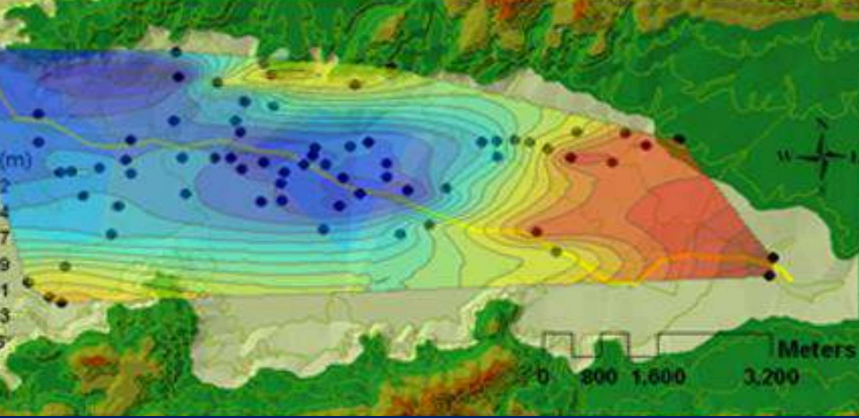




A World Class Training Provider



PRACTICAL GEOSTATISTICS & MINERAL RESOURCE ESTIMATION

VENUE: THE OAKLANDS INN & CONFERENCE CENTRE RANDBURG, JOHANNESBURG

25, 26, 27, 28 & 29 NOVEMBER 2019

Comprehensive and up to date training course that will prepare and equip you with the necessary knowledge and techniques to accurately estimate and evaluate mineral resource based on practical methods that has been proven worldwide



Led by World Class Expert

Dr. Isobel Clark

Bsc Msc DIC PhD FSS FIMMM FSAIMM FAusIMM Ceng MMSA(QP)
Professional mining engineer with 40 years of experience
Author of Practical Geostatistics (1979) and (2000)
Director, Geostokos Limited, Scotland
Former Professor in Camborne School of Mines, University of Exeter, England
Former Professor, University of the Witwatersrand, Johannesburg
11 years of lecturing at Royal School of Mines, London

This 5-day course will consist of two parts.

Part 1 – Practical Geostatistics Workshop

The first 3 days of the course will cover the practical aspect of Geostatistics. It will bring the delegates to in-depth understanding of the mysteries of ordinary kriging and its variants. This is a classroom course and includes manual exercises to reinforce understanding of the techniques. This workshop composed of lectures augmented by practical PC/laptop-based exercises covering many different applications. Case studies ranging from coal through base metals and iron ore to precious metals such as gold and platinum will be covered. All case studies are drawn from Dr Clark's extensive worldwide experience. Practical Geostatistics is aimed at any professionals dealing with the estimation from or interpolation between samples collected on a spatial basis. A minimum of mathematics is necessary to explain the techniques - mainly simple algebra, up to understanding the concepts behind solving simple sets of simultaneous equations and differentiating x^2 . Questions and discussions are actively encouraged. Participants are advised to bring a laptop.

Part 2 – Mineral Resource Estimation

Participants in this Master Class are expected to be conversant with Geostatisticals procedures or at least completed Practical Geostatistics Workshop. Participants are invited to contribute discussion and ideas from their own practical experiences and to bring their own data for preliminary analysis during and after the workshop. The workshop is aimed at professionals who are interested in discussing the real world application of resource estimation techniques. Using little or no mathematics, Isobel Clark discusses casestudies involving interpretation of everyday questions, such as:

- Is my data homogeneous enough for geostatistical mapping?
- Do I have trends in my data and (if so) what kind?
- How do I interpret semi-variograms which deviate from the ideal shapes?
- What Kriging method should I use (if any)?
- Should I be using Kriging results at all?

This course will be an interactive and participative workshop where participants will be encouraged to discuss their own practice and compare it to others and recognised best practice. Real projects and case studies will form an important part of the workshop and participants will be encouraged to discuss and reflect on their own organisations practices and ways to improve them.

BYO – BRING YOUR OWN SESSIONS!!

Get the trainer to address the concern you have in YOUR OWN projects!
YOU can BRING and ANALYSE YOUR own data using Practical Geostatistics 2000 teaching software under the supervision of Dr. Isobel Clark. Take away copies of all software and data sets!
You will be provided with a CD containing all relevant teaching materials.

Each delegate will receive a copy
Of the practical Geostatistics 2000 text book and CD containing (Digital version of text book and PG 2000 software, data sets and tutorials)

Course Format

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Who Should Attend

But not limited to:

- Mining Geologists (Exploration, Production, Resource)
- Mining Engineers
- Mine Surveyors
- Geologist
- Geologist(Trainee)
- Mineral Resource Managers
- MRM Practitioners
- Sampling Personnel
- Sampling Supervisors/Managers
- biologists
- Metallurgist(Trainee)
- Mineral Resource Managers
- Resource Analysts
- Mine Managers
- Mine Supervisors
- Geophysicists
- Geochemist
- Geometallurgist
- statisticians

5 CPD
Points

Providing you with high quality workshops for
the last 10 years

Just a few companies to mention that have attended our past mining Workshops

Anglo American Platinum Mine., Worley Parsons, Cronimet Chrome Mining, Evander Gold Mine, Maptek, Northam Booyseindal Mine, Sabodala Gold Operations SA, Lonmin, Glencore, African Mining & Trust, African Rainbow Minerals Limited, Coal of Africa, Sasol Services,SRK Consulting Pty Ltd, United Manganese of Kalahari, Bafokeng Rasimone Platinum Mine, Discovery Metals Limited, Keaton Mining, Leeuw Mining & Exploration (Pty) Ltd, Metsana Group, Stefanutti Stocks Mining Services, Black Mountain Mining (Pty) Ltd, Exxaro Annot Coal, Samancor Chrome Limited, Intertek Genalysis SA (Pty) Ltd, Mitra SK South Africa, Siza Coal Services CC, Assmang Chrome, Nkomati Mine,TRP, South Deep Gold Mine, Sibanye Gold, Anglo Gold Ashanti, Botswana Ash (Pty) Ltd, Idwala, Sasol, Debeers...

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Practical Geostatistics & Mineral Resource Estimation

25, 26, 27, 28 & 29 November 2019

Course Content

Part 1 (25, 26 & 27 November 2019) **Practical Geostatistics**

Session 1

- The basic assumptions of spatial estimation methods
- Inverse Distance interpolation methods

Session 2

Statistical Methods

- Classical statistics: the Normal distribution
- Confidence levels
- Standard errors

Session 3

Statistical Methods

- Construction and interpretation of semi-variograms
- Identification of trends
- Multi-component models
- Confirmation of basic assumptions
- Outliers

Session 4

Geostatistical Methods

- The experimental semi-variogram
- Modelling semi-variograms
- Trends
- Anisotropy
- Geological features

Session 5

Geostatistical Methods

- Ordinary Kriging
- Lognormal methods
- Indicator methods
- Regression problems (conditional bias)
- Simulation

Session 6

Case Studies and discussions on your own data (BYO)

5 CPD Points can be claimed

Part 2 (28 & 29 November 2019) **Mineral Resource Estimation**

In Part 2 of this course YOU will be bringing YOUR own data. This will be a BYO session preliminary study of real data sets and open discussion guided by participants' interests and previous Q&A sessions.

on participants' interests we can go indepth to the following topics:

1. Basic assumptions and requirements for mineral resource estimation
2. Data validation, top-cuts and capping
3. Construction, interpretation and modelling of semi-variograms
4. Model validation and reconciliation with geological knowledge
5. Geostatistical resource estimation, 3D and block modelling and Kriging
6. Other Kriging techniques, such as MIK and Lognormal Kriging
7. Geostatistical Simulations and Risk Assessment
8. Grade control
9. Drill hole spacing analysis

Session 7

Case Studies and BYO

- construction and interpretation of semi-variograms
- identification of trends
- confirmation of basic assumptions
- outliers

Session 8

Case Studies and BYO

- choice of appropriate kriging techniques
- **practical applications of kriging**

Session 9

Case Studies and BYO

- discussion of case studies from course participants
- general discussion of case studies

Session 10

Case Studies and BYO

- general discussion of case studies
- simulation techniques

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Contact Hamesh Ramparsad on 074 869 5047 or email hamesh@spectaculartc.co.za**

Facilitator Profile and Partial list of Projects

Aranz-Geo (Leapfrog),New Zealand
Aurum Exploration Services,Ireland
AusIMM Annual Conference,New Zealand
Barrick Mining Nevada,USA
Cliffs Mining Services Company,USA
CSA Global Pty Ltd,UK
Doku-Eylul Univeristy Izmir,Turkey
Freda Rebecca Gold Mine,Zimbabwe
Freeport-McMoRan Exploration Corp,Phillipines
Gemcom Software International Inc,Canada
Hindustan Zinc Ltd ,India
Imerys Filtration Minerals,USA
Ma'aden Gold and Base Metals, Saudi Arabia
Newmont Mining, Australia and Nevada USA
Nigerian Geological Survey Agency
Roscoe Postle Associates Inc,Canada
Wardell Armstrong International Ltd,UK

BHP Worsley Alumina,Australia,Bauxite, Chaarat Gold Project ,Kyrgyzstan,gold
Cliffs Mining Services Company-Michigan,USA,iron ore
Compania Minera Area S.A.C.,Peru,gold/silver
ECOSTAT Inc,USA,FlyNet USDA TASC
First Quantum Minerals Ltd,Canada,copper/cobalt dumps
Foskor Pty Ltd,South Africa,copper/phosphates, Freda Rebecca Gold Mine Ltd,Zimbabwe,gold
General Exploration Limited,Tanzania,gold, Hambledon Mining Plc,Kazakhstan,gold
Imerys Filtration Minerals,USA/Spain,talc and diatomaceous earths
Impala Platinum,South Africa,PGMs, Intrepid Potash - New Mexico LLC,USA,potash
Iron Road Murphy South Project,Australia,iron ore
Lumwana Mining Company Limited,Zambia,copper/cobalt/uranium
Mesabi Mining,USA,iron ore, MWH Americas Inc,USA,radon contamination
Petrovavlovsk Ltd,Russia,gold,Red Kite (Bermuda) Management and Advisor Limited,Bermuda,gold
Western Platinum Limited,South Africa,PGM/Chrome

Your World Class Expert Course Presenter: Dr Isobel Clark



Dr Isobel Clark is a professional Mining Engineer who specializes in the technical evaluation of mineral resources and reserves at all stages in the life of a mine. She has taught, researched and consulted in the field of geostatistics for over 45 years and has wealthy experience in practical application of computer-based design and evaluation methods. Possibly best known as the author of the introductory text "Practical Geostatistics" (1979), she is also co-author of a more complete textbook "Practical Geostatistic" (2000). With proven communication skills honed by training non-specialists, she has conducted numerous short courses on a regular basis to companies and educational institutions in four continents. Dr Clark lectured for 11 years at the Royal School of Mines, Imperial College, London, at the University of Witswatersrand in Johannesburg for 9 years and was visiting professor at Camborne School of Mines for 2 years. Isobel acts as a Director of Geostokos Limited and also maintains her position as associated educator at Geostokos (Ecosse) Limited, two international consultancy companies based in Central Scotland. Her recent consultancy assignments range from the evaluation of diatomite deposits in the USA to the study of protected sea-birds in the UK. Dr Isobel received her Ph.D. in Mining Engineering from the University of London, specialising in the reconciliation of grade control data with actual production. In addition to formal qualifications, she regularly attends relevant conferences to learn new methods, theory and applications. She also attends seminars and meetings of the various professional societies of which she has memberships