



Day 1: Principles of Measurement Uncertainty

- 09:00 *Registration and coffee*
- 09:20 Welcome and details of course arrangements
- 09:30 **Measurement uncertainty: What and why**
- 10:00 **Statistics refresher**
- 10:20 **Workshop A1:** Basic statistical calculations
- 10:50 *Coffee*
- 11:10 **ISO measurement uncertainty principles**
- 11:25 **Rules for uncertainty calculations 1: Converting to standard uncertainties**
- 11:55 **Workshop A2:** Converting data and combining uncertainties
- 12:30 *Lunch*
- 13:30 **Rules for uncertainty calculations 2: Combining uncertainties**
- 13:55 **Workshop A3:** Calculating and combining uncertainties
- 14:40 **Quantifying uncertainty components**
- 15:00 *Tea*
- 15:20 **Workshop A4:** Identifying sources of uncertainty in analytical methods
- 15:45 **Evaluation of an uncertainty budget using spreadsheets**
- 16:00 **How to handle precision: One experiment or several?**
- 16:30 **Workshop A5:** Use of spreadsheets to calculate uncertainty
- 17:05 Round up session
- 17:15 *Close*

All timings are approximate

Day 2: Implementing Measurement Uncertainty Principles in Chemical Testing

- 09:15 Using data from validation studies
- 09:30 Cause and effect analysis: A tool for uncertainty estimation
- 10:00 **Workshop B1:** Construct a simple cause and effect diagram
- 10:30 *Coffee*
- 10:50 Introduction to the analytical method used in Workshops B2 - B4
- 11:05 Dealing with data from recovery estimations
- 11:25 **Workshop B2:** Evaluating uncertainty for the analytical method from recovery estimations
- 12:10 *Lunch*
- 13:10 Precision data from validation
- 13:30 **Workshop B3:** Estimating uncertainty for the analytical method from precision data
- 14:15 Other effects in validation studies
- 14:30 **Workshop B4:** Completing the uncertainty budget for the method
- 15:00 *Tea*
- 15:20 Handling uncertainty for large concentration ranges: Level dependence
- 15:40 **Workshop B5:** Estimation of uncertainty using data from validation studies
- 16:30 Discussion: Using and conveying uncertainty estimates
- 16:45 *Close*

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