

Keysight Technologies

Uncertainty Analysis Basics

Course Overview

Course Numbers: H7215X-100

Key Value

Compute measurement uncertainty according to the ISO 17025 standard.

Course Overview

This course teaches the principles used in the computation of measurement uncertainty in accord with the ISO 17025 requirements. The GUM method of combining contributing uncertainties to properly calculate a resultant measurement uncertainty is presented with the aid of an Excel spreadsheet tool designed by Keysight Technologies, Inc. metrology engineers.

This course begins with an introduction to statistics and it covers the distinctive elements of the ISO 17025 standard.

What you will learn

- Basic Statistics
 - compute mean
 - compute standard deviation
 - common statistics terms
- Probability Distributions
 - Gaussian
 - Uniform
 - Triangular
 - U-Shaped
- Type A and B GUM variables
- Sensitivity analysis
- Measurement equations
- Combining uncertainties
- GUM method
- Estimation and simplification
- Dominant RF & Microwave errors

Specifications

Course Type
General Training

Audience

Technicians, engineers and scientists who must understand and use the ISO 17025 GUM uncertainty analysis method or need to improve their understanding of measurement uncertainty for RF and Microwave measurement errors specifically.

Prerequisites

- High school algebra
- Math calculator or laptop computer

Course Length

1 day (expandable to 2 days with computation labs)

Course Format

- 100% lecture (1 day format)
- 50% Lecture + 50% Lab (2 day format)

Detailed Course Agenda

Module I (day 1)

- Measurement Process
- Measurement Uncertainty
- Statistics Definitions
- Computation of Mean
- Computation of Standard Deviation
- Probability Histograms
- Standard (Gaussian) Distribution
- Common Probability Distributions

Module II (day 1)

- ISO 17025 Standard
- Measurement Equation
- Sensitivity Coefficients
- Combining Uncertainties
- Type A and B Variables
- GUM Method
- Keysight GUM Spreadsheet

Module III (day 1)

- RF & Microwave Errors
 - noise
 - mismatch
 - linearity
- SWR Calculator
- kTB noise computation

Module IV (day 2)

- Computation Labs
- Spreadsheet Labs
- Reading Instrument Datasheets

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