Battery learning hub

ADVANCED CERTIFICATION PROGRAM IN BATTERY ENGINEERING

Battery Learning Hub Pvt. Ltd.

ABOUT BATTERY LEARNING HUB

WHO WE ARE

Battery Learning Hub Pvt. Ltd. is an engineering education and research company specializing in Battery Technology, Battery Management Systems (BMS), Electric Vehicles (EV), and Battery Energy Storage Systems (BESS). We develop structured certification programs that bridge the gap between academic learning and industry requirements through application-oriented technical education.

OUR MISSION

To empower students, researchers, faculty members, and industry professionals with practical engineering knowledge, modern development tools, and industry-relevant skills required for the rapidly evolving battery and electric mobility sector.

OUR VISION

To become a leading centre for battery engineering education by delivering high-quality certification programs that prepare engineers to contribute to future energy storage and electric mobility technologies.

OUR APPROACH

Our programs combine engineering fundamentals, simulation-driven learning, model-based development, and real-world industry applications to create a structured learning experience focused on practical problem-solving and technical excellence.

CORE EXPERTISE

Battery Technology | Battery Management Systems (BMS) | Electric Vehicles (EV) | Battery Energy Storage Systems (BESS) | MATLAB & Simulink | Model-Based Design | Battery Testing & Characterization | Battery Pack Development

Building the Next Generation of Battery Engineers

LEARN FROM INDUSTRY EXPERTS

Learn from leading professionals working across Battery Technology, Electric Mobility, Energy Storage Systems, Battery Modeling, Controls Engineering and Global Automotive Industries.

DR. SUSHANT MUTAGEKAR

Ph.D., IIT Madras

Lead Instructor | Battery Expert| Researcher | Founder, Battery Learning Hub Pvt. Ltd.

GUEST SESSIONS BY INDUSTRY EXPERTS

RAVIN SINGH

Battery Modelling and Controls Engineer
Bosch, San Francisco
MS, University of Maryland
BTech, IIT BHU

BOSCH

RAJEEV GURU

Quality Engineer
Tesla
MS, Technische Universitat Berlin, Germany

TESLA

PRANESH NAIK

Urban Mobility & Public Transport Expert
20+ Years with Volvo, Tata & HESS

HESS

FARHAN AHAMED HAMEED

PhD Research Scholar
Binghamton University, New York
M.S, IIT Madras

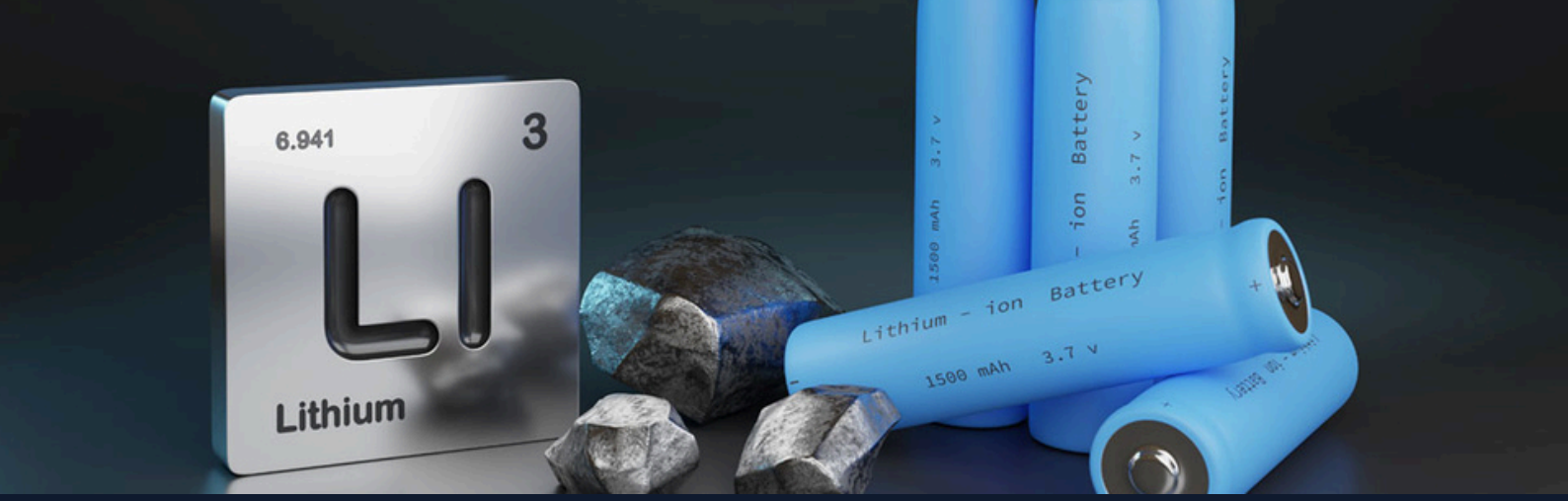
BINGHAMTON UNIVERSITY
STATE UNIVERSITY OF NEW YORK

MARUTI PATIL

Researcher
KU Leuven, Belgium
Ex-ZF, Renault | M.S, IIT Madras

KU LEUVEN

Gain insights from professionals working across **Tesla, Bosch, KU Leuven, Binghamton University and global mobility organisations,** bringing real-world industry perspectives to battery engineering education.



MODULE 1

Battery Cell Fundamentals, Electrochemistry & Terminology

Build a strong foundation in lithium-ion battery (and other emerging cell chemistries) operation, chemistries, key electrical parameters, and datasheet interpretation essential for battery engineering.

WHY THIS TOPIC MATTERS

A clear understanding of battery cells forms the basis for battery pack design, BMS development, thermal management, and state estimation.

LEARNING OBJECTIVES

- Understand different battery chemistries and their working principles.
- Calculate key battery parameters (SoX, SoH, DoD, C-rate, etc.).
- Interpret commercial battery datasheets.

MODULE HIGHLIGHTS

- Battery Fundamentals & Electrochemistry
- Various Cell Chemistries and their construction
- Battery Performance Parameters
- OCV vs SOC Characteristics
- Datasheet Interpretation
- Real time dataset analysis

MODULE 2

Cell Characterization, Testing Standards & Procedures

Learn industry-standard battery testing techniques, characterization procedures, data analysis, and international testing standards.

WHY THIS TOPIC MATTERS

Reliable battery models and BMS algorithms depend on accurate experimental data obtained through standardized testing.

LEARNING OBJECTIVES

- Perform battery characterization tests.
- Analyze battery test data using MATLAB.
- Understand major battery testing standards.

MODULE HIGHLIGHTS

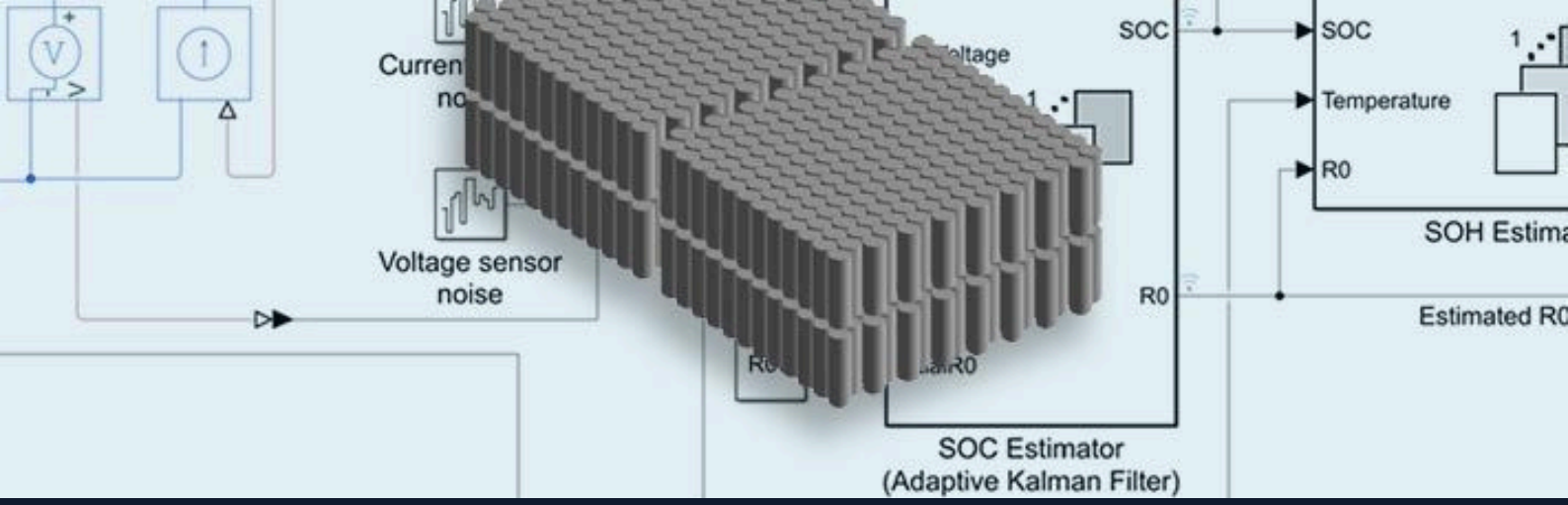
Battery Testing Equipment, Methodologies and procedures

Cell Characterization Techniques

Performance & Aging Analysis

Industry Testing Standards

Real-time dataset analysis



MODULE 3

MATLAB & Simulink for Battery System Design

Develop practical skills in MATLAB, Simulink, and Stateflow for battery data analysis, system modeling, and BMS algorithm development.

WHY THIS TOPIC MATTERS

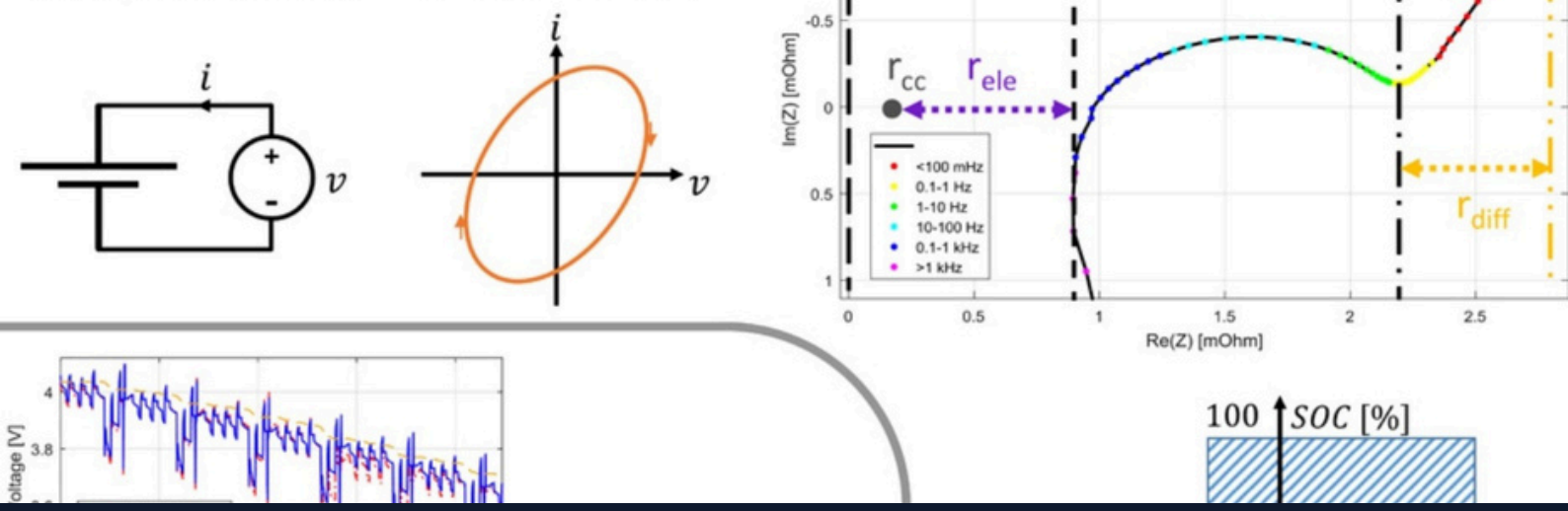
MATLAB and Simulink are the industry-standard tools used by EV manufacturers and battery developers worldwide.

LEARNING OBJECTIVES

- Analyze battery data using MATLAB.
- Build battery models in Simulink.
- Develop Stateflow-based BMS logic.

MODULE HIGHLIGHTS

- MATLAB Programming Fundamentals
- Battery Data Processing
- Simulink Model Development
- Stateflow for BMS Logic
- Model Validation & Debugging



MODULE 4

Cell Modelling: EIS, Equivalent Circuits & Physics-Based Models

Learn to build and validate battery models using equivalent circuit models, impedance spectroscopy, and physics-based approaches.

WHY THIS TOPIC MATTERS

Accurate battery models are the backbone of SoX estimation, SOH prediction, thermal analysis, and advanced BMS algorithms.

LEARNING OBJECTIVES

- Develop ECM battery models.
- Perform parameter estimation from test data.
- Understand EIS and physics-based battery models.

MODULE HIGHLIGHTS

- Equivalent Circuit Models (ECM)
- Parameter Identification
- Electrochemical Impedance Spectroscopy (EIS)
- Physics-Based Battery Models
- Model Validation Techniques

MODULE 5

Pack Sizing for EV & BESS Applications

Design battery packs by translating application requirements into optimal energy, power, voltage, and capacity specifications.

WHY THIS TOPIC MATTERS

Correct pack sizing ensures the right balance between vehicle / energy storage performance, battery life, safety, weight, and cost.

LEARNING OBJECTIVES

- Calculate pack energy and power requirements.
- Select suitable cells and chemistry.
- Design series-parallel pack configurations.

MODULE HIGHLIGHTS

- Vehicle Dynamics
- EV & BESS Energy Calculations
- Battery Pack Sizing Methodology
- Cell & Chemistry Selection
- Series-Parallel Configuration Design
- Performance & Cost Optimization

MODULE 6

Battery Pack Electrical & Mechanical Design

Learn the complete electrical and mechanical design process for transforming cells into reliable battery packs.

WHY THIS TOPIC MATTERS

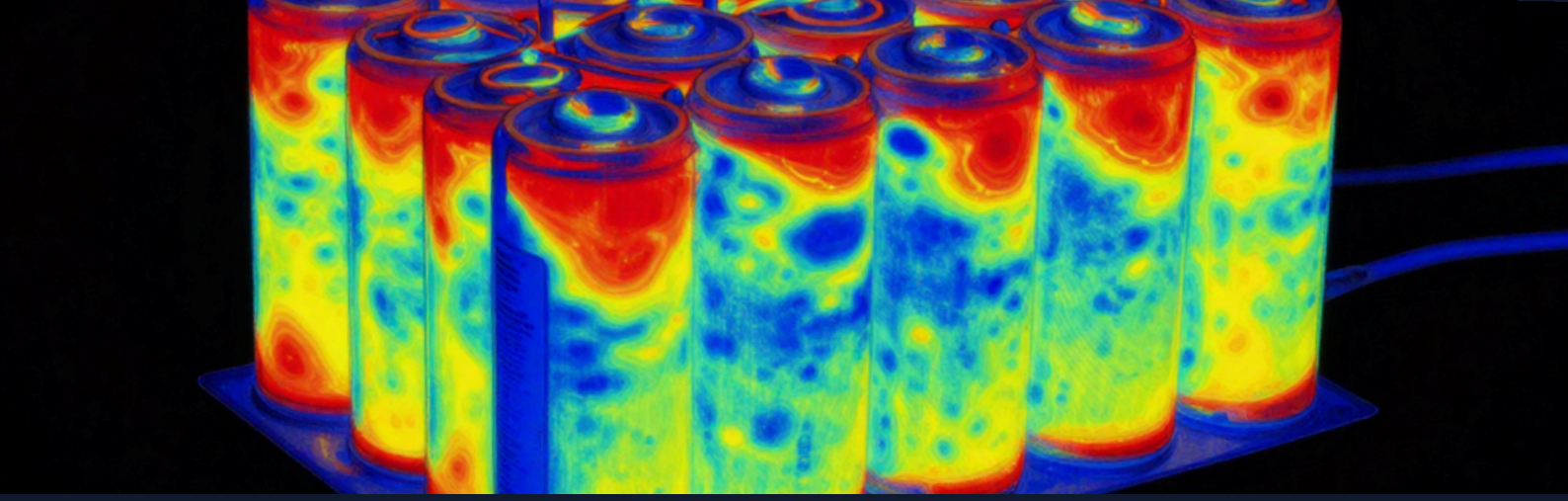
Robust electrical and mechanical design is essential for battery safety, reliability, manufacturability, and certification.

LEARNING OBJECTIVES

- Design pack electrical architecture.
- Select protection components.
- Develop mechanical battery pack layouts.

MODULE HIGHLIGHTS

- Battery Pack Architecture
- Electrical Integration & Protection
- Mechanical Pack Design
- High-Voltage Safety Systems
- Pack-Level Simulation



MODULE 7

Battery Pack Thermal Design & Management

Understand battery heat generation, cooling system design, thermal modeling, and thermal runaway prevention.

WHY THIS TOPIC MATTERS

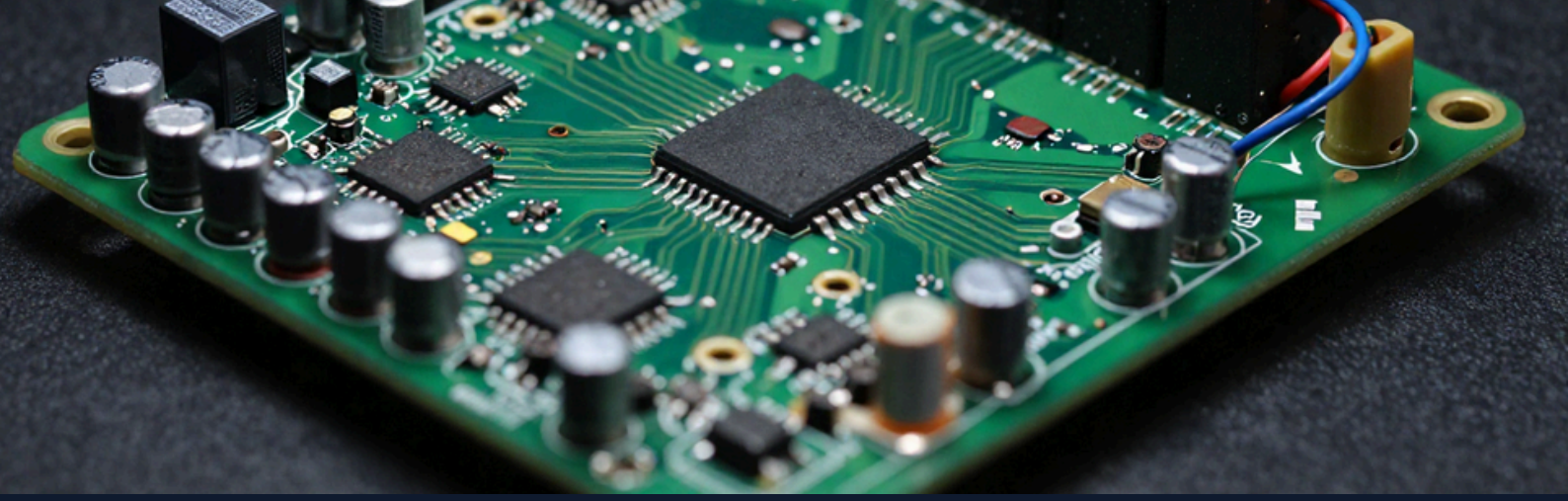
Effective thermal management improves battery performance, extends lifespan, and significantly enhances safety.

LEARNING OBJECTIVES

- Estimate battery heat generation.
- Design cooling systems.
- Develop thermal models for battery packs.

MODULE HIGHLIGHTS

- Battery Thermal Fundamentals
- Thermal Modeling & Simulation
- Active & Passive Cooling Systems
- Thermal Runaway Prevention
- Thermal Safety Engineering



MODULE 8

Battery Management System (BMS): Design & Implementation

Design complete Battery Management Systems including hardware architecture, protection logic, balancing, diagnostics, and communication.

WHY THIS TOPIC MATTERS

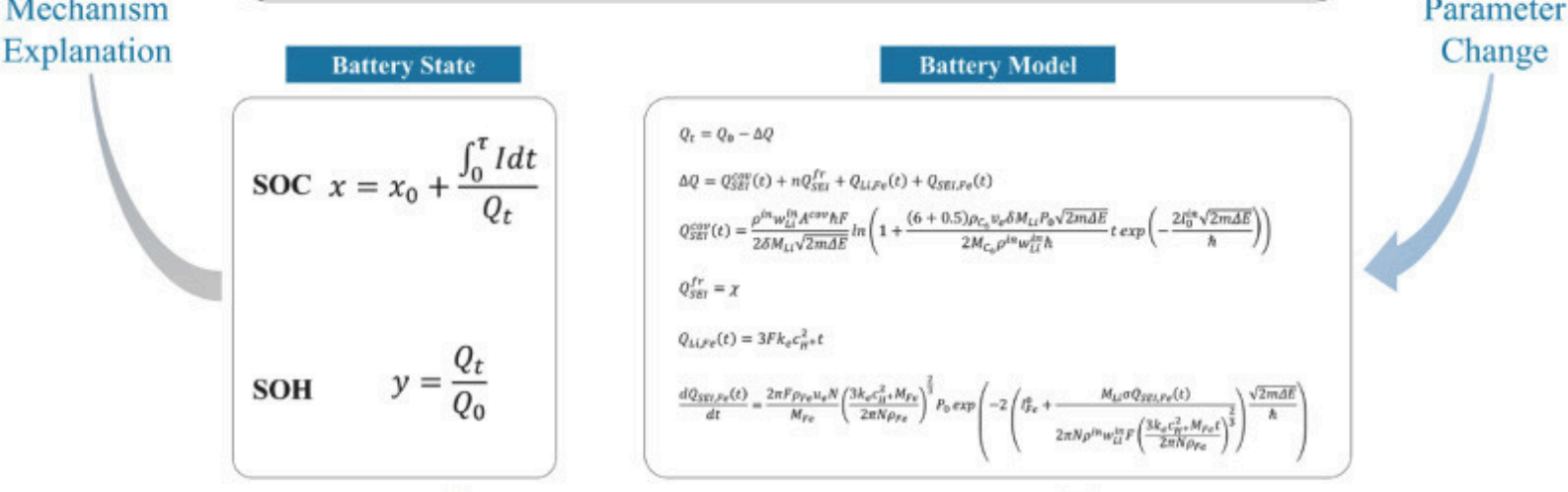
The BMS is the intelligence and safety system of every EV battery pack, ensuring reliable and safe operation.

LEARNING OBJECTIVES

- Design BMS architecture.
- Implement protection and balancing algorithms.
- Develop BMS software using Simulink and Stateflow.

MODULE HIGHLIGHTS

- BMS Architecture & Hardware
- BMS Hardware Design from scratch
- Cell Balancing Strategies
- Fault Diagnostics & Communication
- Functional Safety Principles



MODULE 9

Advanced State Estimation & Control Strategies

Implement advanced battery algorithms for SoC, SoH, and power estimation using modern estimation and control techniques.

WHY THIS TOPIC MATTERS

Advanced estimation algorithms enable accurate range prediction, battery health monitoring, and intelligent fast charging.

LEARNING OBJECTIVES

- Develop EKF-based SOC estimation.
- Implement SOH estimation techniques.
- Understand predictive battery control strategies.

MODULE HIGHLIGHTS

- SOC & SOH Estimation
- Kalman Filter Algorithms
- Remaining Useful Life Prediction
- Intelligent Charging Strategies
- Advanced Battery Control

MODULE 10

Second Life, Recycling & Sustainability of Battery Packs

Explore battery repurposing, recycling technologies, sustainability practices, and emerging global battery regulations.

WHY THIS TOPIC MATTERS

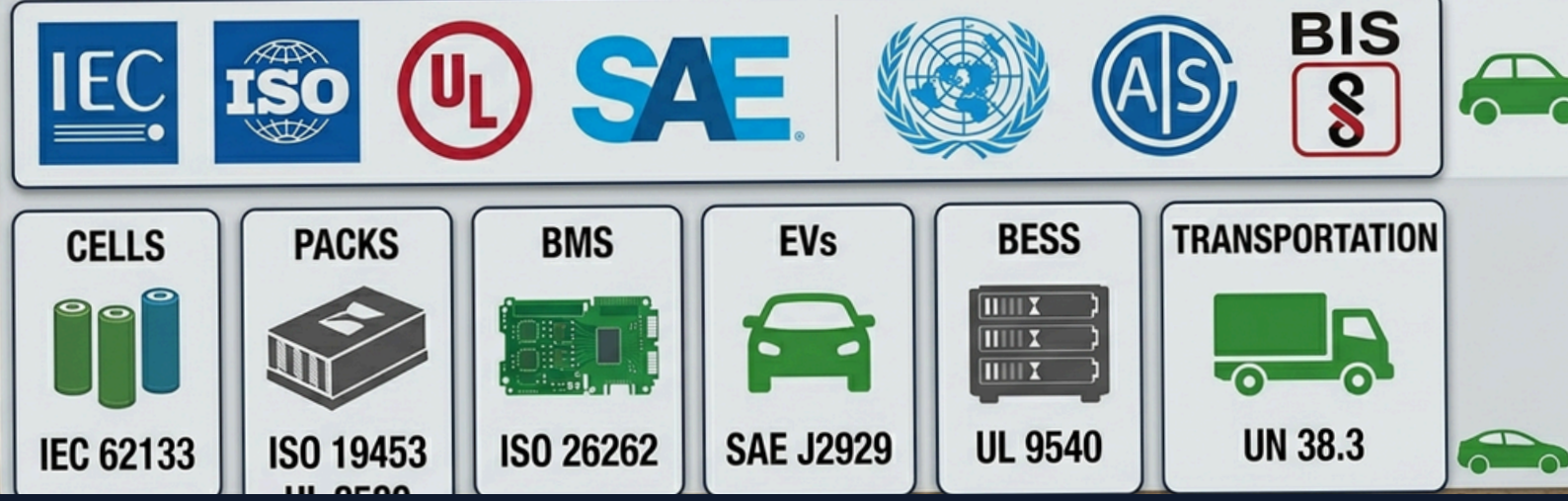
Battery sustainability is becoming a key engineering and regulatory requirement across the global EV industry.

LEARNING OBJECTIVES

- Understand battery second-life applications.
- Learn major recycling technologies.
- Explore battery sustainability regulations.

MODULE HIGHLIGHTS

- Battery Second-Life Applications
- Recycling Technologies
- Circular Battery Economy
- Battery Passport & Traceability
- Sustainability & Global Regulations



MODULE 11

Global Battery Standards

Learn the globally accepted standards and regulations governing the design, testing, safety, transportation, and certification of lithium-ion cells, battery packs, and Battery Management Systems (BMS).

WHY THIS TOPIC MATTERS

Battery standards are essential for ensuring product safety, regulatory compliance, and market acceptance. Engineers working in the battery and EV industry are expected to understand these standards throughout the product development lifecycle.

LEARNING OBJECTIVES

- Understand the purpose and scope of major international battery standards.
- Identify standards applicable to cells, battery packs, BMS, and EVs.
- Interpret testing and certification requirements for battery products.

MODULE HIGHLIGHTS

- Overview of IEC, ISO, UL, SAE, UN, AIS & BIS standards
- EV, BESS and safety standards
- Battery transportation regulations

READY FOR THE INDUSTRY

This program prepares you for high-impact roles across the rapidly growing battery and e-mobility sector.

EV Battery Design Engineer

Design battery systems for next-gen electric vehicles

Battery Storage Specialist

Develop grid-scale energy storage solutions (BESS)

Power Electronics Engineer

Integrate battery packs with power conversion systems

Thermal Systems Engineer

Optimize cooling strategies for battery safety & longevity

BMS Software Developer

Build state estimation algorithms and safety logic

Sustainability & Recycling Analyst

Drive circular economy initiatives for end-of-life batteries

COURSE PRICING

Choose the plan that fits your learning goals

₹42,000 + 18% GST

- All 10 Module Video Lectures (60+ hrs)
- Course Materials & Notes
- MATLAB / Simulink Project Files
- Certificate of Completion
- Biweekly Live Interactive Sessions
- Upto 1 Year Content Access
- Capstone Project

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BULK BOOKINGS
5-10 seats: 5% OFF | 11-20 seats: 10% OFF | 21+ seats: 15% OFF
Contact: support@batterylearninghub.com

PROGRAM DETAILS & SUPPORT

LEARNING FORMAT

- Selfpaced Recorded Modules
- Biweekly Live Interactive Sessions
- Capstone Project

PROGRAM DURATION

- 5 Months Learning Journey
- 12 Months' Content Access

CERTIFICATION

- Certificate of Completion
- Battery Learning Hub

CAREER SUPPORT

- Career Guidance
- Resume Building
- Placement Opportunities

FREQUENTLY ASKED QUESTIONS

How do the live sessions work?

Biweekly live sessions are conducted by Dr. Sushant for doubt-solving, technical discussions, and industry insights. These are interactive sessions designed to complement the recorded content.

Flexible learning. Industry mentorship. Practical exposure. Career-focused outcomes.

CERTIFICATE OF COMPLETION

Certificate

of Completion

Battery learning hub

Verified Certificate

Certificate ID: XXXXXXXX

This certificate is awarded to

Your Name

in recognition of the successful completion of the "Advanced Certification Program in Battery Engineering" conducted by Battery Learning Hub Pvt. Ltd.

Issue Date

MMM DD, YYYY

Director

Dr. Sushant Mutagekar

Ph.D, IIT Madras

JOIN THE COHORT

Limited seats available.
Start Date: July 15, 2026
Last date to register: August 30.
Secure your spot today.

Scan Me

Last Date: August 30, 2026

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