

Certificate Course in Advanced Data Analytics for Defence Officers SQC & OR Unit, Indian Statistical Institute, Pune

ABOUT SQC&OR UNIT, INDIAN STATISTICAL INSTITUTE, PUNE:



Founded by Professor P.C. Mahalanobis in Kolkata on 17th December, 1931, the institute gained the status of an Institution of National Importance by an act of the Indian Parliament in 1959.

The activities of the Institute are organized into divisions, of which seven are for research, development and consultancy activities. Each division comprises of Units. Furthermore, there are Associated Institutions and dedicated R&D Centres of the Institute.

This Institute of National Importance is a unique multi-locational one. The Headquarters are in Kolkata, with Centres in Bangalore, Delhi, Chennai and Tezpur and a branch in Giridih. The academic programmes are offered in these locations. In addition, there are offices in Coimbatore, Hyderabad, Mumbai, Pune, Vadodara primarily for consultancy on statistical quality control and operation research in a wide range of industries

SQC&OR Unit, Pune is a unit of Indian Statistical Institute, active in teaching, training, research and consulting on the application of statistics, operations research & allied science to solve problems of the industry across the spread and depth of the industries and the society, at large. The unit of Pune brings the sanctity of statistics in its other initiatives such as TQM, TPM, Six Sigma, Quality Management, Management Systems, Business Management, Data Analytics, Data Science.

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INDIAN STATISTICAL INSTITUTE

SQC & OR Unit

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1. PROGRAMME OVERVIEW:

Business leaders and executives are now adapting to the analytics revolution to make decisions with minimal errors and maximum predictability. Gone are the days where we had to grovel for data to guide us in effective decision making. As the volume of data available grows exponentially, there is a pressing need to make sense of the structured and unstructured data available. Organisations are struggling to turn data into value and apply it to discover insights for better decision-making. Focus of the programme is first to illustrate a generalized phenomenon of data analytics and then adopting to all functional areas with examples and case studies such as business, HR, supply chain, retail, operations, sales & marketing, social media, finance, banking, insurance, energy, reliability, services and even for defence services and operations. SQC&OR Unit, Indian Statistical Institute, Pune introduces a knowledge rich, case-study centric, innovative Data Science program for armed forces personnel to be get a grip on data analytics in their discipline and also other discipline across the breadth & depth organisations of any nature and all sizes.

2. OBJECTIVE OF THE PROGRAMME:

The arm force officers will receive transferable knowledge & skills of data analytics for fact-based decision-making by an executive from any discipline from any industry, along with complete data analytics after due diligence of data engineering project for each participant. The modules will be centered around case-study specific examples as well as complete case studies from across functionaries like:

- Product Analytics • Customer Churn Analytics • Market Analytics
- Network Analytics • Operations Analytics • Supply Chain Analytics
- HR Analytics, Energy Analytics • Retail Analytics • Social Media Analytics
- Agro analytics • Insurance Analytics - Actuarial Statistics • Healthcare /Clinical Analytics • Balance sheet Analytics - To attract total business • Survival Analytics
- Financial Analytics • Risk Analytics • Legal Analytics • Telecom Analytics and the likes

3. PROGRAMME DESIGN:

Entire programme would be deliberated with fundamental concepts and methodologies of data analytics coupled with examples and internship projects for each participant encompassing live **700 hours** intensive in-class physical training within 6 months from the start of the programme. Participants will opt to take up an internship project which would be followed up along with the classroom sessions. The programme has been so designed to highlight:

- Hands-on case study-centric learning
- Tools Covered- SQC, Hadoop, SalesForce, Mongo dB, R, Python, JMP, Minitab, Tableau, Power BI, focusing on analytics without coding / programming
- Learn from faculty from ISI

4. PROGRAMME METHODOLOGY:

The programme will be conducted from the point methodological point of view as fundamental concepts to motivation to deliberations to examples to exercises to internship projects for each participant using tools, group discussions, presentation by the participants and collaborative research. The participants will be able to learn, apply, train, and induct to larger perspective upon completion of the course.

5. QUALIFICATION CRITERIA:

Officers opting for the course has to be a graduate in preferably science, commerce, engineering, technology and medical background having exposures on MS office and other data analysis and reporting disciplines.

6. COURSE STRUCTURE & SCHEDULE:

Module-1: Business Analytics Motivation of Business (Week starting 28 August-2023: W1)

- Evolution of Business Analytics
- Business Analytics for effective business decision making Business Analytics & its component viz basic data preparation | Basic Analytics | Prescriptive Analytics | Descriptive Analytics | Predictive Analytics | Machine Learning | Deep Learning & Artificial Intelligence

Module-2: Functional Analytics: W2

- Product analytics, Customer Churn Analytics • Market Analytics, Network Analytics • Operations Analytics • Supply Chain Analytics • HR Analytics • Energy Analytics • Retail Analytics • Social Media Analytics • Agro analytics • Insurance Analytics - Actuarial Statistics • Healthcare /Clinical Analytics - Biostatistics • Balance sheet Analytics - To attract total business • Survival Analytics • Financial Analytics • Risk Analytics • Legal Analytics • Telecom Analytics, etc.

Module-3: Prepare Data Set: W3

- Data Preparation, • Dirty & Unstructured data to Adequate & Clean Data • Data & its types • Metadata • Tuple formation of Data • Data Integration - Aggregation, Segregation, Combining, Indexing, Summarizing • Data Quality • Data & its types

Module-4: Visual Analytics: W4-W6

- Tools for visual Analytics • Summaries of statistics connecting to Visual analytics using tools such as Minitab, JMP, Python, Power BI (• Introduction to Power BI • Extracting Data • Power

Query for Data Transformation • Power Pivot for Data Modeling • Data Visualization with Analytics), Tableau (• Introduction • Visualization Design and Data Types • Tableau and Data Connections • Chart Types, Dashboards and Work Sharing) etc.

Module-5: Exploratory Data Analysis: W7-W10

• Events, Probability, random variable, probability distributions • Parameters of probability distribution • Estimation • Sampling distributions, • Test of hypothesis, • Multivariate analysis

Module-6: SQL W11

• SQL Overview • SQL SELECT Statements • SQL Functions and Expressions • SQL Updating • SQL Sub Queries and Unions • SQL Summarization

Module-7: Hadoop W11

• Hadoop Architecture • Basic Features: HDFS Data Characteristics • Map Reduce Architecture • HDFS Architecture Hive Architecture

Module-8: MongoDB W12

• Introduction to MongoDB • Introduction to NoSQL • MongoDB Query Document • Creating, Reading and Updating Data

Module-9: Python Programming W13

• Python Programming • Variables, Data structures & Control flow • Functions, Procedural Approach, Modules, File Handling • Algorithms, Debugging & Bug Fixing

Module-10: R Studio W14

• Introduction to R and R studio • Vectors • Basic analysis using R

Module-11: Advance Excel: W14

• Excel Worksheet Structuring • Formatting Tips • Reference Functions • Pivot Tables, Pivot Charts, Template, Consolidation • What if Analysis • Database Functions • Macro'

Module-12: Modelling: W15-W20

• Steps of Modelling
• Data Partitioning in Modeling
• Regression Modelling (Multiple linear regression, Stepwise regression, Best Subset regression, Ridge Regression, LASSO Regression, Spline Regression, Tree based algorithms including ensembling and the likes)
• Classification Modelling (Discriminant Analytics, Logistic Regression, KNN, Naïve Bayes Classifier and the likes)
• Model Adequacy & accuracy parameter, predictability of model, selection of best models and provisioning modelling in machine learning algorithm
• Deep Neural Network related modelling • Perceptron - ANN • CNN • RNN • Connecting neural network to Deep learning Modeling

Module-13: Descriptive Analytics: W21

• Clustering • Market Basket Analysis • Principal Component Analysis • Factor Analysis
• Conjoint analysis

Module-14: Times Series Analysis and Predictive Analytics: W22

• Use of cluster variables & affinity variables in model • Time Series analysis • prescriptive modeling

Module-15: Machine Learning, Deep Learning and Artificial Intelligence in Data Science W23-W24

- Demystification of AI, ML, Deep Learning in Data Science, Examinations, Internship project guidance, review, presentation and evaluations for each participant

7. ASSESSMENT & CERTIFICATIONS:

- MCQs (80 Marks) & Descriptive questions (20 Marks). • Open book examination. • Minimum score 70% to receive a certificate.
- As a prerequisite for project follow up, at the end of the project report submission, each participant will have to present the case-study internship project to the panel members

8. PROGRAMME DELIVERY

- ✚ Program will take place in the Institute's organization premise with all necessary arrangements.
- ✚ Participants will have to physically attend the programme from 10:00 am to 4:00 pm every day for 3 months period
- ✚ Soft copy of the training material will be given beforehand
- ✚ Lunch, snacks and kits will be given to the participants every day during the programme
- ✚ Stay and parking has to be the responsibility to lie with the participants
- ✚ Class room connected with LCD projector, White board & white board markers will be used
- ✚ Each participant to carry a laptop during the programme
- ✚ No software package will be provided by the Institute. However, help will be extended to download and use the free tools and temporary free downloadable software installation and use.
- ✚ Maximum 30 participants can be accommodated for the programme.

9. PAYMENT

- ✚ Terms of Payment: The fee for the programme is Rs.2.20 lakh per participant which will be paid by DGR (60%) and participants (40%)
- ✚ 40% payment will be collected from participants through NEFT before the registration.

10. ALUMNI STATUS:

Model The participants will be included to our telegram, WhatsApp and LinkedIn and other social media to enable them interact with the alumni of the unit for knowledge exchange, clarity sessions, annual gathering and placement assistance.