EV Battery Technologies Training Course

Professional Development Training Course Outline

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

Course Introduction

EV Battery Technologies Training Course provides a comprehensive, industry-focused understanding of the technologies powering the global electric vehicle (EV) revolution. As automotive manufacturers accelerate the transition toward electrification, sustainable mobility, energy storage, and net-zero transportation, advanced battery expertise has become a critical competitive advantage. This course explores lithium-ion batteries, battery chemistry, cell design, battery packs, Battery Management Systems (BMS), thermal management, fast charging, battery safety, energy density, power density, battery diagnostics, second-life applications, recycling, and emerging solid-state technologies. Participants gain practical knowledge of the complete battery value chain—from raw materials and cell manufacturing to pack integration, vehicle operation, lifecycle management, and end-of-life recovery.

Designed for professionals seeking future-ready EV skills, the program connects technical principles with real-world automotive applications and industry challenges. Through case studies, technology assessments, hands-on analysis, simulations, troubleshooting exercises, and industry best practices, participants learn how to evaluate battery performance, optimize charging and thermal strategies, manage battery degradation, improve safety, and support sustainable battery lifecycle management. The course also examines AI-enabled battery analytics, digital twins, battery passports, predictive maintenance, fast-charging innovation, solid-state batteries, sodium-ion technologies, vehicle-to-grid (V2G), circular economy models, and advanced battery recycling, enabling learners to understand the trends shaping the next generation of EV and energy-storage systems.

Programme Curriculum

EV Battery Technologies Training Course

Introduction

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Course Duration

5 days

Course Objectives

By the end of the course, participants will be able to:

1. Understand the fundamentals of EV battery technologies and their role in vehicle electrification.
2. Compare major battery chemistries, including NMC, LFP, NCA, sodium-ion, and emerging solid-state technologies.
3. Analyze cell, module, and battery-pack architecture for modern electric vehicles.
4. Evaluate energy density, power density, efficiency, C-rate, State of Charge (SoC), and State of Health (SoH).
5. Understand the design and operation of advanced Battery Management Systems (BMS).
6. Apply battery thermal management principles to improve performance, reliability, and safety.
7. Evaluate EV charging technologies, including fast charging, ultra-fast charging, and smart charging.
8. Identify causes of battery degradation, capacity fade, aging, and performance loss.
9. Apply battery safety, fault detection, abuse testing, and risk-management principles.
10. Examine AI, machine learning, predictive analytics, and digital twins for battery diagnostics.
11. Assess battery second-life, recycling, circular economy, and sustainable materials strategies.
12. Evaluate emerging trends such as solid-state batteries, sodium-ion batteries, silicon anodes, and next-generation cells.
13. Develop technology-informed strategies for EV battery performance optimization, lifecycle management, and future mobility.

Target Audience

1. EV and automotive engineers
2. Battery engineers and energy-storage professionals
3. Automotive R&D and innovation teams
4. BMS, charging, and power-electronics specialists

5. Manufacturing, quality, and production professionals
6. Fleet managers and EV infrastructure professionals
7. Sustainability, recycling, and circular-economy specialists
8. Technical managers, consultants, researchers, and entrepreneurs

Course Modules

Module 1: EV Battery Fundamentals & Industry Landscape

- EV architectures and the role of the high-voltage battery system.
- Battery terminology-voltage, capacity, energy, power, C-rate, SoC, and SoH.
- Comparison of BEV, PHEV, hybrid, and fuel-cell electric vehicle architectures.
- Global EV battery-market trends, supply chains, and technology roadmaps.
- Case Study: Tesla's battery-pack evolution and the integration of battery technology with vehicle efficiency.

Module 2: Battery Chemistry & Cell Technologies

- Fundamentals of lithium-ion battery chemistry and electrochemical operation.
- Comparative analysis of NMC, NCA, LFP, LMFP, sodium-ion, and solid-state batteries.
- Cathode, anode, electrolyte, separator, and current-collector technologies.
- Emerging innovations including silicon anodes and high-nickel chemistries.
- Case Study: BYD Blade Battery and the strategic advantages of LFP technology.

Module 3: Cell, Module & Battery-Pack Design

- Cylindrical, prismatic, and pouch-cell architectures.
- Cell-to-Module (CTM) and Cell-to-Pack (CTP) design concepts.
- Pack structural integration, electrical connections, fusing, contactors, and HV components.
- Energy density optimization and lightweight battery-pack engineering.
- Case Study: CATL's Cell-to-Pack approach and its impact on EV range and packaging efficiency.

Module 4: Battery Management Systems & Diagnostics

- BMS architecture, sensing, monitoring, balancing, protection, and communication.
- State Estimation-SoC, SoH, State of Power (SoP), and remaining useful life.
- Passive and active cell balancing strategies.
- Fault detection, diagnostics, data acquisition, and predictive battery analytics.
- Case Study: AI-enabled battery-health monitoring for predictive maintenance and warranty-risk reduction.

Module 5: Thermal Management, Safety & Reliability

- Battery thermal behavior and heat-generation mechanisms.
- Air, liquid, refrigerant, and advanced thermal-management systems.
- Thermal runaway, propagation prevention, venting, and fire-safety considerations.
- Battery abuse testing, reliability engineering, and functional safety principles.
- Case Study: Thermal-runaway mitigation strategies used in modern EV battery-pack designs.

Module 6: EV Charging & Battery Performance

- AC charging, DC fast charging, and ultra-fast charging fundamentals.

- Charging curves, C-rate limitations, battery temperature, and charging efficiency.
- Smart charging, bidirectional charging, and Vehicle-to-Grid (V2G) applications.
- Impact of charging behavior on battery degradation and lifecycle.
- Case Study: High-power fast-charging strategies designed to reduce EV charging time while managing battery health.

Module 7: Battery Lifecycle, Second Life & Recycling

- Battery degradation mechanisms and end-of-life assessment.
- Second-life applications for stationary energy storage systems.
- Battery recycling technologies and recovery of critical materials.
- Circular economy, battery passports, traceability, and sustainable supply chains.
- Case Study: Repurposing retired EV batteries for renewable-energy storage and grid-support applications.

Module 8: Next-Generation EV Battery Technologies

- Solid-state batteries and next-generation electrolyte technologies.
- Sodium-ion, lithium-metal, silicon-anode, and high-energy-density technologies.
- AI-driven battery development, digital twins, and predictive modeling.
- Future battery manufacturing, sustainability, and critical-mineral challenges.
- Case Study: Solid-state battery development programs and their potential impact on EV range, safety, and charging speed.

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
21 Sep 2026	25 Sep 2026	Online	$1,000
21 Sep 2026	25 Sep 2026	Physical	$1,500
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0

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