



भारतीय प्रौद्योगिकी संस्थान दिल्ली  
Indian Institute of Technology Delhi



**DRAW INSIGHTS, MAKE DECISIONS, DRIVE GROWTH.**

# Advanced Certification in Data Science and Decision Science

12 Months | Starts 9<sup>th</sup> July, 2022 | Live Online Lectures

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## OVERVIEW

***“The problem isn’t finding data, it’s figuring out what to do with it.”***

*- Mike Loukides*

The 21<sup>st</sup> century is ruled by data. The science of data has become indispensable for businesses, as it helps enhance efficiency in understanding their customers and decision-making. Businesses are increasingly relying on data/decision sciences for strategic decision-making. Hence, the role of both Data Scientists and Decision Scientists, is important for business growth.

Though both sciences/roles are related to data, there’s a subtle difference. Data Science finds meaning in the chaos of data and helps draw insights, while Decision Science analyses the insights with a view to make a decision to solve a business problem – in the process, it uses analytical tools/techniques involving mathematical formulae, behavioural sciences, and more.

Big Data market's worth in 2027 will be <b>\$103 billion</b>	Data Science platform market growth during 2020-2027 is <b>26.9% CAGR</b>	<b>46%</b> increase in hiring in the Data Science industry in India since 2019
<b>11 million</b> Data Science job openings in India by 2026	Analytics India Report 2017 underlines Decision Science as the <b>'Next Sunrise Sector'</b>	Data Science or Decision Science is rated as the <b>'Sexiest Job of the 21<sup>st</sup> Century'</b> by HBR

Sources: futurelearn.com, indiatoday.in, economictimes.indiatimes.com

**IIT Delhi’s Advanced Certification in Data Science and Decision Science** is specifically designed to equip professionals with an expertise in both the verticals of Data Sciences and Decision Sciences. The objective of the programme is to impart skills in data handling, analytics, cognitive sciences, and relevant analytical tools and techniques. The advanced curriculum will gear you up for an analytics career that will bring a positive shift in your career graph.

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

## PROGRAMME HIGHLIGHTS



A programme from DMS, IIT Delhi.  
DMS is ranked **#5** in NIRF (2021) &  
IITD is ranked **#2** as per QS World  
University Ranking 2022 in India.

Curriculum covers contemporary concepts  
and tools of data & decision sciences



Holistic understanding with capstone  
project implementation

Certification from CEP, IIT Delhi.  
IIT Delhi is ranked globally **#27** (**#1** in India)  
in Times Higher Education Ranking  
for Employability.



## WHO SHOULD ATTEND?

- Professionals aspiring to gain a foothold in the data sciences and analytics domain
- Data Science professionals seeking to gain an in-depth knowledge of the key aspects of analytics and decision sciences
- Experienced leaders willing to deep dive into decision sciences to gain assistance in decision-making

## KEY LEARNING OUTCOMES

After the completion of the programme, the candidate is expected to meet the following objectives:



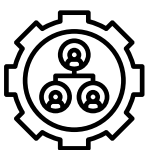
Have a good understanding of business analytics as an overall domain with greater focus on the complex methods of analytics involving data science and decision science.

Develop an acumen towards problem solving and implementation of mathematical concepts for complex data analysis.



Develop an acumen to understand and analyse 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 an analytics career whereby the shift may happen within the organisation or in a new organisation.

# PROGRAMME CONTENT

Modules covered under both Data Science and Decision Science verticals are listed below. However, the sequence of sessions may vary depending on inter-dependency and relatedness of the themes.

## Data Science Vertical

### Module I: Governance of Enterprise Analytics Systems

- Introduction to management of systems in enterprises and industries
- Types and Levels of Analytics Systems
- Understanding the evolution of SMAC era for enterprise systems
- Challenges of managing Artificial Intelligence and Machine Learning Projects
- Technology Alignment and Governance issues in Digital Transformation using Machine Learning.

### Module II: Inferential Analytics

- Statistics 101 and Descriptive Analytics using MS Excel and SPSS/PSPP
- Data Visualisation
- Python programming for data management
- Python for descriptive, diagnostic, and inferential statistics
- Prescriptive Analytics using MCDM/AHP

### Module III: Predictive Analytics and Machine Learning

- Data Mining approaches for predictive analytics
- Supervised and Unsupervised learning
- Regression and Multivariate analysis using SPSS/PSPP
- Data Multidimensionality

- Data model building for Big Data applications
- Machine Learning using Artificial Neural Networks
- Deep Learning
- Fuzzy set theory
- Machine learning using KNN, Kmeans, Random Forest, Support Vector Machine, etc.

## Module IV: Cognitive Science and Big Data Analytics

- Big Data Applications
- Understanding Natural Language Processing Applications (e.g. Search Engines and Social Media)
- Web Analytics (Google)
- Machine Learning Applications and Chatbots
- Social Media Analytics
- Advanced Text Mining like sentiment analysis, topic modelling, and text summarisation
- Advanced Network Science and Applications

## Module V: Tools for Data Science

- Hands-on exercises with Machine Learning for Supervised and Unsupervised learning
- User Interface driven Python applications (Orange)
- Python programming for Big Data and Machine Learning applications
- Text mining using Orange

# Decision Science Vertical

## Module I: Overview on Analytics for Business Decisions

- Understanding of main pillars of business decision analytics
- Introduction to Heuristics/Meta-Heuristics/Hyper-Heuristics/AI
- Application of decision-making models

## Module II: Prescriptive Analytics

- Understanding Quantitative Data Analysis and Prescriptive Analytics
- Linear Programming (Single Objective) using Excel/LINGO
- Non-linear Programming (Single Objective) using Excel/LINGO
- Linear Programming (Multiple Conflicting Objectives)
- Goal Programming using Excel/LINGO
- Applications of Linear Programming/Non Linear Programming in business
- Predictive Analytics using EXCEL/R

## Module III: Business Simulation

- Introduction to basic statistics such as population and sample
- Measure of central tendency, dispersion, and association
- Simulation modelling and analysis using Excel
- Application of simulation in business decisions
- Demand forecasting in business decisions
- R for predictive analytics (demand forecasting)
- Applying AI (Genetic Algorithm) in business decisions using Excel



## Module IV: Descriptive and Qualitative Data Analytics

- Understanding Qualitative Data Analysis and Descriptive Analytics
- Introduction to Multi Criteria Decision Making
- Group Decision-making
- ISM, MICMAC Analysis, IRP, DEMATEL, TOPSIS, ELECTRE
- Hybridisation of MCDM such as IRP-AHP, ISM-AHP, AHP-TOPSIS
- Qualitative data analysis from Most Likely, Pessimistic, and Optimistic Algorithms
- Aggregation of ranking variations using MILP in Excel/LINGO

## Module V: Decision Science Tools and Case Studies

- Case study discussions from several domains of businesses viz., marketing, production, human resource, finance & strategy, using Excel/LINGO



# PROGRAMME DETAILS

## Duration

- 12 months course
- 150 hours of live online teaching

## Delivery

Live online sessions (Direct-to-Device)

## Class Schedule

- 50 sessions of 3 hours each
- 2 sessions to be conducted each day for 25 days (either Saturday or Sunday)
- Timings – 10:00 a.m. to 6:00 p.m.

## Eligibility

- Bachelor's degree with minimum 50% marks
- Proficiency in 10+2 level mathematic
- Selection based on application and personal interview

## Admission Criteria

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

## 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

## Attendance Criteria

Minimum 50% attendance in both, lectures, and labs.



## Certificate of Completion

### CERTIFICATION

Candidates who successfully complete the programme and meet the attendance requirements will receive a “Certificate of Completion” from Continuing Education Programme (CEP), IIT Delhi.

\*Only e-certificates will be issued by CEP, IIT Delhi.

## PROGRAMME COORDINATOR



**Dr. Arpan Kumar Kar**

*Chair Professor & Associate Professor*  
Department of Management Studies  
& School of Artificial Intelligence  
Indian Institute of Technology Delhi

Dr. Arpan Kar is a Chair Professor in IIT Delhi. Within IIT Delhi, he shares a joint appointment in the Department of Management Studies and School of Artificial Intelligence. Administratively he is the Chair of Corporate Relations (DMS) and is a member of Board of Academic Programme and Institute of Eminence Committee, among others. His research interests are in the domain of data science, digital transformation, internet platforms and public policy.

He has authored over a 170 peer reviewed articles and edited 8 books. He is the recipient of Research Excellence Award by Clarivate Analytics for highest citations from 2015-2020. He is the recipient of Basant Kumar Birla Distinguished Researcher Award based on the count of highest quality publications between 2014 - 2019. He is also a Best Seller Author from Ivey / Harvard Business Publishing in 2020.

He is the Editor in Chief of International Journal of Information Management Data Insights, a data science journal published by Elsevier, and associate editor in multiple other scientific journals. He has undertaken over 40 research, consultancy and training projects with organizations like BASF, PWC, Fidelity, EY, Facebook, CIPPEC, BitGrit, Govt. of India (DST, MOTA, MOT, MEITY, MHRD, etc). Prior to joining IIT Delhi, he has worked in IIM Rohtak, Cognizant Business Consulting, and IBM Research.

## PROGRAMME COORDINATOR



**Dr. Surya Prakash Singh**  
*Dhananjaya Chair Professor,*  
Department of Management Studies  
*Chairperson, Operations & Supply Chain Group,*  
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 (IIT Delhi), India. He is also serving as chairperson, Operations & Supply Chain group at DMS, IIT Delhi. He holds a PhD from IIT Kanpur. He is also a postdoctoral fellow from NUS Singapore-MIT USA alliance. He has also been a visiting fellow at Newcastle Business School, Newcastle University, UK, and Alborg University, Denmark. In addition, he was also a visiting faculty at various B-Schools in the country such as IIM Amritsar, IIM Rohtak, IIM Raipur, IIM Kashipur, IIM Ranchi, MDI Gurgaon, SNU Gr. Noida, SCMHRD Pune, XLRI, and XIM Bhubaneswar.

His research interest broadly is in the areas of Operations & Supply Chain Management, Big Data Applications in Operations, Industry 4.0, Block Chain Technology, and Developing Heuristics and Metaheuristics Approaches. He has more than 150 research papers published in various international journals. He has also guest edited special issues for various journals, authored a book, and has done several projects/consulting assignments, and showcased them at domestic and international organisations.

# PROGRAMME FEE, INSTALMENT SCHEDULE AND IMPORTANT DATES

## Programme Fee

Particulars	Amount (₹)*
Programme Fee	1,75,000 + 18% GST

## Instalment Schedule

Date	1 <sup>st</sup> Instalment	2 <sup>nd</sup> Instalment	3 <sup>rd</sup> Instalment	4 <sup>th</sup> Instalment
	To be paid within 7 days of offer roll-out	30 <sup>th</sup> August, 2022	30 <sup>th</sup> October, 2022	30 <sup>th</sup> December, 2022
Amount (₹)*	43,750	43,750	43,750	43,750

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

**Note:**

All fees should be deposited in the IITD CEP Account only; the details will be shared post selection.

## Important Dates

Application Closure Date	30 <sup>th</sup> April, 2022
Programme Start Date	9 <sup>th</sup> July, 2022
Programme End Date	25 <sup>th</sup> June, 2023
Interview Dates	7 <sup>th</sup> and 8 <sup>th</sup> May, 2022
Offer Roll out Date	11 <sup>th</sup> May, 2022

**Apply Now**

# ABOUT 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 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, conduct its own examinations, and award its own degrees.

Since inception, over 48,000 students have graduated from IIT Delhi in various disciplines including Engineering, Physical Sciences, Management, and Humanities & Social Sciences.

The Department of Management Studies is a result of the evolutionary process of constantly responding to a felt need of the Indian Industry and derives satisfaction from its heavy field orientation in all its curriculum activity. Its programmes are designed keeping in mind the changes in the business environment and are comparable to world-class business school programmes aimed at creating holistic managers to face the challenges of an ever-evolving market ecosystem.

For more details, please visit: [www.iitd.ac.in](http://www.iitd.ac.in)



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

## ABOUT CONTINUING EDUCATION PROGRAMME (CEP)

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 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 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>



**For any feedback, please write to:**  
Head CEP, IIT Delhi at [hodqipcep@admin.iitd.ac.in](mailto:hodqipcep@admin.iitd.ac.in)

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Mumbai, Maharashtra 400063.

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.