



Evaluating measurement uncertainty for chemical testing laboratories

On-line programme

Session timings

Unless stated otherwise, session times are:

Session 1: 09:30-12:00 GMT

Session 2: 13:30-16:00 GMT

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 measurement uncertainty ISO measurement uncertainty principles Identifying sources of uncertainty: Cause and effect analysis Approaches to uncertainty estimation: “bottom-up” vs “top-down”	Module 2 Statistics refresher Rules for uncertainty calculations: Converting and combining uncertainties
2	Module 3 Including precision and bias in an uncertainty estimate	Module 4 Completing the uncertainty estimate Evaluating uncertainty estimates using a spreadsheet approach
3	Module 5 Handling uncertainty for large concentration ranges Using and conveying uncertainty estimates	No session



Module	Topics
<u>Module 1</u>	<p>Introduction to measurement uncertainty: What and why</p> <ul style="list-style-type: none">• What is it uncertainty and why is it important?• When and in what form will uncertainty information be required (ISO/IEC 17025 requirements)?• How is measurement uncertainty quantified?• What contributes to measurement uncertainty? <p>ISO measurement uncertainty principles</p> <ul style="list-style-type: none">• Background to the ISO Guide• Definitions, Concepts and assumptions• Recommendations• Implementation <p>Identifying sources of uncertainty: Cause and effect analysis</p> <ul style="list-style-type: none">• Application of cause and effect to uncertainty evaluation• Construction and use of cause and effect diagrams <p>Approaches to uncertainty estimation: “bottom-up” vs “top-down”</p> <ul style="list-style-type: none">• ‘Bottom-up’ vs ‘top-down’ approach to uncertainty estimation• Using validation and quality control data in uncertainty estimation• Sources of data
<u>Module 2</u>	<p>Statistics refresher</p> <ul style="list-style-type: none">• Statistical terminology• Statistical parameters• Useful formulae for statistics• Using Excel to calculate statistics <p>Rules for uncertainty calculations 1: Converting to standard uncertainties</p> <ul style="list-style-type: none">• Rules for converting data to standard uncertainties <p>Rules for uncertainty calculations 2: Combining uncertainties</p> <ul style="list-style-type: none">• Basic rule for combining uncertainties• Uncertainty propagation• Mathematical form of uncertainty• Further rules for combining uncertainties• Expanded uncertainty

Module 3 Introduction to the analytical method used in workshops examples

Evaluating the bias component of an uncertainty estimate

- Uncertainties associated with bias/recovery
- Estimating the method bias/recovery
- Estimating the effect of sample matrix on bias/recovery
- Including bias/recovery in the uncertainty budget

Evaluating the precision component of an uncertainty estimate

- Different types of precision estimate
- Measurement uncertainty and precision studies
- Forms of precision data
- Contribution of precision to the uncertainty budget

Module 4 Completing the uncertainty estimate

- Approaches to quantifying uncertainty
 - Random variation
 - Systematic variation
 - Calculation
 - Published information
 - Experience
- Basis for considering additional effects

Evaluation of an uncertainty budget using spreadsheets

- Principles
- Advantages
- How to set up a spreadsheet

Module 5 Handling uncertainty for large concentration ranges: Level dependence

- Issues with level dependence
- Different scenarios and how to address them in uncertainty calculations

Using and conveying uncertainty estimates

- Conveying uncertainty information to customers
- Using uncertainty information in conformity assessments
 - ISO/IEC 17025 requirements

Course wrap up
