Introduction

Knowledge of the uncertainty of measurement of calibration and testing results is fundamentally important for laboratories, their customers and all institutions using these results for comparative purposes. Competent laboratories know their performance and the uncertainty associated with the results. Uncertainty of measurement is a very important measure of the quality of a result of a calibration or test method.

This course is intended to develop an understanding of uncertainty in calibrations & metrology (including Chemical testing). It helps participants to have an idea of evaluating and calculating uncertainty for laboratories. The participants would know how to develop initial estimates of uncertainty from currently available data as well as how to organize a strategy to systematically evaluate their own calibration and test results. It helps participants to understand the concept of the GUM in application to their calibration or testing.

Objectives

The students should accomplish the following objectives by the end of the course:

1. Understand the current application of measurement uncertainty for conformance to ISO/IEC 17025 requirements.
2. Identify international definitions and other terms used in scientific measurement for defining the estimation of uncertainty
3. Reasonable appreciation of the GUM (Guide to Uncertainty of Measurements) applications.
4. Identify the accreditation body requirements for determining expanded uncertainty of measurements.

Who Should Attend

Technical Managers, Quality Managers, Laboratory Managers, Supervisors, Signatories of calibration and test reports & certificates, Laboratory Quality Personnel.

Course Content

Day 1

- Programme Overview
- Introduction to Uncertainty of Measurement
  - ISO/IEC 17025 Requirements
  - Signatories Responsibilities
  - Why is uncertainty of measurement important?
- History Pertaining to Measurement Uncertainty
  - Previous Estimating Methods
  - Measurement System
  - Measurement
  - SI System of Units
  - Measurement & Uncertainty of Measurement
- Estimating Measurement Uncertainty
  - Measurement Uncertainty
  - Source of Uncertainty
  - Nomenclatures & Definitions
  - Error vs uncertainty

Day 2

- Estimating Measurement Uncertainty
  - Statistical Techniques Commonly Use in Estimating Measurement Uncertainty
    - Probability, Population & Normal Distribution
    - Mean, Standard Deviation and Variance
    - Repeatability & Reproducibility
    - Confidence Limits, Criterion of Detection and Limits of Detection
    - Degrees of freedom, Common Types of Distribution Charts
    - ESDM & Student's t-Distribution
  - Fitted Curves for Some Calibration works
  - Partial Differentiation
- ISO Guide to the Expression of Uncertainty of Measurement (GUM)
  - General
  - Terms specific to ISO
  - How to calculate the uncertainty of Measurement
  - Using the GUM method to estimate measurement uncertainty

Day 3

- Applying the ISO Guide to Uncertainty Calculation
  - Practical considerations
  - Measurement Uncertainty Determination
    - Developing a model for determining measurement uncertainty
    - Establishing sources of uncertainty
    - Uncertainty calculation: standard uncertainties, combined uncertainties, expanded uncertainties
  - Reporting results
  - Practical Guidance on Evaluating Uncertainty Components
- Practical Case Workshop
  - Participants will be guided by a step-by-step determination of all potential input quantities, standard uncertainties, combined uncertainties, expanded uncertainty & final reporting

Course Presenter

DR. STEPHEN WONG KAM SUN – is a HRDC Accredited Trainer and an IQM Certified Expert in ISO/IEC 17025:2017 Standard for Testing, Calibration, and Sampling laboratories. He is a competent Quality Consultant, Trainer and qualified Lead Assessor/Auditor for both ISO 9000 and ISO/IEC 17025.

He is also an effective business management trainer. He holds at least six degrees/professional qualifications, namely, PhD (Sunway University), MBA degree (University of Wales, UK), Chemistry degree (University Malaya), Diploma in Marketing (CIM, UK) and Certified Diploma in Accounting & Finance (ACCA, UK). He has 38 years of management & training experience, including 32 years in quality training and consultancy.

He was the Hon. Secretary (16 years) for the Institute of Quality Malaysia, an approved Quality Trainer for SIRIM and a Quality and Management Consultant to many companies in Malaysia. He was a Council Member of the Malaysian Institute of Management and a well-recognized trainer for MIM. He was also the Gen. Secretary of Malaysia Register of Certificated Auditors (MRCA).

He was a member (1991-2002) of the Malaysian National Accreditation Council of the Department of Standards Malaysia and sat on seven other national committees on ISO. Mr. Stephen Wong had been a key member of the TC 176 and TC 207 national committees responsible to CASCO for the development of the ISO 9001, ISO/IEC 17025 and ISO 14001 standards and other conformity assessment standards. He was also a member of the IATCA (now IPC) representing MRCA in the development of the ISO 19011 Auditing Standard for the ISO 9001 and the ISO 14001.

Registration Guidelines & Procedures

1. Early registration is encouraged. Participants shall be registered on a first-come-first-served basis.
2. Register by completing attached form and return by e-mail to admin@wks-h.com
3. Payment of fee should be made 4 days before course commence.
4. Please made cheque payable to WKS HOLDINGS SDN BHD or transfer the payment to our Public Bank account no: 3078894831 and send us a copy of the transfer slip.
5. Notification of cancellation must be in writing received 4 working days prior to commencement of course (20% of course fee will be retained). Otherwise, full fee will still be charged.
6. WKS reserves the right to cancel or postpone the course in the event of unforeseen circumstances. However, in such an event, participants would be informed as early as it could possibly permit.

UML201227

Registration form

Please register the following for the course on "Uncertainty of Measurement"

Name: _____
Designation: _____

Name: _____
Designation: _____

(please attached extra list if more than two participants)

Reminder: **Participants need to bring a laptop and scientific calculator.**

Name & Address of Company:

_____
_____
_____
_____
_____

Contact Person: _____
Designation: _____
Tel: No: _____ Fax: _____
E-mail: _____

Signature: _____
Date: _____

Method of Payment:
Please made cheque payable to **WKS HOLDINGS SDN BHD** or transfer the payment to our **Public Bank account no: 3078894831** and send us a copy of the transfer slip.

Payment by HRDC grant must be approved before training starts.

WKS reserves the right to cancel or postpone the course in the event of unforeseen circumstances.

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UNCERTAINTY *of* MEASUREMENT

An Appreciation of the Guide to Uncertainty of Measurement (GUM) Applications to **Metrology and Chemical Testing**

Administrative Details

Date: 2 – 4 March 2026
Time: 0900 – 1700
Venue: Plaza Mayang, Petaling Jaya
Fees: RM 1,650 per participant
HRDCorp Claimable

Organized & Managed by
WKS HOLDINGS SDN BHD

Reg. No. : Q109988-A