# Structural Geology for Mining Engineers Training Course

Professional Development Training Course Outline

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

## Course Introduction

Structural Geology is a cornerstone discipline for modern mining engineering, enabling professionals to understand rock deformation, stress regimes, fault systems, folding patterns, and orebody controls that directly influence safe and profitable mineral extraction. Structural Geology for Mining Engineers Training Course is designed with a strong focus on mineral exploration, underground mining stability, geotechnical risk management, orebody modelling, rock mechanics, and mine design optimization, integrating both theoretical foundations and real-world mining applications. Participants will gain critical insights into structural interpretation, deformation analysis, fracture systems, and geological modeling techniques essential for today’s data-driven mining industry.

In an era driven by digital mining, 3D geological modeling, AI-assisted exploration, geotechnical hazard prediction, and resource optimization, structural geology has become a high-value competency for mining engineers. This course bridges the gap between geology and engineering by providing practical tools for fault mapping, stress analysis, structural logging, slope stability assessment, and ore control modeling, ensuring engineers can make informed decisions that improve productivity, safety, and ore recovery in complex geological environments.

## Programme Curriculum

**Structural Geology for Mining Engineers Training Course**

**Introduction**

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**Course Duration**

5 days

**Course Objectives**

1. Understand core principles of structural geology in mining environments
2. Analyze rock deformation, stress-strain relationships, and tectonic forces
3. Identify and interpret faults, folds, joints, and shear zones
4. Apply structural mapping techniques in underground and surface mines
5. Evaluate orebody controls and structural ore localization
6. Integrate rock mechanics with mining engineering design
7. Assess geotechnical risks and ground stability hazards
8. Develop competency in 3D geological and structural modeling
9. Use GIS and digital mapping tools for structural interpretation
10. Improve decision-making in mine planning and excavation design
11. Understand structural logging and core sample interpretation
12. Apply structural data to resource estimation and exploration targeting
13. Enhance safety through predictive geotechnical and structural analysis

**Target Audience**

1. Mining Engineers
2. Geological Engineers and Exploration Geologists
3. Geotechnical Engineers and Rock Mechanics Specialists
4. Mine Planning and Design Engineers
5. Mineral Exploration Professionals
6. Engineering Geology Consultants
7. Metallurgical and Resource Evaluation Teams
8. Mining Project Managers and Technical Supervisors

**Course Modules**

**Module 1: Fundamentals of Structural Geology in Mining**

- Earth structure, lithosphere dynamics, and tectonic settings
- Types of stress: compressional, tensional, and shear
- Rock deformation behavior in mining environments
- Geological time and structural evolution of ore systems

- Structural geology terminology for mining engineers
- **Case Study:** Witwatersrand Basin structural evolution and gold deposition controls

**Module 2: Rock Mechanics and Stress Analysis**

- Stress-strain theory and elastic/plastic deformation
- Rock mass behavior under mining-induced stress
- Failure criteria
- In-situ stress measurement techniques
- Mine-induced seismicity and deformation patterns
- **Case Study:** Deep-level gold mining seismicity analysis in South African mines

**Module 3: Faults, Folds, and Fracture Systems**

- Classification of faults
- Fold geometry and classification systems
- Joint systems and fracture propagation
- Structural controls on ore deposition
- Interpretation of structural cross-sections
- **Case Study:** Bushveld Complex structural controls on platinum mineralization

**Module 4: Structural Mapping and Field Techniques**

- Geological mapping in surface and underground mines
- Compass-clinometer usage and orientation measurements
- Structural data collection and stereonet plotting
- Core logging and structural discontinuity recording
- Field sketching and digital mapping tools
- **Case Study:** Structural mapping of a copper deposit in the Zambian Copperbelt

**Module 5: Orebody Controls and Mineralization Structures**

- Structural control of hydrothermal systems
- Fault-hosted and vein-type mineralization
- Shear zone-hosted ore deposits
- Structural traps and ore enrichment zones
- Relationship between deformation and ore grade distribution
- **Case Study:** Gold-bearing shear zones in Barberton Greenstone Belt

**Module 6: Geotechnical Hazards and Mine Stability**

- Slope stability and underground collapse mechanisms
- Rock bursts, falls of ground, and instability prediction
- Support systems and reinforcement design
- Hazard mapping and risk assessment models
- Monitoring techniques
- **Case Study:** Rock burst mitigation in South Deep Mine operations

**Module 7: 3D Geological Modeling and GIS Applications**

- Introduction to 3D structural modeling software
- Geological database management systems

- GIS integration for mine planning
- Digital elevation models and subsurface interpretation
- Data visualization and structural interpretation workflows
- **Case Study:** 3D modeling of a porphyry copper system in Chile

**Module 8: Structural Geology in Mine Planning and Design**

- Integration of structural data into mine design
- Optimization of drill-and-blast strategies
- Structural risk reduction in excavation planning
- Ore dilution control using structural interpretation
- Strategic mine sequencing and production planning
- **Case Study:** Structural optimization in block cave 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