Statistics for analytical scientists

On-line programme

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.

Each session is scheduled for 2.5 hours but it is expected that most sessions will last for approx. 2 hours.

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** Introduction to statistics Introduction to significance testing	**Module 2** Significance testing: *t*- and *F*-tests
2	**Module 3** Analysis of variance (ANOVA)	**Module 4** Linear regression Control charts

Module	Topics
Module 1	Introduction to course Introduction to statistics • Population vs sample statistics • Distributions of data • Degrees of freedom • Calculating mean, standard deviation, relative standard deviation, standard deviation of the mean Introduction to significance testing • Introduction to significance testing • Probability: level of confidence and significance • One-tailed vs two-tailed tests • Hypotheses • Interpreting results from significance tests
Module 2	Significance testing: *t*-tests • Different t-tests (one-sample, two-sample, paired) • Calculating the *t* statistic • Obtaining critical *t*-values • Assessing the significance of *t* Significance testing: *F*-test • Calculating the *F* statistic • Obtaining critical *F*-values • Assessing the significance of *F*
Module 3	Analysis of variance (ANOVA) • What is ANOVA? • Uses of ANOVA • Key terms in ANOVA (sum of squares, mean square) • ANOVA calculations • Interpreting the results from ANOVA
Module 4	Linear regression: Interpretation of parameters and pitfalls • Uses of regression • Principles of least squares linear regression • Assumptions in linear regression • Interpreting residual plots • Interpreting regression statistics (correlation coefficient, residual standard deviation, etc) • Estimating the uncertainty in predicted values obtained from a linear calibration plot Control charts • Setting up and interpreting Shewhart charts