. Greg has more than 25 years of mining and exploration management experience in North America, Africa and the Pacific. He is specialized in Canadian securities regulatory issues including NI 43-101 and is a frequent speaker on mining technical disclosure standards at mining industry forums and professional associations. Greg is a member of the Canadian Securities Administrators' Mining Technical Advisory and Monitoring Committee on NI 43-101, and the Standing Committee on Mineral Reserve and Mineral Resource Definitions of the Canadian Institute of Mining, Metallurgy, and Petroleum, as well as the CIM Best Practices Committee.

**Greg Kulla,** P.Geo., is Principal Geologist at Amec Foster Wheeler. Greg has 30 years' experience exploring and evaluating mineral deposits and operating mines. His skills include resource estimation, data quality assurance and quality control evaluation, technical audits, and due diligence reviews. He has worked on a diverse set of base and precious metals and industrial minerals deposit types worldwide including porphyry copper-gold-silver-molybdenum, polymetallic skarn, sediment-hosted copper, sulphide nickel, epithermal and orogenic gold, vein-hosted silver, carbonatite-hosted tantalum and niobium, sand and gravel, and crushed aggregate projects. Greg has a well-developed understanding of NI 43-101, JORC and other jurisdiction reporting codes and has been a geology and mineral resource estimate QP/CP for several projects. Before joining Amec Foster Wheeler in 2005, Greg was a mineral exploration geologist for nearly 20 years.

## Who Should Attend

This course is for mine geologists, resource analysts, mining engineers and those in the mining industry acting in a Qualified or Competent Person role. Previous experience in geostatistics or resource estimation is an asset.

## Course Content

This course will instruct attendees on the principles of geostatistics for mineral resource estimation including:

### Day 1

Overview, Statistics & Exploratory Data Analysis: univariate and bivariate statistics, concept of stationarity, EDA working envelopes, geological model, contact plots, compositing, declustering and top-cutting.

### Day 2

Exploratory Data Analysis, Sampling and QA/QC & Structural Analysis: comparing different sample types and pairs of values, sampling, QA/QC and legacy data, variogram vs covariance, correlograms, relative pairwise and Gaussian reconstructed variograms.

### Day 3

Change of Support & Estimation: impact of block size on tonnes and grade above a cut-off grade, in-situ versus contact dilution, change of support corrections including affine, indirect lognormal and discrete Gaussian model, traditional methods of estimation, estimation error, estimation variance, confidence intervals and drill hole spacing studies.

### Day 4

Kriging, Practice of Estimation, Model Validation: ordinary kriging, simple kriging, multiple indicator kriging and uniform conditioning, estimation plan, validating estimations including model vs primary data statistics, selectivity check and kriging neighbourhood analysis.

### Day 5

Mining Reconciliation, Conditional Simulation, Resource Classification & Disclosure Regulations: long-term model to short-term model to mill reconciliation, reconciliation factors, overview of sequential indicator and Gaussian simulation, practical applications to assess uncertainty and anticipated mining dilution and reconciliation, reasonable prospect of economic extraction, quantifying geological and grade continuity for classification, presentation of securities regulations including NI 43-101 and CIM Definition Standards and a comparative overview of CIM definitions, SEC industry guide 7, and JORC standards and guidelines.

**Please note:** A full syllabus is available upon request.

## Exercises

It is recommended to bring a laptop computer with MS Excel and a scientific calculator for the exercises illustrating the concepts and principles that are presented.

## Venue Details

Amec Foster Wheeler
111 Dunsmuir Street, 4th floor
Vancouver, Canada

**Sign-in:**
8:00am - 8:30am, 11 September 2017

**Course Presentation:**
8:30am - 5:00pm all days

**Fees**
CA $2,850 or US $2,200 + tax

**Includes:** prepared manuals, refreshments and lunches.

Payment is required at time of registration. No refunds for cancellations made within two weeks of the course or for 'no shows'. Course delegates can be substituted. If the minimum number of delegates is not achieved, course delegates will be notified one week prior to course start date and fees will be refunded.

# Registration Details

To register, please complete the following form and email it to
**Rita Wong** at rita.wong@amecfw.com

Early registration is advised. Please quote reference 4013 and the surname of the course attendee when making payment at time of registration. If paying by electronic transfer please send proof of payment to Rita Wong at the above email address. Your registration will be confirmed by email. Personal information will be used for internal purposes only.

**Name:**

**Company/organization name:** **Position:**

**Address:**

**City, Province/State:**

**Postal Code:**

**Phone:** **Fax:**

**Email:**

## Payment Options: Please tick

☐ **Cheque:** Please enclose a cheque made payable to Amec Foster Wheeler Americas Ltd.

or

☐ **Electronic transfer**: Please quote course name on EFT transaction and see bank details right.

**ROYAL BANK OF CANADA**
Main Branch – Toronto
200 Bay Street Main Floor
Toronto, Ontario,
Canada M5J 2J5
Tel # (416) 974-3940

**SWIFT #:** ROYCCAT2

**Beneficiary Name:**
Amec Foster Wheeler Americas Ltd

**Beneficiary Bank Account #:**
00002 - 100 460 5