



TRAINING OFFERINGS FOR ANALYTICAL LABORATORIES

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ISO STANDARDS

COMPLIANCE TO ISO/IEC 17025:2017 FOR LABORATORY COMPETENCE

Standard ISO/IEC 17025 was considerably revised in 2017 and aligned with ISO 9001 standards. This course provides a comprehensive review of ISO/IEC 17025 supported with examples of its application to testing or calibration laboratories. This is an excellent course for laboratories seeking accreditation or laboratory personnel seeking an in-depth understanding of the guidelines for competency in testing or calibration.

2-day course

Course Content

- Understanding laboratory competence
- Risk, impartiality, and confidentiality
- Organizational and management requirements for ISO/IEC 17025 compliance
- Laboratory resources
 - Personnel
 - Facilities and environment
 - Equipment
 - Metrological traceability
 - Purchasing goods and services
- Laboratory processes
 - Laboratory work requests
 - Laboratory work processes from accepting requests to delivering products
- Management system requirements
- Software systems for compliance management

ISO 17034 AND GUIDE 35 FOR REFERENCE MATERIAL PROVIDERS

This course provides a comprehensive overview of ISO 17034 for competent and consistent production of reference materials. This course is recommended for reference material providers looking for ideas to improve their operations or seeking accreditation, and laboratory personnel looking for in-depth understanding of reference material production and use.

2-day course

Course Content

- Types of Reference Materials and their use
 - Certified Reference Materials
 - Reference Materials
- Understanding reference material producer competence
- Risk, impartiality, and confidentiality
- Organizational and management requirements for ISO/IEC 17034 compliance
- Reference material producer resources
 - Personnel
 - Facilities and environment
 - Equipment
 - Metrological traceability

- Purchasing goods and services
- Reference material production
- Reference material testing
 - Homogeneity
 - Stability
 - Long-term
 - Transport
 - In the case of repeated use
 - Uncertainty
- Certificates / Product Information Sheets
- Management system requirements

ISO/IEC 17043 AND ISO 13528 – STANDARDS FOR PROFICIENCY TESTING PROVIDERS

This course provides a comprehensive review of requirements for proficiency testing (PT) schemes and inter-laboratory studies. The course covers steps for the design and operation of PT schemes, sample preparation, personnel competence, collection of data, and statistical methods, as well as reporting and interpretation of PT scheme results. This is an excellent course for anyone involved in PT or interlaboratory studies.

2-day course

Course Content

- Competency requirements for PT providers
 - Management requirements
 - Technical requirements
 - PT design
 - PT items preparation
- Statistics for proficiency testing
 - Statistical design
 - Homogeneity and stability
 - Data analysis
 - Qualitative data
- Interpretation and reporting of PT results

LABORATORY MANAGEMENT

RISK MANAGEMENT STRATEGIES FOR LABORATORIES

In 2017, ISO/IEC 17025 introduced the concept of risk-based thinking related to managing laboratory processes. This course provides a brief review of previous risk concepts described in ISO 31000 (2009) and ISO9001 (2015), risk concepts in ISO/IEC 17025, and their application to laboratory operations, as well as some common risk management tools.

1-day course

Course Content

- Risk in ISO/IEC 17025:2017
- Risks and opportunities
- Basics of risk management
- Risk management tools
- Laboratory risk management plan
- Risk assessment tools

INTERNAL AUDITING OF LABORATORIES FOR ISO/IEC 17025:2017 COMPLIANCE

This is a hands-on course that helps laboratory professionals learn different auditing strategies and develop skills for performing efficient internal audits. The course introduces the guidelines for auditing from ISO/IEC 19011 and applies them to ISO/IEC 17025:2017. Participants will learn how to plan, implement, and maintain an audit program, as well as practice auditing methods, questioning techniques, and record-sampling.

2-day course

Course Content

- Terms and definitions
- Process approach to audits
- Implementing an audit program
- Requirements for auditing in ISO/IEC 17025:2017
- Audit approaches and methods
- Developing auditing skills

LABORATORY PERFORMANCE

CONTROL CHARTS FOR EVALUATING TEST METHOD PERFORMANCE

This course introduces control charts as simple and powerful graphical tools to help answer some common questions about test method performance: Are measurements consistent over time? What is the precision of measurement? Is the test method biased? What is the overall measurement uncertainty of the test result? Are different laboratory analysts producing comparable test results?

1-day course

Course Content

- Types of control charts
- Evaluating test method performance
 - Stability
 - Precision
 - Bias
 - Total measurement uncertainty
- Measurement system analysis

IMPLEMENTATION OF LABORATORY QA PROGRAM USING CONTROL CHARTS

Control charts are easy to use statistical tools that allow laboratories to monitor and evaluate testing processes. Shewhart charts (I/MR, Xbar/R or Xbar/S charts) detect large shifts in process, while Exponentially Weighted Cumulative Average (EWCA) and Cumulative Sum (CUSUM) charts detect smaller shifts in the process. Participants in this course will learn how to implement a control chart-based quality assurance program to evaluate analytical measurement system performance, maintain its stability, and monitor its precision and bias. The course will present step by step implementation of a quality assurance program (QAP), statistical methods used, and practical guidelines for interpretation of analytical measurement system performance.

2-day course

Course Content

- Design and implementation of a QAP
 - Selecting quality control materials
 - Defining QAP parameters
 - Selecting control chart types (I/MR, Xbar/R, Xbar/S, EWCA, CUSUM)
 - Collecting and assessing initial data
 - Control chart interpretation
- Deploying control charts for quality control
 - Interpretation of test method performance
 - Development of an out-of-control action plan
 - Re-assessing and updating control charts
 - Evaluating measurement system performance (precision, accuracy, and bias)
 - Process improvement
 - Validating accelerator mass spectrometry (AMS) performance

STATISTICS FOR LABORATORY PROFESSIONALS

INTRODUCTION TO STATISTICAL THINKING

This course provides a one-day overview of the role of statistics for laboratory professionals. The material will be presented at a conceptual level. We begin with introductory concepts and move into the application of statistics in laboratory problems and the challenges that users of laboratory data face with censored (non-detect) data. We conclude with a review of different software tools available for producers and consumers of statistical information.

1-day course

Course Content

- Confidence intervals and hypothesis testing
- Introduction to experimental design
- Linear regression
- Quantification and detection limits
- Statistical software options

STATISTICS FOR TEST METHOD VALIDATION

This course provides a review of statistical methods and American Society of Testing and Materials (ASTM) standards applicable to test method validation. Each concept is applied to practical examples from the laboratory. We work through each example from planning laboratory experiments to data analysis and reporting of test method performance parameters.

2-day course

Course Content

Performance Parameters

- Precision
 - Measures of variation
 - Repeatability
 - Site precision
 - Reproducibility
 - How to estimate precision over concentration
- Linearity
 - Regression diagnostics
 - Weighted vs simple regression
 - Types of regression
 - Inverse regression
- Accuracy and Bias
 - Accuracy versus bias
 - Bias over concentration range
- LOD/LOQ
 - Concepts

- Methods to determine limit of detection (LOD) and limit of quantitation (LOQ)
- Design of Experiment
 - Basics
 - Randomization, blocking, fractional factorial design
 - Designed laboratory studies (specificity, robustness and ruggedness)
- Measurement System Analysis
 - Design
 - Variance components

Sampling for laboratory testing

- Sampling plan
- Common sampling designs
- Sampling equipment
- Subsampling and mass reduction
- Sampling errors and uncertainty

SAMPLING

INTRODUCTION TO SAMPLING IN TESTING LABORATORIES

Important decisions are made based on measurement data obtained by testing one or more small portions of material. The information obtained from the measurements is only as good as the samples tested. This course covers basic concepts of sampling that apply to testing laboratories.

1-day course

Course Content

- Review of sampling in testing laboratories
- Sampling guidelines and standards
- Sampling plans and methods
 - Design
 - Sample collection and handling
 - Sub-sampling and mass reduction techniques
- Sampling records
- Sampling errors

FIELD SAMPLING PLANS FOR STATISTICALLY BASED DECISION MAKING

Field sampling designs are a fundamental part of data collection for statistically based decision making. A well-developed sampling design plays a critical role in ensuring that data are sufficient to support the decision process. Only careful planning focused on the intended use of the data will ensure that the data meet the goals and objectives of the project and can be confidently used for decision making. This course covers several basic and innovative sampling designs and describes the process for deciding which design is right for an application. This course is for laboratory personnel who work directly with clients and want to know more about the field sampling design and the purpose of the sampling.

1-day course

Course Content

- Why is selecting an appropriate sampling design important?
- Review of sampling designs
 - Simple random sampling
 - Stratified sampling
 - Systematic sampling
 - Ranked set sampling
 - Adaptive cluster sampling
 - Composite sampling
- Sampling design implementation