



**C1973 EV LAB**  
IIT Bombay



# e-POSTGRADUATE DIPLOMA IN **E-MOBILITY**

- DESIGNED AND DELIVERED BY IIT BOMBAY FACULTY
- IIT BOMBAY DIPLOMA CERTIFICATE
- INDUSTRY-FOCUSED CURRICULUM
- IIT BOMBAY ALUMNI STATUS

*Offered by C1973 EV Power Train Lab, IIT Bombay*

## India's Top-Ranked University

QS World University  
Rankings 2025

#3

NIRF India Engineering  
Rankings 2024

#45

QS World University  
Rankings in Engineering  
and Technology, 2024

#63

QS World University  
Rankings in Electrical  
and Electronics  
Engineering, 2024

## ABOUT THE e-POSTGRADUATE DIPLOMA

The **e-Postgraduate Diploma (ePGD) in E-mobility** from IIT Bombay equips professionals with cutting-edge expertise in electric vehicle (EV) technology through a comprehensive, six-course curriculum. Designed and delivered by IIT Bombay's esteemed faculty, this synchronous ePGD covers foundational concepts in electric vehicle design followed by advanced topics such as battery technology, electrical drives and their control, power electronics, grid integration, styling, design and manufacturing technologies for electric vehicles. The curriculum emphasizes on conceptual and practical learning, through a series of live and interactive sessions. With an in-person graduation ceremony held at the IIT Bombay campus, this credit-bearing diploma requires the candidates to successfully complete 36 credits that can be saved in the Academic Bank of Credits (ABC), fostering continued academic growth.



1

## **IIT BOMBAY CREDITS**

Earn up to 36 credits from IIT Bombay, which can be saved in the Academic Bank of Credits (ABC)

2

## **DELIVERED BY IIT BOMBAY FACULTY**

Designed and delivered by IIT Bombay faculty

3

## **GRADUATION AT IIT BOMBAY**

In-person graduation ceremony at IIT Bombay campus

4

## **ALUMNI STATUS**

IIT Bombay alumni status

5

## **LATERAL HIRING**

Access to IIT Bombay's lateral hiring group



Designed and delivered  
by IIT Bombay faculty



Earn individual course  
credits which can be  
saved in the Academic  
Bank of Credits (ABC)



Online synchronous  
6-course curriculum  
designed for working  
professionals



Participate in  
peer-to-peer learning  
and expand your  
professional network



Hands-on  
learning through  
industry-relevant tools



In-person graduation  
ceremony at IIT  
Bombay campus



Academic support  
for prompt query  
resolution



IIT Bombay  
alumni status



Personalised  
assistance with a  
dedicated Programme  
Manager



Access to IIT Bombay's  
lateral hiring group

# WHO IS THIS ePGD FOR?



CI973 EV LAB  
IIT Bombay



**Early to Mid-career Professionals** who want to upskill themselves and advance their career in the EV industry



**Scientists and R&D Professionals** who want to build cutting-edge solutions for the growing EV market



**Entrepreneurs** who want to enhance their technical skills to lead the next EV startup effectively



**Academicians and Educators** who want to equip themselves with the latest knowledge to inspire the next generation of EV professionals



**Recent Graduates** who want to launch their career in the EV industry with a solid foundation in electric mobility

1

## Understanding of E-Vehicle Categories

Gain a solid foundation in various electric vehicle types, powertrain components, and the critical role of power electronics in EV systems.

2

## Expertise in Battery Technology

Develop in-depth knowledge of battery chemistry, design, management systems, and charging technologies, with a focus on lithium-ion and alternative battery solutions.

3

## Power Electronics Design

Learn to design and analyze power electronic converters tailored for electric vehicle applications, including inverters and charging systems.

4

## Electric Drive Control

Understand the principles and methods for effectively controlling electric drives, including DC, BLDC, and PMSM motors.

5

## Manufacturing Technologies

Gain insights into modern manufacturing techniques used to make the batteries, motors (especially efficient stator and rotor), and vehicle structures, and understand how manufacturing errors influence the Electric Vehicle's performance

6

## Grid Integration Strategies

Explore the integration of electric vehicles with grid infrastructure, focusing on smart charging, regulatory frameworks, and the impact on energy systems.

7

## Vehicle Design Fundamentals

Learn the essential principles of vehicle styling, ergonomics, and design processes that enhance user experience in electric mobility.



## **SANDEEP ANAND**

Professor and ePGD Coordinator

Dept. of Electrical Engineering, IIT Bombay

Ph.D. | IIT Bombay

**Research Interests:** Electric Vehicles Drive Train and Chargers, Wide Bandgap Devices (GaN and SiC) Based Power Converters



## **SHILADRI CHAKRABARTY**

Assistant Professor

Dept. of Electrical Engineering, IIT Bombay

Ph.D. | IIT Kharagpur

**Research Interests:** High-Frequency-Isolated Converters, Soft-Switching, Wide Bandgap Devices, Power Semiconductor Packaging



## **KISHORE CHATTERJEE**

Dr. D.T. Manwani Chair Professor in Electric Vehicles

Dept. of Electrical Engineering, IIT Bombay

Ph.D. | IIT Kanpur

**Research Interests:** Utility-Friendly Converter Topologies, Power Factor Correction Techniques, Switched Mode Rectifiers, Electronic Ballast, Control of Electric Drives



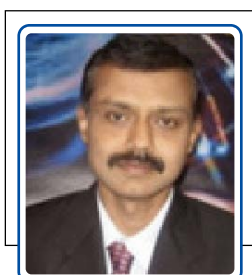
## **PRASHANT P. DATE**

Professor

Dept. of Mechanical Engineering, IIT Bombay

Ph.D. | IIT Madras

**Research Interests:** Metal Forming Processes, Formability, Shopfloor Metallic Waste Processing, Powder Metallurgy, Metal Injection Moulding



## **BAYLON G. FERNANDES**

Professor

Department of Electrical Engineering, IIT Bombay

Ph.D. | IIT Bombay

**Research Interests:** Inverter topologies for VAr compensation, Power electronic interface for non-conventional energy sources, Permanent magnet machines for wind power generation, Switched reluctance machines for electric vehicle application



### **PAVAN KUMAR HARI**

**Associate Professor**

**Energy Science and Engineering, IIT Bombay**

**Ph.D. | IISc Bengaluru**

**Research Interests:** Electrical Machines, Power Electronics and Industrial Drives, Wind Turbine Generators, Magnetic Gears, Railway Power Systems, Micro-Energy Harvesting, Electric and Hybrid Electric Vehicles



### **RAVI PRAKASH**

**Assistant Professor**

**Energy Science and Engineering, IIT Bombay**

**Ph.D. | IISc Bengaluru**

**Research Interests:** High-Performance Control of Motor Drives for Electric Vehicles, Charging of Electric Vehicles, Design, Modulation and Control of Power Electronic Converters



### **ZAKIR RATHER**

**Professor**

**Dept. of Energy Science and Engineering, IIT Bombay**

**Ph.D. | Aalborg University**

**Research Interests:** Grid Integration of Renewables, System Integration of Renewables, Power System Dynamics and Control, Electric Vehicle Grid Integration



### **NISHANT SHARMA**

**Professor**

**Industrial Design Centre, IIT Bombay**

**Ph.D. | IIT Guwahati**

**Research Interests:** Automotive Design, Vehicle Design Process, Product Form and Aesthetics, Participatory Innovation



### **BHARATKUMAR SUTHAR**

**Assistant Professor**

**Dept. of Chemical Engineering, IIT Bombay**

**Ph.D. | Washington University**

**Research Interests:** Multiphase Reaction, Reaction Engineering, Surface Science, Porous Media



# e-POSTGRADUATE DIPLOMA CURRICULUM



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IIT Bombay

This e-Postgraduate Diploma requires candidates to successfully complete 36 IIT Bombay credits across 6 courses: 2 core courses and 4 electives. The courses offered are:

## CORE COURSES

### Introduction to E-Mobility

In this course, you will build a comprehensive understanding of electric vehicle (EV) technology. You will learn about various categories of electric vehicles, powertrain components, sub-systems, and their specifications. After this, you will learn about the critical role played by power electronics in EVs, regenerative braking and integration of EVs into the grid. Additionally, this course will help you build an in-depth understanding of EV charging technologies and the business aspects of charging.

### Battery Technology for Electric Vehicles

In this course, you will learn about the various aspects of battery technology, focusing on lithium-ion batteries and alternative battery solutions. After this, you will learn combining individual batteries to design battery packs and various associated concepts such as charging algorithm, estimation of State of Charge (SoC) and State of Health (SoH). You will also gain hands-on exposure through modeling and simulation of li-ion battery systems using electrochemical and equivalent circuit models. Additionally, the course covers battery management systems and battery safety considerations in detail.



# ELECTIVES

## Manufacturing Technologies for Electric Mobility

In this course, you will learn about identifying manufacturing technologies for making car bodies, batteries and motors. Car body design needs revisiting, in view of heavy battery altering the weight distribution and hence bending, twisting and in general, vehicle behaviour on road. As the course proceeds, you will learn about battery manufacturing technologies which includes drawing up bill of materials for a battery, technologies in manufacture of pouch/prismatic cells and integration into battery packs. The very technologies for autobody production work differently in the context of thin micron thick foils. Manufacturing steps for making batteries, both Li Ion and solid state batteries will be discussed. Finally, manufacture and assembly of motors of different types, including stator manufacture with the latest hairpin winding technology, and rotor manufacture using Soft Magnetic Composites will be discussed. The course will cater only to manufacturing aspects of three systems of an EV and will not cover electronics and control aspects of an EV.

## Power Electronic Converters for EV Applications

In this course, you will learn about power electronics - a critical area for electric vehicles. You will start with the fundamentals of DC-DC converters and voltage source inverters. You will analyze how power factor correction and battery charging circuits work together to optimize performance. As the course proceeds, you will delve into the intricacies of gate driver circuits and inverter design, gaining hands-on knowledge that prepares you for real-world applications. Finally, you'll examine the latest advancements in power semiconductor devices, which play a crucial role in enhancing the efficiency and reliability of EV systems.

## Electrical Drives for EVs

In this course, you will dive into the principles of controlling DC motors for electric vehicles, beginning with field control and variable-speed drives. You'll explore the application of brushless DC motors alongside 3-phase voltage source converters, gaining insights into their operation. The course also covers regenerative braking, allowing you to understand energy recovery in EVs. You will be introduced to key concepts like space vector transformations which will eventually lead to advanced field-oriented control techniques. This comprehensive approach will equip you with the skills needed to excel in motor control applications within electric mobility.

## Electric Vehicle Grid Integration

In this course, you will explore the evolution of EV charging technologies and their integration with power grids, particularly in regions with high EV adoption. The course will cover various charging infrastructures, including Electric Vehicle Supply Equipment (EVSE) for different vehicle types and smart charging systems. As the course progresses, it will delve into regulations, tariff structures, and the impact of EV integration on distribution systems. You'll also examine the synergy between electric vehicles and renewable energy, exploring the role of EVs in enhancing renewable energy penetration at the system level.

## E-vehicle Styling and Design

In this course, you will cover the essential aspects of vehicle aesthetics, packaging, and ergonomics specific to electric vehicles. You will start with the design process, including initial vehicle sketching and computer-aided surfacing, progressing to clay modelling and prototyping. The course will emphasize both exterior and interior design, highlighting how form and function intersect in EV design. Through case studies of various vehicle types, you'll gain insights into real-world applications, while also learning about the tools and skills required in modern vehicle design studios.

## SAMPLE PROJECTS



Vehicle sub-system modelling



Embedded controller for electric motors



Simulation of power electronic systems



Battery modelling techniques and degradation phenomenon



Modelling and control of EV chargers



Impact assessment of EVs on grid infrastructure

**Note:** Curriculum review and changes are under the purview of IIT Bombay and would be undertaken from time to time to ensure the curriculum coverage is in line with industry requirements.

## ELIGIBILITY CRITERIA

The eligibility criteria for the e-Postgraduate Diploma in E-mobility is as follows:

- Candidates must hold a B.E. / B.Tech degree or a 4-year B.Sc / BS degree in a relevant domain of engineering or technology.
- Candidates with post graduate (M.Tech / M.Sc / MS) or doctorate degrees in a relevant domain of engineering and technology can also apply.

## SELECTION PROCESS

### Step 01



#### Application

Interested candidates can apply for e-Postgraduate Diploma by filling out a simple online application form.

### Step 02



#### Online Test and Screening

Applicants must take an online test to assess their foundational knowledge and suitability for the ePGD. After completing the online test, applicants will go through a mandatory screening call with the Registration Office.

### Step 03



#### Offer of Registration

The selected candidates will receive an offer letter to register for the e-Postgraduate Diploma. They will need to pay the registration fee to confirm their participation.

# IMPORTANT DATES



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IIT Bombay

Registration Window	Orientation	Classes Begin
13 <sup>TH</sup> DECEMBER 2024 TO EARLY MARCH 2025	MARCH 2025	MARCH 2025

## FEE STRUCTURE

REGISTRATION FEE	₹30,000	(To be paid within 7 days after receiving the offer letter to confirm registration)
FEE FOR 1 <sup>ST</sup> COURSE	₹95,000	(To be paid at the beginning of 1 <sup>st</sup> course)
FEE FOR 2 <sup>ND</sup> COURSE	₹95,000	(To be paid at the beginning of 2 <sup>nd</sup> course)
FEE FOR 3 <sup>RD</sup> COURSE	₹95,000	(To be paid at the beginning of 3 <sup>rd</sup> course)
FEE FOR 4 <sup>TH</sup> COURSE	₹95,000	(To be paid at the beginning of 4 <sup>th</sup> course)
FEE FOR 5 <sup>TH</sup> COURSE	₹95,000	(To be paid at the beginning of 5 <sup>th</sup> course)
FEE FOR 6 <sup>TH</sup> COURSE	₹95,000	(To be paid at the beginning of 6 <sup>th</sup> course)

For more details on flexible fee payments, please get in touch with the Registration Team.

*Note: Multiple courses will be offered simultaneously for the ePGD candidates. Total fees can be paid accordingly.*

## FINANCIAL ASSISTANCE



*\*Conditions apply. The Financial Assistance options are available through Great Learning. Please reach out to the admissions office at 080 4718-8428 for more details.*

# READY TO ADVANCE YOUR CAREER?



## CONTACT US

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