MERCURY

Advanced Geological Exploration, Resource Evaluation & Mining Systems Management Program

Dubai - UAE: +971 4 450 5697
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Introduction:

This advanced training program provides a comprehensive, field-to-decision understanding of geological mapping, mineral exploration, drilling methodologies, resource evaluation, and mining operations. It integrates theoretical frameworks with applied industry practices, enabling participants to bridge the gap between raw geological data acquisition and strategic mining decisions. The course emphasizes modern technologies, data-driven interpretation, and economic feasibility considerations within the mining lifecycle.

Target Audience:

- Senior geologists and exploration specialists.
- Mining engineers and technical managers.
- Resource estimation and modeling professionals.
- Geological surveyors and field mapping experts.
- Professionals involved in mineral exploration projects.
- Decision-makers in the mining and energy sectors.

Training Objectives:

By the end of this program, participants will be able to:

- Develop advanced expertise in geological mapping and structural interpretation.
- Master modern exploration techniques and integrated survey systems.
- Enhance the design of drilling strategies and subsurface data analysis.
- Evaluate mineral deposits and classify resources and reserves accurately.
- Understand the selection of mining methods and the feasibility assessment.
- Conduct advanced geological mapping and interpret complex structures.
- Design and execute integrated exploration programs using multi-techniques.
- Analyze drilling data and identify mineralization patterns.
- Evaluate ore bodies and apply reserve/resource classification standards.
- Select appropriate mining methods based on geological and economic factors.
- Perform feasibility-level assessments for mining projects.

Targeted Competencies:

- Geological interpretation and spatial analysis.
- Exploration strategy design and execution.
- Subsurface data integration and modeling.
- Resource estimation and classification.
- Mining systems evaluation and optimization.
- Strategic decision-making in mining operations.

Course Content:

Unit One, Geological Mapping and Survey Systems:

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- Advanced Geological Mapping: field mapping methodologies, scale selection, mapping accuracy, integration of GPS and GIS systems, digital mapping platforms, and structural interpretation in mapping workflows.
- Outcrop Analysis: identification techniques, weathering effects, exposure limitations, sampling strategies, and structural measurements from outcrops.
- Bedrock Characterization: differentiation from overburden, lithological identification, structural context, subsurface correlation.
- Stratigraphy Analysis: stratigraphic columns, correlation techniques, depositional environments, sequence stratigraphy, basin analysis.
- Lithology Identification: mineral composition, texture classification, rock origin interpretation, and alteration mapping.
- Structural Geology Interpretation: stress regimes, deformation history, structural mapping integration.
- Fault and Fold Systems: classification, recognition in field and subsurface, impact on mineralization, displacement analysis.
- Topographic Map Utilization: contour interpretation, elevation profiling, integration with geological data, and terrain analysis.

Unit Two, Exploration Techniques and Technologies:

- Prospecting Strategies: traditional vs modern approaches, indicator minerals, reconnaissance surveys, targeting methods.
- Remote Sensing Applications: satellite imagery interpretation, spectral analysis, alteration detection, GIS integration.
- Geophysical Survey Systems: principles, survey design, data acquisition, interpretation workflows.
- Geochemical Sampling Techniques: soil, stream sediment, rock sampling, contamination control, anomaly detection.
- Aeromagnetic Survey Analysis: magnetic anomalies, subsurface structure detection, mineral targeting.
- Seismic Survey Methods: wave propagation, reflection/refraction techniques, subsurface imaging.
- Radiometric Survey Applications: radioactive element detection, mapping alteration zones, and exploration targeting.
- Electromagnetic EM Survey Systems: conductivity mapping, detection of sulfide deposits, depth penetration analysis.

Unit Three, Drilling and Subsurface Analysis:

- Core Drilling Diamond Drilling Techniques: drilling design, core recovery optimization, orientation methods, cost considerations.
- Reverse Circulation RC Drilling Methods: operational principles, sample quality, speed vs accuracy trade-offs.
- Borehole Design and Management: drilling patterns, spacing optimization, deviation control, safety considerations.
- Assay and Laboratory Analysis: sample preparation, analytical techniques, QA/QC protocols, error minimization.
- Geochemical Anomaly Interpretation: threshold determination, anomaly classification, integration with geology.
- Logging Techniques: lithological logging, geotechnical logging, structural logging, digital logging systems.
- Mineralization Identification: ore controls, alteration halos, zonation patterns, and economic significance.

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Unit Four, Ore Bodies and Resource Evaluation:

- Ore Body Modeling: geometry, continuity, grade distribution, 3D modeling techniques.
- Mineral Deposit Classification: genetic models, deposit types, exploration implications.
- Grade and Cut-off Grade Analysis: economic thresholds, grade distribution, sensitivity analysis.
- Vein and Lode Systems: structural controls, formation processes, and exploration targeting.
- Reserve vs Resource Classification: international standards JORC, NI 43-101, reporting requirements, risk levels.
- Gangue Minerals Analysis: identification, processing implications, economic impact.
- Tailings Management: waste characterization, environmental considerations, reprocessing potential.
- In-situ Resource Evaluation: extraction feasibility, technological constraints, economic viability.

Unit Five, Mining Methods and Site Development:

- Open-pit Mining Systems: design parameters, slope stability, equipment selection, cost optimization.
- Underground Mining Methods: room and pillar, cut and fill, block caving, and ventilation systems.
- Greenfield Exploration Projects: early-stage exploration, risk assessment, project development lifecycle.
- Brownfield Exploration Strategies: resource expansion, mine life extension, data integration.
- Mining Lease and Claim Management: legal frameworks, licensing procedures, compliance requirements.
- Feasibility Study Development: scoping study, pre-feasibility, feasibility levels, financial modeling, risk analysis.
- Mine Planning and Optimization: production scheduling, resource utilization, cost control
- Environmental and Sustainability Considerations: impact assessment, rehabilitation planning, ESG compliance.