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

Some courses are scheduled with afternoon and evening sessions to allow participation from other time zones. Please see the website for details.

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	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
Module 1	Introduction to measurement uncertainty: What and why • 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? ISO measurement uncertainty principles • Background to the ISO Guide • Definitions, Concepts and assumptions • Recommendations • Implementation Identifying sources of uncertainty: Cause and effect analysis • Application of cause and effect to uncertainty evaluation • Construction and use of cause and effect diagrams Approaches to uncertainty estimation: “bottom-up” vs “top-down” • ‘Bottom-up’ vs ‘top-down’ approach to uncertainty estimation • Using validation and quality control data in uncertainty estimation • Sources of data
Module 2	Statistics refresher • Statistical terminology • Statistical parameters • Useful formulae for statistics • Using Excel to calculate statistics Rules for uncertainty calculations 1: Converting to standard uncertainties • Rules for converting data to standard uncertainties Rules for uncertainty calculations 2: Combining uncertainties • 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