भारतीय प्रौद्योगिकी संस्थान दिल्ली
Indian Institute of Technology Delhi

Certificate Programme In
Data Science & Machine Learning

Technical Orientation: Dec 24, 2024
6 Months | Live Online Sessions

BATCH 9

भारतीय प्रौद्योगिकी संस्थान दिल्ली
INDIAN INSTITUTE OF TECHNOLOGY DELHI

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

Programme Overview

As machine learning adoption continues to grow rapidly across industries, DSML is evolving from just focusing on predictive models toward a more democratized, dynamic and data-centric discipline. The Data Science and Machine Learning market size is expected to show an annual growth rate (CAGR 2024-2030) of 17.15%, resulting in a market volume of US$528.10bn by 2030. Source: Statista 2024.

In FY23, the public funding for the digital India mission increased by 67% to reach US$1.29 billion (Rs. 10,676 crore). This mission involves a plan for the effective use of Data Science and AI to promote financial inclusion, supplement the education sector, and transform the urban infrastructure. Source: IBEF 2023.

The Indian Institute of Technology Delhi (IIT Delhi) presents a comprehensive six-month online Certificate Programme in Data Science & Machine Learning. This industry-oriented programme equips you with the expertise to transform data into actionable insights and build powerful predictive models. Master sought-after skills in data manipulation, analysis, and machine learning algorithms, including Python programming, statistics, deep learning, and data visualisation. Whether you're a working professional seeking to upskill, a graduate aiming to stand out, or an individual passionate about data analysis, this programme is designed for you.

The Indian analytics industry is predicted to escalate to USD 98 billion in 2025 and nearly USD 119 billion in 2026. Currently, the demand for data scientists is at an all-time high in India. Analysts have predicted around 11 million job openings in data science by 2026 in India alone.

According to Analytics Insights, India will capture 32% of the big data market worldwide and generate USD 20 billion by 2026.

AIM Research suggests that India has contributed 9.4% of total global analytics job openings, rising from 7.2% in January 2020.

Technical Orientation	Duration	Programme Fee	Format
24 December 2024	**6 months**	**INR 1,50,000 + GST**	**Live Online**

Programme Highlights

Learn from the faculty of IIT Delhi, one of India's Leading Engineering School

Experience high-impact live-learning and assess real-world case studies

Gain structured industry-oriented insights, and work on real-world datasets

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

Receive an industry-recognised Certificate from CEP, IIT Delhi

Who Is This Programme For?

Early and mid-career professionals seeking a dynamic edge in Data Science and ML to propel their careers forward with precision.

High potential professionals hungry for insights, equipped with a passion for harnessing data science and machine learning to steer strategic decisions and ignite business expansion.

Programme Modules

Module 1: Data Science Essentials

- Fundamentals of Python*
- Fundamentals of Mathematics - Linear Algebra/Probability
- Measures and Descriptors of Data, Distributions and Estimation
- Basics of Data Bases
- Exploratory Data Analysis
- Hypothesis Testing and Evaluation
- **Self-learning Project:** Evaluating Channel Effectiveness by Using Hypotheses

Module 2: Communicating Effectively with Data

- Data and Information Systems
- Storytelling with Data
- Designing Business Dashboards
- **Self-learning Project:** Visualising Mutual Funds and Stocks

Module 3: Optimisation for Machine Learning

- Optimisation Formulations
- Gradient and Search-Based Optimisation for Machine Learning
- Linear, Quadratic, and Nonlinear Programming
- Multi-objective and Multi-Criteria Decision-Making - Evolutionary Tools
- **Self-learning Project:** Multi Objective Optimisation in Stock investments

Module 4: Machine Learning

- Regression and Derivatives
- Trees and Random Forests
- Boosting Techniques
- Clustering – Hierarchical K-means Clustering
- Dimensionality Reduction: PCA
- **Self-learning Project:** Predicting Customer Churn

Programme Modules

Module 5: Deep Learning

- ⊘ Deep Feedforward Neural Nets
- ⊘ Convolutional Neural Nets
- ⊘ Long Short-Term Memory (LSTM) Networks
- ⊘ Introduction to Transformers and Attention Mechanisms
- ⊘ Explainable AI
- ⊘ **Self Learning Project:** CNN Model for Land Use

Module 6: Introduction to Generative AI

- ⊘ VAEs, GANs and Diffusion Models
- ⊘ Introduction to LLMs
- ⊘ Applications of Generative AI
- ⊘ **Self Learning Project:** Generative AI

Note:
- Modules/ topics are indicative only, and the suggested time and sequence may be dropped/ modified/ adapted to fit the total programme hours. Case studies, real world examples and numerical illustrations are an integral part of multiple modules included in the course.
- The primary mode of learning for this programme is via live online sessions with faculty members. Post session video recordings will be made available until the course duration.
- Emeritus or the institute does not guarantee availability of any session recordings.
- Fundamentals of Python will be taught via recorded sessions. The faculty will be conducting Q/A on the same.

Hands On Learning

Capstone Project

A capstone project in Data Science and Machine Learning serves as the culmination of theoretical knowledge and practical skills acquired throughout the programme. It typically involves solving a problem using data-driven techniques and advanced algorithms. Students engage in various stages of the project lifecycle, including exploratory data analysis, model selection and training, and evaluation. The project offers an opportunity to demonstrate proficiency in programming languages such as Python, statistical analysis, machine learning algorithms and data visualisation techniques. This activity is carried out in groups, and students pick one of the three four contexts given to them.

Tools Covered

Note: Please note that only foundational understanding shall be provided, of the tools listed above.

Programme Coordinator

Dr Hariprasad Kodamana

Associate Professor
Department of Chemical Engineering
Joint Faculty, School of AI
Indian Institute of Technology Delhi

Dr Hariprasad Kodamana is a PhD from IIT Bombay, where he received the Institute Award for Excellence in PhD thesis. His research interests include machine learning, optimisation, model-based control, fault detection and diagnosis. His research work has been published in various notable international peer-reviewed journals and presented in leading conferences.

Dr Agam Gupta

Associate Professor
Department of Management Studies
Associate Faculty, School of AI
Indian Institute of Technology Delhi

Dr Agam Gupta is a fellow of the Indian Institute of Management Calcutta (IIM Calcutta). His research areas include platform ecosystems, digital marketing, computational social science, and complexity. He has taught various courses on data visualisation and data mining. His research work has featured in reputed international journals and conferences proceedings.

Dr Manojkumar Ramteke

Professor
Department of Chemical Engineering
Associate Faculty, School of AI
Indian Institute of Technology Delhi

Dr Manojkumar Ramteke is a PhD from the Department of Chemical Engineering, IIT Kanpur. He has also worked as a scientist at the Institute of Chemical and Engineering Sciences (ASTAR), Singapore. His research work is focused on multi objective optimisation of process applications, scheduling and planning of chemical processes, control of chemical processes, novel meta-heuristic and Machine Learning algorithms, and DNA computing and bio-sensors.

Note: Programme Coordinators might change due to unavoidable circumstances, and revised details will be provided closer to the programme start date.

Programme Certificate

Participants will be awarded a successful completion certificate from IIT Delhi on scoring at least 50% marks on aggregate in any two out of three quizzes, need to satisfactorily complete a group project, and maintaining a minimum attendance of 70%. Participants who are unable to maintain 50% marks in the evaluation components, but have a minimum attendance of 85% shall be awarded a participation certificate.

Note: All certificate images are for illustrative purposes only and may be subject to change at the discretion of IIT Delhi. The organising department of this programme is IIT Delhi Yardi School of Artificial Intelligence. Sample e-certificate to be issued by CEP IIT Delhi are shown above.

Learning Outcomes

Build predictive models using neural networks and time series data forecasting models

Develop an in-depth understanding of industry best practices for regression, clustering, decision trees and deep learning

Hone optimisation techniques to minimize errors and forge precise models, mastering data science excellence.

Gain hands-on experience in machine learning algorithms, the statistical models behind them and the applications of ML

Profiles of Past Participants

Work Experience

44%	38%
8%	12%
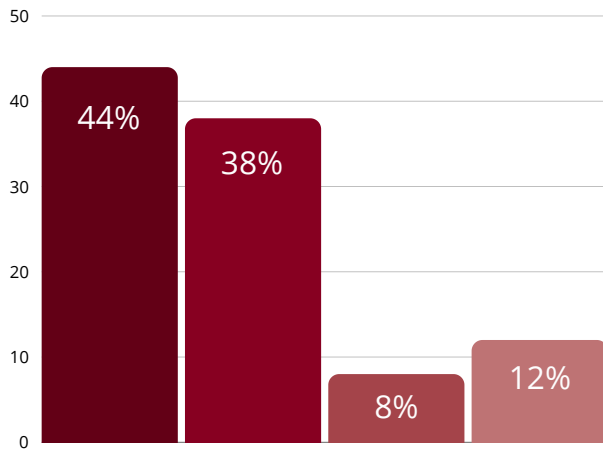
● 0 to 10 Years
● 10 to 20 Years
● 20 to 30 Years
● 30+ Years

Industry

34%	43%
12%	
3%	4%	4%
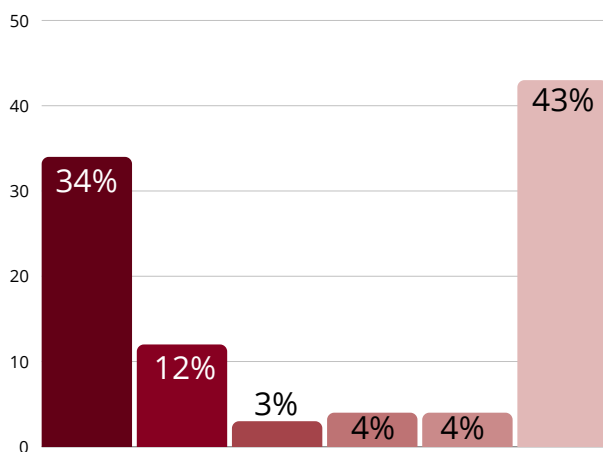
● IT Services
● Engineering
● Consulting
● Education
● Financial Services
● Others*

*Others include Bioinformatics, Education, Infrastructure, Healthcare, Renewable Energy, and Travel, amongst others.

Profiles of Past Participants

" The focus on concepts from the ground up was the best part which enables to build a strong foundation for understanding complex scenarios. "

Siddharth Sahany

Batch 2

" The technicalities of the subject was covered in detail and adequate implementation and theoretical background was covered. This helped me in appreciating the machine learning algorithms better. "

Mudit Sharma

Batch 2

" Good introduction to the world of machine learning, it has given me confidence to explore machine learning and its applications to my field. "

Anisha Chaudhary

Batch 3

" The course curriculum is very good and the content more real time so it is really useful for any students to become expertise in the field of Data Science and Machine Learning. "

Niranjan Nidadavolu

Batch 4

" Concept of data science and machine learning is described thoroughly. It helped me to get an insight into the topic. "
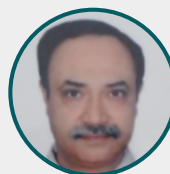
Bharati Sinha

Batch 4

" The lessons delivery by professors were really very good. Sessions were interactive and helped understand complex topics. Also, many real life cases included has helped to connect the course. "

Ajay Ganjoo

Batch 4

Programme Details

Programme Fee	INR 1,50,000 + GST
Duration	6 Months
Technical Orientation	Dec 24, 2024
Academic Orientation	Jan 12, 2025
Live Online Sessions	Jan 19, 2025, Sunday, 10 AM to 1 PM

Programme Details

- Graduates (10+2+3) or Diploma Holders (10+2+3 or higher) from a recognised university (UGC/AICTE/DEC/AIU/State Government/recognised international universities) in any discipline at the time of registration.

- Participants are expected to have a background 12th grade mathematics or completed at least a course of statistics/mathematics/data science in UG/PG level. Exceptions can be allowed if the participants have sufficient work experience in the data science field.

Eligibility

- Graduates (10+2+3)/ Diploma Holders (10+2+3 or higher) from a recognised university in any discipline as on December 24, 2024

Selection Process

- Screening and selection will be done by IIT Delhi.

Evaluation

- At the faculty's discretion, three assessments consisting of an hour-long online quiz will be conducted.
- In addition to passing in quizzes the students need to satisfactorily complete a group project.

Payment Schedule

	Remarks	Amount
Instalment 1	Within 5 days post-selection	INR 15,000 + GST
Instalment 2	December 27, 2024	INR 37,500 + GST
Instalment 3	February 15, 2025	INR 52,500+ GST
Instalment 4	April 06, 2025	INR 45,000 + GST

Note:
- *The actual programme schedule will be announced closer to the programme start.*
- *GST (currently @ 18%) will be charged extra on these components.*
- *Postage charges for books and study materials sent to locations outside of India will be paid for by the student.*
- *Loan and EMI services are provided by Eruditus Learning Solutions Pte Ltd, and IIT Delhi is not responsible for the same.*

Last Date to Apply	Nov 26, 2024
Shortlisted Candidates Will Be Informed by	Dec 03, 2024
Last Date to Submit the Fee	Within 5 Days Post-selection

Note: Applications will be reviewed based on eligibility and subsequent shortlisting process as laid down by the Programme Coordinators.

All fee should be submitted in the IIT Delhi CEP account only, and the receipt will be issued by IIT Delhi CEP account for your records.

* 6 month duration is counted from first academic session i.e. (Jan 19, 2025) and the same date will also be mentioned on the certificate as the starting date of the programme. The mentioned minimum eligibility criteria is not a guaranteed for selection. Selection cut-off for this programme can be altered on the discretion of IIT Delhi.

Application Requirements

Graduation and Post-Graduation Education:

- Consolidated Graduation Marksheet (All Semester)
- Final year students may submit the marksheets up to the previous semester

ID Proof:

- Any Government-issued photo ID (PAN Card/ Driving License/ Passport, etc).
- Submission of passport-size photo during application is mandatory

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.

Since its inception, over 48000 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. For more details, please visit: www.iitd.ac.in

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 under eVIDYA@IITD (ई-विद्या@IITD): enabling Virtual & 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 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. For more details, please visit: http://cepqip.iitd.ac.in

APPLY NOW

For registration and any other information,
please get in touch with us at **iitd.execed@emeritus.org**

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

☺ **WhatsApp the Advisor On +91 86570 38243***

 *This number does not accept any calls. Please message your queries.

service provider
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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