Mineral Liberation Analysis (MLA) Training Course

Professional Development Training Course Outline

Category	General Training	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

The Mineral Liberation Analysis (MLA) Training Course is designed to equip mining, metallurgy, and mineral processing professionals with advanced skills in automated mineralogy, ore characterization, digital mineral analysis, process optimization, geometallurgy, AI-driven mineral processing, sustainable mining technologies, and data-driven beneficiation strategies. This intensive course integrates theoretical knowledge with practical laboratory applications using modern MLA systems, scanning electron microscopy (SEM), image analysis software, and machine learning approaches for mineral identification and liberation assessment. Participants will gain industry-relevant competencies to improve operational efficiency, recovery optimization, resource evaluation, and decision-making in modern mining environments.

The course focuses on emerging trends shaping the global mining industry, including Industry 4.0 mining, smart mineral processing, ESG compliance, critical minerals analysis, battery mineral characterization, predictive analytics, digital twins, circular economy mining, and sustainable beneficiation technologies. Through real-world case studies, hands-on software training, and laboratory demonstrations, learners will understand how MLA supports mineral exploration, flotation optimization, hydrometallurgy, tailings management, and process plant performance enhancement. The program is structured to build expertise aligned with international mining standards and the evolving needs of mining companies, research institutions, and mineral laboratories.

Programme Curriculum

Mineral Liberation Analysis (MLA) Training Course

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Course Objectives

1. Develop expertise in Mineral Liberation Analysis (MLA) methodologies and applications.
2. Understand advanced automated mineralogy and SEM-based mineral characterization techniques.
3. Apply AI and machine learning in mineral processing optimization.
4. Improve skills in geometallurgical data interpretation and ore variability analysis.
5. Master quantitative mineralogical analysis for beneficiation processes.
6. Optimize flotation, gravity separation, and hydrometallurgical operations using MLA data.
7. Learn modern approaches in critical minerals and battery minerals characterization.
8. Analyze tailings reprocessing and circular economy mining strategies.
9. Enhance operational efficiency using digital mining and Industry 4.0 technologies.
10. Strengthen competencies in process mineralogy and sustainable resource management.
11. Utilize advanced software tools for data analytics and mineral image processing.
12. Develop problem-solving skills using real-time plant performance monitoring systems.
13. Apply international standards and best practices in ESG-compliant mining operations.

Target Audience

1. Mineral Processing Engineers
2. Metallurgists and Extractive Metallurgy Professionals
3. Geologists and Exploration Specialists
4. Mining Engineers and Plant Operators
5. Laboratory Analysts and Mineralogists
6. Research Scientists and Academic Professionals
7. Environmental and Sustainability Officers in Mining
8. Graduate Students and Technical Consultants in Mining & Minerals

Course Modules

Module 1: Fundamentals of Mineral Liberation Analysis

- Introduction to MLA principles and workflows
- Mineral liberation concepts and particle characterization

- Overview of SEM and automated mineralogy systems
- Mineral identification and classification techniques
- Data acquisition and interpretation fundamentals
- **Case Study: Optimization of copper ore liberation analysis** for improved flotation recovery in a large-scale concentrator plant.

Module 2: Automated Mineralogy and SEM Applications

- SEM instrumentation and operational procedures
- Backscattered electron imaging techniques
- Energy dispersive spectroscopy (EDS) analysis
- Automated particle analysis workflows
- Calibration and quality control procedures
- **Case Study: Gold ore mineralogical mapping** using SEM-EDS systems for enhanced recovery prediction.

Module 3: Quantitative Mineralogical Analysis

- Quantitative phase analysis methods
- Mineral abundance and grain size distribution
- Liberation and association measurements
- Data validation and statistical interpretation
- Reporting standards for mineralogical studies
- **Case Study: Iron ore beneficiation optimization** through quantitative mineralogical analysis.

Module 4: Geometallurgy and Ore Characterization

- Geometallurgical modeling principles
- Ore variability and spatial mineral distribution
- Integration of geological and processing data
- Predictive mineral processing models
- Resource-to-recovery optimization strategies
- **Case Study: Geometallurgical modeling of polymetallic deposits** for production forecasting.

Module 5: Process Mineralogy and Plant Optimization

- Process mineralogy in comminution circuits
- Flotation optimization using MLA data
- Gravity and magnetic separation analysis
- Hydrometallurgical process support
- Process troubleshooting and optimization techniques
- **Case Study: Flotation circuit optimization in a platinum processing plant** using MLA datasets.

Module 6: Critical Minerals and Battery Materials Analysis

- Characterization of lithium-bearing minerals
- Rare earth element mineralogy
- Graphite and battery raw material analysis
- Sustainability and strategic minerals processing
- Advanced beneficiation techniques for critical minerals
- **Case Study: Lithium ore characterization project** for battery-grade concentrate production.

Module 7: Digital Mining and Data Analytics

- Industry 4.0 applications in mining
- AI-driven mineral data interpretation
- Machine learning for mineral classification
- Digital twins in mineral processing plants
- Big data analytics and process automation
- **Case Study: AI-assisted predictive maintenance and ore sorting** in smart mining operations.

Module 8: Sustainable Mining and ESG Applications

- Environmental impact assessment in mineral processing
- Tailings characterization and reprocessing
- Circular economy approaches in mining
- ESG compliance and sustainability reporting
- Energy-efficient mineral beneficiation technologies
- **Case Study: Tailings reprocessing project** for resource recovery and environmental remediation.

Training Methodology

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

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Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com