

## More Complex Data Analysis Methods

Using Microsoft Excel for modelling, simulation, optimisation, and predictive analytics

### Introduction

It has been shown that statistical analysis of numerical data is a potent instrument that gives firms practical insight into issues like corporate finance, production procedures, service delivery, and product quality control.

But with the emergence of the Internet of Things, the ensuing explosion of Big Data, and the growing demands of business to model and predict, a lot of the analytical opportunities and requirements of a contemporary, high-performing organisation cannot be satisfied by traditional data analysis techniques alone.

An increasing number of businesses are struggling with intricate modelling and simulation issues, tackling issues such as optimising production processes, maximising performance efficiency, minimising operational costs, mitigating risk, identifying fraud, and forecasting future behaviour and results.

This fully computer-based Advanced Data Analysis Techniques training course demonstrates, via a number of real-world examples, how to utilise Microsoft Excel to address a variety of challenging and practical business challenges. The difficulties come from the broadest conceivable spectrum of applications: financial risk management, manufacturing optimisation, supply chain logistics, robotics, and effective healthcare delivery. Each challenge is unique and communicates a set of well-thought-out learning goals.

The ability to write and simulate genuine issues will be taught to the delegates. They will then learn how to utilise these simulations to forecast future behaviour, optimise performance, and comprehend system functioning. The training programme is designed for those who want to specialise in the modelling and simulation of intricate business processes and have familiarity with traditional data analysis approaches.

### Objectives

With the use of a variety of extremely potent modelling, simulation, and predictive analytical techniques, this training course seeks to equip individuals involved in monitoring, managing, and controlling complex business processes with the knowledge

and practical skills necessary to transform data into meaningful information.

**The following are the particular goals of this Advanced Data Analysis Techniques training course:**

- Instructing participants on how to handle a variety of intricate business issues that need for modelling, simulation, and predictive analytical techniques
- To demonstrate in detail to attendees how to use Microsoft Excel 2016 (or Office 365) to carry out a variety of modelling, simulation, and predictive analytical techniques.
- To provide attendees a thorough grasp of sophisticated data analysis techniques, such as Time Series models, Bayesian models, conventional and genetic optimisation techniques, Monte Carlo models, Markov models, What If analysis, and more.
- To include participants in the whole three days of learning about and using modelling and simulation techniques in Microsoft Excel in order to fully solve the eight given business challenges that are utterly realistic.
- To help delegates transition from making decisions based on intuition to making decisions based on information in complex situations. This will allow them to improve their forecasting and ability to predict future behaviour, become more adept at-risk assessment and making risk-informed decisions, and fully utilise the wealth of information found in big data.
- To make it evident why the world's top businesses believe that modelling, simulation, and predictive analytics are crucial to producing high-quality goods and services at the lowest feasible cost

## Training Methodology

Using a problem-based learning approach, this Advanced Data Analysis Techniques training course presents participants with a series of real-world problems derived from a broad range of applications, including supply chain logistics, engineering, chemistry, insurance, and financial risk assessment.

This is a fully applications-oriented training course that spends as little time as possible on analytical theory and mathematics and as much time as possible on using real-world Excel techniques and explaining how and why they work.

The majority of the delegates' time will be devoted to investigating how to utilise Microsoft Excel for modelling and simulation techniques in order to create answers for the utterly genuine situations that are put forward.

## Organizational impacts

**Businesses that can make the best decisions possible and accurately forecast future trends and behaviours will be able to significantly improve their competitiveness in the global marketplace. By enrolling their staff in this training**

## **programme, businesses can anticipate the following benefits:**

- A change in decision-making from information-based to intuition-based
- The giving of precise answers to challenging issues
- Improved forecasting and behaviour prediction for the future
- Advanced business process modelling and simulation
- Improved risk assessment and decision-making based on risk awareness
- Increased profitability from the abundance of information found in big data

## **Personal Impact**

**All of the more popular modelling, simulation, and predictive analytical techniques will be thoroughly understood and extensively practiced by participants in this Advanced Data Analysis Techniques training course. These techniques will all directly relate to a wide range of business issues. Delegates will specifically acquire:**

- Fresh perspectives on using Microsoft Excel for modelling, prediction, and optimisation
- Knowledge of Linear Programming
- Knowledge of When and How to Apply Genetic and Newtonian Optimisation Techniques
- Proficiency in Monte Carlo Simulation, Markov Modelling, and Scenario Analysis
- The capacity to identify which analysis types are appropriate for a given set of problems
- Enough situational awareness to determine whether a method may provide false results.

## **Who should attend?**

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## Course Outline

### Day 1

#### Programming in Lines

- Overview of Optimisation; Multiple Variable Optimisation Issues; Identifying the Goal Function, Limitations on Issues, and Sign Restrictions the "region of feasibility"; Visual Representation; Application using Excel Solver
- Solving production, supply chain, and logistics problems using linear programming includes maximising refinery output and cutting production and delivery costs for intricate supply chains that include batch manufacturing and storage.

### Day 2

#### Newtonian and Genetic Methods of Optimisation

- Biological Origins, Stochastic Search Strategies, Introduction to Genetic Algorithms, Linear and Non-linear Optimisation Problems, and Limitations of Newton-type Optimizers How Genetic Algorithms Are Applied; Encoding, Mutation, Recombination, Selection, and Parallelization Techniques Application using Excel Solver
- How to Solve a Variety of Optimisation Issues, Including the Well-Known "Travelling Salesman Problem" by Improving a Big Manufacturing Robot's Motion Trajectory with and Without Forced Constraints

### Day 3

#### Analysis of Scenarios

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- An Overview of Scenario Analysis; An Excel What-If Example kinds of hypothetical analyses doing a manual Excel what-if analysis; tables with one variable data; Tables with two variables
- Utilising Excel's Scenario Manager; applying scenario analysis to forecast company costs and income in the face of uncertainty

## Day 4

### Markov Models

- Recognising Risk; An Overview of Markov Models Five Steps to the Creation of Markov Models; Changing matrices and arrays in Excel; Building the Markov Chain;
- Evaluation of the Model; Rewind and Sensitivity Evaluation; First-order and second-order Monte Carlo simulations
- Markov Models and Decision Trees; Simplifying Tree Structures; Clearly Accounting for Event Timing
- Modelling the Outcomes of a Healthcare System and Simulating an Insurance No Claims Discount Scheme using Markov Chains

## Day 5

### Monte Carlo Simulation

- Overview of Monte Carlo Simulation; Excel building pieces for Monte Carlo simulation; Employing the RAND() method; Acquiring the ability to model the issue; constructing simulations based on worksheets; basic issues; How many times through is sufficient? defining difficult issues; constructing a variable model; examining the information; putting the model in freeze "Paste Values" function; manual recalculation; fundamental statistical operations The PERCENTILE() function
- Monte Carlo simulation is used to solve issues with city traffic flow, product sales uncertainty, market growth forecasting, and currency exchange rate risk assessment.