Carbonate-Hosted Ore Systems 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

Carbonate-hosted ore systems represent some of the most complex, economically significant, and highly coveted mineral domains globally, supplying a vast majority of the world's base metals (Zn, Pb, Cu) along with critical technology-enabling byproducts (Ag, Ga, Ge, In). Carbonate-Hosted Ore Systems Training Course is designed to provide geoscientists, exploration managers, and mining professionals with a holistic, deep-dive understanding of these systems. By decoding the intricate physics of hydrothermal brine migration, basin evolution, structural fluid conduits, and geochemical traps, participants will master the skills necessary to predict, target, and discover tier-one deposits in complex sedimentary and structural basinal settings.

The framework focuses heavily on the structural and stratigraphical architecture of sediment-hosted mineral systems, explicitly contrasting Mississippi Valley-Type (MVT), Irish-Type, and Sediment-Hosted Copper (SSC) mineral systems. Armed with cross-disciplinary workflows encompassing high-resolution vectoring geochemistry, advanced geophysics, and 3D geomodelling, attendees will learn to mitigate risk in capital-intensive drill campaigns. Ultimately, this course bridges the gap between academic metallogenic theories and high-stakes exploration execution, empowering organizations to build robust pipelines of critical mineral assets.

Programme Curriculum

Carbonate-Hosted Ore Systems Training Course

Introduction

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Course Objectives

1. Deconstruct Basin Architecture.
2. Differentiate Mineralization Styles.
3. Model Hydrothermal Brine Dynamics.
4. Deploy Advanced Isotope Vectoring.
5. Optimize Carbonate Alteration Mapping.
6. Master 3D Subsurface Geomodelling.
7. Harness Hyperspectral and Remote Sensing Data.
8. Interpret High-Resolution Geophysics.
9. Formulate Metal Precipitation Hypotheses.
10. Implement Core Logging Workflows.
11. De-risk Blind Target Exploration.
12. Sustain Critical Raw Material Supply.
13. Mitigate Environmental and ESG Risks.

Targeted Audience

- Senior Exploration Geologists
- Project and Exploration Managers
- Mine Geologists and Resource Estimators.
- Geochemical and Geophysical Specialists
- Consulting Geoscientists.
- Government and Geological Survey Scientists.
- Graduate and Doctoral Researchers.
- Investment Analysts and Technical Directors.

Course Modules

Module 1: Tectonic Settings & Basinal Geodynamics

- Analysis of crustal extension, continental rifting, and intracratonic basinal frameworks.
- Structural evolution of sedimentary basins and the mechanics of syn-rift fault systems.
- The role of basement horsts and grabens in guiding deep-seated hydrogeological pathways.
- Thermal maturation, chemical compaction, and fluid expulsion kinetics over time.

- *Case Study Analysis:* Tectonic controls and structural geometry of the Irish Mississippian Rift Basin and its associated Zn-Pb deposits.

Module 2: Metallogenesis of MVT and Irish-Type Systems

- Genetic models and comparative analysis of classic Mississippi Valley-Type (MVT) vs. Irish-Type deposits.
- Timing of mineralization
- Geochemical signatures of low-temperature (100?C?200?C) metal-bearing basinal brines.
- Source-transport-trap frameworks within regional sediment-hosted base-metal domains.
- *Case Study Analysis:* Paragenesis and fluid inclusion characteristics of the Pine Point MVT District (Canada) vs. Navan Irish-Type System (Ireland).

Module 3: Structural Geology & Fluid Conduits

- Stress, rock failure, and fracture mechanics within thick carbonate platforms.
- Fault-seal analysis and the development of high-permeability dilational fault jogs.
- Characterization of fault zones, brecciation mechanisms, and hydrothermal conduit plumbing.
- Application of stereonets and structural validation routines in structural target interpretation.
- *Case Study Analysis:* Fault-displacement distribution and fluid flow pathway mapping at the Lisheen and Galmoy Zn-Pb deposits.

Module 4: Carbonate Lithofacies & Alteration Halos

- Stratigraphic principles, depositional facies, and sequence stratigraphy of carbonate rocks.
- Petrography of hydrothermal dolostone geobodies vs. regional stratabound diagenetic dolomites.
- Mechanisms of hydrothermal karsting, zebra textures, and carbonate dissolution breccias.
- Zonality of wall-rock alteration and distal-to-proximal mineralogical vectors.
- *Case Study:* Hydrothermal dolomitization geobodies and alteration mapping vectors within the Riópar Zn-(Fe-Pb) district, Southeast Spain.

Module 5: Isotope Geochemistry & Micro-Textures

- Application of stable C and O isotopes to map distal extensions of mineralized fluids.
- Sulfur (S) isotope systematics
- Laser Ablation ICP-MS (LA-ICP-MS) trace element fingerprinting of sphalerite, galena, and pyrite.
- Identification of bacterially derived micro- and nano-textures in sulfide assemblages.
- *Case Study:* High-resolution sulfur isotope vectoring and microchemical characterization at the Upper Mississippi Valley district.

Module 6: Exploration Geophysics for Carbonate Systems

- Gravity and magnetic data processing to identify underlying basement highs and basement architecture.
- Magnetotelluric (MT) and electrical resistivity techniques for mapping deep brine pathways and alteration zones.
- High-resolution 2D/3D seismic interpretation for tracing structural displacement and syn-rift faults.
- Rock properties, physical density, and chargeability characteristics of carbonate-hosted massive-to-disseminated ores.
- *Case Study Analysis:* Geophysical discovery workflows and structural unravelling of the Admiral Bay Zn-Pb deposit, Canning Basin.

Module 7: Hyperspectral Imaging & Digital Core Logging

- Fundamental physics of electromagnetic radiation interactions with carbonate minerals.
- Short-Wave Infrared (SWIR) and Long-Wave Infrared (LWIR) mapping of calcite-dolomite-ankerite ratios.
- Rigorous, industry-standard protocols for structural core logging and digital geotechnical data collection.
- Integration of drone-captured optical data and automated digital outcrop interpretation.
- *Case Study:* Hyperspectral core logging deployment at the Century SEDEX/Zinc-Lead deposit for real-time alteration vectoring.

Module 8: 3D Geomodelling & Target Vectoring Workflows

- Principles of 3D spatial geostatistics, variograms, and structural trend modeling.
- Integration of multi-disciplinary datasets (geophysics, geochemistry, structural data) into a shared 3D software space.
- Workflows for building predictive, evidence-based exploration targeting matrices.
- Advanced property modeling for geometry validation, fault restoration, and drilling optimization.
- *Case Study:* 3D exploration target generation and blind-discovery model execution at the San Vicente MVT District, Peru.

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

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