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IIT JAMMU

INSTITUTE INCUBATION & INNOVATION COUNCIL

SKILL LYNC

Post Graduate Certification Program In EV & Autonomous Vehicle Technology

About This Certification Program

The **Post Graduate Certification Program offered by IIT Jammu through I3C–IIT Jammu in collaboration with Skill-Lync** is created to address the growing gap between traditional engineering education and the evolving skill requirements of the automotive and mobility industry. It is a comprehensive program that covers both the basics and advanced concepts in **Electric Vehicle (EV) technologies and their applications in the automotive industry,** enabling learners to build practical, application-ready engineering capabilities.

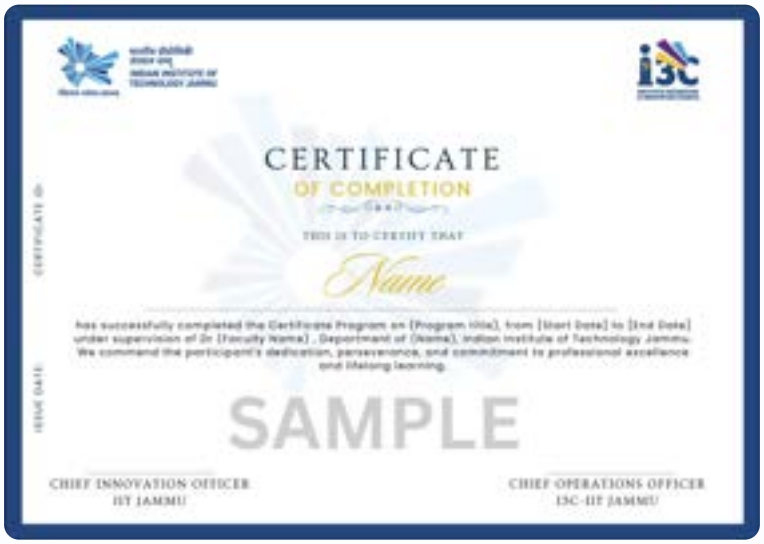
India's automotive and mobility sector currently supports over **19 million** jobs and is projected to generate **more than 2 million additional engineering and technical roles by 2030.** As vehicles become more complex, employers increasingly seek engineers who can apply engineering principles within real production, validation, and regulatory environments, rather than limiting their expertise in conceptual or theoretical knowledge.

The program delivers an integrated learning experience that combines strong academic foundations with applied, industry-aligned training. Through structured, project-based learning, exposure to modern engineering tools, and guided problem-solving, learners develop industry-ready competencies aligned with real EV automotive engineering workflows, supported by **IIT Jammu certification and 100% placement assistance provided by Skill-Lync.**

IIT Jammu Certificate

The IIT Jammu certification, awarded as part of the Post Graduate Certification Program in EV & Autonomous Vehicle Technology, represents successful completion of a structured, academically guided learning journey aligned with institutional Standards.

Certificate issued by IIT Jammu in collaboration with I3C–IIT Jammu and Skill-Lync. The certification validates that the learner has met defined academic requirements and demonstrated applied competence in Electric Vehicle (EV) technologies and their applications in the automotive industry through evaluated coursework and projects. It adds formal academic weight to the program outcomes and enhances the credibility of a candidate's profile for core automotive and Electrical engineering roles.



What This Certification Represents

- Academic recognition from an Institute of National Importance
- Strong theoretical grounding aligned with institutional standards
- Industry-relevant learning evaluated through structured assessment
- Enhanced credibility during resume screening and interviews

Program Highlights

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Career-Oriented Curriculum

Designed for electrical and electronics engineers at different experience levels, aligned with real automotive and EV job roles.

12-Month Industry-Focused Program

A structured 12-month learning journey mapped to OEM and Tier-1 engineering requirements.

Industry-Grade Projects

Build hands-on expertise with 25+ real-world EV automotive design and development projects.

Practical Challenges

Strengthen applied skills through 135 structured challenges covering core EV automotive concepts.

EV Engineering Tool Proficiency

Build practical, hands-on expertise using industry-standard tools applied across electric powertrain, battery systems, simulations, and vehicle integration.

Career Readiness & Interview Support

Access career counselling, mock interviews, and interview opportunities, provided by Skill-Lync, subject to eligibility.

Learn From IIT Faculty & Industry Experts

Sessions delivered by IIT faculty and experienced industry professionals, supported by live and recorded learning.

Who This Program Is Designed For

The electric vehicle ecosystem spans multiple domains - including energy storage, power electronics, electric machines, control systems, and vehicle-level integration. This Post Graduate Certification Program in EV & Autonomous Vehicle Technology is structured to support engineers at different career stages who aim to build or advance careers in the EV and electrified mobility domain.

Who Can Benefit From This Program

Electrical & Electronics Engineering Graduates / Freshers

Ideal for graduates looking to enter the EV domain with a strong foundation in EV fundamentals, MATLAB & Simulink, batteries, motors, and power electronics, supported by hands-on design and simulation exposure.

Early-Career Engineers (0–2 Years Experience)

Suitable for engineers from automotive, electrical, electronics, or manufacturing backgrounds who want to transition into EV-focused roles involving battery systems, electric motors, power converters, or EV simulations.

Working Professionals (2–5 Years Experience)

Designed for professionals seeking structured upskilling in EV system design, energy storage, motor design, power electronics, and model-based development using industry tools such as MATLAB, Simulink, ANSYS, and GT-SUITE.

Professionals Aiming For EV System & Integration Roles

Relevant for engineers aspiring to work on EV powertrains, battery packs, hybrid systems, wiring harnesses, and system-level simulations, aligned with OEM and Tier-1 EV development practices.

Course Curriculum

1 EV Fundamentals

This module introduces the core concepts of electric vehicles, focusing on EV architecture, major subsystems, and operating principles. It builds a strong conceptual foundation for understanding how electric vehicles function as integrated systems.

Key Topics Covered:

- Electric vehicle architecture and layouts
- Key EV components and their functions
- Working principles of electric vehicles
- Overview of EV powertrain systems

2 Matlab And Simulink Basics

This module introduces the fundamentals of MATLAB and Simulink used for engineering computation and system modeling. Learners develop essential skills required for simulation-based analysis in EV and electrical engineering applications.

Key Topics Covered:

- MATLAB programming fundamentals
- Data visualization and mathematical modeling
- Simulink block-based modeling concepts
- Introduction to system-level simulations

Course Curriculum

3 Design Concepts Of Power Electronic Converters For Industries

This module focuses on the design principles of power electronic converters used in industrial and EV applications. Learners understand how converter design impacts efficiency, performance, and reliability.

Key Topics Covered:

- Basics of power electronics and converters
- Design concepts of industrial power converters
- Efficiency and performance considerations
- Application of converters in EV systems

4 Fuel Cell And Ultra Capacitor For EV Using MATLAB & Simulink

This module introduces fuel cells and ultra-capacitors as alternative energy sources for electric vehicles. Learners simulate their integration and performance within EV systems using MATLAB and Simulink.

Key Topics Covered:

- Fundamentals of fuel cells and ultra-capacitors
- Energy storage characteristics and comparison
- EV system integration concepts
- MATLAB & Simulink-based simulations

Course Curriculum

5 Li-Ion Battery System Design In EV & ES

This module covers the design and integration of lithium-ion battery systems for electric vehicles and energy storage applications. Learners understand performance, safety, and efficiency considerations in battery system design.

Key Topics Covered:

- Li-ion battery fundamentals and chemistry
- Battery pack design and integration
- Safety and thermal considerations
- Performance and efficiency evaluation

6 PCB Design For Beginners Using Altium Designer

This module introduces printed circuit board (PCB) design fundamentals with a focus on EV-related electronic applications. Learners gain hands-on exposure to schematic creation and PCB layout using Altium Designer.

Key Topics Covered:

- PCB design fundamentals and workflow
- Schematic capture basics
- PCB layout and component placement
- Introduction to Altium Designer tools

Course Curriculum

7 Electric Motor Design Using MATLAB And ANSYS Maxwell

This module focuses on the design and analysis of electric motors used in electric vehicles. Learners perform motor modeling, selection, and performance evaluation using industry-standard tools.

Key Topics Covered:

- Electric motor fundamentals and types
- Motor design principles for EV applications
- MATLAB-based motor calculations
- Performance analysis using ANSYS Maxwell

8 EV Technology Series

This module provides an overview of electric vehicle technologies and their applications within the automotive industry. It helps learners connect individual EV subsystems to the larger vehicle ecosystem.

Key Topics Covered:

- Overview of EV technologies
- EV subsystems and integration
- Automotive applications of EV technology
- Industry trends in electric mobility

Course Curriculum

9 Basics Of Electric Vehicle Simulations Using Ansys

This module introduces EV system-level simulation and analysis using Ansys tools. Learners simulate critical EV subsystems to understand performance and thermal behavior.

Key Topics Covered:

- EV system simulation fundamentals
- Battery and powertrain modeling
- Thermal management concepts
- Ansys-based EV simulations

10 Hybrid Electric Vehicle Simulation Using GT-SUITE

This module focuses on modeling and simulation of hybrid electric vehicles using GT-SUITE. Learners analyze energy flow, powertrain behavior, and system efficiency.

Key Topics Covered:

- HEV architecture and configurations
- Energy management strategies
- Powertrain performance analysis
- GT-SUITE-based HEV simulations

11 Automotive Wiring Harness Using CATIA V5

This module covers the complete wiring harness design process used in automotive EV applications. Learners understand routing, packaging, and integration of electrical systems within vehicles.

Key Topics Covered:

- Vehicle electrical distribution system basics
- Wiring harness routing and layout
- Electrical component integration
- CATIA V5 electrical workbench workflow

Optional Self-Paced Track

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1 Core And Advanced Python Programming

This module builds strong programming fundamentals and advanced Python skills required for data analytics, automation, and software-driven engineering applications. Learners gain hands-on experience in writing efficient, scalable Python programs used across analytics and engineering domains.

Key Topics Covered

- Python fundamentals: statements, functions, classes, and objects
- File handling and exception handling
- Numerical and data analysis using NumPy and Pandas
- GUI programming using Tkinter
- Database handling using SQLite3

2 Data Structures And Algorithms Using Python

This module builds strong problem-solving and algorithmic thinking skills using Python. Learners gain hands-on experience designing efficient, scalable programs aligned with industry and interview expectations.

Key Topics Covered

- Time & space complexity analysis
- Arrays, linked lists, stacks, queues
- Trees, heaps, tries, and graphs
- Sorting, searching, and hashing techniques
- Greedy algorithms, divide & conquer
- Backtracking and dynamic programming

Optional Self-Paced Track

3 Introduction To ADAS & Vehicle Validation

This module provides a foundational understanding of Advanced Driver-Assistance Systems (ADAS) used in modern vehicles. Learners explore core ADAS features, industry tools, and validation workflows used in autonomous and semi-autonomous driving systems.

Key Topics Covered

- Evolution and history of ADAS
- Core ADAS features: ABS, Cruise Control, ACC, AEB, Lane Keep Assist
- ADAS levels, development & validation workflows
- Scenario creation and automated valet parking concepts
- Simulation tools including MATLAB, Simulink, QGIS
- Sensor fusion for autonomous emergency braking
- Python scripting and driving scenario validation

4 Applying CV For Autonomous Vehicles Using Python

This module provides a practical introduction to computer vision concepts used in autonomous vehicles. Learners understand how images and videos are processed, how cameras perceive the environment, and how vision algorithms enable perception in ADAS and self-driving systems.

Key Topics Covered

- Image processing and feature extraction
- Camera geometry and 3D vision
- Object detection, tracking, and segmentation
- Deep learning–based vision models
- Autonomous vehicle perception use cases

Optional Self-Paced Track

5 Localization, Mapping, And SLAM Using Python

This module introduces the core programming concepts used to enable autonomy in robots and self-driving vehicles. Learners understand how Python is used to model robot behavior, handle uncertainty, and implement localization and mapping techniques that allow vehicles and robots to navigate their environment independently.

Key Topics Covered

- Fundamentals of localization, mapping, and SLAM
- Probability theory and uncertainty modeling in robotics
- Robot behavior algorithms and decision-making logic
- Introduction to Robot Operating System (ROS) concepts
- Python-based scripting using Jupyter Notebook
- Industry-aligned challenges and hands-on projects in autonomous systems

6 Path Planning And Trajectory Optimization Using C++ And ROS

This module introduces core motion planning and trajectory optimization techniques used in autonomous vehicles and robotics, with hands-on implementation using ROS and C++.

Key Topics Covered

- Configuration space and motion planning fundamentals
- Sampling-based and non-holonomic planning method
- Trajectory planning and optimization
- Basics of reinforcement learning for planning
- Practical implementation using ROS and RViz

Optional Self-Paced Track

7 Autonomous Vehicle Controls Using MATLAB And Simulink

This module focuses on model-based control strategies used in modern driver-assistance and Level-2 autonomous vehicle systems, with practical exposure to industry-standard tools.

Key Topics Covered

- Automotive control strategies for ADAS and autonomous systems
- Model-based system engineering concepts
- Control algorithm development and simulation
- Designing and modifying Level-2 autonomous vehicle control models
- MATLAB and Simulink workflows used in the automotive industry

Projects

1 EV Fundamentals

In these projects, learners design and develop simulation-based EV subsystem models using MATLAB & Simulink. The focus is on understanding control strategies, energy flow, power electronics behavior, and battery system performance under real electric vehicle operating conditions

EV System Modeling & Simulation Projects

- Design and Develop a PWM Controlled Fan Load with DC Motor
- Design and Develop a Simulink Model to Understand Energy Analysis of EVs on Different Driving Cycles
- Design and Simulation of Buck Converter for Auxiliary Load in EV
- Design and Develop a Model for Lithium-ion Battery Pack Capacity Estimation
- Design and Simulation of Battery Pack to Analyze its Performance

2 Matlab And Simulink Basics

In these projects, learners apply fundamental MATLAB programming and Simulink modeling concepts to solve optimization and control problems. The projects focus on algorithm development, system modeling, and validation of results through simulation and visualization.

MATLAB & Simulink Fundamentals Projects

- Traveling Salesman Problem
- Speed Control of a Direct Current (DC) Motor

Projects

3 Design Concepts Of Power Electronic Converters For Industries

In these projects, learners design and analyze key power electronic building blocks used in industrial and electric vehicle applications. The focus is on understanding converter losses, efficiency, and inverter modeling aligned with real-world EV operating conditions.

Power Electronics Design & Modeling Projects

- Loss Calculation of a DC/DC Converter using MATLAB
- Modeling of 3 Phase Inverter for Electric Vehicle Application

4 Fuel Cell And Ultra Capacitor For EV Using MATLAB & Simulink

In these projects, learners develop simulation models to understand fuel cell–based electric vehicles and energy storage integration. The focus is on system-level modeling and energy management strategies using MATLAB and Simulink.

Fuel Cell & Energy Storage Modeling Projects

- Fuel Cell Electric Vehicle Development
- Energy Management Technique

Projects

5 Li-Ion Battery System Design In EV & ES

In these projects, learners focus on modeling, analyzing, and designing lithium-ion battery systems for electric vehicles and energy storage applications. The emphasis is on battery behavior estimation and real-world pack design based on practical requirements.

Battery Modeling & Pack Design Projects

- Estimating the Voltage-based SOC of the Battery using 1 RC Model in MATLAB
- Project Based on a Real-world Scenario

6 PCB Design For Beginners Using Altium Designer

In these projects, learners gain hands-on experience in PCB design workflows using Altium ECAD software. The focus is on schematic creation, layout development, and practical board-level design for real-world electronic applications.

PCB Design & Workspace Development Projects

- Create a Project Workspace for MIC33030
- Create a Project Workspace for Arduino Mini

Projects

7 Electric Motor Design Using MATLAB And ANSYS Maxwell

In these projects, learners analyze and simulate electric motor behavior with a focus on performance evaluation and electromagnetic analysis. The projects combine MATLAB-based studies with ANSYS Maxwell simulations to understand real-world motor operation.

Electric Motor Analysis & Simulation Projects

- Startup Behavior Analysis of an Induction Motor
- Simulation in ANSYS Maxwell and Report Creation

8 EV Technology Series

A short Project that introduces learners to the fundamental concepts of Electric Vehicle (EV) technologies and their applications in the automotive industry.

9 Basics Of Electric Vehicle Simulations Using Ansys

A short Project that introduces learners to the fundamental concepts of Electric Vehicle (EV) technologies and their applications in the automotive industry.

Projects

10 Hybrid Electric Vehicle Simulation Using GT-SUITE

In this project, learners develop and simulate a P4 parallel hybrid electric vehicle architecture focused on real-world drivability and fuel economy. The project emphasizes system integration, power flow analysis, and performance optimization for on-road HEV applications.

Hybrid Vehicle Development Project

- Development of P4 Parallel Hybrid Vehicle

11 Automotive Wiring Harness Using CATIA V5

In these projects, learners design and develop automotive wiring harnesses for both engine and vehicle body applications. The focus is on routing, packaging, flattening, and detailed drawing creation using CATIA V5 electrical workbenches.

Wiring Harness Design & Documentation Projects

- Wiring Harness on Engine
- Wiring Harness on Car Body

What Our Learners Say

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"The structured learning and continuous guidance helped me strengthen my technical skills and prepare confidently for industry roles."

Kannaiah Yangala - Post Graduate Trainee, Tata Technologies

"The EV Design & Development program gave me hands-on exposure to automotive technologies and the confidence to start my career in core EV roles."

Venkata Naga Sandeep Bolisetty - Associate Engineer, BlueBinaries

"I'm grateful for the opportunity to start my career at Tata Technologies. Skill-Lync played a key role in enabling this transition by connecting learning with real industry opportunities."

Mohammed Maheen - Graduate Engineer Trainee (ER&D), Tata Technologies

"Skill-Lync's structured courses and strong career support were instrumental in securing my placement. The certification validated my skills and prepared me for real-world engineering roles."

Praveen Kumar - Engineer, Intelizign Engineering Services Pvt. Ltd.

"Skill-Lync's comprehensive training and expert guidance helped me build strong industry-relevant skills. The certification played an important role in achieving my placement."

Tejavath Vijay - Electrical & Electronics Engineer, Adrasti Technologies