



## 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 Webex platform.**

Day	Session 1	Session 2
0	<b>Module 0.1</b> – Pre-course work – familiarisation with Excel and basic statistical tools	
1	<b>Module 1</b> Introduction to statistics Introduction to significance testing	<b>Module 2</b> Significance testing: $t$ - and $F$ -tests
2	<b>Module 3</b> Analysis of variance (ANOVA)	<b>Module 4</b> Linear regression Control charts



---

<b>Module</b>	<b>Topics</b>
<u>Module 1</u>	<p>Introduction to course</p> <p>Introduction to statistics</p> <ul style="list-style-type: none"><li>• Population vs sample statistics</li><li>• Distributions of data</li><li>• Degrees of freedom</li><li>• Calculating mean, standard deviation, relative standard deviation, standard deviation of the mean</li></ul> <p>Introduction to significance testing</p> <ul style="list-style-type: none"><li>• Introduction to significance testing</li><li>• Probability: level of confidence and significance</li><li>• One-tailed vs two-tailed tests</li><li>• Hypotheses</li><li>• Interpreting results from significance tests</li></ul>
<u>Module 2</u>	<p>Significance testing: <math>t</math>-tests</p> <ul style="list-style-type: none"><li>• Different <math>t</math>-tests (one-sample, two-sample, paired)</li><li>• Calculating the <math>t</math> statistic</li><li>• Obtaining critical <math>t</math>-values</li><li>• Assessing the significance of <math>t</math></li></ul> <p>Significance testing: <math>F</math>-test</p> <ul style="list-style-type: none"><li>• Calculating the <math>F</math> statistic</li><li>• Obtaining critical <math>F</math>-values</li><li>• Assessing the significance of <math>F</math></li></ul>
<u>Module 3</u>	<p>Analysis of variance (ANOVA)</p> <ul style="list-style-type: none"><li>• What is ANOVA?</li><li>• Uses of ANOVA</li><li>• Key terms in ANOVA (sum of squares, mean square)</li><li>• ANOVA calculations</li><li>• Interpreting the results from ANOVA</li></ul>
<u>Module 4</u>	<p>Linear regression: Interpretation of parameters and pitfalls</p> <ul style="list-style-type: none"><li>• Uses of regression</li><li>• Principles of least squares linear regression</li><li>• Assumptions in linear regression</li><li>• Interpreting residual plots</li><li>• Interpreting regression statistics (correlation coefficient, residual standard deviation, etc)</li><li>• Estimating the uncertainty in predicted values obtained from a linear calibration plot</li></ul> <p>Control charts</p> <ul style="list-style-type: none"><li>• Setting up and interpreting Shewhart charts</li></ul>

---