



Quantitative Analysis

Course Introduction:

This course is designed to provide participants with a comprehensive understanding of the mathematical and statistical techniques used in data analysis across various industries. The course emphasizes theoretical concepts and their applications to solve complex problems involving data collection, interpretation, modeling, and decision-making. Attendees will gain foundational knowledge of statistical methods, regression analysis, optimization, and other analytical techniques, which are crucial for driving informed business decisions, scientific research, and technological advancements.

The course focuses on enhancing participants' ability to interpret quantitative data, build mathematical models, and apply statistical methods effectively. By exploring both traditional and modern quantitative techniques, this training will equip professionals with the theoretical background necessary to perform robust data analysis, tackle uncertainties in data, and apply quantitative reasoning in decision-making processes. Participants will be introduced to advanced topics in quantitative modeling, with an emphasis on their theoretical foundations and relevance to real-world applications.

Course Objectives:

By the end of the training, participants will be able to:

- Develop a solid understanding of key quantitative analysis methods and techniques.
- Learn to apply statistical tools and mathematical models for data interpretation and prediction.
- Understand the foundations of regression analysis, time series analysis, and optimization methods.
- Gain insight into multivariate analysis and its applications in data-driven decision-making.
- Understand the principles of data sampling, hypothesis testing, and probability theory.
- Apply theoretical knowledge to complex problems in various fields such as business, economics, engineering, and science.

Who Should Attend?

This course is designed for all:

- Data Analysts
- Statisticians
- Researchers and Scientists
- Economists and Financial Analysts
- Engineers involved in process optimization and modeling
- Professionals in industries requiring data-driven decision-making
- Managers and decision-makers working with data insights

Course Outline:

Day 1: Introduction to Quantitative Analysis and Statistical Foundations

- **Overview of Quantitative Analysis:**
 - Definition and significance of quantitative analysis in different fields
 - The role of data in decision-making and problem-solving
 - Types of data: Qualitative vs. Quantitative
- **Basic Statistical Concepts:**
 - Descriptive statistics (mean, median, mode, variance, standard deviation)
 - Probability theory and distributions (normal, binomial, Poisson)
 - Sampling techniques and sample size determination
 - Central Limit Theorem

Day 2: Probability Theory and Hypothesis Testing

- **Probability Concepts and Theorems:**
 - Conditional probability and Bayes' theorem
 - Random variables and probability distributions
 - Expected value and variance of random variables
- **Hypothesis Testing:**
 - Null and alternative hypotheses
 - Type I and Type II errors
 - Z-tests, t-tests, and chi-square tests
 - P-value interpretation and significance testing
 - Confidence intervals and their interpretation

Day 3: Regression Analysis and Model Building

- **Simple Linear Regression:**
 - Concept and application of linear regression
 - Estimation of regression parameters (least squares method)
 - Assumptions and diagnostics of linear regression models
 - Interpretation of regression coefficients
- **Multiple Regression Analysis:**
 - Multiple linear regression and its applications
 - Multicollinearity and its effects on regression models
 - Model selection techniques (stepwise, AIC, BIC)
 - Evaluating model performance and residual analysis

Day 4: Time Series Analysis and Forecasting

- **Introduction to Time Series Data:**
 - Time series components: Trend, seasonality, and noise
 - Stationarity and transformations of time series data
- **Time Series Forecasting Models:**
 - Moving averages and exponential smoothing
 - Autoregressive (AR), Moving Average (MA), and ARIMA models
 - Forecast accuracy measures (MAPE, RMSE)
 - Model selection and evaluation for time series forecasting

Day 5: Optimization and Multivariate Analysis

- **Optimization Methods:**
 - Linear programming and simplex method
 - Integer programming and constraint optimization
 - Objective functions and constraint formulation
- **Multivariate Analysis:**
 - Introduction to multivariate analysis techniques
 - Principal Component Analysis (PCA) and Factor Analysis
 - Cluster analysis and its applications
 - Discriminant analysis and classification methods

Course Methodology:

A variety of methodologies will be used during the course that including:

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play

- (10%) Concepts
- Pre-test and Post-test
- Variety of Learning Methods
- Lectures
- Case Studies and Self Questionnaires
- Group Work
- Discussion
- Presentation

Course Certificate:

International Center for Training & Development (ICTD) will award an internationally recognized certificate(s) for each delegate on completion of training.

Course Fees:

To be advised as per course location. This rate includes participant's manual, Hand-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Timings:

Daily Course Timings:

08:00 - 08:20	Morning Coffee / Tea
08:20 - 10:00	First Session
10:00 - 10:20	Coffee / Tea / Snacks
10:20 - 12:20	Second Session
12:20 - 13:30	Lunch Break & Prayer Break
13:30 - 15:00	Last Session