



**भारतीय प्रौद्योगिकी संस्थान दिल्ली**  
**Indian Institute of Technology Delhi**

**NIRF Rank 2 in Engineering Category 2024**

# **Executive Programme in Semiconductor Manufacturing and Technology**

**Duration: 6 months | Live Online**



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

## → PROGRAMME OVERVIEW

Step into the future of innovation with IIT Delhi's 6-month Executive Programme in Semiconductor Manufacturing & Technology, designed exclusively for working professionals. Gain cutting-edge expertise in semiconductor processes, design, and fabrication, while enhancing your skills to thrive in this rapidly evolving industry. Delivered by industry experts and academic leaders, this program combines flexibility with rigor, empowering you to upskill without pausing your career. [Verify program validity on IIT Delhi CEP](#)

## → FEES

₹1,25,000/- (plus GST @18%)

## → KEY PROGRAMME DETAILS

Eligibility	B.Tech/M.Sc./10+2+3 diploma holders
Duration	6 months (81 hours)
Mode	Online
Schedule	9:30 am – 12:30 pm, Sundays
Campus Immersion	A two-day in-person session at IIT Delhi toward the end of the program.
Program Coordinator	Prof. Awanish Pandey
Fees	₹ 1,25,000/- (plus GST @18%)



## → PROGRAMME HIGHLIGHTS



### e-Certificate of successful completion from CEP, IIT Delhi

Participants must attend at least 40% of the lectures and tutorials. Those who secure more than 50% of the assessment marks along with the required attendance will receive an e-Certificate of Completion. Meanwhile, participants who meet the attendance requirement but score less than 50% in assessments will be awarded an e-Certificate of Participation.



### Expert-Led Curriculum

Delivered by faculty from IIT Delhi's Optics & Photonics Center, complemented by guest lectures from industry leaders.



### Real-World Relevance

Gain hands-on insights into semiconductor manufacturing processes, emerging technologies, and the latest industry trends.



### Prestige

Certification from one of India's most renowned institutions, boosting your professional credentials.



### Immersive Experience

A two-day campus immersion at IIT Delhi for in-depth interactions and networking opportunities.



## → LEARNING OUTCOMES



**Return on Investment:** Master semiconductor devices and technologies, from basic concepts to advanced applications in EVs, AI, space, and more. Gain the skills to lead and innovate in this rapidly evolving industry.



**Accelerate Your Professional Growth:** Learn to design and fabricate cutting-edge semiconductor devices. Position yourself as an expert in emerging technologies like AI and automotive.



**Explore the Opportunities of the Semiconductor Revolution:** Stay ahead of the semiconductor revolution by understanding market trends and commercial opportunities. Unlock new pathways for innovation and success.



**Empower Your Organization:** Leverage insights into global market dynamics and lead your organization in semiconductor technology. Drive growth and capitalize on next-gen advancements.



**Build a Future-Ready Team:** Develop a team skilled in designing nano-scale devices. Lead innovations across sectors like EVs and AI, keeping your organization competitive and forward-thinking.

# → WHAT WILL YOU LEARN?

## **Module 1: Fundamentals of Semiconductor Devices and Technology**

- ▶ This module introduces the core principles of semiconductor physics, the design and operation of basic semiconductor devices, and the foundational technologies that drive modern electronics.

## **Module 2: Semiconductor Fabrication and Process Technologies**

- ▶ This module delves into the fabrication techniques of semiconductor devices, covering lithography, doping, etching, oxidation, metallization, and thin film deposition. Participants will learn about cleanroom environments and the critical steps involved in manufacturing integrated circuits.

## **Module 3: Device Physics and Performance Optimization**

- ▶ This module focuses on the physics governing semiconductor devices, including band theory, carrier transport, and junction behavior. It also explores methods to optimize device performance, such as scaling, material selection, and thermal management.

## **Module 4: Advanced Applications of Semiconductor Technology**

- ▶ This module covers cutting-edge applications of semiconductor technology in electric vehicles (EVs), the automotive industry, data centers, space exploration, artificial intelligence (AI), and the entertainment sector, highlighting the transformative impact of semiconductors in these fields.

## **Module 5: Semiconductor Market Dynamics and Commercial Opportunities**

- ▶ This module explores the global semiconductor industry, covering key market trends, supply chain challenges, and emerging technologies.





## PROGRAMME MODULES

### Module 1: Fundamentals of Semiconductor Devices and Technology

- ▶ **Semiconductor Materials**  
Understand the basic properties of intrinsic and extrinsic semiconductors, including concepts like doping and charge carriers.
- ▶ **Energy Band Theory**  
Explore energy bands and how they differentiate semiconductors from conductors and insulators.
- ▶ **P-N Junctions**  
Learn about the formation of p-n junctions and their role in basic semiconductor devices like diodes.
- ▶ **Basic Semiconductor Devices**  
Get an overview of simple devices such as diodes and transistors, focusing on their design and functionality.
- ▶ **Semiconductor Applications**  
Discuss real-world applications of semiconductors, from simple electronics to more advanced systems like LEDs and solar cells.

### Module 2: Semiconductor Fabrication and Process Technologies

- ▶ **Introduction to Semiconductor Fabrication**  
Gain insights into the semiconductor manufacturing process. Understand the importance of precision in fabrication.
- ▶ **Lithography Techniques in Fabrication**  
Explore the various lithography methods used in semiconductor production. Learn how these techniques impact device resolution and performance.

## → PROGRAMME MODULES

### ▶ **Doping and Material Modification**

Understand the principles of doping and its effects on semiconductor properties. Examine methods for modifying material characteristics.

### ▶ **Etching Processes in Semiconductor Manufacturing**

Study the etching techniques essential for device fabrication. Learn the differences between wet and dry etching methods.

### ▶ **Cleanroom Practices and Environmental Control**

Delve into the importance of cleanroom environments. Understand the protocols and technologies used to maintain cleanliness in semiconductor fabs.

## Module 3: Device Physics and Performance Optimization

### ▶ **Carrier Transport Mechanisms**

Examine drift, diffusion, and recombination processes and their impact on device operation.

### ▶ **Junction Behavior**

Analyze the behavior of p-n junctions, including electric fields, depletion regions, and forward/reverse bias conditions.

### ▶ **Scaling and Miniaturization**

Understand the effects of device scaling on performance and efficiency, particularly in modern transistors.

### ▶ **Material Selection**

Explore the role of different semiconductor materials (e.g., silicon, gallium nitride) in optimizing device performance.

### ▶ **Thermal and Power Management**

Learn strategies to manage heat and power in high-performance semiconductor devices for improved reliability.



## → PROGRAMME MODULES

### Module 4: Advanced Applications of Semiconductor Technology

- ▶ **Semiconductors in Electric Vehicles**  
Explore how semiconductors are transforming the electric vehicle industry. Understand their role in power management and control systems.
- ▶ **Data Centers and High-Performance Computing**  
Delve into the impact of semiconductor technology on data centers. Learn about energy efficiency and processing capabilities.
- ▶ **Semiconductors in Space Applications**  
Study the unique challenges of semiconductor use in space. Explore materials and technologies designed for extreme environments.
- ▶ **Artificial Intelligence and Machine Learning**  
Examine how semiconductors enable advancements in AI. Learn about specialized chips for neural networks and deep learning.
- ▶ **Entertainment Technologies: Gaming and Beyond**  
Explore the role of semiconductors in the entertainment industry. Understand their applications in gaming, VR, and media streaming.

### Module 5: Semiconductor Market Dynamics and Commercial Opportunities

- ▶ **Global Semiconductor Market Overview**  
Understand the structure and size of the global semiconductor market, including major players, key regions, and market segments.



## → PROGRAMME MODULES

### ▶ **Supply Chain Dynamics and Challenges**

Explore the semiconductor supply chain, including raw material sourcing, manufacturing processes, and recent disruptions like the global chip shortage.

### ▶ **Emerging Technologies and Growth Opportunities**

Identify new trends in semiconductor technology, such as AI, 5G, and automotive applications, and explore potential commercial opportunities.

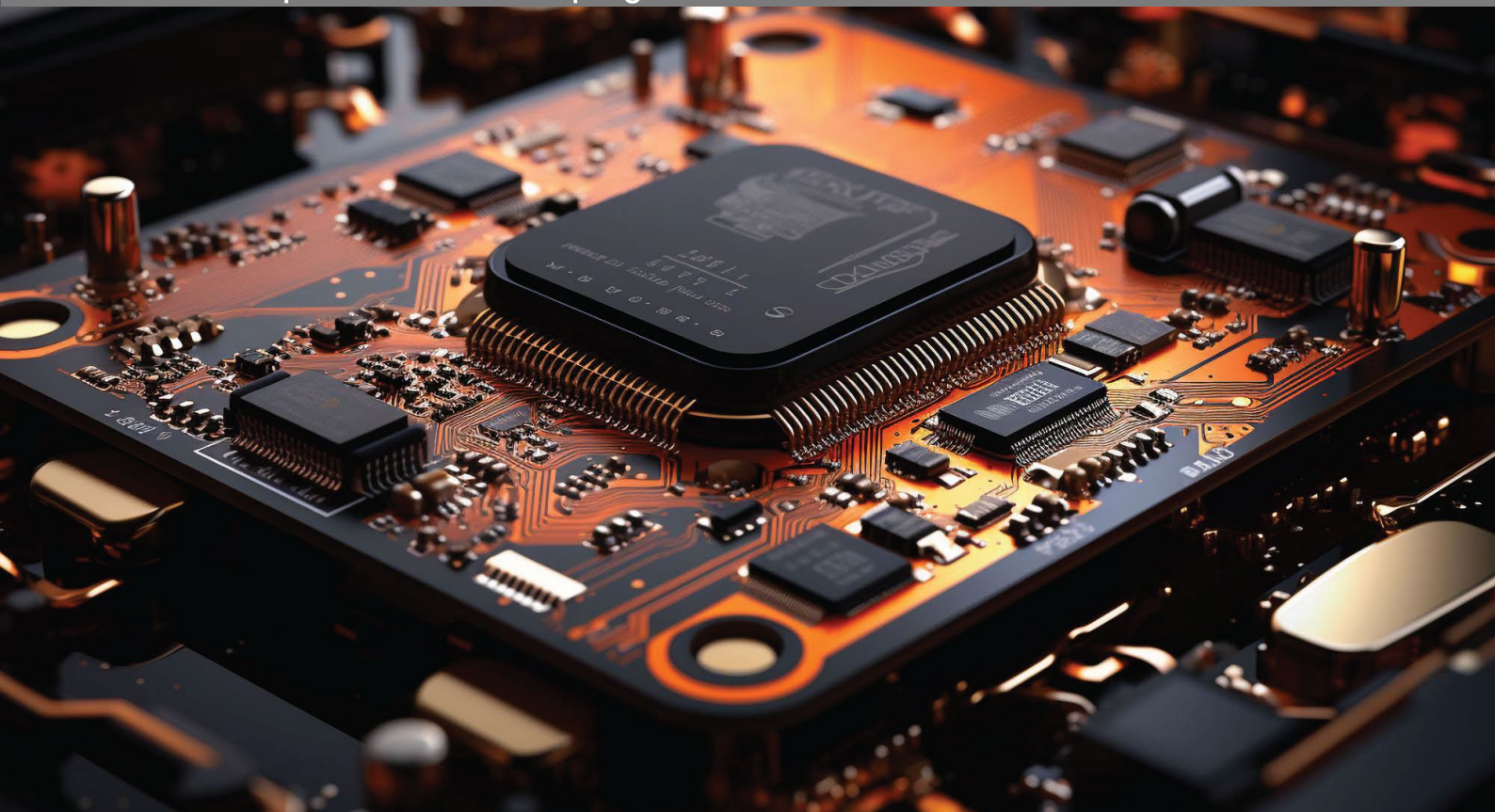
### ▶ **Geopolitics and Semiconductor Trade Policies**

Analyze the impact of geopolitical factors on the semiconductor industry, including trade wars, export controls, and government policies.

### ▶ **Investment and Innovation in Semiconductor Startups**

Learn about venture capital, funding strategies, and the role of innovation in driving growth within the semiconductor ecosystem.

Modules/ topics are indicative only, and the suggested time and sequence may be dropped/ modified, or adapted to fit the total programme hours.



## → PROGRAMME FEES

Particulars	Amount (₹)
Programme Fees	₹ 1,25,000
GST @ 18%	₹ 22,500
Total Fees	₹ 1,47,500

### Note:

- All fees should be submitted in the IITD CEP account only, and the details will be shared post-selection.
- The receipt will be issued by the IIT Delhi CEP account for your records.
- Easy EMI options available.
- Loan and EMI Options are services offered by Teamlease Edtech. IIT Delhi is not responsible for the same.

## → WITHDRAWAL & REFUND FROM PROGRAMME

- Candidates can withdraw within 15 days from the programme start date. A total of 80% of the total fee received will be refunded. However, the applicable tax amount paid will not be refunded on the paid amount.
- Candidates withdrawing after 15 days from the start of the programme session will not be eligible for any refund.
- If you wish to withdraw from the programme, you must email [cepaccounts@admin.iitd.ac.in](mailto:cepaccounts@admin.iitd.ac.in) and [cepdelhi@digiversity.com](mailto:cepdelhi@digiversity.com), stating your intent to withdraw. The refund, if applicable, will be processed within 30 working days from the date of receiving the withdrawal request.

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

## → PAYMENT SCHEDULE

Installment	Installment Date	Amount (₹)
I	Within 3 days of offer roll out	₹ 60,000+GST
II	On or before 20th June 2025	₹ 65,000+GST

Total fees – ₹ 1,25,000+GST [No cost EMI available]

### Note:

- GST @ 18% will be charged extra in addition to the programme fees.

## → PROGRAMME TIMELINES

Application Closure Date	30th May, 2025
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**APPLY NOW**

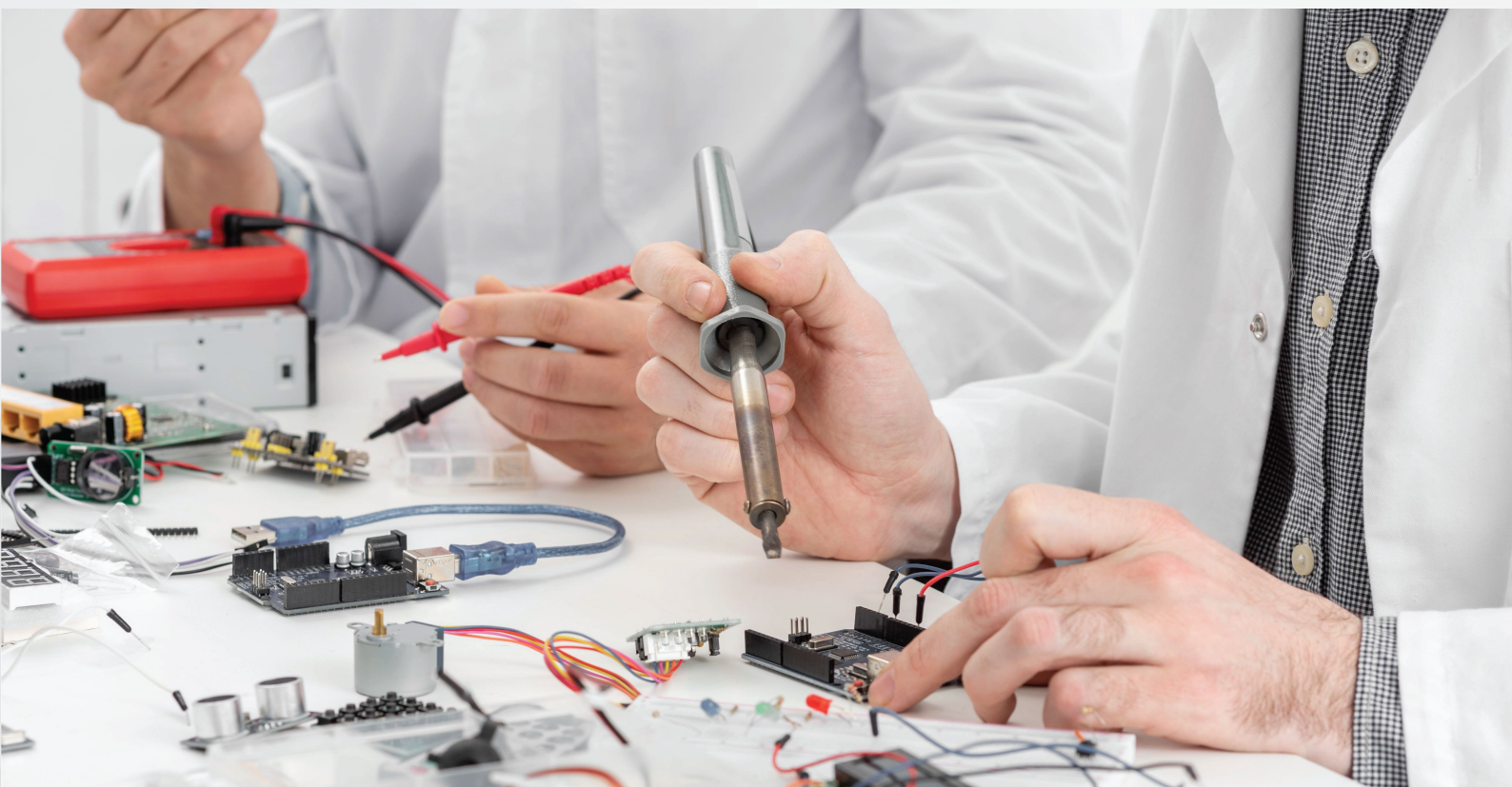


# → PROGRAMME E-CERTIFICATE

<b>Participation Certificate</b>	Awarded with at least 40% attendance and below 50% marks.
<b>Successful Completion Certificate</b>	Awarded with a minimum of 40% attendance and over 50% marks.



- The above e-certificate is for illustrative purposes only and the format of the e-certificate may be changed at the discretion of IIT Delhi.
- Only e-certificate will be provided and it will be issued by CEP, IIT Delhi.
- The organizing department of this programme is the Optics & Photonics Center, IIT Delhi.



## → PROGRAMME COORDINATOR



### PROF. AWANISH PANDEY

Assistant Professor

OPTICS AND PHOTONICS CENTRE, INDIAN INSTITUTE  
OF TECHNOLOGY DELHI, NEW DELHI.

Prof. Awanish Pandey is an Assistant Professor at the Optics and Photonics Centre, IIT Delhi. He has nearly a decade of experience in semiconductors technology, having worked with leading semiconductor foundries like imec, Belgium, and renowned research facilities such as CERN in Geneva, Switzerland. He obtained his Ph.D. from the Indian Institute of Science, Bangalore in 2019. Primarily, his research works revolves around manipulating the flow of photons in nanophotonic structures made of semiconductors such as Silicon. Currently, his research group is focusing on developing ultra-high-speed integrated photonic links and systems for 6G communication. Additionally, he plays a key role in the National Quantum Mission (NQM), contributing to the development of India's first photonic quantum processor.





## → ESTEEMED FACULTY



### **PROF. DEEPAK JAIN**

Assistant Professor

OPTICS AND PHOTONICS CENTRE, INDIAN INSTITUTE  
OF TECHNOLOGY DELHI, NEW DELHI.

Deepak Jain is an Assistant Professor at the Optics & Photonics Center (OPC) of the Indian Institute of Technology Delhi. Before this, he was an Assistant Professor at the Electrical Engineering department of the Indian Institute of Technology Bombay, a University Research Fellow at the University of Sydney, and a Hans Christian Oersted and Marie-Curie Research Fellow at the Technical University of Denmark. He obtained his Ph.D. from the Optoelectronics Research Center, University of Southampton, UK, and his MTech from the Indian Institute of Technology Kanpur. His area of interest revolves around semiconductor, optical fibers, and technology transformation from academia to industry. He is a co-founder of DeepLase Technologies and BrahmaSens Technologies, Delhi-based laser and sensor company respectively, SpecPhotonics, an Adelaide-based specialty optical fiber company, and was an early co-founder of NORBLIS, a Danish broadband laser company. He has more than 70 publications, including 30 journal publications and several invited conference papers. He is also a senior member of Optica and IEEE.



### **PROF. DHEERAJ PRATAP**

Assistant Professor

OPTICS AND PHOTONICS CENTRE, INDIAN INSTITUTE  
OF TECHNOLOGY DELHI, NEW DELHI.

Dheeraj Pratap is an Assistant Professor at the Optics and Photonics Centre (OPC) of the Indian Institute of Technology (IIT) Delhi. He obtained his PhD degree in metamaterials from the IIT Kanpur in 2016. Later, he was a postdoctoral researcher in GRESPI at the University of Reims Champagne-Ardenne, France. For a short time, he worked as a project scientist at the IIT Kanpur and then as an Assistant Professor at the Veermata Jijabai Technological Institute (VJTI) Mumbai. Before joining the OPC, he was a CSIR-Nehru Science Postdoctoral Fellow at the CSIR-Central Scientific Instruments Organization (CSIO) in Chandigarh. His research interests include photonic metamaterials, metasurfaces, plasmonics, and photothermal effects. He has published several research articles in national and international journals of repute and has a few patents.



## → SYSTEM REQUIREMENTS

This programme includes online learning classes conducted on Zoom. To attend a online learning class you will need to have a PC/ Laptop/ Mac with:

- Speakers and microphone: built-in or a USB plug-in or wireless Bluetooth
- Webcam: built-in or USB plug-in
- Processor: with Dual Core 2Ghz or higher (i3/ i5/ i7 or AMD equivalent)
- RAM: 4 GB or higher
- OS: Either MacOS 10.7 or higher OR Windows 8 or higher
- An internet connection: Minimum bandwidth of 3.0 Mbps (up/ down)
- Browser: IE 11+, Edge 12+, Firefox 27+, Chrome 30+
- Zoom software client installed on your PC/ Laptop/ Mac

We use the Zoom software application to conduct online learning classes. Zoom works on a variety of PCs/ Laptops/ Mac systems and also on phones and tablets.

You can join your online learning class from a phone or tablet if it supports the Zoom client.

We recommend that you attend classes from a PCs/ Laptops/ Mac.







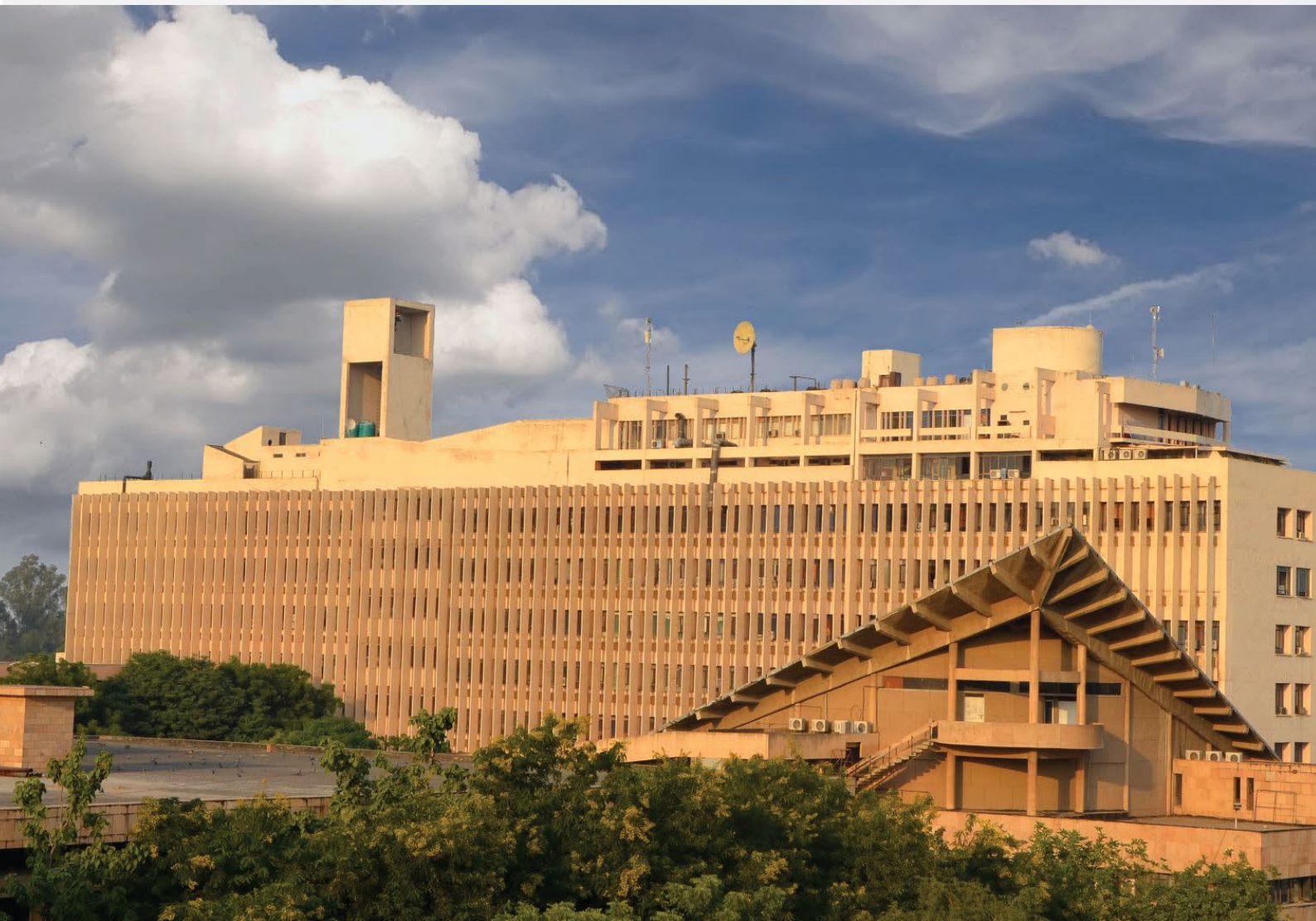
## ➔ ABOUT IIT DELHI

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 College of Engineering in 1961, the Institute was later declared as 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, to conduct its own examinations, and to award its own degrees. NIRF Rank 2 in Engineering Category 2024. Since its inception, over 40,000 students have graduated from IIT Delhi in various disciplines including Engineering, Physical Sciences, Management and Humanities & Social Sciences. Of these, nearly 5070 received PhD degrees. The rest obtained a Master's Degree in Engineering, Sciences and Business Administration. These alumni today work as scientists, technologists, business managers and entrepreneurs. There are several alumni who have moved away from their original disciplines and have taken to administrative services, active politics or are with NGOs. In doing so, they have contributed significantly to the building of this nation, and to industrialisation around the world.



## ➔ ABOUT CONTINUING EDUCATION PROGRAMME (CEP)

Executive Education is a vital need for the organisations to build a culture that promotes newer technologies and solutions and builds a workforce that stays abreast of the rapidly transforming needs to the technological, business and regulatory landscape. Committed to the cause of making quality education accessible to all, IIT Delhi has launched Online Certificate Programmes enabling Virtual & Interactive-learning for Driving Youth Advancement @IITD for Indian as well as international participants. IIT Delhi was ranked second among engineering schools in India by the National Institutional Ranking Framework (NIRF) in 2024. 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 level 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.







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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