



Data Analysis Techniques

Course Outcomes:

- To provide delegates with both an understanding and practical experience of a range of the more common analytical techniques and representation methods for numerical data
- To give delegates the ability to recognize which types of analysis are best suited to particular types of problems
- To give delegates sufficient background and theoretical knowledge to be able to judge when an applied technique will likely lead to incorrect conclusions
- To provide delegates with a working vocabulary of analytical terms to enable them to converse with people who are experts in the areas of data analysis, statistics and probability, and to be able to read and comprehend common textbooks and journal articles in this field
- To introduce some basic statistical methods and concepts
- To explore the use of Excel 2010 or 2013 for data analysis and the capabilities of the Data Analysis Tool Pack

Course Outline :

- The Basics Sources of data, data sampling, data accuracy, data completeness, simple representations, dealing with practical issues
- Fundamental Statistics
- Mean, average, median, mode, rank, variance, covariance, standard deviation, “lies, more lies and statistics”, compensations for small sample sizes, descriptive statistics, insensitive measures
- Basics of Data Mining and Representation
- Single, two and multi-dimensional data visualisation, trend analysis, how to decide what it is that you want to see, box and whisker charts, common pitfalls and problems
- Data Comparison
- Correlation analysis, the auto-correlation function, practical considerations of data set dimensionality, multivariate and non-linear correlation
- Histograms and Frequency of Occurrence
- Histograms, Pareto analysis (sorted histogram), cumulative percentage analysis, the law of diminishing return, percentile analysis
- Frequency Analysis
- The Fourier transform, periodic and a-periodic data, inverse transformation, practical implications of sample rate, dynamic range and amplitude resolution
- 12 Regression Analysis and Curve Fitting
- 13 Linear and non-linear regression, order; best fit; minimum variance, maximum likelihood, least squares fits, curve fitting theory, linear, exponential and polynomial curve fits, predictive methods
- Probability and Confidence
- Probability theory, properties of distributions, expected values, setting confidence limits, risk and uncertainty, ANOVA (Analysis of Variance)
- Some More Advanced Ideas
- Pivot tables, the Data Analysis Tool Pack, internet-based analysis tools, macros, dynamic spreadsheets, sensitivity analysis

