MAESTRO CONSULTANTS

# ADVANCED DATA ANALYSIS

## COURSE OUTLINE 2020

Contact Us On :
Tel : +971 7 2042072 |
Email: training@maestrouae.net
Website: www.maestrouae.net

**TRAINING TITLE**

ADVANCED DATA ANALYSIS

**VENUE**

Dubai, UAE

**DURATION**

5 Days

**DATES**

22 - 26 March 2020

**PRICE**

US$4,000 per attendee including training material/handouts, morning/afternoon coffee breaks and Lunch buffet daily.

## TRAINING INTRODUCTION

This course focuses on the techniques and applications statistical data analysis. Typically, focuses on understanding the data, empirical model building using observational data for characterization, estimation, inference and prediction. Participants will study the theory, principles and methods for statistical analysis of observational data. Regression analysis, Parameter Estimation, and Testing of Hypotheses will be the primary tools to be discussed. Participants will develop empirical model building skills and be able to employ the models for characterization, estimation and prediction purposes.

While statistical techniques are emphasized throughout, the course has a strong engineering and management orientation. Guidelines are given throughout the course for selecting the proper type of statistical technique to use in a wide variety of product and non-product situations.

## TRAINING OBJECTIVES

**On successful completion of the course you will be able to:**

- To give the participants a sound understanding of the principles and the basis for applying the basic principles of modern statistical methods for analyzing the data and make the correct inferences.
- To perform data analysis and/or data investigation for what perspective.

- To use data analysis results and turns it in attractive presentations for decision making processes.
- To define the key concepts in Statistics and Sampling
- To enable the attendees to grasp the advanced information in various aspects of basic data analysis.
- To present different techniques of statistical data analysis
- To introduce the concept of regression analysis and statistical modeling to participants.
- To illustrate study cases for different applications of statistical data analysis

## TRAINING AUDIENCE

Engineers and Senior Engineers/Specialists working in technical areas (Field and Headquarters) dealing with production or maintenance activities. Planning Engineers with technical background, Reliability Engineers, etc… This course is also intended for engineers in various industrial and service sectors, private and public fields that need a tool to plan for the future of their company. Strategic planning managers, research and development managers, general managers, and can be tailored according to company's specific needs.

## COURSE OUTLINE

**The following topics will be covered in 5 days**

### DAY ONE

### INTRODUCTION & BASICS

- Introduction
- Types of Data: Measurement & Categorical Variables
- Measurement scales
- Variables
- Parameters
- Statistics:
    - Descriptive Statistics
    - Inferential Statistics

- Accuracy And Precision
- Summation Notation
- Confidence Intervals
- Exercises

**UNIVARIATE DATA**

- Central Tendency
  - ☐ Mean
  - ☐ Median
  - ☐ Mode
- Spread
  - ☐ Range
  - ☐ Semi-Interquartile Range
  - ☐ Variance
  - ☐ Standard Deviation
- Shape
  - ☐ Skew
  - ☐ Kurtosis
- Graphs
- Exercises

**BIVARITE DATA**

- Scatter plots
- Pearson's Correlation
- Example Values of r
- Exercises

**PROBABILITY**

- Simple & Conditional Probability

- Probability of (A and B) and (A or B)
- Binomial Distribution
- Exercises

**DAY TWO**

**NORMAL DISTRIBUTION**

- Definition
- Standard Normal Distribution
- Conversion to Percentiles and Back
- Exercises

**SAMPLING DISTRIBUTION**

- Definition
- Sampling Distribution of the Mean
- Standard Error
- Central Limit Theorem
- Difference Between Means
- Proportion
- Difference Between Proportions
- Exercises

**POINT ESTIMATION**

- Overview
- Characteristics of Estimators
- Estimation Variance
- Exercises

**CONFIDENCE INTERVALS**

- Overview

- Mean, σ Known
- Mean, σ Estimated
- General Formula
- Difference Between Means of Independence Groups: σ Known; σ Estimated
- Linear Combination of means from Independent Groups
- Exercises

**DAY THREE**

LOGIC OF HYPOTHESIS TESTING

- Ruling Out Changes as an Explanation
- The Null Hypothesis
- Steps in Hypothesis Testing
- The Precise Meaning of the p Value
- At What Level is H0 Really Rejected
- Statistical and Practical Significance
- Type I and II Errors
- One- and Two-Tailed Tests (t-tests)
- Confidence Intervals and Hypothesis Testing
- Exercises

**HYPOTHESIS TESTING WITH STANDARD ERRORS**

- General Formula
- Tests of μ, σ Known
- Tests of μ, σ Estimated
- μ1 - μ2, Independent Groups, σ Estimated
- μ1 - μ2, Dependent Groups, σ Estimated
- Linear Combination of Means, Linear Combination of Means, Independent

Groups

- Proportions
- Differences Between Proportions
- Exercises

**POWER & *P VALUE**

- Introduction
- Factors Affecting Power
    - o Introduction
    - o Size of Differences Between Means
    - o Significance Level
    - o Sample Size
    - o Variance
    - o Other Factors
- Estimating Power
- *P Value
- Exercises

**ANALYSIS OF VARIANCE (ANOVA)**

- Preliminaries
- ANOVA with 1 Between-Subjects Factor
- Tests supplementing ANOVA
- Formal Model
- Expected Mean Squares
- Exercises

**PREDICTION**

- Introduction
- Standard Error of the Estimate

- Partitioning the Sums of Squares
- Confidence Intervals and Significance Tests for Correlation and Regression
- Simple Linear Regression
- Multiple Linear Regression
- Exercises

**DAY FOUR**

**HYPOTHESIS TESTING WITH STANDARD ERRORS**

- General Formula
- Tests of μ, σ Known
- Tests of μ, σ Estimated
- μ1 - μ2, Independent Groups, σ Estimated
- μ1 - μ2, Dependent Groups, σ Estimated
- Linear Combination of Means, Linear Combination of Means, Independent

**Groups**

- Proportions
- Differences Between Proportions
- Exercises

**POWER & *P VALUE**

- Introduction
- Factors Affecting Power

o Introduction

o Size of Differences Between Means

o Significance Level

o Sample Size

o Variance

o Other Factors

• Estimating Power

• *P Value

• Exercises

**ANALYSIS OF VARIANCE (ANOVA)**

• Preliminaries

• ANOVA with 1 Between-Subjects Factor

• Tests supplementing ANOVA

• Formal Model

• Expected Mean Squares

• Exercises

**DAY FIVE**

**PREDICTION**

• Introduction

• Standard Error of the Estimate

• Partitioning the Sums of Squares

• Confidence Intervals and Significance Tests for Correlation and Regression

• Simple Linear Regression

• Multiple Linear Regression

• Exercises

**TRAINING CERTIFICATE**

**MAESTRO CONSULTANTS** Certificate of Completion for delegates who attend and complete the training course

## METHODOLOGY

Our courses are highly interactive, typically taking a case study approach that we have found to be an effective method of fostering discussions and transferring knowledge. Participants will learn by active participation during the program through the use of individual exercises, questionnaires, team exercises, training videos and discussions of "real life" issues in their organizations. The material has been designed to enable delegates to apply all of the material with immediate effect back in the workplace.