भारतीय प्रौद्योगिकी संस्थान दिल्ली
Indian Institute of Technology Delhi

Artificial Intelligence and Machine Learning for Industry (Batch 02)

06 Months | Online | ₹1,65,000 + GST

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

Artificial Intelligence and Machine Learning

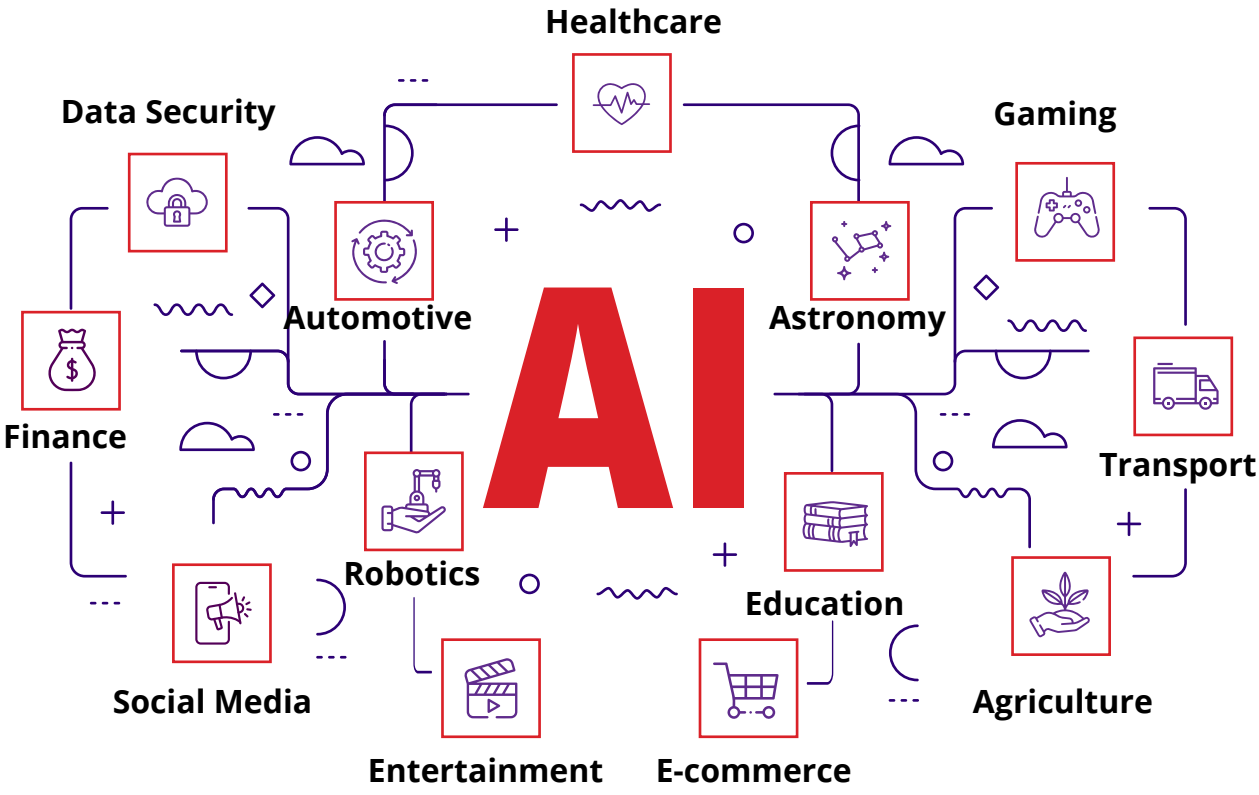
Artificial Intelligence (AI) and Machine Learning (ML) are a significant evolution in computer science and data processing that is not only rapidly revolutionising industries and businesses, but also spawning new business processes and models. As industries and businesses adapt and adopt technology and undergo digital transformation, they generate a humongous amount of data, the value of which can only be unlocked by properly collecting, processing, and analysing it to gain insights and drive decisions. Enter AI and ML.

AI and ML: Driving Business Transformation

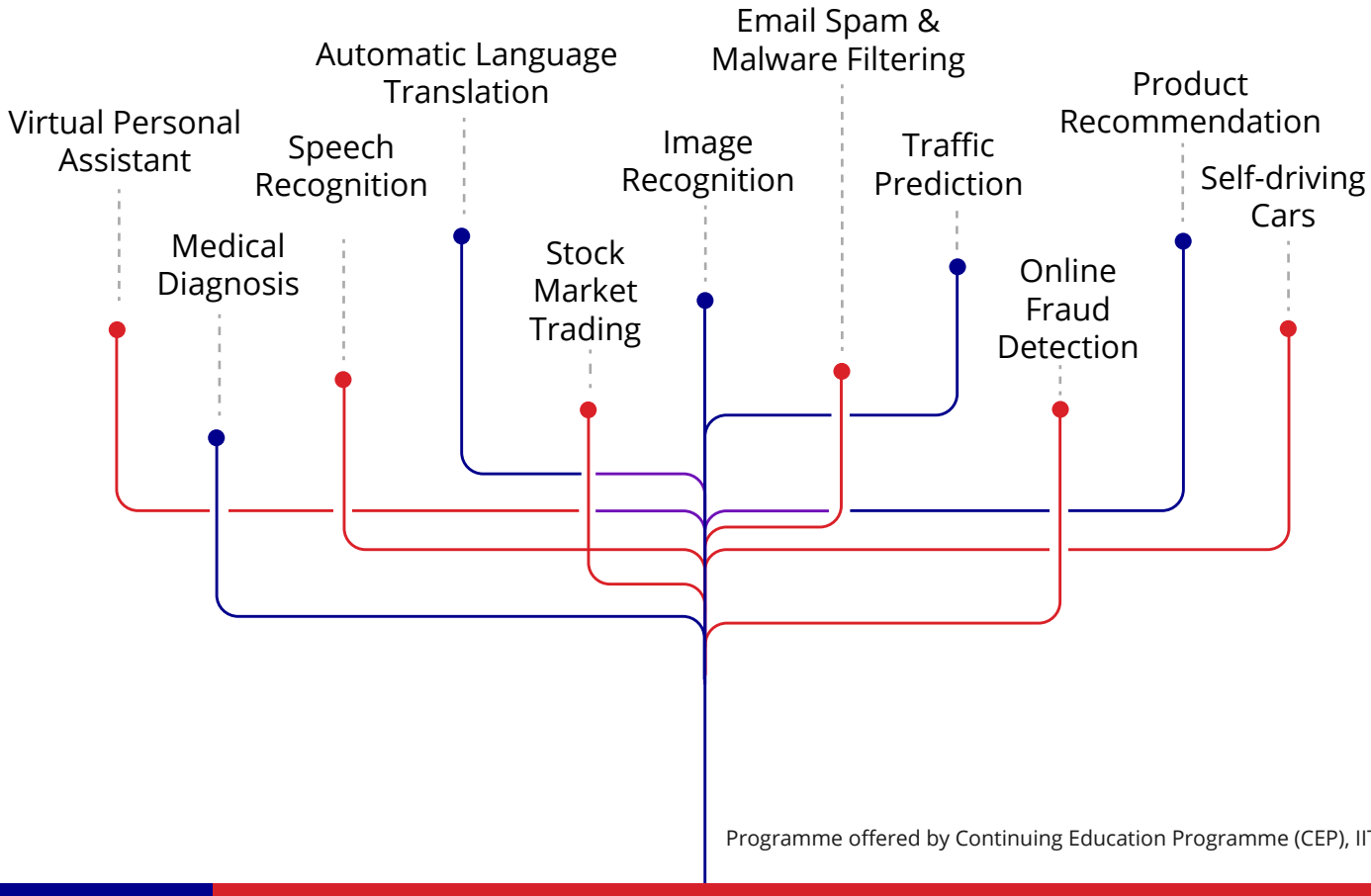
AI and ML applications enable organisations to extract value out of the data they collect, delivering business insights, automating tasks, and advancing system capabilities. AI/ML has the potential to transform all aspects of a business by helping them achieve measurable outcomes including:

- Optimising Existing Business Services
- Automating Business Operations
- Offering Differentiated Services
- Increasing Customer Satisfaction
- Reducing Costs
- Increasing Revenues

Applications of AI



Applications of ML



AI and ML: Market Size & Projection

	Global	Indian
2021	$58.3 bn	$2.8 bn
2026	$309.6 bn	$7.8 bn

In today's data and technology-driven world, data is a highly treasured resource and now it's cheaper than ever to capture and store it due to cutting-edge technologies. For some businesses, AI and ML helps in improving operational efficiency and decision-making, while for others it assists by eliminating losses and increasing revenue. Upskilling yourself in this domain through a well-curated programme from a premier institute will equip you to intelligently apply AI and ML techniques of complex real-world problems.

The course is thoughtfully crafted with a fine balance between theory and practice, with a special focus on learners from non-CS backgrounds.

Roles and Career Paths in Artificial Intelligence and Machine Learning Field

- **AI Architect**
- **Machine Learning Engineer**
- **Data Scientist**
- **AI Engineer**
- **NLP Engineer**

Artificial Intelligence and Machine Learning for Industry

Programme Highlights

- A programme from the Department of Yardi School of AI, IIT Delhi; IIT Delhi is ranked #3 as per QS World University Rankings 2023 in India
- 6-month online training programme
- 64 hours of live online sessions by IIT Delhi faculty
- Contemporary case studies and hands-on practice sessions
- International guest lectures by industry experts
- E-certificate issued by CEP, IIT Delhi

Who should attend?

- Fresh graduates from science or engineering background seeking a career in the AI/ML domain.
- Professionals in the IT industry seeking to gain AI/ML expertise and become AI/ML specialists.
- Professionals seeking to upskill themselves and apply it in their strategic decision-making.

Learning Outcomes

Understanding of machine learning tools, algorithms, and industrial applications.

Gain hands-on experience in applying advanced ML techniques through case studies and practice exercises.

Understand the working of neural networks and gain the ability to design and implement them using various tools and techniques.

Able to design and implement various AI and ML techniques in a range of real-world applications.

Programme Curriculum

Self-Paced Module - Practical Python for Industry Professionals.

- Foundations of Python Programming

Module 1: Mathematical Foundations for AI/ML

- **Motivations and Introduction to different ML paradigms**
- **Linear Algebra for ML**
  - Vectors and Matrices
  - Vector Space and Subspace
  - System of Linear Equations
  - The Concept of Rank and Independent Vectors
  - Inner Product Space
  - Norms
  - Positive Definite Matrix
  - Matrix factorisation (EVD, SVD, QR, LR, etc.)
  - Projection and Orthogonality
- **Probability and Statistics for Data science**
  - Random Variables
  - Distribution and Density Functions
  - Conditional Probability
  - Bayes Theorem
  - Joint Distribution
  - Concept of Independence
  - Covariance and Correlation
  - Introductory Statistical Inference (Likelihood, MAP, etc.)
  - Concept of Entropy, Mutual Information, and KL Divergence
- **Optimisation**
  - Function and Derivatives
  - Gradient Descent
  - Stochastic Gradient Descents
  - Convex Optimisation Formulation and Optimality Conditions, and ADAM Optimiser
- **Hands-on Demo 1: Linear Algebra using NumPy**
  - On the concepts of Linear Algebra
  - Probability Basics, and Optimisation with Practical ML Applications

Programme Curriculum

Module 2: Regression Methods

- Simple and Multiple Linear Regression
- Hands-on Demo 2: SLR/MLR
- Least Squares Approach
- Moving Beyond Linearity: Non-linear regression
- Hands-on Demo 3: NLR

Model Selection

Model Selection, Regularisation, and Bias-Variance Trade-off

M2 Project: Regression application

Module 3: Classification Methods

- Motivation and Introduction to Classification Problems

Logistic Regression

- Logistic Regression
- Hands-on Demo 4: Logistic Regression

Decision Tree

- Introduction to Decision Trees
- Random Forests, Bagging, and Boosting
- Hands-on Demo 5: Random Forests
- Interpretability of Machine Learning Models

Hyperplanes

- Concept of Hyperplane Classifier

SVM

- Support Vector Machines, Kernel SVM
- Hands-on Demo 6: SVM
- Multi-class Classifiers

Clustering

- Clustering Methods
- Hands-on Demo 7: Clustering

M3 Project: Classification Application

Programme Curriculum

Module 4: Deep Learning

Neural Networks
- Fundamentals of Neural Network and Feedforward Network
- Concept of Training and Backpropagation
- Hands-on Demo 8: ANN

Convolutional Neural Networks
- Fundamentals of Convolution
- Convolutional Neural Network Architecture
- Hands-on Demo 9: CNN

Recurrent Neural Networks/LSTM
- Introduction to Time Series and Sequential Data
- Introduction to Language Modelling and NLP
- Recurrent Neural Network and LSTM/GRU
- Hands-on Demo 10

Graph Neural Networks
- Introduction to Graph Data
- Graph Neural Network Architecture
- Hands-on Demo 11

Transformers
- Concept of Transformers and its Application to NLP

Generative AI
- Introduction to Generative AI and LLM Models

M4 Project: Deep learning application

Projects

1. Linear Regression Lab

Is there a connection between sales and different types of ad expenditure? In this lab, we try to forecast the sales of a product assuming ad sales are available.

2. Logistic Regression Lab

Sentiment Analysis of consumers. Can we directly infer the quality of any product based on its reviews?

3. Decision Tree, Random Forest, XGBoost

In-depth analysis of algorithms on benchmark datasets.

4. SVM

Image classification on fashion MNIST dataset, intuition of soft margin, hard margin, solving SVM using CVXPY

5. Neural networks

Basic understanding and implementation of each layer of NN. Writing and understanding gradient descent/backpropagation algorithm in Python.

6. Neural Networks

Comparison of Neural Networks and SVM on Image classification datasets.

7. CNN

Ever wondered how computers identify faces? We will see how CNN has revolutionised the field of Computer Vision.

8. CNN

Understanding layers, visualisation of the learning process, Occlusion, GRADCAM

Projects

9. Sequential Model (RNN/LSTM)

Implementation of RNN/LSTM. Hands-on implementation for Caption/Summary generation from images/videos.

10. Understanding and implementation of Variational AutoEncoder on MNIST dataset. We will see how to encode images in a latent space of lower dimensions.

11. Is it possible to generate new images which never existed? Understanding and implementation of Generative Adversarial Networks on benchmark datasets.

12. GNN

Are you ready to take your machine learning to the next level? Whether you want to build a recommender system for social media platforms or do drug prediction in biomedical, GNN has your back. We will see the Extension of Deep Learning on Graphs (GNN).

13. GNN

Introduction to several GNN variants GCN, GraphSage, etc

14. NLP

Text Summarisation

15. Course Project

Build your own recommender system using any of the discussed techniques (GNN, CNN, LSTM, classical ML, etc.)

Tools to be taught

Python, PyTorch, Tensorflow, Sklearn, Pandas, Numpy, Matplotlib, Seaborn, and several popular libraries. The course focuses on the implementation of ML algorithms.

Programme Details

Eligibility Criteria

- Any science, engineering, or commerce graduate
- Diploma holders (10+3) or (10 + 2+ 3) are also eligible
- Preference will be given to applicants with experience

Programme delivery

Live Online Sessions delivered
Direct to Device (D2D)

Class Schedule

Saturday: 9:00 AM to 12:00 PM

Admission Criteria

Selection based on application review

Duration

- 6 Months
- 64 hours of online live session
- 15 hours self-paced

Campus events/immersion

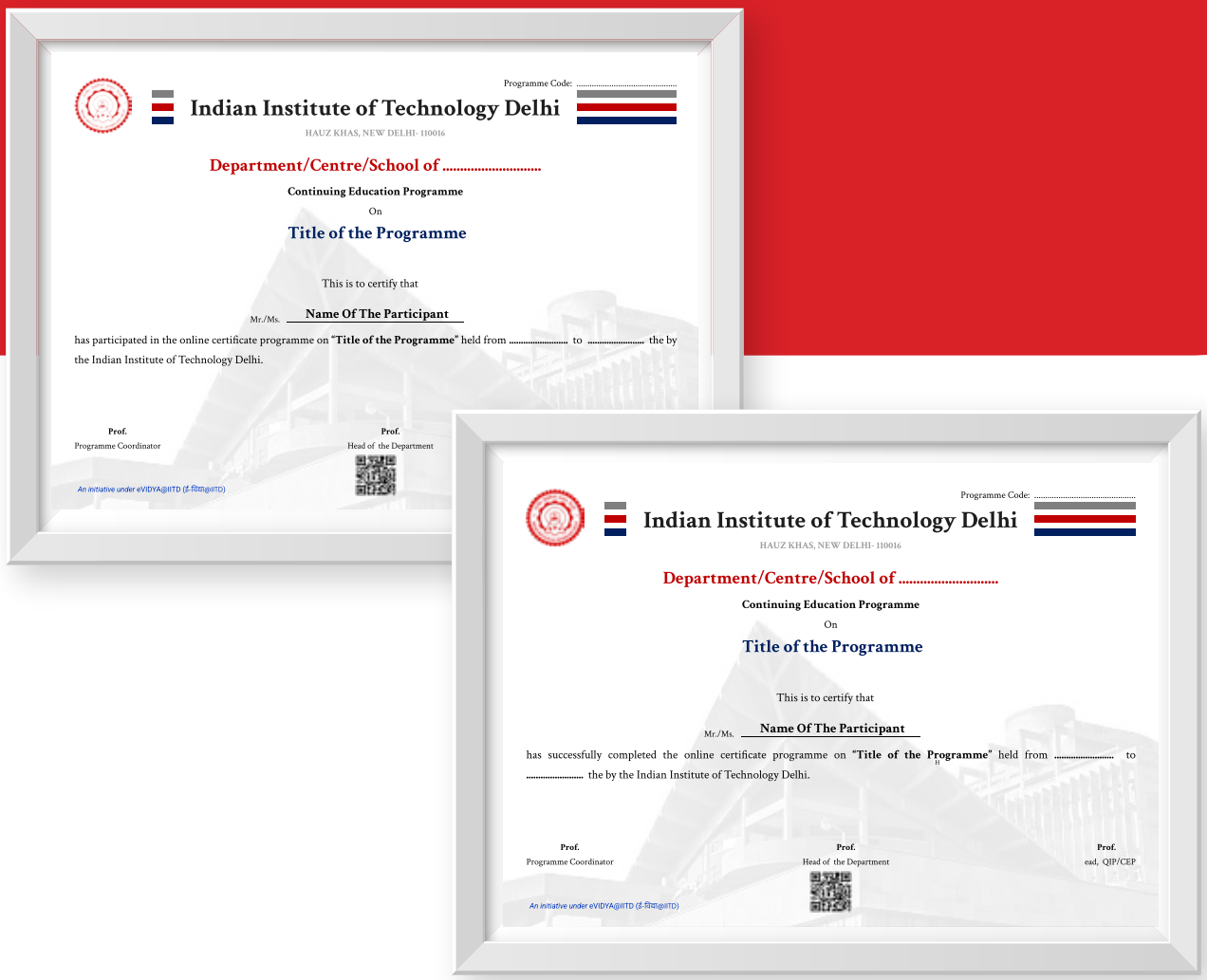
1-day for interaction with candidates in IIT Delhi campus (optional for learners to attend).

Evaluation

- 10% - End of module assignments
- 30% - End of module projects
- 30% - End of programme MCQ-based exam
- 30% - End of programme project
- Attendance (Grace) – 5

Certification*

- Candidates who score at least 50% marks overall and have a minimum attendance of 50%, will receive a 'Certificate of Completion' from CEP, IIT Delhi.
- Candidates who score less than 50% marks overall and have a minimum attendance less than 50%, will receive a 'Certificate of Participation' from CEP, IIT Delhi.
- The organising department of this programme is Yardi School of Artificial Intelligence, IIT Delhi.



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

Programme Coordinator

DR. SANDEEP KUMAR

Assistant Professor

Department of Electrical Engineering & Yardi School of Artificial Intelligence, and Bharti School of Telecommunication Technology and Management,
Indian Institute of Technology Delhi

Dr. Sandeep Kumar is an assistant professor in the Department of Electrical Engineering, Yardi School of Artificial Intelligence, an associate faculty at Bharti School of Telecommunication Technology and Management at the Indian Institute of Technology Delhi (IIT Delhi) and heads the Machine Intelligence Signals and Networks (MISN) lab at IIT Delhi. In his academic journey thus far, he has received the DST Inspire Faculty Fellowship Award, 2019–2024, and TCS doctoral fellowship 2015–2017. His research focuses on the coherent interaction of machine learning, graphical models, statistics, and deep learning for developing tools and methods that help solve complex problems arising from data ubiquity.

The contributions from his research work have been published in reputed machine learning conferences and journals, including NeurIPS, JMLR, and IEEE Transactions. At IIT Delhi, he has taught several courses in the area of Machine Learning, such as Mathematical Foundations for Machine Learning, Advanced Machine Learning, Software Fundamentals, and Optimisation Methods.

Programme Coordinator

DR. MANABENDRA SAHARIA

Assistant Professor

Department of Civil Engineering, and
Yardi School of Artificial Intelligence,
Indian Institute of Technology Delhi

Dr. Manabendra Saharia is an Assistant Professor in the Department of Civil Engineering and an Associate Faculty of the Yardi School of Artificial Intelligence at the Indian Institute of Technology Delhi. Previously, he worked in the hydrology labs of the NASA Goddard Space Flight Center and the National Center for Atmospheric Research (NCAR). Dr. Saharia received his PhD in Water Resources Engineering from the University of Oklahoma. At IIT Delhi, his HydroSense research lab focuses on developing physics and AI/ML-based techniques to monitor and mitigate natural hazards such as floods and landslides.

He has been recognized for his scientific contributions, having received Young Scientist awards from both the National Academy of Sciences, India (NASI) and the International Society for Energy, Environment and Sustainability (ISEES). He is also a Visiting Scientist to NCAR (USA) and a Global Guest Professor to Keio University (Japan).”

Testimonials

NISHIT

"I have around 16 years of experience in the field of Artificial Intelligence Machine Learning and Data Science. Currently, I have a Data Science team which works in the retail and pharma domain. I always wanted to keep myself updated on the current developments in this field and when this programme came to me through IIT Delhi, I thought this is a great opportunity. The people, the faculty, and the teaching assistants are very knowledgeable and very helpful. They are always there to help you with the technical problems, they support you throughout. Though the classes were on weekends, they were available all the time. This is a great opportunity where you can upskill yourself and this investment is not on the programme but on yourself on the personal as well as the professional front where you are abreast with all the tech enhancements."

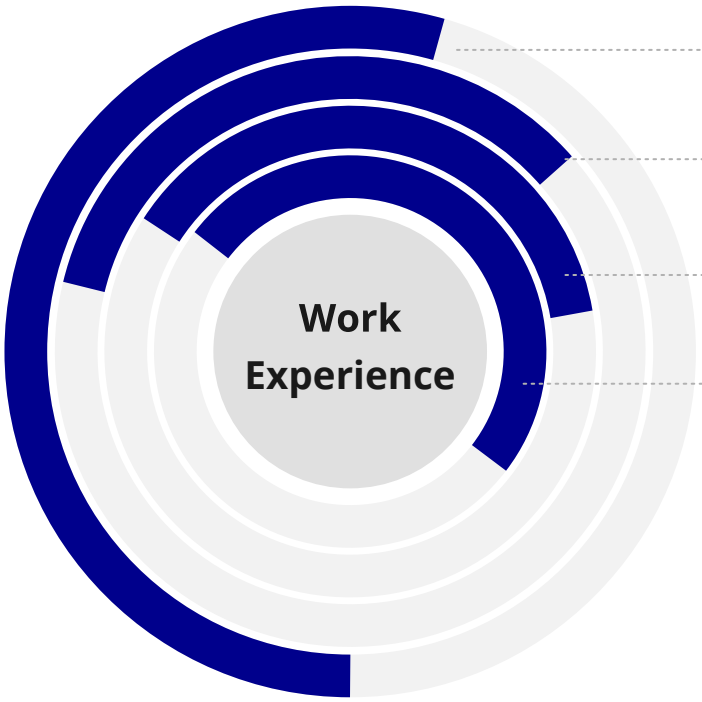
MEGHNA

“I am an engineer. I am working in SAP for the past 14 years and I have realised that Artificial Intelligence and Machine Learning for Industry course from IIT Delhi was the right thing to do. I came across this course through LinkedIn and I have had a very good experience with TimesPro and IIT Delhi. I have trust in IIT Delhi, and I feel that leaders are born here. So, I feel this is a very good platform and AI is a course which is doing very well."

VIKAS

"It's been 7 years since I graduated, and I wanted to upskill myself in new technologies. Machine Learning, Generative AI, and other emerging fields have been making headlines, and I discovered TimesPro through a LinkedIn post. I enrolled in the CEP course offered by IIT Delhi, specifically designed for professionals looking to enhance their knowledge of the working environment. Thanks to this programme, I can now work on various Machine Learning projects, including the detection and classification of breast cancer cells. I would like to express my gratitude to IIT Delhi for providing this opportunity and to TimesPro for facilitating the event."

Past Participants Profile



- **1 to 3 yrs** 27%
- **4 to 7 yrs** 24%
- **8 to 11 yrs** 24%
- **Above 12 yrs** 25%

Industries

49% IT Services

12% BFSI

4% Automotive

4% Energy

4% Manufacturing

25% Others*

*Others includes Consumer Services, E-learning, Healthcare, Telecom etc.

Programme Fee

Particulars	Amount (₹)
Programme Fee	1,65,000
GST @18%	29,700
Total Fees	1,94,700

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

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.
- Easy EMI options available.
- Loan and EMI Options are services offered by TimesPro. 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* and *icare@timespro.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.

Instalment Schedule

Instalment	Instalment Date	Amount (₹)*
I	Within one-week of offer-rollout	66,000
II	10th March, 2024	49,500
III	10th April, 2024	49,500

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

Programme Timelines

Application Closure Date	4th February, 2024
Programme Start Date	17th February, 2024
Programme End Date	17th August, 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. The management department of IIT Delhi is ranked 4th among all B-Schools in management education in terms of national rankings (NIRF rankings by Ministry of Education) and international rankings (QS rankings).

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 2023 in India (Engineering and Technology)

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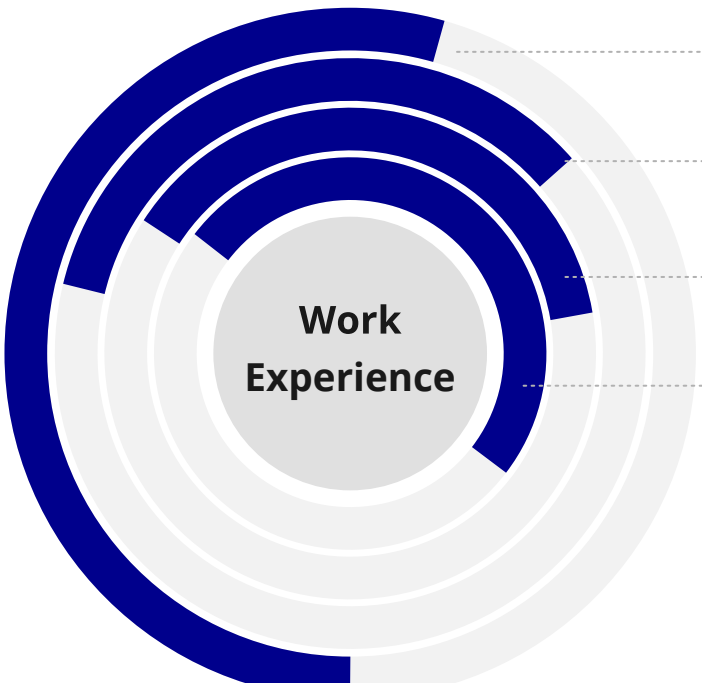
For any feedback, please write to:
CEP, IIT Delhi at
contactcep@admin.iitd.ac.in

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.



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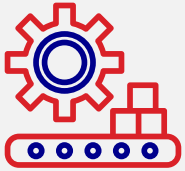

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