Hydrogeology in Mining Training Course

Professional Development Training Course Outline

Category	General Training	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Hydrogeology in mining is a critical discipline that focuses on the interaction between groundwater systems and mineral extraction activities. As modern mining operations expand deeper and become more complex, understanding groundwater flow modeling, aquifer characterization, mine dewatering systems, and environmental water impact assessment has become essential for safe and sustainable resource extraction. Hydrogeology in Mining Training Course equips professionals with advanced knowledge of hydrogeological investigations, groundwater contamination control, geotechnical-water interaction, and predictive water balance modeling to support efficient mine planning and operational stability.

With increasing global emphasis on ESG compliance, sustainable mining, water resource management, climate-resilient mining operations, and digital hydrogeology modeling tools, the demand for skilled hydrogeologists in mining is rapidly growing. This course integrates theoretical foundations with practical applications, including GIS-based hydrogeological mapping, numerical groundwater simulation, pumping test analysis, and mine water risk assessment frameworks. Participants will gain hands-on experience in solving real-world mining water challenges while aligning with international best practices and regulatory standards.

Programme Curriculum

Hydrogeology in Mining Training Course

Introduction

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Course Duration

10 Days

Course Objectives

1. Understand fundamentals of mining hydrogeology and groundwater systems
2. Apply aquifer characterization techniques and subsurface mapping tools
3. Conduct groundwater flow modeling using MODFLOW and numerical simulation tools
4. Design mine dewatering and depressurization systems
5. Evaluate hydrogeological risks in open-pit and underground mining
6. Implement groundwater contamination prevention and remediation strategies
7. Perform pumping tests, slug tests, and hydraulic conductivity analysis
8. Develop mine water balance and water budgeting models
9. Utilize GIS and remote sensing for hydrogeological analysis
10. Ensure ESG compliance and environmental water impact assessments
11. Interpret geotechnical-hydrogeological interactions in mine design
12. Apply real-time groundwater monitoring and data analytics
13. Integrate sustainable water resource management in mining operations

Target Audience

1. Mining Engineers
2. Hydrogeologists
3. Geotechnical Engineers
4. Environmental Scientists
5. Geological Engineers
6. Mine Planning Professionals
7. ESG and Sustainability Officers
8. Graduate Students in Earth Sciences

Course Modules

Module 1: Introduction to Mining Hydrogeology

- Groundwater fundamentals in mining environments
- Role of hydrogeology in mine safety
- Hydrological cycle in mining zones
- Surface-groundwater interaction
- Regulatory frameworks
- **Case Study:** Water inflow issues in South African gold mines

Module 2: Aquifer Systems and Classification

- Confined vs unconfined aquifers
- Fractured rock aquifers in mining
- Porosity and permeability concepts
- Aquifer testing methods
- Groundwater storage estimation
- **Case Study:** Coal basin aquifer classification in Australia

Module 3: Groundwater Flow Principles

- Darcy’s Law applications
- Hydraulic gradient analysis
- Flow nets in mine design
- Steady and transient flow systems
- Boundary conditions
- **Case Study:** Copper mine groundwater inflow in Chile

Module 4: Hydrogeological Mapping

- Geological mapping techniques
- Structural controls on groundwater
- Lithological logging
- Fracture mapping
- Field data integration
- **Case Study:** Fractured rock mapping in Canadian mining regions

Module 5: Pumping and Slug Tests

- Test design and execution
- Data interpretation methods
- Transmissivity and storativity
- Well efficiency analysis
- Field instrumentation
- **Case Study:** Dewatering tests in underground mines in Zambia

Module 6: Mine Dewatering Systems

- Dewatering strategies for open pits
- Underground mine drainage design
- Sump and pumping systems
- Wellpoint systems
- Water disposal planning
- **Case Study:** Deep mine dewatering in South African platinum mines

Module 7: Groundwater Modeling (MODFLOW)

- Model setup and calibration
- Parameter estimation
- Sensitivity analysis
- Scenario modeling
- Predictive simulations

- **Case Study:** Iron ore mine modeling in Brazil

Module 8: Mine Water Balance

- Inflow and outflow estimation
- Recharge and discharge calculations
- Climate impact considerations
- Water budgeting tools
- Scenario forecasting
- **Case Study:** Water balance in Australian open-pit mines

Module 9: Hydrochemistry in Mining

- Water quality parameters
- Acid mine drainage (AMD)
- Geochemical interactions
- Sampling and lab analysis
- Contaminant transport
- **Case Study:** Acid mine drainage in Appalachian coal mines

Module 10: Environmental Impact Assessment

- Hydrogeological baseline studies
- Impact prediction models
- Mitigation strategies
- Monitoring frameworks
- Compliance reporting
- **Case Study:** EIA for copper mining expansion projects

Module 11: GIS in Hydrogeology

- Spatial data analysis
- Remote sensing applications
- Digital elevation models
- Hydrogeological layer mapping
- GIS modeling tools
- **Case Study:** GIS-based groundwater mapping in India’s mining belts

Module 12: Fractured Rock Hydrogeology

- Joint and fault systems
- Flow in fractured media
- Rock mass permeability
- Structural geology integration
- Field characterization
- **Case Study:** Gold mine fracture flow in Western Australia

Module 13: Groundwater Monitoring Systems

- Monitoring well installation
- Sensor technologies
- Data logging systems

- Real-time monitoring dashboards
- Data interpretation
- **Case Study:** Automated groundwater monitoring in Scandinavian mines

Module 14: Climate Change & Mining Water Risks

- Climate variability impacts
- Drought and flood risks
- Adaptive water strategies
- Resilience planning
- Risk modeling
- **Case Study:** Climate-driven mine flooding in Indonesia

Module 15: Sustainable Mine Water Management

- Water reuse strategies
- Zero liquid discharge systems
- ESG-aligned water policies
- Circular water economy
- Sustainable extraction planning
- **Case Study:** Water recycling system in Chilean lithium mining

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	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

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

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