

ABOUT THE INSTRUCTORS

Dr. Sean Dessureault

is a tenure-track professor currently engaged in research primarily related to the integration and effective utilization of modern mining information systems. He also consults in the area of data warehousing, strategic and tactical technology strategy, and mine automation through *MISOM* Consulting Services. *MISOM* also develops integrated IT solutions and workforce training for modern mines.

Dr. Paul Dunn

worked as Projects Manager for 7 years with the *CMTE* (Centre for Mining Technology and Equipment) at the University of Queensland, Australia. This work was predominantly in new drilling and excavation technologies for the Australian mining industry. Prior to this, Dr. Dunn spent some years lecturing and consulting to the mining industry with Curtin University in Western Australia. Dr. Dunn is currently an Associate Professor with Laurentian University's School of Engineering, is the Chair in Mining Technology and is the Graduate Coordinator for the School of Engineering. As Director of *MIRARCO*'s Centre for Mining Technology, Dr. Dunn is focusing his research on waterjet technologies and virtual reality applications in health & safety, training and developing long term mine planning tools.

Dr. Enrique Rubio

is an Assistant Professor at the University of Chile in the field of mining technology. His research area is related to the development of reliability models applied to production planning systems. Dr. Rubio has written more than 12 articles for the international conferences and mining journals. His main areas of interest are mining technology, mine planning, numerical modeling and information systems in mining. During his career he has worked as a mining consultant for *Codelco* (Chile), *Gemcom* (Canada), *Placer Dome* (Canada), *Rio Tinto* (UK), *Freeport Indonesia* (Indonesia), *De Beers* (South Africa) and *McIntosh Engineering* (USA).



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PRE-SYMPOSIUM SHORT COURSES

April 23-24, 2007

Sheraton Hotel & Convention Center, Santiago, Chile

Registration at:

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PRE-SYMPOSIUM SHORT COURSE 1

MINE PLANNING TOOLS AND LATEST DEVELOPMENTS



Instructor:

Dr. Enrique Rubio
Assistant Professor,
University of Chile

Prerequisites

The course is designed for engineers and geologists that are involved in mine planning, production scheduling and production control processes. The course aims to provide the tools to maximize ore body recovery and utilization, both oriented towards maximizing shareholders' values. The fundamentals as well as the latest developments in the field of underground and open pit mine planning such as integrated mine planning models, geo-mining-metallurgical models, price, grade and infrastructure uncertainty treatment in production scheduling will be covered.

Language

Course will be presented in Spanish. Should it be necessary, simultaneous English-Spanish translation will be available.

Course Resources

The course will largely use PowerPoint and projected examples.

Course topics

- Mine Planning in the organization
- Mine planning process
- Production scheduling
- Production scheduling optimization
- Integrated mine planning models
- Infrastructure reliability for production scheduling

Students will learn to:

- Define the mine capacity
- Define an optimal production sequence
- Define best production schedules
- Introduce complex blending and geo/mining metallurgical constraints in production scheduling
- Introduce technical uncertainty into production planning

Course Program

The course begins with a brief introduction of the role of mine planning and how it is related to the business value definition. After that the subjects of the components of the mine planning process will be discussed. Then a production schedule will be defined and its relevance in the mining engineering activity will be discussed. A fourth topic defines the problem of sequencing and production scheduling as operation research models, illustrating different applications to blending, sequencing and others. The fifth one defines the integration of different areas of the mining value chain into a mine planning model, such as the milling and the marketing activities. Finally, a novel technique to introduce infrastructure reliability into production planning as means of technical uncertainty will be discussed.

The course has been prepared to be lectured 2 days from 08:30 AM to 17:00 PM with an hour and a half break for lunch. The afternoons will be devoted to case studies and applications.

PRE-SYMPOSIUM SHORT COURSE 2

MODERN MINING INFORMATION SYSTEMS

Utilization & Effectiveness



Instructors:

Dr. Sean Dessureault
*Assistant Professor,
University of Arizona,
USA*

Dr. Paul Dunn
*Associate Professor,
Laurentian University,
Canada*

Prerequisites

It is assumed that students possess basic computer skills and are familiar with some of the basic software tools in mining, namely Excel, Enterprise systems, Fleet Management systems, Drill Monitoring systems, and process monitoring.

Language

Course will be presented in English. Simultaneous English-Spanish translation will be available.

Course Resources

A specific modern text book does not exist for this class. Resources will be several copies of conference and journal papers and printed PowerPoint slides. The course will largely use PowerPoint and projected examples.

Specific Instructional Goals / Overview

Mining technology has evolved to include not only large complex machines but also complex involved information systems that require knowledge of management techniques and computer skills. This course focuses on the basic IT skills necessary for engineers and managers to begin extracting and using the information contained within the large amount of data currently stored in modern mining information systems. The key goals are for the students to be able to extract information, undertake analysis, integrate data sources, and formally document data models. Some of the more modern and complex analysis techniques, such as data mining, building and using OLAP cubes, and using Neural Networks (artificial intelligence), will be reviewed, although not in depth as these are considered more advanced topics.

Methodology

This course will be taught through a combination of lectures and in-class exercises using real data from existing mines.



Topics:

- Basics of Databases and database design
- Effective documentation of database solutions
- Commercial systems in mines and their data types
- Data Warehousing & Data Mining
- Business Processes & their data

Students will learn to:

- Integrate databases
- Design and implement OLAP cubes, then slice & dice data
- Access huge databases through MS Excel
- Schedule data importation into analysis tools
- Create sustainable analysis tools of integrated data solutions

Sections

These topics will be covered by reviewing the following phases, although, focus may change depending on the interest of the audience.

- *Phase I* -Introduction to topic: DBs & Business Processes
- *Phase II* -Basics of DBs & Commercial Systems
- *Phase III* -Database design for mining engineers
- *Phase IV* -Business processes & their data
- *Phase V* -Views & Sequential Querying Language (SQL)
- *Phase VI* -Data Mining
- *Phase VII* -Data to Action
- *Phase VIII* -The road ahead

COURSE PROGRAM

DAY 1: Monday, April 23, 2007

Speaker: *Dr. Sean Dessureault, University of Arizona, USA*

- 8:30** Introduction to topic
Current and future issues in the effective use of mine Information System (IS) infrastructure.
- 10:00** Coffee Break
- 10:30** Basics of DBs & Commercial Systems. Introduction to common IS tools at mine sites, exploring basic database software (Access, SQL Server)
- 11:30** Database design for mining engineers. Learning about metadata, Entity Relationship diagrams, data integration, and some basic SQL codes. Recognizing commercial IS infrastructure and its business processes.
- 12:30** Lunch
- 14:00** Exercises. Practicing creating, populating, and manipulating databases (Microsoft Access)
- 15:30** Coffee Break
- 16:00** Views & Sequential Querying Language (SQL). Introduction to views, queries, and basic SQL commands in SQL Server or MS Access including some exercises.
- 17:00** End of day 1.

DAY 2: Tuesday, April 24, 2007

- 8:30** Review, Views & Sequential Querying Language (SQL). Brief review of previous day's material, using Views in SQL Server, basic commands in SQL.
- 10:00** Coffee Break
- 10:30** Data Mining. Introduction of OLAP cubes and Data Mining (Neural Network exercise) & exercises.
- 12:30** Lunch
- Speaker:** *Dr. Paul Dunn, Laurentian University, Canada*
- 14:00** Introduction to Spatial Data Systems for Exploration and Mine Planning. Exploration examples will focus heavily on case studies and show how data from various sources (borehole data, geophysical data, geology etc..) can be integrated.
- 15:30** Coffee Break
- 16:00** Mine planning integration examples using visualization techniques. Mine planning examples but show how various components of research software and existing data stores have to be developed as an integrated process for optimised mine planning and design.
- Speaker:** *Dr. Sean Dessureault, University of Arizona, USA*
- 16:30** Data to Action. Key Issues to remember, review, process of ensuring a sustainable and effective IS infrastructure.
- 17:00** Course ends.