ELECTRIC VEHICLE SOFTWARE DEVELOPMENT

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SUMMARY

This 30-hour online certificate course is designed for Diploma & Bachelor's students and professionals who want to build a strong foundation in Electric Vehicle (EV) technology and Software Development.

- The course covers EV fundamentals, Powertrain, Battery management, Charging infrastructure, Battery Swapping, Maintenance & Repair, EV Software Development, and job opportunities in the EV industry. In addition, learners will explore advanced topics like solar-powered EVs, hydrogen fuel cell technology and autonomous EVs, along with real-world case studies of five major EVs.
- The program includes assignments, quizzes, and hands-on virtual training, ensuring that certified participants are well-equipped to enter the EV industry or launch their own EV startup.

COURSE DETAILS

Course Name	Certificate program on Electric Vehicle Software Development
Course Structure	10 Modules | **Duration**: 30 Hours | **Mode**: Online | **Level**: Intermediate
Assessment	Final assessment and certification (**2 hours**) will be conducted separately to validate learning and award certificates.
Target Audience	Diploma & Bachelor's Students and Professionals
Prerequisites	Basic knowledge on Electrical, Electronics, Physics, Mechanics, Computer Programming, Interest in Automotive Technology & Sustainability
Outcome	Certified candidates can secure EV industry jobs or start their own EV startup

COURSE MODULES

Module 1: Introduction to Electric Vehicles 3 hours

- History & Evolution of Electric Vehicles
- Types of Electric Vehicles (BEV, HEV, PHEV, FCEV)
- EV Market Trends & Future Scope
- Basic Working Principle of an EV
- Key Components of an EV (Motor, Battery, Controller, Charger, etc.)
- Comparison: EV vs ICE (Internal Combustion Engine) Vehicles
- Assignment & Quiz

Module 2 : EV Powertrain & Motor Technology 3 hours

- EV Powertrain Architecture
- Types of Motors Used in EVs (BLDC, PMSM, Induction Motors, etc.)
- Motor Efficiency & Performance Analysis
- Motor Controllers & Inverters in EVs
- Regenerative Braking System
- Case Study: Tesla's Powertrain vs Indian EVs
- Assignment & Quiz

Module 3: Battery Technology & Battery Management System (BMS) 3 hours

- Battery Chemistry (Li-ion, LFP, NMC, Solid State, etc.)
- Battery Design & Manufacturing Process
- Battery Charging & Discharging Cycles
- State of Charge (SOC) & State of Health (SOH) Calculation
- Thermal Management of Batteries
- Safety and Protection Mechanisms in BMS
- Case Study: Tesla vs Ather Battery Technology
- Assignment & Quiz

Module 4: Charging Infrastructure & Charging Management 3 hours

- Types of EV Chargers (AC, DC, Fast Charging, Wireless Charging)
- Charging Station Infrastructure & Standards (CCS, CHAdeMO, GB/T, Bharat EV Charger)
- Grid Integration & Load Management for EV Charging
- Smart Charging & V2G (Vehicle to Grid) Technology
- Solar-powered Charging for EVs
- Case Study: Tesla Supercharger vs Indian Charging Networks
- Assignment & Quiz

Module 5: Battery Swapping Technology 3 hours

- Concept of Battery Swapping
- Advantages & Challenges of Swapping
- Global vs Indian Battery Swapping Policies & Market
- Battery Standardisation for Swapping
- Case Study: Ola Battery Swapping & Gogoro Swapping Model
- Assignment & Quiz

Module 6: EV Maintenance, Repair & Safety 3 hours

- Common EV Issues & Troubleshooting
- Motor & Controller Issues
- Battery Fault Detection & Repair
- Software Issues & Diagnostics
- Safety & Emergency Handling in EVs
- Hands-on Virtual Training & DIY EV Repair
- Assignment & Quiz

Module 7: EV Software Development & IoT 3 hours

- Introduction to EV Software Development (CAN, IoT, BMS Software, etc.)
- Motor Control & Powertrain Software Basics
- Battery Simulation & Software Testing
- IoT & AI in Electric Vehicles
- Cloud-based Vehicle Diagnostics
- Case Study: Smart Features in Tesla & Ather 450X
- Assignment & Quiz

Module 8: EV Companies & Job Opportunities 3 hours

- Top EV Companies in India & Globally (Tesla, Tata, Ola, Ather, Rivian, BYD, etc.)
- Skills Required to Enter the EV Industry
- Job Roles & Salary Expectations in EV Industry
- EV Startups – How to Build Your Own EV Company?
- Government Policies & Subsidies for EV Startups
- Assignment & Quiz

Module 9: Case Studies of 5 Vehicles 3 hours

- Tesla Model 3 – Battery, Charging & Performance Analysis
- Ola Electric Scooter – Battery Swapping & Software
- Tata Nexon EV – Battery & BMS Case Study
- Ather 450X – Performance, Motor & Charging System
- Mercedes EQS – Advanced EV Features & Market Trends
- Assignment & Quiz

Module 10: Advanced Topics – Solar-Powered EVs & Future Technologies 3 hours

- Solar-Powered EV Design & Integration
- Fuel Cell Electric Vehicles (FCEV) – Hydrogen Fuel Cell Technology
- Wireless Charging & Dynamic Charging Roads
- Autonomous & AI-Driven EVs
- Solid-State Batteries & Future of Battery Tech
- Case Study: Aptera Solar Car & Toyota Mirai FCEV
- Assignment & Quiz

Final Assessment & Certification 2 hours

- Final Test Covering All Modules (Objective + Case Study Based)
- Project Submission: EV System Design | TO BE DONE
- Live Q&A and Expert Panel Discussion
- Certificate Distribution to Qualified Participants

OPPORTUNITIES

Why take this course?

- Learn from industry experts and real-world case studies
- Gain practical skills with assignments, quizzes, and hands-on virtual training
- Open doors to high-demand EV job roles & startup opportunities
- Receive a recognised certification to boost career prospects

Career Opportunities

- EV Engineer & Battery Specialist
- EV Charging & Infrastructure Specialist
- EV Software Developer
- EV Maintenance & Service Engineer