VIRTUAL TECHNICAL COURSES PRIOR TO GEOMIN-MINEPLANNING 2023

THURSDAY, JULY 06
09:00 AM – 11:30 AM (UTC-4)

COURSE 1: **"INTRODUCTION TO *MACHINE LEARNING* AND OPTIMIZATION IN MINE PLANNING AND GEOSTATISTICS: APPLIED ALGORITHMS AND TOOLS"**
Juan Luis Yarmuch, Academic, Department of Mining Engineering, Universidad de Chile; **and Nadia Mery,** Academic, Department of Mining Engineering, Universidad de Chile

Language: Spanish

FRIDAY, JULY 07
10:00 AM – 13:30 PM (UTC-4)

COURSE 2: **"AN OVERVIEW OF IN-PIT CRUSHING CONVEYING (IPCC) SYSTEMS TECHNOLOGY IN OPEN-PIT MINES"**
Yashar Pourrahimian, Associate Professor, School of Mining and Petroleum Engineering, University of Alberta, Canada

Language: English

MONDAY, JULY 10
10:00 AM – 13:30 PM (UTC-4)

COURSE 3: **"TOWARDS SUSTAINABLE CIRCULAR MINING: VALORIZING MINING WASTE"**
Liey-si Wong, Academic, Department of Geological Sciences, Universidad Católica del Norte, Chile

Language: Spanish

VIRTUAL TECHNICAL COURSES PROGRAMS

Course 1:

Introduction to Machine Learning and Optimization in Mine Planning and Geostatistics: Applied Algorithms and Tools

When: Thursday, July 6, 2023
Instructors: **Juan Luis Yarmuch,** Academic, Department of Mining Engineering, Universidad de Chile; **and Nadia Mery,** Academic, Department of Mining Engineering, Universidad de Chile
Language: Spanish
Time: **09:00 AM – 11:30 AM** (Chilean time zone).

Description: The Introduction to Machine Learning and Optimization in Mine Planning and Geostatistics: Applied Algorithms and Tools workshop is designed to provide participants with the fundamental knowledge to understand Machine Learning and Optimization in the field of mine planning and geostatistics.

General objectives

- Objective 1: To understand the basic concepts of Machine Learning in geostatistics.
- Objective 2: To recognize the basics of optimization and its importance in mine planning.
- Objective 3: To analyze practical examples of ML and optimization applications.

CONTENTS AND PROGRAM

Time	Presentation	Presenter
09:00 -09:50	Module 1: Machine Learning applied to Geostatistics - Introduction - Course Description - Contextualization of the Use of ML and Opt in Mine Planning and Geostatistics - Fundamentals of ML in Geostatistics - Definition of ML Concepts and Applications - Discussion	Nadia Mery

10:00 - 10:50	Module 2: Optimization in Mine Planning - Introduction to Optimization - Common Optimization Problems - Algorithms and Optimization methods in Mine Planning - Examples of Models Applied to Mine Planning - Discussion	Juan Luis Yarmuch
11:00 - 11:30	Module 3: - Real-time Geological Model Updating - Automation of Phasing Design in Open Pit Mines - Production Plans Incorporating Operational Width Constraints	Nadia Mery Juan Luis Yarmuch

LECTURER(S) BIO

Nadia Mery is a Civil Mining Engineer (2015) and Master in Mining (2016) from Universidad de Chile and PhD in Minerals Engineering from Ecole Polytechnique Montreal, Canada. She is currently an academic in the Department of Mining Engineering at Universidad de Chile, where she teaches in the area of data analysis and evaluation of geological resources and mining reserves, in addition to being a researcher at the Advanced Mining Technology Center (AMTC). The academic has several publications in the main journals in the area of geostatistics, in addition to the presentation of several papers at national and international conferences. She worked in the mining industry as a Production Engineer at Codelco, Radomiro Tomic Division.

Juan Luis Yarmuch is a Civil Mining Engineer (2007) and Master in Mining (2012) from Universidad de Chile, and PhD in Engineering from the University of Melbourne, Australia. He has worked as a Senior Mine Planning Engineer in companies such as Codelco and Barrick. He is currently the Executive Director of the Thinking Mine Design Pty company, Principal Investigator of the "Optimal pushback design" AMIRA project and Assistant Professor (mine planning) at the Department of Mining Engineering, Universidad de Chile.

Course 2:

An Overview of In-Pit Crushing Conveying (IPCC) Systems Technology in Open-Pit Mines

When: Friday, July 7, 2023
Instructors: **Yashar Pourrahimian,** Associate Professor, School of Mining and Petroleum Engineering, University of Alberta, Canada
Language: English
Time: **10:00 AM – 13:30 PM** (Chilean time zone).

Description: As the name indicates, this workshop is design as an overview of in-pit crushing conveying (IPCC) systems technology in open-pit mines.

GENERAL OBJECTIVES

- To develop a comprehensive understanding of IPCC systems technology in open pit mines.
- To analyze the advantages and disadvantages of IPCC compared to traditional truck and shovel operations in open pit mining.
- To review of various components and operational considerations of IPCC systems.

CONTENTS AND PROGRAM

10:00 – 10:50	Module 1: Part 1 – Introducing the School of Mining at the University of Alberta Part 2 – Introduction to In-pit Crushing and Conveying Systems	Dr. Yashar Pourrahimian
10:50 – 11:00	Questions and discussion Module 1	
11:10 – 12:00	Module 2: Different IPCC Systems and Pros and Cons	Dr. Yashar Pourrahimian
12:00 – 12:10	Questions and discussion Module 2	
12:20 - 13:10	Module 3: Solving an Example Using Excel to Compare the Truck System with IPCC	Dr. Yashar Pourrahimian

13:10 – 13:20	Questions and discussion Module 3	
13:20 - 13:30	Conclusions and Closure of the Course	Dr. Yashar Pourrahimian

LECTURER(S) BIO

Dr. Yashar Pourrahimian holds the position of Associate Professor at the University of Alberta's School of Mining and Petroleum Engineering. With over 18 years of experience in research, teaching, and consulting, he is a registered professional Mining Engineer. Dr. Pourrahimian conducts his research through the Mining and Rock Science Development and Innovation Laboratory (MRDIL) at the University of Alberta. His primary research interests lie in the application of mathematical modeling, optimization techniques, discrete event and continuous simulation, as well as intelligent agents to address complex and large-scale decision-making problems in surface and underground mine planning and operations. Notably, he has authored more than 80 papers in leading mining journals and conferences. Furthermore, Dr. Pourrahimian has successfully developed, tested, and delivered prototype software packages for mine planning optimization.

Course 3:

Towards Sustainable Circular Mining: Valorizing Mining Waste

When: Monday, July 10, 2023
Instructors: **Liey-si Wong,** Academic, Department of Geological Sciences, Universidad Católica del Norte, Chile
Language: Spanish
Time: **10:00 AM – 12:30 PM** (Chilean time zone).

Description: The course consists of a characterization of the elements contained in mining wastes, many of which constitute what are currently called critical raw materials. Then, the attendees will be shown hydrometallurgical and environmentally friendly methods for the extraction of the metals of interest. The course will end by showing methods of waste valorization, characterization of metals and possible uses (work done by the academic who teaches the module).

GENERAL OBJECTIVE

- To apply valorization techniques to mining wastes.

SPECIFIC OBJECTIVES

- To show characterization methods to detect elements of interest.
- To teach the types of copper mining wastes.
- To identify methods of valorization of mining wastes.

CONTENTS AND PROGRAM

10:00 - 10:50	Module 1: Circular Economy-Circular Mining	Dra. Liey-si Wong
10:50 - 11:00	Questions and discussion Module 1	
11:10 - 12:00	Module 2: Origin of Massive Mining Tailings: Paradigm Shift from Waste to Raw Material	Dr. Liey-si Wong
12:00 - 12:10	Questions and discussion Module 2	
12:20 - 13:10	Module 3: Bioremediation-Bionanomineralization: A Grain of Sand for Circular Mining	Dr. Liey-si Wong
13:10 – 13:20	Questions and discussion Module 3	
13:20 - 13:30	Conclusions and Closure of the Course	Dr. Liey-si Wong

LECTURER(S) BIO

Liey-si Wong is an Exploration Geologist from UCN, with a MSc. in Mineralogy, applied to Geometallurgy (Universidad de Concepción), a MSc. in Economic Geology, mention in Mining Exploration (UCN), and a PhD in Mineral Process Engineering (Universidad de Antofagasta) with extensive experience in innovation and technology in mining processes and obtaining by-product materials from the copper industry. Expert in methods of characterization of minerals and materials, applied to exploration and geometallurgy.

She currently works as an Academic-Researcher in the Department of Geological Sciences at the Universidad Católica del Norte, is part of the Núcleo del Litio, Bionanomining – Secondary Mining line of research and is a collaborator of the Science-up project, axis of Female Leadership, promoting the entry of women to STEM.