# Mine Subsidence Analysis 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

Mine subsidence is a critical geotechnical and environmental challenge associated with underground mining activities, where surface deformation occurs due to the collapse or gradual movement of underground voids. Mine Subsidence Analysis Training Course is designed to equip professionals with advanced capabilities in geotechnical engineering, rock mechanics, mining risk assessment, GIS-based subsidence modeling, and ground deformation prediction. Participants will gain strong technical expertise in understanding subsidence mechanisms, predictive modeling techniques, and mitigation strategies aligned with modern mining safety standards and sustainability frameworks.

With the increasing adoption of smart mining technologies, remote sensing, LiDAR surveying, geospatial analytics, AI-driven ground stability modeling, and digital twin mining systems, the demand for skilled professionals in subsidence analysis is rapidly growing. This course integrates theoretical foundations with practical applications, enabling learners to assess real-world mining scenarios, interpret subsidence data, and design effective ground control strategies. It emphasizes regulatory compliance, environmental impact reduction, infrastructure protection, and risk-informed decision-making in mining operations globally.

## Programme Curriculum

**Mine Subsidence Analysis Training Course**

**Introduction**

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**Course Duration**

5 days

**Course Objectives**

1. Understand mine subsidence mechanics and ground failure systems
2. Apply rock mass characterization and geotechnical classification systems
3. Perform subsidence prediction modeling using empirical and numerical methods
4. Utilize GIS and remote sensing for surface deformation mapping
5. Develop expertise in finite element modeling (FEM) for ground stability
6. Analyze longwall mining-induced subsidence patterns and behavior
7. Implement risk assessment frameworks for mining-induced hazards
8. Evaluate environmental impact of subsidence on ecosystems and infrastructure
9. Use LiDAR and satellite imagery for terrain deformation analysis
10. Design subsidence mitigation and ground control strategies
11. Interpret time-dependent settlement and strain distribution data
12. Apply AI and machine learning in predictive subsidence analytics
13. Ensure regulatory compliance and mining safety governance standards

**Target Audience**

1. Mining engineers and geotechnical engineers
2. Civil engineers working on underground infrastructure
3. Geological and geoscience professionals
4. Environmental impact assessment specialists
5. Surveyors and GIS analysts
6. Mining safety and risk management officers
7. Government regulators and mining inspectors
8. Researchers and postgraduate students in mining/geotechnical fields

**Course Modules**

**Module 1: Fundamentals of Mine Subsidence**

- Concepts of subsidence formation and collapse mechanisms
- Trough, discontinuous, pothole, and sinkhole subsidence
- Stress redistribution in underground excavation
- Rock mass behavior and failure criteria
- **Case Study:** Coal mine subsidence event in underground longwall mining region

**Module 2: Rock Mechanics & Geotechnical Properties**

- Rock mass rating (RMR) and Q-system analysis
- Elastic and plastic deformation behavior of rock strata
- Jointing, faulting, and discontinuities impact
- Laboratory and field testing methods
- **Case Study:** Stability analysis of fractured sandstone strata in mining zone

**Module 3: Subsidence Prediction Techniques**

- Empirical prediction models
- Numerical modeling using FEM and FDM
- Probability-based subsidence forecasting
- Calibration using field monitoring data
- **Case Study:** Predictive modeling of subsidence in deep coal extraction site

**Module 4: GIS & Remote Sensing Applications**

- Spatial analysis of surface deformation
- Satellite interferometry (InSAR) techniques
- Digital elevation model (DEM) interpretation
- Mapping subsidence-prone zones
- **Case Study:** GIS-based subsidence mapping of active mining belt

**Module 5: Monitoring & Instrumentation Systems**

- Ground movement monitoring instruments
- Real-time sensor-based monitoring systems
- Data acquisition and interpretation
- Integration with IoT mining systems
- **Case Study:** Real-time subsidence monitoring in underground metal mine

**Module 6: Risk Assessment & Hazard Management**

- Hazard identification and vulnerability mapping
- Quantitative risk assessment models
- Infrastructure damage prediction
- Emergency response planning
- **Case Study:** Urban infrastructure damage due to adjacent mine collapse

**Module 7: Environmental Impact & Mitigation**

- Surface water and groundwater impacts
- Soil degradation and ecosystem disruption
- Land rehabilitation techniques
- Sustainable mining practices
- **Case Study:** Environmental restoration of post-subsidence mining land

**Module 8: Advanced Digital Mining & AI Applications**

- Machine learning for deformation prediction
- Digital twin modeling in mining environments
- Big data analytics in geotechnical monitoring
- Automated subsidence risk classification systems

- **Case Study:** AI-based subsidence prediction in smart 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 |

| 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**

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