



भारतीय प्रौद्योगिकी संस्थान दिल्ली
Indian Institute of Technology Delhi

★ 8 Months

★ Starts 28th
September 2024

★ Live Online Lectures

Advanced Certification in Data Science and Decision Science (Batch 04)

Navigating the Data Deluge: Turning Information into Action

In the 21st century, data reigns supreme. As businesses strive to enhance efficiency and gain a deeper understanding of their customers, the science of data has become indispensable. Companies increasingly rely on data and decision sciences for strategic decision-making, making the roles of Data Scientists and Decision Scientists crucial for business growth.

While both roles are centered on data, they serve distinct functions. Data Science seeks to extract meaning from the chaos of data, uncovering valuable insights. Decision Science, on the other hand, takes these insights and applies analytical tools, mathematical formulas, behavioral sciences, and more to make informed business decisions.

The Critical Roles of Data and Decision Scientists

Data Scientists: These professionals delve into vast amounts of data, finding patterns and trends that can inform business strategies. They employ techniques such as machine learning, statistical analysis, and data mining to turn raw data into meaningful insights.

Decision Scientists: Building on the insights provided by Data Scientists, Decision Scientists apply a range of analytical tools and techniques to make strategic decisions. Their work involves not just data analysis, but also understanding human behavior and leveraging cognitive sciences to solve complex business problems.

Bridging the Gap: **Advanced Certification in Data Science and Decision Science**

Recognizing the importance of these roles, IIT Delhi offers an Advanced Certification in Data Science and Decision Science through its Continuing Education Programme (CEP). This program is designed to equip professionals with expertise in both fields, providing comprehensive training in data handling, analytics, cognitive sciences, and the latest analytical tools and techniques. The advanced curriculum aims to prepare participants for an analytics career that can significantly elevate their career trajectory.

Why This **Certification Matters**

- **Big Data Market Growth:** The Big Data market is projected to be worth \$103 billion by 2027.
- **Job Opportunities:** By 2026, there will be 11 million job openings in Data Science in India alone.
- **Market Growth:** The Data Science platform market is expected to grow at a CAGR of 26.9% from 2020 to 2027.
- **Industry Recognition:** According to the Analytics India Report 2017, Decision Science is emerging as the 'Next Sunrise Sector'.
- **Increased Hiring:** Since 2019, there has been a 46% increase in hiring within the Data Science industry in India.
- **Prestige:** Data Science and Decision Science have been lauded as the 'Sexiest Job of the 21st Century' by the Harvard Business Review.

In conclusion, while finding data is no longer the challenge it once was, the true hurdle lies in determining how to effectively use it. Through a blend of Data Science and Decision Science, businesses can navigate the complexities of modern data landscapes, transforming raw information into actionable strategies that drive growth and innovation.



Advanced Certification in **Data Science and Decision Science**

The IIT Delhi Advanced Certification in Data Science and Decision Science addresses the dynamic needs of the industry, equipping participants with advanced skills in data analytics, artificial intelligence, and machine learning. With a strong focus on practical problem-solving for management decision-making, this program blends rigorous theoretical knowledge with hands-on experience. Graduates are well-prepared to excel in the field of data science and drive substantial career advancements.

Programme **Highlights**

- Live online lectures by IIT Delhi faculty
- Holistic understanding with capstone project implementation
- Campus visit at IIT Delhi
- Curriculum covering contemporary concepts and tools of data & decision sciences
- Sessions on GenAI and Large Language Models
- E-certificate issued by CEP, IIT Delhi

Who Should **Attend?**

- Professionals aspiring to gain a foothold in the Data Sciences and Machine Learning domain.
- Data Science professionals seeking to gain an in-depth knowledge of the key aspects of Machine Learning, Artificial Intelligence and Decision Sciences.
- Experienced leaders willing to deep dive into Decision Sciences to gain assistance in decision-making.

Learning Outcomes



Develop a strong understanding of different types of data analytics, artificial intelligence and machine learning algorithms and mathematical models.

Develop a strong focus and problem-solving logic for handling complex data problems for management decision making involving data science and decision science.



Develop an acumen towards problem solving for complex data analysis with an algorithmic and systematic approach, which is techno-functional in nature.

Develop an acumen to understand and analyse large datasets with descriptive, predictive, prescriptive and cognitive science algorithms.



Enable problem solving ability through hands on exercises and capstone projects.

Gear up for a transition towards a data science and decision science career whereby the shift may happen within the organisation or in a new organisation.



Programme Curriculum

Common Module for Data Science and Decision Science Vertical

Module I: Python programming

- Central Tendencies, Dispersion and Correlation Analysis
- Clustering, Multinomial Regression and Logistic Regression analysis
- Longitudinal Data / Time Dependent Data Analysis
- Supervised Learning and Classification using Decision Trees and ANN
- Text Mining, Natural Language Processing and Sentiment Analysis

Learning outcomes:

- Develop knowledge about data manipulation in python
- Learn how to handle large volumes of data
- Build skills to implement machine learning using python
- Develop managerial inferences from Big Data

Data Science Vertical

Module 1: Descriptive and Inferential Analysis

- Introduction to Data Science and Types of Data Management Enterprise Systems
- Data Visualisation - Methods and Approaches in Computer Human Interaction Principles

Learning outcomes:

- Understand the range of data analysis using different methods
- Understand different visualisation methods to interpret large volumes of data

Module 2: Artificial Intelligence and Machine Learning

- Multidimensional Data handling, Regression, Unsupervised Machine Learning
- Predictive Analytics with AI/ML - Advanced Supervised and Unsupervised Machine Learning
- Machine Learning using Artificial Neural Networks and Fuzzy Set Theory
- Supervised ML - Decision Trees, Random Forest, SVM, Naïve Bayes Classifiers, Ensemble Learning

Learning outcomes:

- Learn the computational background of supervised machine learning algorithms
- Learn the computational background of unsupervised machine learning algorithms

Module 3: AI/ML for Big Data and Cognitive Science

- Machine Learning using Deep Learning and Convolutional Neural Networks
- NLP in Social Media Analytics - Sentiment Analysis, Text Summarisation, Topic Modelling, LDA, Network Analytics
- Network Science with Graph Theory, hands on exercises with small networks data
- Generative Artificial Intelligence and Chatbots, Large Language Models using Deep Learning

Learning outcomes:

- Understand the building blocks for computer vision
- Understand how large-scale graphs operate in internet ecosystems
- Understand how web search and social networks operate on user generated data
- Understand how chatbots are designed

Module 4: AI/ML for Managers

- Data model building for ML and Big Data applications - Boston City Case Study
- Governance of AI/ML - Fairness, Accountability, Transparency, Ethics, UX & Regulations
- UI driven Python (Orange), Supervised and Unsupervised Machine Learning
- Generative Artificial Intelligence, Conversational AI and Prompt Engineering
- Reinforcement Learning and Federated learning

Learning outcomes:

- Understand governance of AI/ML systems in enterprises
- Learn the evolution of code based to no-code environments for data scientists
- Master emerging machine learning paradigms for future

Module 5: Data Science Learning Enrichment & Assessment

- Data Science Capstone Project - Unsupervised and Supervised Machine Learning Implementations
- Individual Evaluation on Data Science and Machine Learning

Learning outcomes:

- Learn how to deploy AI/ML algorithms for data science projects
- Develop understanding on futuristic issues for data science professional

Decision Science Vertical

Module I: Overview to Decision Science

- Understanding Main Pillars of Business Decision Science and Heuristics/Meta-Heuristics/AI
- Central Limit Theorem, Distributions, Dispersion, Population, Sample, T Test, Z Test, Chi Square Test
- Comparing Multiple Groups - ANOVA, MANOVA
- Linear Algebra - Matrix Operations, Determinants, Vectors and Eigen values

Learning outcomes:

- Understand the main pillars of Decision Science viz. Prescriptive, Predictive and Descriptive Decision Science
- To also provide basics on Statistics to understand the main pillars of Decision Science.

Module 2: Prescriptive Decision Science

- Introduction to Linear Programming (Single Objective) and solving using Solver/LINGO
- Sensitivity Analysis using Solver/LINGO
- Goal Programming (Multiple Objectives) Using Solver/LINGO
- Application of LP/NLP in Business Decisions through Case Study

Learning outcomes:

- Understand Prescriptive Decision Science.
- Develop Prescriptive models using examples.
- Solve Prescriptive models.
- Explain the use of Excel solver and LINGO packages in solving the prescriptive models
- Discuss practical cases to show application of Prescriptive Decision Science.

Module 3: Predictive Decision Science

- Time Series Analysis (Moving Average, Exponential)
- Time Series Analysis (Holtz and Winter-Holts Model)
- Auto Regressive Integrated Moving Average Models

Learning outcomes:

- Understand Predictive Decision Science.
- Discuss time series methods in Predictive Decision Science.
- Learn regression methods in Predictive Decision Science.

Module 4: Multi Criteria Decision Science

- Multi Criteria Decision Making: ISM, DEMATEL, AHP
- Multi Criteria Decision Making: IRP, ANP, TOPSIS

Learning outcomes:

- Understand Descriptive Decision Science.
- Discuss popular Descriptive Decision Science using practical examples

Module 5: Decision Science Learning Enrichment & Assessment

- Decision Science Case Study Approaches
- Decision Science Capstone Project
- Individual Evaluation on Decision Science

Learning outcomes:

- Group case study presentations.
- Demonstrate the real-life applications of all pillars of Decision Science.
- Individual evaluation

Capstone Project

Data Science:

Students would be shared datasets with large volume of data. On that dataset, first the students need to demonstrate skills surrounding feature selection. Subsequently students need to run algorithms for unsupervised algorithms. Lastly on the data set, students need to demonstrate applications of multiple supervised machine learning algorithms and evaluate these algorithms for their suitability, given the context of the data / case setting. Project implementation may be undertaken in a combination of SPSS/PSPP, Python and Orange.

Decision Science:

Participants would be exposed to all three pillars of decision science viz. prescriptive, predictive and descriptive decision making through various modules under decision science. To easily implement the concepts, practical examples would be discussed through case study-based capstone project. These tools and techniques would be discussed using Excel, Excel Solver, Python, and LINGO. T

Tools you will Master





Job Roles



Decision Scientists

Decision Scientists apply analytical and quantitative techniques to assist decision-making processes within an organization. They leverage data science, operations research, and behavioural science to develop decision support systems and provide actionable recommendations for optimising business performance.



Business Analyst

Business Analysts identify business needs and determine solutions to business problems. This often involves analysing data to improve processes, products, services, or software. They work closely with stakeholders to gather requirements and ensure solutions align with business goals.



Data Architect

Data Architects design and manage an organization's data infrastructure. They create blueprints for data management systems to integrate, centralize, protect, and maintain data sources. Their work ensures that data is accessible, reliable, and efficiently stored, supporting various analytical and operational needs



Data Scientist

Decision Scientists apply analytical and quantitative techniques to assist decision-making processes within an organization. They leverage data science, operations research, and behavioural science to develop decision support systems and provide actionable recommendations for optimising business performance.



Data Analyst

Data Analysts collect, process, and perform statistical analyses on large datasets. They create reports, dashboards, and visualisations to help organisations make data-driven decisions. They focus on interpreting data to find trends and patterns that inform business strategies.

Eligibility Criteria

Graduates or Postgraduates in Science, Engineering, Business, or any related disciplines.

Duration



8 months

- 120 Hours of Live Teaching/Interaction
- 40 Hours across 2 Capstone Projects (Group activity)
- 200 Hours of Self-paced Learning (50 hours for preparing for quizzes/assignments + 150 hours of Extra Reading Material)



Delivery

**Live Online
Sessions delivered**



**Direct to
Device (D2D)**

Class Schedule

3 to 4 Saturdays in a month
9 AM onwards

Admission Criteria

Selection will be based on
application review.

Campus Immersion

Optional campus immersion at IIT Delhi Campus for interaction between faculty and learners.



DSDS - Batch 02

Assessment and Evaluation

- Each vertical, data science and decision science will have equal weightage of 100% each.
- 40% - Two examinations for each vertical i.e., Data Science and Decision Science
- 40% - Capstone Project Implementation
- 20% - Case studies, in-class assessments, and data/mathematical modelling problems





Certification*

Candidates who score at least 50% marks overall and have a minimum attendance of 40%, will receive a 'Certificate of Successful Completion'.

Candidates who score less than 50% marks overall and have a minimum attendance of 40%, will receive a 'Certificate of Participation'

The organising department for this programme is the Department of Management Studies, IIT Delhi.

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

Programme Coordinator



Dr. Arpan Kumar Kar

Chair Professor & Professor

Department of Management Studies and
School of Artificial Intelligence,

Indian Institute of Technology Delhi

Dr. Arpan Kumar Kar is a Professor in Indian Institute of Technology Delhi, India. He holds the ASG Endowed Chair Professorship in the space of data and decision science. Within IIT Delhi, he holds a joint appointment between Department of Management Studies and Yardi School of Artificial Intelligence. Administratively, he chairs Corporate Affairs, Member of Faculty Search Committee and Advisory Committee for the Overall Curriculum Development Cell. His research and teaching interests are in the domain of data science, artificial intelligence, digital transformation, internet ecosystems, social media and ICT-based public policy. He has supervised over 15 doctoral students and over 75 masters dissertations.

In total, he has authored over 200 scientific publications and edited over 12 books. Among these, he has authored over 75 journal publications in established scientific journals (ABDC A, ABS 3 and WoS Q1 journals) and 16 publications in ABDC A* journals. He has been cited over 17000 times with an H index of 58 and i-10 index of 150. He is the Editor in Chief of International Journal of Information Management Data Insights, published by Elsevier, which is a Q1 journal on data science. He is a senior editor of Decision Support Systems (ABDC A*). He is also Associate Editor in International Journal of Information Management (ABDC A*), Communications of the Association for Information Systems (ABDC A), Journal of Computer Information Systems (ABDC A) and Global Journal of Flexible Systems Management (ABDC A). He has been a Guest Editor for top journals like Journal of the Association for Information Systems (ABDC A*), Decision Support Systems (ABDC A*), Industrial Marketing Management (ABDC A*), International Journal of Information Management (ABDC A*, 2 times), Information Systems Frontiers, (ABDC A, 2 times), etc. He is on the editorial board of 12 other scientific journals.

He has also handled over 20 externally funded research projects from national and international firms and governments like BASF (Germany), Fidelity International (UK), Department of Science and Technology (GoI), Digital India (GoI), PriceWaterhouse Coopers (UK), Facebook (NcMec/CPF, USA), EY / World Bank 9 (Bangladesh), Ministry of Electronics and IT (GoI), CIPPEC (Argentina), Ministry of Tribal Affairs (GoI), Ministry of Textiles (GoI), World Data Science Forum (BitGrit, Japan), etc. He has also handled over 20 Training Programmes (FDPs and MDPs) within and outside India. He has given over 100 talks and keynotes in national and international conferences. He is on the Advisory Board of different academic institutions like Symbiosis International University and XLRI Jamshedpur. He has been on multiple advisory and selection committees for Ministry of Cooperation, Vigyan Prasar (DST), Digital India (MeiTY), and Ministry of Education, Singapore.

He has been an external expert for faculty selection in other IITs and IIMs. He has received over 20 national and international awards from reputed organizations. He recently received the Career 360 Outstanding Faculty Award based on Research Publications and Citations from the Minister of MEITY and AICTE Chairman in October, 2023. In the past, he has received the Research Excellence Citation Award 2021 based on highest individual Web of Science citations in India based on a 5-year duration from Clarivate Analytics. He is a recipient of the Basant Kumar Birla Distinguished Researcher Award 2020 based on highest number of ABDC A* publications over a period of 5 years. His teaching case on Social Media Analytics received the Best Seller Award in IVEY Cases / Harvard Business Publishing based on 5-year sales. He has also won multiple other awards like International Federation of Information Processing Best Paper awards (3 times), Association of Computing Machinery ICEGOV Best Paper award, Tata Consultancy Services Best Researcher award, Project Management Institute Research Scholar award, Association of Indian Management Schools Best Researcher award, IIT Delhi Teaching Excellence award, multiple best paper awards from NIT conferences and Research Productivity Awards from IIM Rohtak.

In terms of education, he completed his Graduation in Engineering from Jadavpur University and Doctorate in Information Systems from XLRI Jamshedpur. Prior to joining IIT Delhi, he has worked in IIM Rohtak as Assistant Professor, and before that in the industry in Cognizant Business Consulting and IBM India Research Laboratory.

Programme faculty



Dr. Surya Prakash Singh

Dhananjaya Chair Professor and Professor

Department of Management Studies,
Indian Institute of Technology Delhi

Dr. Surya Prakash Singh is a Dhananjaya Chair Professor in the Department of Management Studies (DMS), Indian Institute of Technology Delhi (IITD), India. He is also serving as chairperson, Operations & Supply Chain group at DMS, IIT Delhi. He holds a Ph.D. from IIT Kanpur. He is also a postdoctoral fellow from NUS Singapore-MIT USA alliance. He has been also a visiting fellow at Newcastle Business School, Newcastle University, UK; and visiting professor at Alborg University, Denmark and IMT Atlantique, Nantes, France. In addition to this, he was also associated in various capacities at some of the B-Schools in the country such as IIM Amritsar, IIM Bodgaya, IIM Kashipur, IIM Ranchi, IIM Rohtak, IIM Raipur, MDI Gurgaon, SNU Gr. Noida, SCMHRD Pune, XLRI, and XIM Bhubaneswar.

His research interest includes broadly in the area of Operation & Supply Chain Management, Big Data applications in Operations, Industry 4.0, Block Chain Technology, and developing heuristics and metaheuristics approaches. His work has been published in leading international journals of repute. More than 160 research papers have been published at various international journals and conference proceedings. He has also Guest Edited special issues for Annals of Operations Research; Production Planning & Control; Resources, Conservation & Recycling; Global Journal of Flexible Systems Management; Management of Environmental Quality; Sustainability; and International Journal of Logistics Management. In addition, he is also actively involved as an Associate Editor at Journal of Cleaner Production & Global Journal of Flexible Systems Management, and Area Editor at Operations Management Research. He is also acting as Editorial Board member at International Journal of Information Management and International Journal of Information Management Data Insight.

Prof. Singh believes in action research, therefore, he has done various projects and consultancies at domestic and international level to show the real application of the

research which he carried out and published in various journals of repute. Some of the organizations where he showed application of research are UKIERI British Council Division UK; BASF SE Germany; Ministry of Tribal Affairs, Govt. of India; Indian Oil Corporation Limited; Rail Vikas Nagar Limited; UP Sugar Mill Associations; National Buildings Construction Corporation India; Airport Authority of India Ltd., UGC India; Central Council for Research in Ayurvedic Sciences-India; Public Health Engineering Department, Govt. of M.P., National Highway Authority of India Limited, Govt. of India; Ivory Education Pvt. Ltd, New Delhi, and SPARC, GoI.

Some of his research work acknowledged by the media:
<https://www.news18.com/news/education-career/iit-delhi-professor-frames-guidelines-to-sustainably-dispose-off-medical-waste-4714718.html> and
<https://indiaeducationdiary.in/iit-delhi-faculty-comes-up-with-mathematical-model-to-implement-indias-vision-of-self-reliant-economy/>

Prof. Singh also authored a text book on Production & Operations Management published by Vikash Publication, New Delhi, India and more than 5000 copies have been sold.



Testimonials:



Sudam Charam Sahu

"It's a great course having deep curriculum on Data Science & Decision Science. You will get to know the insights on how data is important and how it can be powerful for any industry. Overall great learning experience with Arpan Sir & Surya Sir. 100% recommend."



Shubhadeep Sarkar

"Nice programme what we have been attending for last one year. A very detailed & in-depth approach by the professors in clearing out the theories & concepts of data and decision science. Case Studies & projects given are very helpful in a way of application of the knowledge gained to practical problem solving."



Garima Jain

"Really grateful to get this opportunity of being taught by IIT professors. Course content is also really good. Also, the introduction to tools like Orange, SPSS, LINGI, Excel Solver etc. has been a good exposure. There is no limit or boundary of learning, and all could not be covered in just one course as we all know this field of data analytics is huge. So, we need to continuously deep dive in this ocean of knowledge and keep learning, as learning is a continuous process. Glad to have this opportunity and I have already recommended to people in contact."



Pradeep Sharma

"Course Content is extremely well designed. Prof. presented very well, explanation with realtime case studies is very much beneficial. Will surely recommend others."

Programme Fee

Particulars	Amount (in ₹)
Programme Fee	1,89,000
GST@18%	34,020
Total	2,23,020

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 TimesPro. IIT Delhi is not responsible for the same.
- **Withdrawal and Refund**
 - 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	Particulars	Amount (₹)**
Registration Fee*	To be paid at the time of registration	10,000
Instalment 1 st	Within 7 days of offer-rollout	61,000
Instalment 2 nd	12 th November, 2024	59,000
Instalment 3 rd	11 th January, 2025	59,000

Note:

- *Registration fee of ₹10,000 will be charged for processing the selected applications only, post confirmation email from the institute. The registration fee is also part of the total programme fee.
- An offer letter from CEP, IIT Delhi will be released post the successful receipt of the Registration Fee.
- **GST@ 18% will be charged extra in addition to the fee

Programme Timelines

Application Closure Date	9 th September, 2024
Programme Start Date	28 th September, 2024
Programme End Date	May 2025

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

ABOUT CONTINUING EDUCATION PROGRAMME

Executive education is a vital need for the 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 & 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>

5th

in NIRF Ranking 2023
(Management Studies)

2nd

in QS World University
Rankings 2024 in India

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

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