Underground Mine Design Basics 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

Underground Mine Design Basics Training Course is designed to equip mining professionals with foundational and applied competencies in underground mine planning, geotechnical assessment, excavation design, and safe production optimization. The course focuses on developing practical understanding of orebody characterization, stope design, development layouts, ventilation fundamentals, rock mechanics, and mine safety engineering principles. Participants will gain exposure to modern digital mine planning tools, 3D modeling workflows, and risk-based design approaches that align with global mining standards and operational best practices.

This training integrates theoretical frameworks with real-world mining scenarios to ensure participants can translate knowledge into actionable design decisions. Emphasis is placed on safe underground extraction methods, cost-efficient mine layouts, geotechnical stability analysis, and production scheduling optimization. By the end of the course, learners will be capable of contributing to sustainable underground mine development projects, improving operational efficiency, reducing geotechnical risk, and supporting data-driven mine engineering decisions across both hard rock and coal mining environments.

Programme Curriculum

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Course Duration

5 days

Course Objectives

1. Understand underground mine design principles and mine lifecycle planning
2. Apply rock mechanics and geotechnical stability analysis in design decisions
3. Develop stope layout optimization and ore extraction strategies
4. Interpret geological models for mine planning and orebody geometry
5. Design safe underground development layouts
6. Implement ventilation network fundamentals and airflow design basics
7. Apply ground support systems and rock reinforcement techniques
8. Perform basic mine scheduling and production sequencing
9. Evaluate mining methods
10. Use 3D mine design software concepts and digital modeling workflows
11. Identify and mitigate underground mining hazards and risk factors
12. Integrate cost estimation and economic evaluation in mine design
13. Apply sustainable mining and environmental compliance principles

Target Audience

1. Mining engineers
2. Geotechnical engineers and rock mechanics specialists
3. Mine planners and production engineers
4. Mining technology and survey technicians
5. Geology graduates entering mining industry
6. Health and safety mining officers
7. Project managers in mining operations
8. Engineering students specializing in mining or mineral engineering

Course Modules

Module 1: Fundamentals of Underground Mining

- Overview of underground mining methods and classifications
- Mining cycle: exploration to production phases
- Basic orebody geometry and extraction concepts
- Mine access methods: shafts, declines, adits
- **Case Study:** Comparative analysis of deep-level gold vs. shallow copper mines

Module 2: Rock Mechanics & Geotechnical Basics

- Stress distribution in rock masses
- Rock mass classification systems
- Failure mechanisms in underground openings
- Support selection fundamentals
- **Case Study:** Ground collapse analysis in a sublevel open stope

Module 3: Underground Mine Design Layouts

- Development design: ramps, drifts, crosscuts
- Stope and pillar design principles
- Ore flow and material handling pathways
- Mine sequencing and access optimization
- **Case Study:** Layout optimization for a narrow-vein gold deposit

Module 4: Mining Methods & Applications

- Cut-and-fill mining method fundamentals
- Room and pillar extraction systems
- Sublevel stoping design principles
- Shrinkage stoping applications
- **Case Study:** Method selection for a high-grade polymetallic orebody

Module 5: Ventilation & Airflow Basics

- Ventilation network structure in underground mines
- Primary and secondary airflow systems
- Heat, gas, and dust control principles
- Fan selection and airflow balance basics
- **Case Study:** Ventilation redesign after methane buildup incident

Module 6: Mine Planning & Scheduling

- Introduction to production sequencing
- Block modeling and resource estimation basics
- Short-term vs long-term planning concepts
- Equipment utilization and cycle optimization
- **Case Study:** Production delay recovery plan in a declining orebody

Module 7: Safety, Risk & Ground Control

- Hazard identification in underground environments
- Risk assessment methodologies
- Ground support monitoring systems
- Emergency response planning
- **Case Study:** Rockburst mitigation in deep-level mining operations

Module 8: Digital Mine Design Tools

- Introduction to 3D mine modeling systems
- CAD-based underground design workflows
- Data integration from geology and surveying
- Visualization and design validation techniques

- **Case Study:** Digital transformation of legacy mine design into 3D model

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

Start Date	End Date	Location	Price
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

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