AusIMM, CIM, SME, and SAIMM
☐ Members: $2,750.00 AUD ($2,500 Excluding Taxes)
☐ Non-members: $3,069.00 AUD ($2,790 Excluding Taxes)

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Registration includes course notes, lunch, and morning and afternoon tea.

Participation in this course may be a valid activity towards continuing professional development with up to **26 contact hours.**

Participants receive a Certificate of Completion.

Notification of Cancellation received in writing up to October 24, 2017 (minimum of 10 working days before the course) will incur a 20% cancellation fee. No refund will be made after this time. An alternative participant may be nominated.

WHO SHOULD ATTEND
This course is designed for mining engineers, mine geologists, resource analysts, and project managers involved in feasibility studies, development and operations, interested in new technologies for risk management and optimal decision support.

Please note: *It is strongly recommended that participants bring a laptop.*

INSTRUCTORS
Roussos Dimitrakopoulos is a Professor and Canada Research Chair (Tier I) in Sustainable Mineral Resource Development and Optimization under Uncertainty, and Director, COSMO - Stochastic Mine Planning Laboratory. He holds a PhD from École Polytechnique de Montréal and an MSc from the University of Alberta. He works on risk-based simulation and stochastic optimization in mine planning and production scheduling, the simultaneous optimization of mining complexes and mineral value chains under uncertainty. He has taught short courses and worked in Australia, North America, South America, Europe, the Middle East, South Africa and Japan. He received the Synergy Award of Innovation in 2012 by the Governor General of Canada for research contributions to mining science and engineering and his long-standing partnership with Anglo Gold Ashanti, Barrick Gold, BHP Billiton, De Beers, Newmont Mining, Vale and Kinross Gold. In 2013, he received AIME's Mineral Economics Award, and was a CIM distinguished lecturer in 2015-2016.

VENUE DETAILS
Pan Pacific Perth
207 Adelaide Terrace
Perth, WA 6000 Australia
https://www.panpacific.com/en/hotels-resorts/australia/perth.html

LOGISTICS
Lectures are given from 9 AM (refreshments at 8:30 AM) to 5 PM with two 15 minute coffee breaks and a 1 hour lunch break.

COSMO

COSMO – Stochastic Mine Planning Laboratory Mining Engineering
cosmo.mcgill.ca

COSMO - Stochastic Mine Planning Laboratory, a global centre for leading-edge research and graduate education in "orebody modelling and strategic mine planning with uncertainty", is supported by AngloGold Ashanti, Barrick Gold, BHP Billiton, De Beers, Kinross, Newmont Mining, Vale, and the Canada Research Chairs Program, NSERC, and CFI.
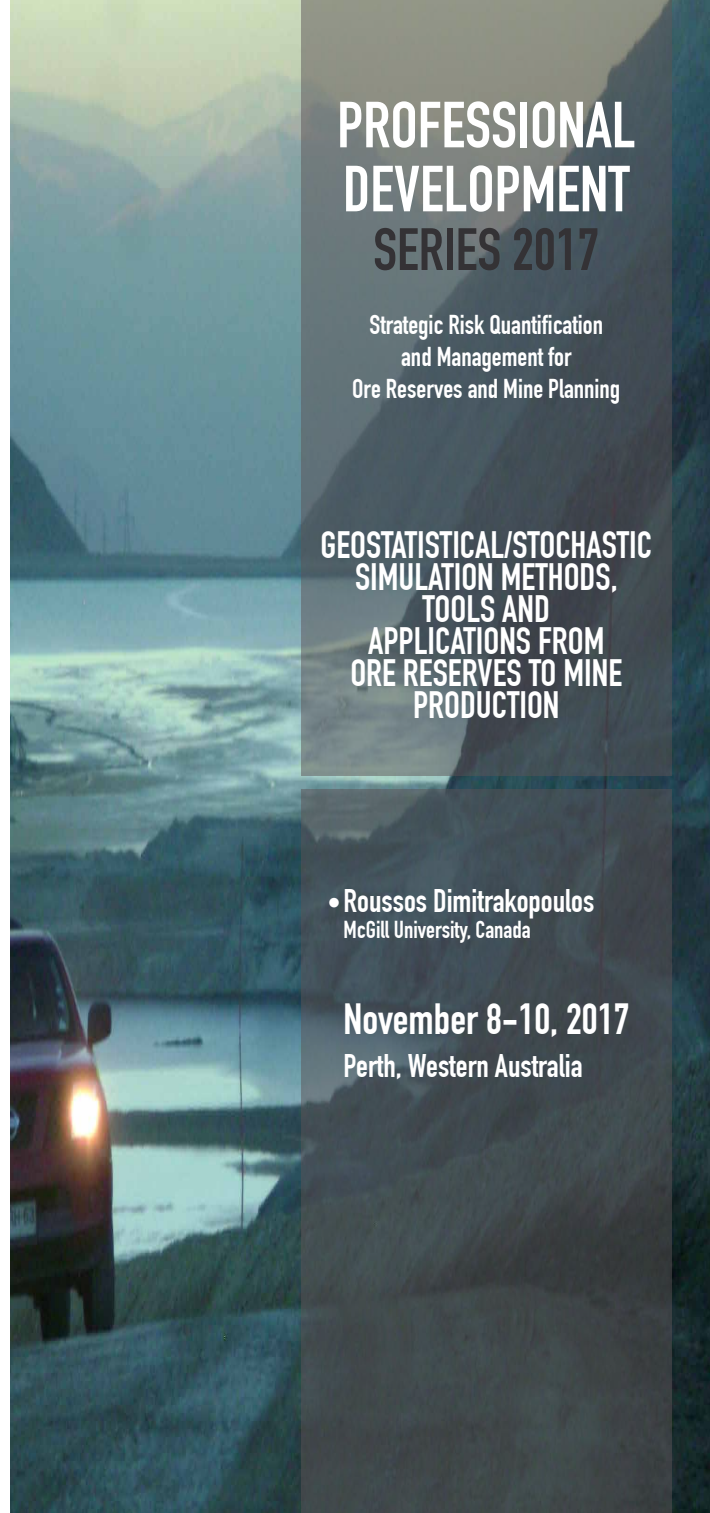
PROFESSIONAL DEVELOPMENT
SERIES 2017

Strategic Risk Quantification and Management for Ore Reserves and Mine Planning

GEOSTATISTICAL/STOCHASTIC SIMULATION METHODS, TOOLS AND APPLICATIONS FROM ORE RESERVES TO MINE PRODUCTION
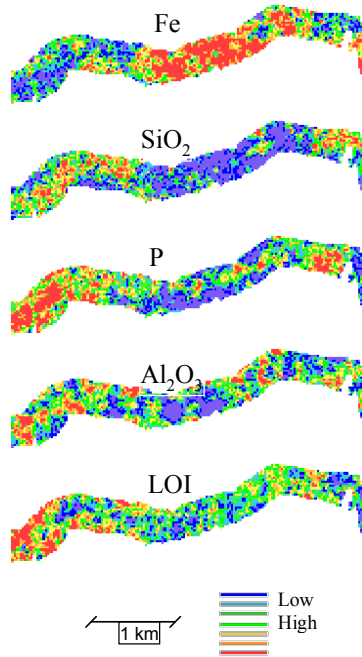
• **Roussos Dimitrakopoulos**
McGill University, Canada

November 8–10, 2017
Perth, Western Australia

Joint simulations of an iron ore deposit in WA

Fe

SiO$_2$

P

Al$_2$O$_3$

LOI

Low
High

1 km

GEOSTATISTICAL/STOCHASTIC SIMULATION METHODS, TOOLS AND APPLICATIONS FROM ORE RESERVES TO MINE PRODUCTION

OBJECTIVES AND CONTENT

At the time of a continuing rebound of metal markets, learn how the application of modern geostatistical (stochastic) simulation technologies for modelling mineral deposits that can add substantial value to key aspects of mining ventures from feasibility and development to production planning and valuation, as well as be exposed to geological risk-management for operating mines.

Learn how you can improve performance by:

- Discovering how and why risk-based models add substantial value in mining ventures
- Reviewing limitations of conventional orebody models for downstream mining applications
- Learning the state-of-the-art geostatistical simulation concepts and new efficient methods
- Exploring the utilisation of simulation methods in a diversity of mining industry practices that unlock and add value at different stages of a mining project or operation
- Understanding how to manage quantified orebody risk in ore reserves, mine planning and design, and mineral asset valuation
- Participating in hands-on computer workshops using real case studies

COURSE OUTLINE

Introduction - Foundational Concepts, Techniques and Limits

- Quantification of geological uncertainty and risk management add value, shelter investments and maximises profits
- Grade estimation or simulation? The major limits of conventional approaches
- Frameworks for modelling geological uncertainty, reporting, profitability, optimisation and mining operations
- Mining data analysis and description, spatial complexity of geological patterns, connectivity of extreme values

Methods and Techniques

- Intuitive introduction to Monte Carlo simulations and risk assessment
- Fast and efficient sequential stochastic simulation algorithms for:
  Single elements, joint simulation of correlated elements, direct block simulation, simulation of geological boundaries and material types
- New multiple-point and high-order simulation methods
- Practical aspects, performance related topics, do simulation methods matter?
- Aspects of geo-metallurgical properties and geostatistical simulations

### Learning Through the Industrial Practice of Geostatistical Simulations

- Simulation based grade-tonnage curves and resource/reserve classification (large gold deposit)
- Cost effective drilling programs: simulations with 'armed bandits' for optimising additional drilling (gold deposit with multiple material types)
- Reserve risk quantification, selectivity and dilution (nickel deposit)
- Block simulation of multiple correlated elements (iron ore deposit)
- Simulation of geology/wireframes with multiple-point geostatistics (SNESIM at an iron ore deposit; WAVESIM at an underground copper deposit)
- Recoverable reserves based on simulated future data (gold and copper deposits)
- Profitability and risk based grade control (gold deposit case study)
- Selection of mining parameters in a gold deposit with multiple material types
- Risk quantification in pit design and production scheduling using simulated orebodies – understanding why and what (disseminated gold deposit)
- Assessing risk in recoverable reserves and meeting project production schedules ahead of mining (gold deposit)
- Product quality management and production scheduling with simulated deposits (iron ore deposit)
- Using sets of orebody simulations in a new generation of stochastic optimisers (gold and copper deposit case studies)
- Simulation of geo-metallurgical variables and integration to short-term production planning (copper deposit)
- Application of new high-order simulation approaches and practical effects (gold deposit)

Where to from here?
- Breaking down technical silos

Computer Workshops
- Simulation of a lateritic nickel deposit with different methods, comparisons and assessment of risk from resource variability grade tonnage curves and reporting (using the public domain SGeMS software with newly added methods)
- Loss/Profit based grade control in a typical gold min
- Will forecasts be met? Geological risk quantification for a typical mine design and life-of-mine production schedule in a copper deposit
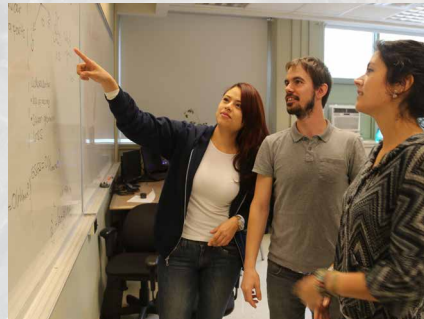
The AusIMM Proceedings: "Orebody Modelling and Strategic Mine Planning SMP 2014: Integrated mineral investment and supply chain optimisation" is included on USB key with the course materials

REGISTER ONLINE: www.ausimm.com.au