

Virtual Technical Courses prior to Minexcellence 2026

Free access for all registered conference participants.

Wednesday, November 18

PRE-CONFERENCE ACTIVITIES

ONLINE

Virtual Technical Courses | Free Access for Registered Participants

SPA

14:00 –
17:30

**Protecting the final slope and maximizing reserves:
operational excellence in contour blasting for open-pit
mines**

Carlos Arroyo, Academic, Universidade Federal de Ouro Preto,
Brazil



Thursday, November 19

PRE-CONFERENCE ACTIVITIES

ONLINE

Virtual Technical Courses | Free Access for Registered Participants

10:00 –

SPA

Stochastic simulation applied to mine planning

13:30

David Meneses, Professor, Universidad de Antofagasta, Chile



15:00 –

ENG

Evaluating near-face stockpile mining with optimization and discrete-event simulation

18:30

Hongshuo Gong, Academic, University of Alberta, Canada



Friday, November 20

PRE-CONFERENCE ACTIVITIES

ONLINE

Virtual Technical Courses | Free Access for Registered Participants

SPA

10:00 –

**Hyperspectral characterization applied to geometallurgy:
from mineralogy to predicting operational performance**

13:30

Leandro Voisin, Director, Dept. of Mining Engineering; and
Christian Ihle, Graduate Program Coordinator, Dept. of Mining
Engineering, Universidad de Chile



COURSE 1: Protecting the final slope and maximizing reserves: operational excellence in contour blasting for open-pit mines

Carlos Arroyo

Academic, Universidade Federal de Ouro Preto, Brazil

WHEN

November 18

LANGUAGE

Spanish

LENGTH

3 hours and 30 minutes

DESCRIPTION

The integrity of the final slope is the factor that separates a safe, profitable operation from a geotechnical liability. In this intensive three-and-a-half-hour masterclass, participants will learn the concept of Wall Control: a set of controlled blasting techniques (presplitting, buffer holes, smooth blasting, and trim blasting) that preserve the final slope face, minimize damage to the remaining rock mass, and ensure the geometric conformity of the benches.

GENERAL OBJECTIVES

1. Understand the fundamentals of Wall Control: master contour blasting techniques—presplitting, buffer blasting, smooth blasting, and trim blasting—and their role in protecting the final slope and maintaining bench geometry.
2. Apply vibration and charge control: calibrate the local propagation law (k and β), define peak particle velocity (PPV) limits and maximum charges per delay (Q) for each geomechanical domain, and optimize timing with electronic detonators.
3. Turn Wall Control into strategic value: translate reduced damage to the rock mass into increased recoverable reserves, lower dilution, greater safety, and sustainable operational continuity.

CONTENT AND PROGRAMME

14:00 - 14:50	Module 1: Fundamentals of Wall Control	Carlos Arroyo
14:50 - 15:00	Questions and discussion Module 1	
15:00 - 15:10	Break 1	
15:10 - 16:00	Module 2: Vibration and charge control	Carlos Arroyo
16:00 - 16:10	Questions and discussion Module 2	
16:10 - 16:20	Break 2	
16:20 - 17:10	Module 3: Timing, sequencing, and real-world cases	Carlos Arroyo
17:10 - 17:20	Questions and discussion Module 3	
17:20 - 17:30	Conclusions and Closure of the Course	Course Coordinator

LECTURER BIO

Carlos Arroyo is a mining engineer and a specialist in geotechnics applied to rock blasting. His academic work is associated with the Universidade Federal de Ouro Preto (UFOP), one of Brazil's leading mining engineering institutions. His career combines academic research and practical experience in open-pit mining operations, with a focus on vibration control, final slope stability, and controlled blasting techniques (Wall Control).

COURSE 2: Stochastic simulation applied to mine planning

David Meneses

Professor, Universidad de Antofagasta, Chile

WHEN

November 19

LANGUAGE

Spanish

LENGTH

3 hours and 30 minutes

DESCRIPTION

This technical course develops participants' ability to apply stochastic simulation, with an emphasis on the Monte Carlo method, to analysis and decision-making in mine planning under uncertainty. It is intended for engineers, planners, and industry professionals interested in assessing how variability in geological, operational, and economic conditions affects the achievement of a mining operation's or project's objectives. Through computational exercises and applied cases, participants will learn to identify sources of uncertainty, represent them using probability distributions, incorporate dependencies between variables, and generate scenarios to evaluate planning alternatives. Variables considered will include ore grades, metallurgical recovery, equipment availability and productivity, operating costs, and mining commodity prices. The analysis will cover the interpretation of outcome distributions, the estimation of probabilities of failing to meet targets, and the identification of the variables with the greatest influence on performance, alongside a review of model assumptions and consistency.

The course integrates these procedures with objective-based risk management, linking scenarios, probabilities, and consequences to performance measures, requirements, targets, and risk tolerance levels. Participants will use simulation results to compare production plans, assess the probability of exceeding budgets or failing to meet production commitments, and analyze mitigation measures in light of their costs and benefits. By the end of the course, they will be able to develop and communicate planning recommendations supported by probabilistic evidence, considering the expected performance, risk exposure, and robustness of each alternative.

GENERAL OBJECTIVES

4. Apply stochastic simulation methods, with an emphasis on Monte Carlo simulation, to represent and analyze the geological, operational, and economic uncertainty that influences mine plan performance.
5. Integrate risk management into mine planning by linking scenarios, probabilities, and consequences to performance objectives and risk tolerance levels in order to assess the achievement of production and economic targets.

6. Support decision-making by comparing mine planning alternatives based on their expected performance, risk exposure, and robustness, as well as the costs and benefits of mitigation measures.

CONTENT AND PROGRAMME

10:00 - 10:50	Module 1: Introduction to stochastic simulation	David Meneses
10:50 - 11:00	Questions and discussion Module 1	
11:00 - 11:10	Break 1	
11:10 - 12:00	Module 2: Mine planning and risk management	David Meneses
12:00 - 12:10	Questions and discussion Module 2	
12:10 - 12:20	Break 2	
12:20 - 13:10	Module 3: Case studies	David Meneses
13:10 - 13:20	Questions and discussion Module 3	
13:20 - 13:30	Conclusions and Closure of the Course	Course Coordinator

LECTURER BIO

David Meneses holds a degree in Mining Engineering from the Universidad de Antofagasta and a master's degree in Mining from the Universidad de Chile. He is a professor in the Department of Mining Engineering at the Universidad de Antofagasta, where he teaches Mine Planning, Mining Methods, Simulation, and Optimization. His academic and research work focuses on applying quantitative tools to the analysis of operations and decision-making in mining. He has published research on the simulation and modeling of mining operations and has presented conference papers on optimizing mine plans under economic uncertainty.

COURSE 3: Evaluating near-face stockpile mining with optimization and discrete-event simulation

Hongshuo Gong

Academic, University of Alberta, Canada

WHEN

November 19

LANGUAGE

English

LENGTH

3 hours and 30 minutes

DESCRIPTION

This technical course presents an integrated optimization and discrete-event simulation framework for evaluating Near-Face Stockpile (NFS) mining in open-pit operations. The course covers the formulation of short-term mine production scheduling models and the development of simulation models to capture equipment interactions and operational uncertainty. An oil-sands case study is used to demonstrate how optimized mining schedules can be evaluated through simulation and compared with conventional truck-shovel operations. Participants will gain practical insights into integrating mathematical optimization and simulation for mine planning, system evaluation, and engineering decision support.

GENERAL OBJECTIVES

1. Understand Near-Face Stockpile Mining System.
2. Understand MILP-Based Mine Scheduling Optimization.
3. Learn steps to build a Discrete-Event Simulation for Mine Operations.
4. Understand how to integrate Optimization-Simulation Framework.
5. Quantitative Comparison of Mining Strategies.

CONTENT AND PROGRAMME

15:00 - 15:50	Module 1: Near-Face Stockpile Mining & Optimization	Hongshuo Gong
15:50 - 16:00	Questions and discussion Module 1	
16:00 - 16:10	Break 1	
16:10 - 17:00	Module 2: Discrete-Event Simulation of Mining Operations	Hongshuo Gong
17:00 - 17:10	Questions and discussion Module 2	
17:10 - 17:20	Break 2	
17:20 - 18:10	Module 3: Integrated Optimization-Simulation & NFS Evaluation	Hongshuo Gong
18:10 - 18:20	Questions and discussion Module 3	
18:20 - 18:30	Conclusions and Closure of the Course	Course Coordinator

LECTURER BIO

Hongshuo Gong is a mining engineer, researcher, and academic whose work focuses on optimizing complex mining operations. He began his academic training at Northeastern University in China, where he earned a BSc in Mining Engineering in 2014 and an MSc in the same field in 2016. He then moved to Canada for postgraduate studies at the University of Alberta in Edmonton, where he earned a PhD in Mining and Mineral Engineering. He is currently a postdoctoral researcher at the same institution.

As a member of the Mining Optimization Laboratory (MOL) in the School of Mining and Petroleum Engineering, he specializes in developing integrated simulation and optimization frameworks for open-pit mining. His research has introduced advanced quantitative methods for managing near-face stockpiles, an approach aimed at maximizing net present value (NPV) and stabilizing the quality of feed delivered to processing plants. His technical background centers on mathematical solutions for modern mine planning.

COURSE 4: Hyperspectral characterization applied to geometallurgy: from mineralogy to predicting operational performance

Leandro Voisin

Director, Department of Mining Engineering, Universidad de Chile

Christian Ihle

Graduate Program Coordinator, Dept. of Mining Engineering, Universidad de Chile

WHEN

November 20

LANGUAGE

Spanish

LENGTH

3 hours and 30 minutes

DESCRIPTION

Mineralogical variability is one of the main challenges in predicting and optimizing the performance of mining processes. Hyperspectral characterization now makes it possible to obtain rapid, nondestructive, high-resolution mineralogical information, turning large volumes of spectral data into valuable information for geometallurgical decision-making.

This course presents the fundamentals, technologies, and applications of hyperspectral characterization, emphasizing its integration with conventional characterization techniques and its use in developing predictive models for variables relevant to mineral processing. Drawing on foundational concepts and copper mining case studies, it will examine applications in grinding and in predicting the rheological behavior of slurries and tailings. The course connects mineralogy, advanced characterization, and operational performance, showing how hyperspectral information can be incorporated into geometallurgical strategies to anticipate variability, improve process control, and support operational decisions.

GENERAL OBJECTIVES

1. Understand the fundamentals of hyperspectral characterization, its main spectral ranges, technologies, and capabilities for mineralogical identification and quantification in mining.
2. Assess the potential and limitations of hyperspectral techniques, as well as how they complement other advanced mineralogical and chemical characterization tools in geometallurgical applications.

3. Relate mineralogical, textural, and spectral information to grinding performance, analyzing its potential to anticipate variability in breakage and in variables associated with electricity and grinding media consumption.
4. Analyze the influence of mineralogy, particularly phyllosilicates, on the rheological behavior of slurries and tailings and its impact on variables such as viscosity and yield stress.
5. Apply a predictive geometallurgical approach that integrates hyperspectral characterization, mineralogical variables, and process data to anticipate ore behavior and support operational decision-making.

CONTENT AND PROGRAMME

10:00 - 10:50	Module 1: Hyperspectral characterization: fundamentals, technologies, and applications in geometallurgy	Leandro Voisin
10:50 - 11:00	Questions and discussion Module 1	
11:00 - 11:10	Break 1	
11:10 - 12:00	Module 2: From mineralogy to grinding performance: predictive applications of hyperspectral characterization	Leandro Voisin
12:00 - 12:10	Questions and discussion Module 2	
12:10 - 12:20	Break 2	
12:20 - 13:10	Module 3: From mineralogy to rheology: predicting the behavior of slurries and tailings	Christian Ihle
13:10 - 13:20	Questions and discussion Module 3	
13:20 - 13:30	Conclusions and Closure of the Course	Course Coordinator

LECTURERS' BIOS

Leandro Voisin holds a degree in Mining Engineering and an MSc in Extractive Metallurgy from the Universidad de Chile, as well as a PhD in Extractive Metallurgy and Materials from Tohoku University, Japan. He is currently Director and an academic in the Department of Mining Engineering at the Universidad de Chile. His more than 25 years of professional experience span academia, industry, technology development, and strategic leadership, with a focus on geometallurgy, mineral processing, extractive metallurgy, and advanced mineral characterization.

He has served as a director of Empresa Nacional de Minería (ENAMI) and Executive Director of the Centro Nacional de Pilotaje de Tecnologías para la Minería (CNP). He also maintains extensive scientific collaborations with Japanese institutions, including Tohoku University and the University of Tokyo, and with institutions in Europe. He has participated in numerous R&D, innovation, and technology transfer projects with national and international companies and institutions. He has worked on more than 40 engineering projects in Chile and abroad, authored more than 40 scientific publications, participated in over 90 international conferences, and coauthored technical books on extractive metallurgy, innovation, and technology development for mining.

Christian Ihle holds a degree in Mechanical Engineering and a PhD in Engineering Sciences, specializing in Fluid Mechanics, from the Universidad de Chile. He is currently an Associate Professor in the Department of Mining Engineering at the Universidad de Chile and cofounder of Flairce, an engineering company focused on applying artificial intelligence to specialized tasks that are critical to mineral processing operations and project engineering. He specializes in rheology, hydraulic transport of suspensions, and physical separation, with applications in the thickening and clarification of tailings systems. He has coauthored approximately 50 papers in international scientific journals, including the chapter "Long-Distance Slurry Pipeline Transport" in the *SME Surface Mining Handbook* (2023), as well as a similar number of conference papers and around 70 presentations at national and international scientific and technical meetings.

He has more than 25 years of professional experience as a specialist, advisor, and manager on over 35 projects involving engineering, characterization, operational support, and specialized software development. His work has focused mainly on slurry pipeline systems and tailings storage facility monitoring, with experience in Chile, Argentina, Brazil, Peru, and Norway.