Mineral Identification Techniques 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 Identification Techniques Training Course is designed to equip participants with advanced knowledge and practical skills in modern mineral identification, ore characterization, geochemical analysis, and mining laboratory techniques. As the global mining and exploration industry increasingly adopts digital mining technologies, AI-powered mineral analysis, sustainable resource management, and automation-driven exploration systems, professionals require specialized expertise to accurately identify, classify, and evaluate mineral resources. This training delivers hands-on exposure to mineralogical testing, petrographic analysis, XRD/XRF interpretation, field sampling, and laboratory quality assurance aligned with international mining standards and ESG compliance frameworks.

This course integrates cutting-edge mineral exploration trends, smart mining innovation, geoscience analytics, critical minerals assessment, rare earth element identification, and data-driven geological interpretation to meet current industry demands. Participants will gain practical competency in identifying metallic and non-metallic minerals, evaluating ore deposits, applying analytical instrumentation, and interpreting geological datasets for mining operations, exploration projects, environmental assessments, and industrial mineral processing. The program emphasizes real-world case studies, operational efficiency, sustainability practices, and technology-enabled mineral resource evaluation for mining professionals, geologists, laboratory analysts, and exploration specialists.

Programme Curriculum

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Course Duration

5 days

Course Objectives

1. Develop advanced skills in mineral identification and ore characterization techniques.
2. Understand modern geochemical and mineralogical analysis methodologies.
3. Apply XRD, XRF, SEM, and petrographic analysis technologies effectively.
4. Enhance competency in critical minerals and rare earth elements identification.
5. Learn digital approaches in AI-driven mineral exploration and smart mining systems.
6. Improve field capabilities in rock sampling, core logging, and geological mapping.
7. Master laboratory quality assurance and quality control (QA/QC) procedures.
8. Interpret mineralogical data using GIS and geoscience data analytics platforms.
9. Evaluate mineral deposits for sustainable mining and resource optimization.
10. Understand international standards in mineral resource classification and reporting.
11. Apply advanced techniques in industrial minerals and precious metals identification.
12. Strengthen decision-making using data-driven exploration and mineral valuation tools.
13. Enhance operational efficiency through automation, digital transformation, and mining innovation strategies.

Target Audience

1. Geologists and Exploration Geologists
2. Mining Engineers and Metallurgists
3. Laboratory Technicians and Analysts
4. Mineral Processing Professionals
5. Environmental and Sustainability Officers
6. Quarry and Industrial Mineral Operators
7. Government Mining and Geological Survey Officials
8. Researchers, Academics, and Graduate Students in Geosciences

Course Modules

Module 1: Fundamentals of Mineral Identification

- Introduction to mineralogy and crystallography
- Physical and optical properties of minerals
- Mineral classification systems
- Mohs hardness scale and streak testing
- Density and cleavage identification techniques
- **Case Study:** Identification of sulfide and oxide minerals in a gold exploration project.

Module 2: Geological Mapping and Sampling Techniques

- Geological field mapping methods
- Core logging and drill sample interpretation
- Rock, soil, and stream sediment sampling
- GPS and GIS applications in exploration
- Data recording and reporting standards
- **Case Study:** Geological mapping for copper mineralization assessment.

Module 3: Petrographic and Microscopic Analysis

- Thin section preparation techniques
- Polarizing microscope applications
- Optical mineralogy fundamentals
- Textural and structural interpretation
- Ore microscopy analysis
- **Case Study:** Petrographic analysis of iron ore formations for beneficiation planning.

Module 4: Advanced Mineral Analytical Techniques

- X-Ray Diffraction (XRD) applications
- X-Ray Fluorescence (XRF) analysis
- Scanning Electron Microscopy (SEM) fundamentals
- Spectroscopic mineral identification methods
- Automated mineralogy systems
- **Case Study:** Application of XRF and XRD in lithium exploration projects.

Module 5: Geochemical and Geostatistical Analysis

- Geochemical sampling strategies
- Assay data interpretation
- Elemental analysis and anomaly detection
- Geostatistical modeling techniques
- Mineral resource estimation basics
- **Case Study:** Geochemical targeting in rare earth element exploration.

Module 6: Industrial Minerals and Critical Minerals

- Identification of industrial minerals
- Critical minerals and energy transition metals
- Rare earth elements evaluation
- Battery minerals exploration trends
- Economic significance of strategic minerals
- **Case Study:** Nickel and cobalt mineral identification for EV battery supply chains.

Module 7: Laboratory QA/QC and Safety Procedures

- Laboratory safety management systems
- Sample preparation protocols
- Quality assurance and quality control
- Calibration and instrument maintenance
- International laboratory standards
- **Case Study:** Implementing QA/QC protocols in a mining laboratory environment.

Module 8: Digital Mining and Sustainable Resource Evaluation

- Smart mining technologies
- AI and machine learning in mineral exploration
- Remote sensing and hyperspectral imaging
- ESG and sustainable mining practices
- Digital transformation in geosciences
- **Case Study:** AI-assisted mineral targeting in sustainable mining operations.

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:

Register Online Now

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