

# Metrology Training - Statistics for the Laboratory (Uncertainties)

## GUM

**Duration : 1 – 1,5 days**

<b>1. Regulatory context and summary of technical requirements, clause 5 of v2005:</b> <ul style="list-style-type: none"> <li>• Purpose of measurement activity</li> <li>• Summary of the principle of accreditation</li> <li>• Introductory examples</li> </ul>
<b>2. General concepts of metrology and importance of the field</b>
<b>3. Definitions/principles</b> <ul style="list-style-type: none"> <li>• Quantity</li> <li>• Measurement</li> <li>• Other fundamental definitions: accuracy, fidelity, correctness</li> <li>• Types of measurements</li> <li>• Measurement errors</li> <li>• Calibration</li> <li>• Uncertainties</li> </ul>
<b>4. Uncertainty calculations</b> <ul style="list-style-type: none"> <li>• Types of uncertainties: A and B</li> <li>• Type A calculations</li> <li>• Type B calculations</li> <li>• Combined uncertainty calculations</li> </ul>
<b>5. Reporting results</b> <ul style="list-style-type: none"> <li>• How to round off</li> <li>• Confidence interval and coverage factor</li> <li>• Confidence interval for standard deviation</li> <li>• Case of normal distribution</li> </ul>
<b>6. (Introduction) Statistical analysis of a measurement system (case of variables):</b> <ul style="list-style-type: none"> <li>• Determine whether the variation due to the method (operator, device, method) is sufficiently small compared to the physical variation of the measured elements. Application to inter-laboratory comparisons and calibration.</li> <li>• =&gt; Statistical tool: ANOVA: Analysis of variance, Sum of squares, Gage R&amp;R</li> </ul>