



## Further Statistical Tools for Analytical Chemists

**09:00**    *Registration and coffee*

**09:30**    Introduction to course

**09:40**    Introduction to non-normal distributions

- Characteristics of a normal distribution
- Causes of deviations from normality
- Effects of non-normality
- Identifying non-normal data

Workshop 1: Identifying non-normal distributions

**10:10**    Dealing with intrinsically non-normal distributions

- Some common non-normal distributions
- Transformations (why and how)
- Application of transformed data

**10:35**    *Coffee*

**10:55**    Workshop 2: Handling non-normal distributions

**11:20**    Outlier handling 1: Identification of outliers

- Graphical methods for identifying outliers
- Statistical tests for identifying outliers
- Outliers vs stragglers

Workshop 3: Visual and statistical outlier identification

**12:10**    Outlier handling 2: Retention, rejection and accommodation

- Effect of outliers
- Causes of outliers
- Rejection of outliers
- Outlier accommodation ("robust" statistics)

Workshop 4: Handling outliers

**13:00**    *Lunch*

**13:45**    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

Workshop 5: Scenarios for one-way and two-way ANOVA

Two-way ANOVA without replication

- Worked example shown using EXCEL
- Partitioning the variance further: Error MS

Workshop 6: Carrying out and interpreting basic two-way ANOVA

**14:35** Two-way ANOVA with replication

Workshop 7: Carrying out and interpreting two-way ANOVA with replication

- Replication
- Partition variance further – concept of interaction
- Worked example
- Interpretation

**15:20** *Tea*

**15:40** 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

Workshop 8: Carrying out weighted regression

**16:15** Non-linear regression: Polynomials

- Procedure for polynomial regressions
- Polynomial regression using Excel regression function

Workshop 9: Carrying out and interpreting non-linear regression

**17:15** Round-up and general discussion

**17:30** *Close*

***Individual times approximate***