1. Mine Planning and Design Series

Week 1 - April 30 to May 3, 2013 - 4 days
Strategic Mine Planning & Optimization
Software: Gemcom-Gems, Whittle, and MineSched

Week 2 - June 4 to 7, 2013 - 4 days
Open Pit Mine Design & Polygon Modeling
Software: Gemcom-Gems

Week 3 - July 9 to 12, 2013 - 4 days
Medium/Short-Term Production Scheduling
Software: Gemcom-MineSched

2. Strategic Mine Planning & Optimization

May 28 to 31, 2013 - 4 days
Software: Gemcom-Whittle & Excel Solver

3. Simulation Modeling of Mining and Processing Systems

May 14 to 17, 2013 - 4 days
Software: Arena - Rockwell Automation

Instructor
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Registration
Online registration will be open soon
http://www.ualberta.ca/MOL/
For more information please contact Hooman Askari at hooman@ualberta.ca

Software Gemcom-Gems, Whittle, and MineSched

Three-week course extended over three months.
This three-week course extends over three months. It is ideally suited to those from industry who wish to gain a more in depth understanding and knowledge of modern mine planning and optimization tools and theory. The course could be taken as a combination of on-site and distance-learning. Designed for mining professionals who want to update their theoretical and practical knowledge in strategic mine planning and optimization, open pit mine and dump design, polygon modeling, mining-cut evaluation, medium- to short-term production scheduling, and ore grade control. The course complements theory with comprehensive instructions and hands-on computer labs using Gemcom Software. Participants are expected to spend 60 hours on lecture material and 60 hours on computer labs, exercises, and project. On completion of this program, the successful attendee will have an in depth understanding of fundamental principles of open pit mine planning and design. Also they will be able to apply their theoretical knowledge by using modern mine planning software. The objectives are met through lectures, tutoring, and undertaking a mine planning project. The project starts with estimated and simulated block models and covers all the steps required to a complete open pit mine design and a monthly production schedule.

Medium/Short-Term Production Scheduling
Software: Gemcom-MineSched

Whittle software will be used for the strategic mine planning week. Principles and fundamental concepts involved in strategic mine planning and design of open pit mines are presented. Subjects covered are geometrical layout design; open pit limit optimization using manual method, floating cone, and 2D & 3D Lerchs and Grossmann algorithms; production planning; mine-life estimation, cut-off grade optimization and Lane’s theory; final pit limit optimization and production scheduling in the presence of grade uncertainty; risk based mine planning. The course also covers an introduction to mathematical programming for mining engineers using Excel Solver. Mathematical optimization models and case studies for long and short-term open pit mine planning are presented. The course complements theory with comprehensive instructions and hands-on experience using Whittle strategic mine planning software and Excel.

MineSched software will be used for the short-term production scheduling section of the program. This section will focus on generating monthly and weekly mine schedules adhering to the mine strategic plan. Ore control operations using polygons and mining-cut evaluations for short-term planning will be also covered. The course will go over data preparation; setting parameters: rates, delays, priorities, targets; defining mining locations; defining mining capacity – truck shovel hours; defining process streams; period polygons: tonnage/grades, and reporting in and Excel, MS Project. The project work will continue starting from the long-term yearly schedule generated within the designed pit to a monthly production plan taking into account mining and processing capacities, truck-shovel hours, blending targets, and stockpiles. The participants will learn how to: schedule from block, polygonal and grid models with any number of materials and qualities; graphically sequence mining blocks while reporting tonnage and grade; incorporate mining directions, bench lags, face geometry, location limits and other mining constraints to ensure practical schedules.
2. STRATEGIC MINE PLANNING AND OPTIMIZATION
May 28 to 31, 2013 - 4 days – Whittle software
The Strategic Mine Planning and Optimization course is a comprehensive four-day course designed for mine planners, mining engineers, managers, and decision makers in the mining industry. Principles and fundamental concepts involved in strategic mine planning and design of open pit mines are presented. Subjects covered are geometrical layout design; open pit limit optimization using manual method, floating cone, and 2D & 3D Lerchs and Grossmann algorithms; production planning; mine-life estimation, cut-off grade optimization and Lane’s theory; final pit limit optimization and production scheduling in the presence of grade uncertainty; risk based mine planning. The course also covers an introduction to mathematical programming for mining engineers using Excel Solver. Mathematical optimization models and case studies for long and short-term open pit mine planning are presented. The course complements theory with comprehensive instructions and hands-on experience using Whittle strategic mine planning software and Excel Solver. Participants will complete a project quantifying uncertainty in production plans using multiple realizations of conditionally simulated orebodies in Whittle. Outcomes of the course include:
- Understand concepts of strategic mine planning.
- What costs should be included in pit optimization.
- Understand principles of Lerchs Grossman 3D algorithm.
- Pit limits optimization with practical mining width.
- Generate optimal shells, reports and schedules.
- Practical push back design with a minimum mining width.
- Complete a strategic mine planning study in Whittle.
- Production scheduling – using contractors.
- Advanced techniques with mining direction control.
- Buffer Stockpiles and Extractive Blending.
- Practical push back design with a minimum mining width.
- Complete a strategic mine planning study in Whittle.

3. SIMULATION MODELING OF MINING AND PROCESSING SYSTEMS
May 14 to 17, 2013 - 4 days
Fundamentals of Discrete Event Simulation (DES) modeling and its industrial applications to mining and processing systems are presented. Theoretical and statistical aspects of simulation, including input and output analysis, experimental design, and variance reduction techniques are presented. Arena Simulation Environment (Rockwell Automation) is used as the primary modeling simulation tool. On completion of this course, you will have an in depth understanding of principles and methodologies, of discrete event simulation and its application to mining and processing systems. A series of labs using Arena Simulation Software are undertaken to model and optimize real world systems. The first two days of the course focuses on mining systems:
- A review on probability and statistics and fundamental simulation concepts.
- Truck-shovel simulation modeling using resources, queues, and basic animation to calculate fleet productivity.
- Mixed fleet truck-shovel simulation modeling using resources sets and maintenance schedules.
- Introduction of resource failures with defining probability distribution functions for mean time between failures and mean time between repairs of trucks, shovels, and crushers.
- Truck dispatching using station-route and assessing the reliability of the system.

The rest of the course - two days - will focus on combined continuous and discrete event simulation of processing systems.
- Size classifications including sieves and hydrocyclones.
- Comminution operations including crushing machines, grinding, and semi-autogenous mills.
- Solid-liquid separation including thickeners and filtration.
- Gravity and magnetic separation modeling.
- Comminution and separation sub-models for grinding machines, separators, and classifiers.

Bulk material terminal modeling including arrival of trains, stockyard cells, stockpile blending, stackers and reclaimers, and the ships loading section.

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Mining Optimization Laboratory
Mining Optimization Laboratory (MOL) is an industrial research consortium directly sponsored by mining companies who exclusively receive research results. MOL research focuses on two major themes:
- Mine Planning and Design.
- Simulation Optimization of Mining Systems.

MOL research focuses on using operations research and advanced analytical methods such as mathematical modeling, optimization, discrete event/continuous simulation, and intelligent agents to arrive optimal or near-optimal solutions to complex, large-scale mine planning/operations decision-making problems.