Fundamentals and LAP Problems Preparation
Course Syllabus/Learning Objectives

Day 1. Introduction, Certificates, & Supplier Evaluation

After covering concepts, using your notes and resources, you will be able to:

- IDENTIFY and use documentary reference materials to ensure good quality, accurate, traceable measurement results.
- EXPLAIN highlights and key concepts of each topic to each other and to your managers and show how these topics fit into a management system like ISO/IEC 17025.
- IMPLEMENT several simple tools, job aids, and references to use and improve your laboratory operations.
- IDENTIFY compliance of certificates of calibration with required components of a calibration certificate.
- IDENTIFY gaps/non-conformity on calibration certificates.
- APPLY knowledge of the checklists (job aids) and review of the certificates.
- EVALUATE certificates from issued by your laboratory and received from external suppliers.
- CREATE & UPDATE your compliant certificate of calibration.

Day 2. Metrology Traceability and Risk Analysis (GMP 11, GMP 13)

After covering concepts, using your notes and resources, you will be able to:

Module 1--Mass:

- DEFINE Metrological Traceability, Calibration, Measurand, Measurement Standard, and Calibration & Measurement Capability (CMC).
- DESCRIBE why traceability matters.
- LIST the essential elements of metrological traceability.
- APPLY concepts of traceability hierarchies, essential elements, and risk/gap analysis to measurement activity for NIST SOP 8 (Mass) and NIST SOP 19

Module 2--Volume:

- DESCRIBE traceability of mass measurements to the International System of Units (SI); and ASSESS the evidence of traceability for mass measurements in your laboratory.
- IDENTIFY and then EVALUATE the traceability hierarchy for volume calibrations in your laboratory to ensure that there are no gaps to providing adequate objective evidence.

Day 3.Measurement Assurance (SOP 30, SOP 9, SOP 17, SOP20, appendices, measurement assurance assessments and lab control charts)

After this session, using your notes and references, you will be able to:

- DESCRIBE Measurement Assurance and give some examples of problems when it is absent from a laboratory and procedures

- REFERENCE applicable sections of ISO/IEC 17025 that relate to measurement assurance
- IDENTIFY and MATCH activities with different approaches to measurement assurance
- IDENTIFY control charts and components Variables Standard deviation Title, Axis, Statistical Control Limits
- RECOGNIZE control charts that are out of control, SHARE ideas about causes and potential actions
- DESCRIBE check/control standards and some key points about their use APPLY measurement assurance concepts and practices to SOP 8 and 19

Day 4.Mass Echelon III (SOP 8) Webinar (and supporting procedures)

At the end of these sessions, using Standard Operating Procedures 2, 8, 9, 29, 30, 34, and Good Measurement Practices 10, 11, 12, and 13 participants will be able to:

- IDENTIFY and USE reference materials to ensure good quality, accurate, traceable measurement results;
- EXPLAIN highlights and key concepts of each topic (noted on the Course Syllabus/Detailed Learning Objectives) to each other and to your managers and show how these topics fit in to a management system using ISO/IEC 17025 as the basis;
- Have and know how to IMPLEMENT several simple tools, job aids, and references to use and improve your laboratory operations; and
- COMPLETE the Fundamentals of Metrology Laboratory Auditing Program (LAP) Problems.

Day 5.Volume Echelon II (SOP 19)

At the end of these sessions, using Standard Operating Procedures 17, 19, 29, 30, 31, and Good Measurement Practices 3, 11, 12, and 13 participants will be able to:

- IDENTIFY and USE reference materials to ensure good quality, accurate, traceable measurement results;
- EXPLAIN highlights and key concepts of each topic (noted on the Course Syllabus/Detailed Learning Objectives) to each other and to your managers and show how these topics fit in to a management system using ISO/IEC 17025 as the basis;
- Have and know how to IMPLEMENT several simple tools, job aids, and references to use and improve your laboratory operations; and
- COMPLETE the Fundamentals of Metrology Laboratory Auditing Program (LAP) Problems.

Day 6.Basic Uncertainty (SOP 29, uncertainty 8 step worksheet)

At the end of this module, using your notes and resources, you will be able to:

- IMPLEMENT uncertainty analysis and reporting methods consistent with the Guide to the Expression of Uncertainty in Measurement (GUM) and the 8 step process of SOP 29. This means, to correctly:
- SPECIFY the measurand and measurement equation
- IDENTIFY uncertainty components
- QUANTIFY each component in appropriate units
- CONVERT to standard uncertainties

- COMBINE using appropriate equation (often Root Sum Square)
- EXPAND using appropriate coverage factor
- EVALUATE the result for accuracy, suitability, compliance, fit for purpose
- REPORT the result, rounded to two significant digits, with an explanatory Statement that includes the components and how determined, coverage factor, degrees of freedom, and confidence interval

Day 7.Proficiency Testing (GLP 1, PT Follow up form)

At the end of this module, using your notes and resources, you will be able to:

- DESCRIBE purposes of an Interlaboratory Comparison;
- DEFINE an Interlaboratory Comparison and Proficiency Test;
- DESCRIBE where, when, and why PTs are performed;
- CALCULATE Normalized Error and Precision Test results; and
- ASSESS your PT data using the Normalized Error and Normalized Precision calculation results.

Day 8.Calibration Certificate (Part II) & Wrap Up and Feedback

At the end of this module, using your notes and resources, you will be able to:

For MASS:

- ASSESS calibration certificates for mass to requirements;
- DESCRIBE a supplier evaluation process;
- CONDUCT a simple supplier evaluation to ensure traceability of standards and that certificates comply with requirements; and
- CREATE a calibration certificate that complies with all requirements of SOP 1 and ISO/IEC 17025:2017, Section 7.8.

For VOLUME:

- ASSESS calibration certificates for volume to requirements;
- DESCRIBE a supplier evaluation process;
- CONDUCT a simple supplier evaluation to ensure traceability of standards and that certificates comply with requirements; and
- CREATE a calibration certificate that complies with all requirements of SOP 1 and ISO/IEC 17025:2017, Section 7.8.