



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 training 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
<u>Module 1</u>	<p>Introduction to course</p> <p>Introduction to non-normal distributions</p> <ul style="list-style-type: none"> • Characteristics of a normal distribution • Causes of deviations from normality • Effects of non-normality • Identifying non-normal data <p>Dealing with intrinsically non-normal distributions</p> <ul style="list-style-type: none"> • Some common non-normal distributions • Transformations (why and how) • Application of transformed data
<u>Module 2</u>	<p>Outlier handling 1: Identification of outliers</p> <ul style="list-style-type: none"> • Graphical methods for identifying outliers • Statistical tests for identifying outliers • Outliers vs stragglers <p>Outlier handling 2: Retention, rejection and accommodation</p> <ul style="list-style-type: none"> • Effect of outliers • Causes of outliers • Rejection of outliers • Outlier accommodation (“robust” statistics)
<u>Module 3</u>	<p>Introduction to two-way ANOVA – fundamentals of ANOVA</p> <ul style="list-style-type: none"> • Why do we need ANOVA? • Example of one-way ANOVA • Principles behind ANOVA • Examples of two-way ANOVA <p>Two-way ANOVA without replication</p> <ul style="list-style-type: none"> • Worked example shown using EXCEL • Partitioning the variance further: Error MS <p>Two-way ANOVA with replication</p> <ul style="list-style-type: none"> • Replication • Partition variance further – concept of interaction • Worked example • Interpretation

Module	Topics
<u>Module 4</u>	<p>Introduction to further regression</p> <ul style="list-style-type: none">• Uses of regression• Basic principles of linear regression• Assumptions for least squares linear regression• Typical residual plots• When to use weighted and polynomial regression <p>Weighted regression</p> <ul style="list-style-type: none">• Procedure for weighted regression <p>Non-linear regression: Polynomials</p> <ul style="list-style-type: none">• Procedure for polynomial regressions• Polynomial regression using Excel regression function
