A Comprehensive Course on Business Analytics & Machine Learning

- By IDEAS - INSTITUTE OF DATA ENGINEERING, ANALYTICS AND SCIENCE FOUNDATION, INDIAN STATISTICAL INSTITUTE, KOLKATA

Duration - 14 weeks | 2 classes per week | 2-days immersive session

Functional Domains

- Operations
- Human Resources
- Finance
- Marketing

Focus on actual implementation through case examples, capstone projects and integration of latest Generative AI and Agentic AI tools

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"Formerly, when religion was strong and science weak, men mistook magic for medicine; now, when science is strong and religion weak, men mistake medicine for magic." – THOMAS SZASZ.

Motivation:

Effective usage of quantitative tools like statistics, machine learning and AI are no longer optional, they are fundamental requirements for survival and growth. Effective day-to-day as well as strategic management requires answering many questions like – How to measure and improve customer satisfaction? How to improve delivery compliance? How to identify and eliminate wastes in production and service processes? How to check whether current systems and processes are capable of meeting customer needs? Which areas need to be focused on to reduce costs? The list is seemingly endless.

These and many other business questions that executives and managers face regularly, and struggle to come up with timely, accurate and sustainable solutions, can be addressed using quantitative tools. However, merely having knowledge of usage of the tools is not enough. The user community must understand how to look at a business problem from a quantitative perspective. Inability to understand this often leads to wrong diagnosis and consequently, wrong solutions. In fact, not being able to understand how to approach a problem despite being trained in analytic techniques is fairly common. Another important disconnect is the inability to understand the nuances of data collection. Analytic solutions often fail to bring value as the data were not collected appropriately. This is a non-trivial problem as incorrectly collected data often seems to be alright.

Course Objectives:

In the proposed course, we try to bridge these gaps. The course is proposed to be completely hands-on where each participant will solve an actual business problem. The main objective of the course is to ensure that the participants can identify, formulate and provide sustainable solutions to actual business problems in the areas of operations, supply chain, marketing. It will equip participants to leverage business analytics, statistics, and AI/ML for decision making, process improvement, and strategic advantage

Target Audience:

- Mid and senior-level executives and managers in business operations, supply chain, marketing, retail, banking, HR, procurement, and related fields.
- Professionals interested in hands-on experience solving real business challenges with analytics and AI/ML

Delivery Mode:

The entire course is proposed to be divided into 6 modules which would be taught online. Two to three hands-on sessions will be conducted in hybrid mode, where offline participants can attend the hands-on session at ISI Kolkata. Total duration of this certification course will be about 12-14 weeks, with two sessions per week. It will be followed by 2 weeks of project work and a presentation. Quiz and assignments will be associated with each module.

Course Coverage:

Module 1: Introduction to Business Analytics:

Discussion on quantitative problems. Discussion on Business Analytics – its role, advantages and limitations. Understanding usage of analytics in different domains like manufacturing, retail, banking, health care, marketing, logistics, travel and hospitality, government etc. Exercises, quiz and take-home assignments. [2 sessions]

Module 2: Understanding Business Problems from Quantitative Perspectives:

Basic data literacy and statistical concepts. Exploratory Data Analysis (EDA) and its usage to understand business problems. Understanding problem formulation in quantitative terms and its impact on quality of solutions. Advanced exploration to uncover hidden patterns. Exercises, quiz and mini project.

- **Topics:** Data generation, concepts of probability, summary measures and visualization, EDA, estimation and hypotheses testing to solve business problems. Advanced exploration techniques – clustering, multi-dimensional scaling (MDS), co-occurrence patterns [4 sessions]
- **Hands-On** approach to Data Visualization and Dashboard Building [2 sessions]

Module 3: Statistical Models to Solve Business Problems:

Concepts of stochastic models. Meaning of value estimation, prediction and classification in business context. Identification and fitting of value estimation, prediction and classification models. Model validation and testing – measuring model performance. Deploying models – practical issues. Exercises, quiz and mini project. [4 sessions]

- **Topics:** Basics of stochastic models. Concept of regression and classification in terms of conditional expectation and probability. Different types of regression – MLR, Logistic, Cox regression. Time series analysis and ARIMA models for prediction. Model performance – AIC / BIC, MAPE, RMSE, R^2 / adjusted R^2 / pseudo R^2. Cross validation. Usage of residual plots and residual analysis. [4 sessions]

Module 4: Machine Learning Techniques for Business Applications:

Build proficiency in selecting, applying, and evaluating the most relevant machine learning algorithms for business problems through guided hands-on exercises

- **Topics:** Fundamentals of supervised and unsupervised ML methods relevant to business (e.g., classification, regression, clustering, dimensionality reduction), Data preparation best practices: feature selection, handling missing data, partitioning, and scaling for model reliability; Tree-Based Models (Decision Trees, Random Forests), Boosting Techniques; Support Vector Machines; Neural Networks (emphasizing business use cases), Ensemble Learning Strategies and their value for business analytics; Model evaluation: accuracy, precision, recall, F1, ROC-AUC, and business-focused metrics (e.g., cost savings, revenue impact); Model validation: cross-validation, overfitting/underfitting, model interpretation and transparency; Model deployment issues [4 sessions]
- **Hands-On** sessions ML model building with no-code tools [2 sessions]

Module 5: Industry Use Cases By Specialization:

Based on the specialization chosen by the participants (Marketing, Finance, HR, Supply Chain & Operations), separate sessions to be conducted by Industry specialists [2 sessions]

Module 6: Gen AI / LLM / Agentic AI – New tools for the Business:

Empower learners to understand, design, and deploy the latest Generative AI approaches (e.g., LLMs) and Agentic AI frameworks for solving contemporary business problems.

- **Topics:** Foundational concepts (tokenisation, word embedding, language modelling); How LLMs work, How LLMs are trained, Applied Gen AI for business: prompt/context engineering, RAG (Retrieval-Augmented Generation); The role of Co-Pilots; Agentic AI concepts; Role of Agentic AI in workflow automation, Deploying and Evaluating AI based business applications; Ethical and legal issues [2 sessions]
- **Hands-On** sessions on Running LLMs locally, Chatbot development [2 sessions]

Capstone Project: Designing a Gen AI or Agentic AI powered business solution (individually or in teams), with demonstration and business case presentation. Projects should be conducted in the Specialization chosen by the participants (Operations / Marketing / Finance / HR) – 2 weeks

Project Presentation (to be conducted in hybrid mode)

Proposed timings: Weekend classes (to be finalized)

Course fee:

Rs.40000 + 18 % Tax as per Govt. Rules. Total fees: Rs.47,200 /- per participant. Fees to be paid through online bank transfer only.
*Cost of travel & accommodation for Experiential Learning Session at ISI Kolkata Campus in is not included in the above fee
The bank details for on-line payment are given below.
Fees once paid will not be refunded under any circumstances.

Payment Options:

1. Bank transfer details for payment through NEFT/ RTGS

   Name of the account holder: Jamshedpur Management Association

   Current A/C number: 50200036754530 Name of the bank: HDFC Bank Ltd.

   Branch: Mithila Motors, Ram Mandir, Main Road, Bistupur, Jamshedpur- 831001

   IFSC Code: HDFC0000087

2. **UPI ID**

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