Further Statistical Tools for Analytical Scientists

On-line programme

The course is delivered as 4 modules over 2 days. Each session is scheduled for 2.5 hours but it is expected that most sessions will last for approx. 2 hours.

Session timings

Unless stated otherwise, session times are:

Session 1: 09:30-12:00
Session 2: 13:30-16:00

Sessions will include a mixture of presentations, interactive exercises and practice calculations.

You will also be scheduled for a 30 min pre-course connectivity test to allow you to check your audio and access to the Webex platform.

Day	Session 1	Session 2
0	**Module 0.1** – Pre-course work – familiarisation with Excel and basic statistical tools	
1	**Module 1:** Non-normal distributions	**Module 2:** Outlier identification and handling
2	**Module 3:** Two-way ANOVA	**Module 4:** Weighted and non-linear regression

Module	Topics
Module 1	Introduction to course Introduction to non-normal distributions • Characteristics of a normal distribution • Causes of deviations from normality • Effects of non-normality • Identifying non-normal data Dealing with intrinsically non-normal distributions • Some common non-normal distributions • Transformations (why and how) • Application of transformed data
Module 2	Outlier handling 1: Identification of outliers • Graphical methods for identifying outliers • Statistical tests for identifying outliers • Outliers vs stragglers Outlier handling 2: Retention, rejection and accommodation • Effect of outliers • Causes of outliers • Rejection of outliers • Outlier accommodation (“robust” statistics)
Module 3	Introduction to two-way ANOVA – fundamentals of ANOVA • Why do we need ANOVA? • Example of one-way ANOVA • Principles behind ANOVA • Examples of two-way ANOVA Two-way ANOVA without replication • Worked example shown using EXCEL • Partitioning the variance further: Error MS Two-way ANOVA with replication • Replication • Partition variance further – concept of interaction • Worked example • Interpretation

Module	Topics
Module 4	Introduction to further regression • Uses of regression • Basic principles of linear regression • Assumptions for least squares linear regression • Typical residual plots • When to use weighted and polynomial regression Weighted regression • Procedure for weighted regression Non-linear regression: Polynomials • Procedure for polynomial regressions • Polynomial regression using Excel regression function