BISD - Bharat Institute for Skill Development

EXCLUSIVE FACULTY DEVELOPMENT PROGRAM ON ELECTRIC VEHICLES (EV) – 40 HOURS

This FDP aims to equip faculty members with in-depth knowledge of EV technology, its components, business models, regulatory aspects, and future trends. The program includes theoretical sessions, hands-on training, and case studies.

Additional Features:

- ✅ Expert Sessions from industry veterans
- ✅ Hands-on Lab Training with real EV components
- ✅ Industrial Visit (Optional) to an EV manufacturing facility
- ✅ Case Studies to provide practical insights

Program Structure

Module No.	Module Name	Duration (Hours)	Mode
1	Introduction to Electric Vehicles (EV)	4	Lecture + Discussion
2	Components and Systems	6	Lecture + Practical Demonstration
3	Battery Technology and Management	6	Lecture + Hands-on Experimentation
4	Electric Motor and Drive Systems	5	Lecture + Hands-on Training
5	Charging Infrastructure and Protocols	5	Lecture + Hands-on Training
6	Safety and Regulatory Considerations	3	Lecture + Case Studies
7	EV Economics and Business Models	4	Lecture + Market Analysis
8	Case Studies and Real-world Applications	4	Discussion + Industry Insights
9	Future Trends and Developments	3	Expert Talks + Research Insights
10	Capstone Project and Assessment	4	Project Work + Evaluation

Module-wise Breakdown

1. **Introduction to Electric Vehicles (EV) (4 Hours)**

- Evolution of EVs and market overview
- Types of EVs (BEV, HEV, PHEV, FCEV)
- EV architecture and comparison with ICE vehicles
- Environmental benefits and sustainability

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2. Components and Systems (6 Hours)

- Powertrain components and their functions
- Vehicle Control Unit (VCU) and Communication protocols
- EV subsystems: Braking, steering, cooling, HVAC
- System integration and design challenges

3. Battery Technology and Management (6 Hours)

- Battery chemistry (Li-ion, Solid-state, emerging technologies)
- Battery Management System (BMS) and thermal management
- Charging cycles, SoC, SoH, DoD calculations
- Recycling and second-life applications of EV batteries

4. Electric Motor and Drive Systems (5 Hours)

- Types of motors used in EVs (BLDC, PMSM, Induction motors)
- Motor controllers and drive systems
- Regenerative braking and its impact on efficiency
- Motor design and selection criteria

5. Charging Infrastructure and Protocols (5 Hours)

- EV charging levels (L1, L2, DC Fast Charging)
- OCPP protocol and smart charging
- Grid integration and Vehicle-to-Grid (V2G) technology
- Challenges in charging station deployment

6. Safety and Regulatory Considerations (3 Hours)

- Safety standards for EVs (ISO, IEC, BIS regulations)
- Thermal runaway and risk mitigation in batteries
- Crash testing and compliance requirements
- Fire safety, electromagnetic compatibility (EMC)

7. EV Economics and Business Models (4 Hours)

- Cost breakdown of EVs vs. ICE vehicles
- EV subsidies, policies, and government incentives
- Revenue models in EV industry (battery leasing, charging networks)
- Market growth trends and investment opportunities.

8. Case Studies and Real-world Applications (4 Hours)

- Success stories of leading EV manufacturers
- Startup ecosystem in EVs (Tesla, Ola, Ather, Tata)
- Implementation challenges in India
- Policy-driven developments in EV adoption

9. Future Trends and Developments (3 Hours)

- Solid-state batteries and alternative energy sources
- AI and IoT in EVs (Autonomous driving, smart charging)
- Hydrogen fuel cell technology
- Industry 4.0 and digital transformation in EV manufacturing

10 Capstone Project and Assessment (4 Hours)

- Hands-on project on EV design, BMS, or charging solutions
- Group discussion and innovation challenge
- Faculty assessment and feedback session
- Certification and closing ceremony

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