



Advanced Certification in

Data Science and Decision Science

IIT - Delhi

Program Overview

IIT Delhi's Advanced Certification in Data Science and Decision Science is specifically designed to equip professionals with expertise in both the verticals of Data Sciences and Decision Sciences. The objective of the program 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 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



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 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 mathematics
- 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.