

GREEN ENERGY DAY

30 AUGUST 2022

CPD POINTS

GSSA - 8

SACNASP - 1

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PRELIMINARY PROGRAMME



The Critical Role of the Minerals Industry in South Africa's Green Energy Future

Is a full transition to green energy feasible for South Africa and, if so, how long will it take and what is the role of the Minerals Industry in a new energy future for the country?

Internationally, energy generation is closely linked to the socio-economic and infrastructural development of a country. The South African economy is energy intensive, registering the highest per capita greenhouse emissions on the continent, with coal making up 80% of its electricity.

In contrast, South Africa has one of the largest natural solar, wind and wave power generation potentials in the world, but is hamstrung by its lack of critical materials necessary to leverage green power technology.

How will the Minerals Industry respond to these challenges and opportunities?

Join industry experts, as we debate these critical questions and attempt to discover the best way forward in an exclusive online workshop covering topics such as:

Critical Raw Materials and the Energy Transition | Green Minerals | Carbon Markets
Oil & Gas Industry Value Chain | How Investors view Renewables
And many more...

MEMBER - **R1 000** | NON MEMBER - **R1 500** | ACADEMIC/RETIRED - **R500**

Free for all Registered Students

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DRILLING METHODS & TECHNIQUES IN RESOURCE EXPLORATION

13 SEPTEMBER - 04 OCTOBER 2022

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COURSE SUMMARY

Frequently, new geologists are placed on drilling projects with very little understanding of the drilling operation. In order to effectively contribute to managing the project, geologists require at least a basic level of understanding of drilling principles and the drilling operation as a whole.

This course, provided by Colin Rice, will provide newly qualified geologists, that have had little or no exposure to drilling operations, with a fundamental understanding of selected aspects of a drilling operation.

The course is a combination of online, self-directed learning and virtual contact sessions where concepts can be discussed and clarified, questions can be answered, and practical applications of the concepts can be discussed. Delegates will have access to a discussion forum, printable notes in pdf format and support sessions throughout the course.

REGISTRATION FEES

Member - R3000 | Non Member - R3500 | Student/Retired - R2000

3D GEOMODELLING

07 OCTOBER 2022

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ABOUT THE WORKSHOP

Recent trends in mining and exploration are set to further accelerate the demand and growth of 3D geological modelling software. These trends include the inevitable increase in cost per ton of resource and global economic slowdowns.

These require companies to constantly cost-cut during extraction and to improve resource delineation. Add to this the trend that new discoveries are deeper and in more structurally-complex setting, and it's apparent that a great deal of attention needs to be focused on getting the geometry of a deposit, as early as possible in the exploration and mining value chain, correct.

REGISTRATION

Members - **R3,000** | Non-Members - **R3,500** | Students/Retired/Academic - **R2,000**

The GSSA, in conjunction with their event partner(s), will sponsor a limited number of students. Click [here](#) for the application form.

Applications open on 07 September 2022

COURSE INFORMATION

Recent trends in mining and exploration are set to further accelerate the demand and growth of 3D geological modelling software. These trends include the inevitable increase in cost per ton of resource and global economic slowdowns. These require companies to constantly cost-cut during extraction and to improve resource delineation. Add to this the trend that new discoveries are deeper and in more structurally-complex setting, and it's apparent that a great deal of attention needs to be focused on getting the geometry of a deposit, as early as possible in the exploration and mining value chain, correct.

The versatile application of well-built, validated 3D models is one of the most important tools for achieving this and forms the basis for all downstream processes. From the point of view of drillhole targeting, resource extension, geotechnical design, infrastructure and cost simulation, pre- and post-blast surveying, geohydrological simulations, truck and bucket volume calculations and many other routine mine tasks, 3D models are a common and necessary denominator.

The past decade has seen a tremendous growth in the capabilities of almost all commercial 3D geomodelling packages, to the point where they run on high-end PCs. This growth has changed the complexion of mineral exploration and mining; there is now a huge overlap in terms of basic volume modelling and manipulation between commercially-available, general modelling packages and those specifically tailored for use in geology and mining. Recent trends are away from software packages that have unforgiving data import routines, use explicit, section-based modelling and which incorporate limited data sets or types. The trend is towards software packages that have flexible import routines; rapid, dynamic, implicit modelling of surfaces and shells, integration of large numbers of disparate data sets and 3D querying of spatial data to determine trends and patterns. These typically incorporate an easy, workflow-driven approach.

The one-day online course takes you through:

- An overview of the various data types that should be combined and examined in a typical model-building process
- The applicability of specific modelling techniques and philosophies, to various deposit types and problems
- The processes of 3D geological modelling and the techniques employed
- The differences between explicit, implicit and rules-based conditional modelling, and up-to-date trends in their related mainstream software packages
- Incorporation of structural data to create a fault network
- Tertiary use of 3D models, such as surface dip analysis, apparent dip analysis, 3D querying, intelligent targeting and trend analysis
- A review of most commercial or mainstream 3D geomodelling packages used in the minerals industry

BENEFITS OF ATTENDING

- The course is not specific to any modelling package, but rather uses a “nuts-and-bolts” approach, by way of presenting the underlying data and techniques employed
- The course provides a broad overview of 3D modelling packages applied to exploration and mining
- The course provides an overview of the various data types that should be combined and examined in a typical model-building process, in order to create fully-constrained 3D models
- The applicability of specific modelling techniques and philosophies, to various deposit types and problems, will be discussed. Inter alia: exploration models; geophysical data inversion; resource estimation models; geotechnical models, conceptual models are touched upon
- Basic definitions of points, lines or polylines and polygons, and varieties in nomenclature, are covered
- The attendee will gain a thorough understanding of the processes of 3D geological modelling and the techniques employed, to the point where they should have the tools and vernacular to approach basic 3D modelling in virtually any software package
- The differences between explicit, implicit and rules-based conditional modelling, and up-to-date trends in their related mainstream software packages, will be presented
- Incorporation of structural data, in order to create a fault network, will be demonstrated by way of several examples
- Tertiary use of 3D models, such as surface dip analysis, apparent dip analysis, 3D querying, intelligent targeting and trend analysis will be addressed
- Commercial or mainstream 3D geomodelling packages will be discussed, based on a set of key criteria and workflows

WHO SHOULD ATTEND

Geologists (mainly Junior, Mining, Exploration, Hydraulic, Engineering, Resource) |
Exploration Managers | Geotechnical Engineers (Engineering Geologists) | Surveyors | Mine Planners
Academics (Professors, Lecturers in Geoscience and Geology Departments) | Consulting Companies
Mineral Resource Managers | Mining Engineers | CEOs

ABOUT THE SPEAKER



Dr Ian Basson

Ian qualified with a Ph.D. in Structural Geology from the University of Natal (now Kwazulu-Natal) in 2000. He completed his Post-Doctoral Studies at the University of Cape Town, with a focus on the structural controls on kimberlite emplacement, in 2002. Ian is a professional structural geologist with over 23 years' experience in mapping, structural analysis and 3D modeling. His skill set includes mapping of complex structural environments, including high-grade metamorphic terranes and those with a significant brittle-ductile or brittle overprints; structural and lithological mapping of open-cast mines; translation of structural features into parameters that are used by geotechnical engineers and mining personnel in pit slope design and mine planning; 3D modeling of complex geology; lithological and structural interpretation of geophysical and Landsat/ASTER data sets; forward structural modelling in greenfields or brownfields exploration projects using stress mapping and modelling. Ian has undertaken over 180 projects for his clients and has published 34 peer-reviewed articles. He is a Senior External Lecturer at the University of Stellenbosch, where he presents the Honours Geology class with a course on general 3D modelling and a practical course in Leapfrog.

PROFESSIONAL ORGANISATIONS

- Practicing Natural Scientist, S.A. Council for Natural Scientific Professions (Pr. Sci. Nat.)
- Fellow of the Geological Society of South Africa (GSSA)
- Member of the Society of Economic Geologists, U.S.A. (SEG)
- Associate Member of the S.A. Institute for Engineering and Environmental Geologists (SAIEG)

EXPERIENCE

Ian founded Tect Geological Consulting in 2002 (www.tect.co.za). Since then, Tect has worked on 38 deposit types in 25 countries throughout Africa and Middle East. Tect's main clients are Kumba's Sishen and Kolomela operations, Venetia Mine (De Beers), Voorspoed Mine (De Beers); Palabora (RTZ); Jwaneng, Orapa, Letlhakane and Damtshaa Mines (Debswana); Geita Main and Star and Comet Pits (Geita Mine, AngloGold Ashanti); Chimiwungo (Barrick), Kansanshi (First Quantum Minerals), Northam Platinum's Zondereinde and Booyendal Mines, Amandelbult's Moddergat Area (Anglo Platinum), Lonmin Marikana 2# and PTM's Waterberg Prospect.

PROGRAMME

DATE: 07 October 2022

NAME OF EVENT: 3D GEOMODELLING WORKSHOP

TIME	TOPIC	SPEAKER
7:30 - 8:00	<i>Registration & Introduction</i>	Ian Basson
8:00 - 10:00	Session 1 - Introduction and General Concepts	
	Session 2 - Choice of Software Package	
	Session 3 - Geometries and Raw Data	
	Session 4 - Data Verification and Validation	
10:00 - 10:30	<i>Tea Break</i>	
10:30 - 12:30	Session 5 - Drillhole Data	
	Session 7 - Surface Modelling	
	Session 8 - RBFs	
12:30 - 13:15	<i>Lunch Break</i>	
13:15 - 15:15	Session 9 - Implicit Modelling	
	Session 10 - Rules-Based Implicit Modelling	
	Session 11 - Modelling of Structures	
15:15	<i>Tea Break</i>	
15:45	Session 12 - Model Validation	
	Session 13 - Use of Validated Models	
	Session 14 - Software Package Reprise	
	Session 15 - Unconstrained or Poorly-Constrained Models	
	Section 16 - Summary and Wrap-Up	



DATA ANALYTICS AND MACHINE LEARNING FOR GEOSCIENTISTS

18 & 19 OCTOBER 2022

8AM - 4.30PM

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ABOUT THE WORKSHOP

2nd Annual Data Analytics and Machine Learning Course

This two-day workshop introduces geoscience students and practising professionals to the theory and application of spatial data analytics and machine learning.

You will learn to develop data-driven machine workflows for spatial data treatment, visualisation, lithofacies prediction and automated 3D block modelling using drill core/well logs, sourcing of satellite remote sensing data and extracting useful information for automated mineralisation anomaly detection, and stochastic simulation. As you build prediction and classification models, you will learn how to train algorithms using training data so you can predict the outcome for future datasets.

REGISTRATION

Members - **R2,500** | Non-Members - **R3,000** | Students/Retired/Academic - **R1,500**

The GSSA, in conjunction with their event partner(s), will sponsor a limited number of students. Click [here](#) for the application form.

Applications open on 18 September 2022

COURSE INFORMATION

Specifically, the two-day course will teach you to:

- Effectively prepare data for Data Analytics and Machine Learning applications in order to ensure that conclusions drawn are trustworthy and reliable
- Gain insights from data using a lean workflow that incorporates outlier detection, data debiasing and imputation, feature engineering, and spatiotemporal modeling
- Understand the assumptions and limits of data precision, scale and coverage
- Create classification, prediction and spatial uncertainty models

By the end of the workshop, you will have a firm understanding of:

- Classification of lithofacies from drill core data
- Automated anomaly detection
- Dimension reduction and visualisation of gridded data
- Uncertainty quantification using stochastic models

Working environment

Python Integrated Development Environment (IDE) and Code Editors such as Jupyter Notebook, Spyder, Visual Studio, Visual Studio Code, PyCharm. These packages will be installed during the 1st day of the course.

Location

TBC

ABOUT THE SPEAKER



Glen Nwaila

Prof. Glen Nwaila from the University of the Witwatersrand
(@LinkedIn: Glen Nwaila

Link: <https://www.linkedin.com/in/glen-nwaila-057786124/>)

Glen received his BSc (Hons.) Geology from the University of Johannesburg, MSc in Chemical Engineering from the University of Cape Town, and a PhD in Geology with distinction from the University of Würzburg, Germany. He has more than 13 years of experience in research, teaching and industrial work in the field of economic and mining geology, geometallurgy, machine learning and hydrometallurgy.

Glen worked and collaborated with research and industry centres worldwide such as South Africa, Canada, DRC, Germany, Ghana, Sweden, USA, the United Kingdom, and Zambia. Currently, Glen holds the position of Director at the Wits Mining Institute and Adjunct Professor at the University of the Witwatersrand. His research interests are (1) genesis and evaluation of ore deposits, (2) machine learning applied to geology and mineral processing, (3) metal accounting, and (4) process optimization in hydrometallurgical plants. His most recent work focuses on impacts of digital transformation in the mining industry and the move towards data banks for process simulation and augmented reality.