



Evaluating Measurement Uncertainty for Chemical Testing Laboratories Day 1 Principles of Measurement Uncertainty

9:00 *Registration and coffee*

Morning session

Welcome and introduction to course

Introduction to measurement uncertainty: What and why

Statistics refresher

Workshop A1: Basic statistical calculations

ISO measurement uncertainty principles

Rules for uncertainty calculations 1: Converting to standard uncertainties

Workshop A2: Converting data and combining uncertainties

Afternoon session

Rules for uncertainty calculations 2: Combining uncertainties

Workshop A3: Combining uncertainty estimates

Cause and effect analysis: A tool for uncertainty estimation

Workshop A4: Construction of a simple cause and effect diagram

Quantifying uncertainty components

Workshop A5: Identifying sources of uncertainty

Approaches to uncertainty estimation: "bottom-up" vs "top-down"

Round up session

17:15 **Close**



Day 2 Implementing Measurement Uncertainty

Morning session

9:00 Recap of Day 1

Evaluation of uncertainty using spreadsheets

Workshop B1: Use of spreadsheets to calculate uncertainty

Using validation data in uncertainty estimation – general approach

Introduction to the analytical method used in Workshops B2 - B4

Evaluating recovery and the associated uncertainty

Workshop B2: Evaluating uncertainty for the analytical method from recovery estimations

Afternoon session

Including precision in an uncertainty estimate

Workshop B3: Estimating uncertainty for the analytical method from precision data

Completing the uncertainty estimate

Workshop B4: Completing the uncertainty budget for the method

Handling uncertainty for large concentration ranges: Level dependence

Workshop B5: Revision exercise

Discussion: Using and conveying uncertainty estimates

16:45 Close