



Digital Transformation and Innovation

Advanced Data Analytics

Course Introduction

With the advent of the emergence of the IoT, the consequential growth in Big Data, and the ever-increasing requirements to model and predict, many of the analytical opportunities and needs of a business now cannot be resolved only by using conventional statistical methods alone.

Organizations are turning to predictive analytics to help solve difficult problems and uncover new opportunities. Predictive models help businesses attract, retain and grow their most profitable customers. This training course is designed to provide participants with advanced concepts of data analytics and techniques to create a variety of powerful modeling, simulation, and predictive analytical methods. This includes the Bayesian models, Newtonian and genetic optimization methods, Monte Carlo simulation, Markov models, advanced What If analysis, Time Series models, Linear Programming, and more.

Target Audience

- All Data analysis professionals
- Business and technology leaders
- Business Unit Managers
- Business Development Consultants
- General Managers / Regional Managers
- Senior and mid-level leaders
- Individual leaders of all levels in the organization
- Marketing and sales Consultants

Learning Objectives

- Gain a comprehensive understanding of how to unravel a wide range of business problems that require modeling, simulation, and predictive analytical approaches....
- Familiarize with and understand common modeling, simulation, and predictive analytical techniques, including Bayesian models, conventional and genetic optimization methods, Monte Carlo models, Markov models, What If analysis, Time Series models, Linear Programming, and more...
- Select which modeling, simulation, and predictive analysis methods are best suited to which types of problems....
- Apply modeling, simulation and predictive analytical methods using Microsoft Excel 2010 (or higher) and in particular the Solver tool

Course Outline

- **Day 01**

Linear Programming

- Introduction to Optimisation;
- Multi-variate Optimisation Problems;
- Determining the Objective Function;
- Constraints to Problems;
- Sign Restrictions;
- The 'feasibility region';
- Graphical Representation;
- Implementation using Solver in Excel
- Using Linear Programming to Solve Production and Supply Chain / Logistics Problems, such as optimizing the products from a refinery, and minimizing the manufacturing and delivery costs for a complex supply chain (with and without batch manufacturing, and with and without warehousing)

- **Day 02**

Newtonian and Genetic Optimisation Methods

- Linear and Non-linear Optimisation Problems;
- Stochastic Search Strategies;
- Introduction to Genetic Algorithms;
- Biological Origins;
- Shortcomings of Newton-type optimizers;
- How to Apply Genetic Algorithms;
- Encoding; Selection;
- Recombination;
- Mutation;
- How to Parallelise;
- Implementation using Solver in Excel
- How to Solve a range of Optimisation Problems,
- Culminating in the classic 'traveling salesman problem' by optimizing the motion trajectory of a large manufacturing robot, both with and without forced constraints

• Day 03

Scenario Analysis

- Introduction to Scenario Analysis;
- A What-If example in Excel;
- Types of What-If analysis;
- Performing manual what-if analysis in Excel;
- One Variable Data Tables;
- Two-variable data tables
- Using Scenario Manager in Excel;
- Using scenario analysis to predict business expenses and revenues for an uncertain future

• Day 04

Markov Models

- Understanding Risk;
- Introduction to Markov Models;
- 5 Steps for Developing Markov Models;
- Manipulating Arrays and Matrices inside Excel;
- Constructing the Markov Model;
- Analyzing the Model;
- Roll Back and Sensitivity Analysis;
- First-order Monte Carlo;

- Second-order Monte Carlo
- Decision Trees and Markov Models;
- Simplifying Tree Structures;
- Explicitly Accounting for Timing of Events
- Using Markov Chains to simulate an insurance no-claims discount scheme, and Modelling the Outcomes of a Healthcare System

• **Day 05**

Monte Carlo Simulation

- Introduction to Monte Carlo Simulation;
- Monte Carlo building blocks in Excel; Using the RAND() function;
- Learning to model the problem;
- Building worksheet-based simulations;
- Simple problems;
- How many iterations are enough?
- Defining complex problems;
- Modeling the variables;
- Analyzing the data;
- Freezing the model;
- Manual recalculation;
- "Paste Values" function;
- Basic statistical functions;
- PERCENTILE() function
- Monte Carlo Simulation solutions to problems of traffic flow in a city, dealing with uncertainty in the sale of products, predicting market growth, and assessing risk in currency exchange rates.

Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
Dec. 14, 2025	Dec. 18, 2025	5 days	4250.00 \$	Qatar - El Doha

