



भारतीय प्रौद्योगिकी संस्थान दिल्ली
Indian Institute of Technology Delhi



Certificate Programme on Fundamentals of EVs and Charging Infrastructure

5 Months | Starts 25th November, 2023 | Live Online Lectures

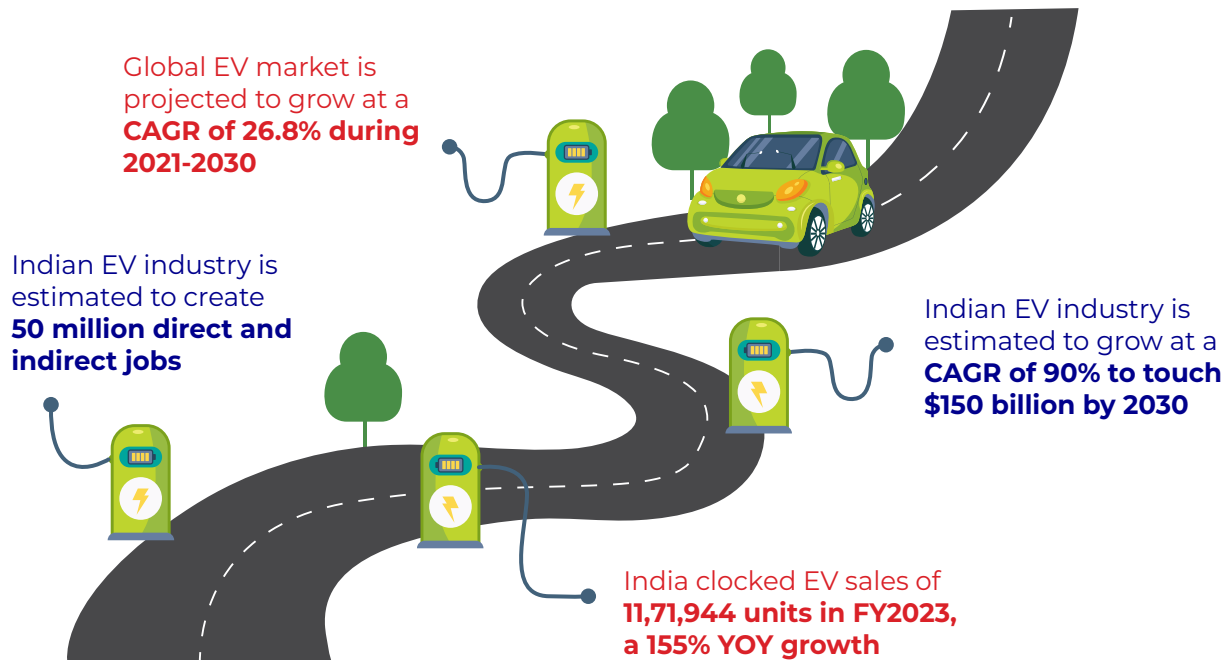
Electric Vehicles and Charging Infrastructure in India

A New Roadmap Taking Shape

'Range Anxiety'. The Oxford Dictionary added this new phrase to its list in 2013 — meaning, 'the fear of an Electric Vehicle (EV) running out of power before reaching a charging point'. This was the time when the world's best-selling EV could travel only 120km between charges, while an Internal Combustion Engine (ICE) vehicle could go beyond 600km with a tank full of conventional fuel, which kept consumers away from buying EVs.

With persisting problems like pollution, global warming and depleting conventional fuel resources, many governments globally are pushing hard for cleaner EVs. Morgan Stanley Bank reckons that, by 2050, half the cars on the roads worldwide will be battery-powered (economist.com).

In year-end 2022, India surpassed Japan and Germany and became the third-largest automobile market, in terms of sales, where EVs accounted for just 1.3% of the total sales (timesofindia.indiatimes.com). With its focus on next-gen mobility solutions and the concerted efforts, encouragement and schemes of the government, the Indian EV industry has become the country's sunrise sector.



Source: eletimes.com; timesofindia.indiatimes.com; autocarpro.in; economictimes.indiatimes.com

However, the high cost of EVs, economies of scale for manufacturers and the insufficient charging infrastructure giving rise to 'range anxiety', are a few roadblocks to faster EV adoption. India has taken on the challenge to find solutions and is working towards becoming an EV nation. Charge your EV knowledge too with this IIT Delhi programme and become a part of the country's newest sunrise sector.

Certificate Programme on Fundamentals of EVs and Charging Infrastructure



Programme Highlights



A Programme from the Centre for Automotive Research and Tribology (CART), IIT Delhi. IIT Delhi is ranked #2 as per the QS World University Ranking 2024 in India



5-month online programme for working professionals



IIT Delhi Continuing Education Programme (CEP) Certificate



52 hours of live online sessions by IIT Delhi faculty and industry experts



Peer-learning and networking opportunities

Who should attend?

- Engineering graduates seeking to grow in the industry
- The programme is important for people who have started their careers in the automobile sector or, are at the mid-level and want to groom themselves with EV technologies which can help them seek better-level positions.

Learning Outcomes



Develop essential skills needed in today's dynamic engineering world



Get a hands-on refresher on Electrical Engineering and Power Electronics



Acquire an in-depth understanding of the Fundamentals of EVs



Master advanced concepts like Design of EV Chargers, Control of EV Chargers, Protection of EV Chargers, Communication and Security

Programme Curriculum

Module 1: Electrical Engineering Refresher

- Voltage and current specifications
- Switching network fundamentals
- Power calculation
- Battery charging basics
- Heat generation in electrical network
- Assignment 1: Hardware oriented simulation basics

Module 2: Power Electronics Refresher

- Power converter analysis
- Rectifier and DC/DC topologies
- Grid interaction
- Grounding and earthing
- Assignment 2: Power electronics circuits

Module 3: Fundamentals of EVs

- Fundamentals of EVs

Module 4: Design of EV Charger

- Building blocks
- Power semiconductor selection
- Magnetic design
- Gate drivers
- Assignment 3: Component design

Programme Curriculum

Module 5: Control of EV Chargers

- Voltage and current sensors
- Feedback control design
- Class project: Power electronics system implementation

Module 6: Protection of EV Chargers

- Thermal design
- Different types of protections
- EMI/EMC
- Assignment 4: Filter design

Module 7: Hardware Lab

- Hardware implementation of class project at IIT Delhi (optional)

Module 8: Communication and Security

- Introduction to 5G
- 5G automotive
- Power line communications
- Wireless charging
- Communication between charger and cloud server and various charge point operators (OCPP and OCPI)
- Communication protocol testing
- AC and DC fast charger testing (theory)

Programme Details



Eligibility

- B.E./B.Tech./B.Sc./M.Sc./M.E./M.Tech./Diploma in Electrical and Electronics
- Basic electrical knowledge is required for this programme.



Delivery

Online Direct-to-Device
(D2D) mode



Duration

5 Months
52 hours live online sessions
5 Hours Lab (optional)



Class Schedule

Every Saturday and Sunday: Total 3
hours/week*
Session Timings - 3:00 p.m. to 4:30 p.m.
*Subject to change



Admission Criteria

Selection based on application review
and interview with the faculty.



Campus Event / Immersion

One day campus immersion at IIT
Delhi Campus (optional)



Evaluation

Assignments: 40%
Class project and Lab: 30%
MCQ Test: 3 (Best 2 will be considered): 30%



Certification*

- Candidates who score at least 50% marks overall and have a minimum attendance of 50%, will receive a 'Certificate of Successful Completion' from CEP, IIT Delhi.
- Candidates who score less than 50% marks overall and have a minimum attendance of 50%, will receive a 'Certificate of Participation' from CEP, IIT Delhi.
- The organising department for this programme is Centre for Automotive Research and Tribology (CART), IIT Delhi.



**Only e-Certificates will be issued by CEP, IIT Delhi for this programme.*

Programme Coordinator



DR. SANTANU K. MISHRA

Professor

Centre for Automotive Research and Tribology (CART),
Indian Institute of Technology Delhi

Dr. SANTANU K. MISHRA received a B.Tech. degree in Electrical Engineering from the College of Engineering and Technology, Bhubaneswar, India, in 1998, an M.Tech. degree in Energy Systems Engineering from Indian Institute of Technology, Chennai, India, in 2000, and the Ph.D. degree from the Department of Electrical and Computer Engineering, University of Florida, Gainesville, FL, USA, in 2006.

He worked as a Staff Application Engineer with the International Rectifier Corporation (now Infineon Technologies) in Rhode Island, USA, from 2004 to 2008. From 2008 to 2023, he was a Professor with the Department of Electrical Engineering at the Indian Institute of Technology Kanpur. In 2017, he worked as a Visiting Professor at the Center for Power Electronics System (CPES) at Virginia Tech, USA.

Currently, he is a Professor with the Center for Automotive Research and Tribology (CART) at the Indian Institute of Technology Delhi.

His research interests include power converter design, implementation, control, and applications. He serves as an associate editor of several journals and their special sessions including IEEE Transactions on Industry Applications, IEEE Transactions on Power Electronics, IEEE Consumer Electronics Magazine, IEEE Journal of Emerging and Selected Topics in Power Electronics, IET Power Electronics, and IET Rapid Communication.

He is a fellow of IET, London, and INAE, India.

Programme Coordinator



DR. B.K. PANIGRAHI

Head of CART and Professor

Centre for Automotive Research and Tribology (CART),
Indian Institute of Technology Delhi

Dr. Bijaya Ketan Panigrahi is presently working as a professor in the Electrical Engineering Department and head of Centre for Automotive Research and Tribology (CART), IIT Delhi, India. Prior to joining IIT Delhi in 2005, he has served as a faculty in Electrical Engineering Department, UCE Burla, Sambalpur, Odisha, India from 1992 to 2005. His research interest includes application of AI and ML techniques to power system planning, operation, control, protection, security and management. His research also focuses on various domain of Smart Grid and Micro grid. Professor Panigrahi is also looking extensively on the issues of EV charging infrastructures and the impact of fast charging infrastructure on the grid, Battery management system, Battery pack design and Battery swapping stations. He has served as the editorial board member / associate editor/ special issue guest editor of different international journals published by IEEE, IET, Elsevier, Springer etc. He is also associated with various international and national conferences in various capacity. Dr Panigrahi has published more than 700 research papers in various international and national journals and conference proceedings. He is a fellow of INAE, NASI, AAI and Senior member of IEEE.

Programme Faculty



DR.MANAV BHATNAGAR

Professor

Department of Electrical Engineering,
Indian Institute of Technology Delhi

Dr. Manav Bhatnagar is currently a Professor with the Department of Electrical Engineering, IIT Delhi, New Delhi, India, where he is also a Brigadier Bhopinder Singh Chair Professor. He holds a global rank of 517 in the area of Networking & Telecommunications among the top 2% scientists in a global list compiled by the prestigious Stanford University. He is a Fellow of IET, INAE, NASI, IETE, and OSI. He has received the prestigious NASI-Scopus Young Scientist Award, Shri Om Prakash Bhasin Award, and Dr. Vikram Sarabhai Research Award. He has been an Editor of the IEEE Transactions on Wireless Communications during 2011-2014. Currently, he is an Editor of the IEEE Transactions on Communications. He has published more than 100 high quality IEEE journal papers out of which 10 are single authored. His research interests include signal processing for MIMO systems, free-space optical communication, satellite communications, and machine learning.

Programme Faculty



DR. SAPTARSHI BASAK

Asst. Professor

CART, Indian Institute of Technology Delhi

Dr. Saptarshi Basak received his B.E. degree in Electrical Engineering from Jadavpur University, Kolkata in 2010, M. Tech Degree in Electrical Engineering with specialization in Machine, Drives and Power Electronics from Indian Institute of Technology Kharagpur in 2012 and the Ph.D degree from the Department of Electrical Engineering, Indian Institute of Technology Kharagpur in 2019.

Currently, he is an Assistant Professor associated to the Centre for Automotive Research and Tribology (CART) at IIT Delhi. Prior to joining CART, he was with the Electronics and Control (R&D) Division of Shakti Pumps (India) Limited where he was involved in firmware development of solar pump drives, grid-connected photovoltaic converters and hybrid inverters. His research interests include Design and Control of Special Electric Machines, On-board generation systems, Estimation Techniques and Control of AC Drives applied to electric vehicles, development of on-board charging systems. His teaching interest includes Design and Analysis of EV Motors, Power Electronics and Motor Drives for EVs, Special Electrical Motors for EVs.

Programme Fee

Particulars	Amount (₹)
Programme Fees	1,55,000
GST @18%	27,900
Total Fees	1,82,900

All fees should be submitted in the IITD CEP Account only, and the details will be shared post-selection

Easy EMI Options Available

Note:

- Payment of fees should be submitted in the IIT Delhi CEP account only and the receipt will be issued by the IIT Delhi CEP account for your records.
- Loan and EMI Options are services offered by TimesPro. IIT Delhi is not responsible for the same.



Instalment Schedule

Instalment	Instalment Date	Amount (₹)*
I	To be paid within 7 days of offer rollout	60,000
II	10 th December, 2023	55,000
III	10 th January, 2024	40,000

*GST @18% will be charged extra in addition to the fee.

Programme Timelines

Application Closure Date	11 th November, 2023
Programme Start Date	25 th November, 2023
Programme End Date	April 2024

APPLY NOW 



भारतीय प्रौद्योगिकी संस्थान दिल्ली Indian Institute of Technology Delhi



The Indian Institute of Technology Delhi (IIT Delhi) is one of the 5 initial IITs established for training, research and development in science, engineering and technology in India. Established as the College of Engineering in 1961, the Institute was later declared an Institution of National Importance under the “Institutes of Technology (Amendment) Act, 1963” and was renamed as “Indian Institute of Technology Delhi”. It was then accorded the status of a Deemed University with powers to decide its own academic policy, conduct its own examinations and award its own degrees. Since its inception, over 48,000 students have graduated from IIT Delhi in various disciplines including Engineering, Physical Sciences, Management and Humanities & Social Sciences.

For more details, please visit: www.iitd.ac.in

Continuing Education Programme (CEP)

Executive education is a vital need for companies to build a culture that promotes newer technologies and solutions and builds a workforce that stays abreast of the rapidly transforming needs in the technological, business and regulatory landscape. Committed to the cause of making quality education accessible to all, IIT Delhi has launched Online Certificate Programmes under eVIDYA@IITD (ई-विद्या @IITD), enabling Virtual and Interactive learning for Driving Youth Advancement @IITD for Indian as well as international participants.

These outreach programmes offered by the Indian Institute of Technology Delhi (IIT Delhi) are designed to cater to the training and development needs of various organisations, industries, society and individual participants at national and international levels with a vision to empower thousands of young learners by imparting high-quality Online Certificate Programmes in cutting-edge areas for their career advancement in different domains of engineering, technology, science, humanities and management.

For more details, please visit: <http://cepqip.iitd.ac.in>

2nd
in NIRF Ranking 2023
(Engineering)

2nd
in Outlook ICARE Rankings
2023 (Engineering)

2nd
in QS World University
Rankings 2024 in India

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For any feedback, please write to:
CEP, IIT Delhi at
contactcep@admin.iitd.ac.in

1800-120-2020
admissions@timespro.com
www.timespro.com



Online Certificate Programmes are offered by the Indian Institute of Technology Delhi under the aegis of Continuing Education Programme (CEP) so that the Institute can realise its vision of serving as a valuable resource for industry and society, and fulfil its mission to develop human potential to its fullest extent so that intellectually capable and imaginatively gifted leaders can emerge in a range of professions.

Programme offered by Continuing Education Programme (CEP), IIT Delhi