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AL113:

Advanced Statistical Analysis of Laboratory Data *Method Development, Method Validation, Uncertainty, Calibration, SQC and Data Interpretation*

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Training Description:

This course is designed to provide participants with good knowledge and skills required to perform advanced statistical calculations in modern analytical laboratories. The course starts by reviewing the existing knowledge of participants on the fundamental concepts of statistics. Method development and validation will then be discussed which also include the quality requirements as per the ISO 17025 standard. Participants will then be introduced to the process of measuring uncertainty estimation by identifying uncertainty sources, quantifying and reporting combined uncertainty. The course will then discuss the various calibration functions and the types of statistical quality control charts (SQC) and wrap up with the procedures and methods used to interpret the inter & intra laboratory data. Participants will have the opportunity to apply the principles learned to actual problems through the use of illustrative case studies under the guidance of the instructor. Through a combination of lectures and problem-solving sessions, participants will learn advanced statistical techniques that they can put to immediate use in their laboratory.

Training Objectives:

By the end of the training, participants will be able to:

- ✓ Apply statistical formulas used in QC/QA and illustrate method development & validation
- ✓ Identify the proper procedure for analytical measurement & uncertainty including its uncertainty sources, error and uncertainty, method validation and traceability
- ✓ Explain the uncertainty evaluation procedure for Quantifying Uncertainty (GUM), and use prior collaborative method development and validation study data
- ✓ Calculate the combined uncertainty and analyze the results based on standard and expanded uncertainty reports
- ✓ Explain the calibration functions which include the establishment of an analytical range, determination of the calibration function, verification of linearity & precision and recovery
- ✓ Enumerate the types

Training Designed for:

This course is intended for those who are involved in method development, method validation, uncertainty, calibration, SQC and data interpretation of laboratory data. This includes all degree-holder staff of analytical laboratories, R&D and government statutory employees. Further, QA/QC employees and third-party inspection and certification companies will also benefit from this course.

Training Program:

DAY ONE:

- ❖ PRE-TEST
- ❖ Introduction
- ❖ Fundamental Concepts in Statistics
  - Review of Basic Statistical Formulas used in QC/QA
  - Statistical Tests such as (T&F) Distribution
  - Sampling & Pair Sampling
  - ANOVA

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- **Method Development & Validation**
  - Analytical Method Validation
  - Chemical Method Validation – The Future
  - Laboratory Quality Standards

DAY TWO:

- **Method Development & Validation** (cont'd)
  - Statistical Method Validation for Test Laboratories
  - Method Validation Procedure
- **Measuring Uncertainty**
  - Analytical Measurement & Uncertainty
  - The Process of Measurement Uncertainty Estimation
  - Specification of the Measure
  - Identifying Uncertainty Sources

DAY THREE:

- **Measuring Uncertainty** (cont'd)
  - Quantifying Uncertainty (GUM)
  - Calculating the Combined Uncertainty
  - Reporting UNCE

DAY FOUR:

- **Calibration Functions**
  - Calibration of the Analytical Procedure
  - Establishing of an Analytical Range
  - Determination of the Calibration Function & Process Data
  - Determination for the Linear Calibration Function
  - Process Data for the Linear Calibration Function
  - Process Data for the 2-order Calibration Function
  - Verification of Linearity & Precision
  - Recovery Function
- **Types of Statistical Quality Control Charts (SQC)**
  - Control Limits
  - Steps to Construct a Control Chart

DAY FIVE:

- **Types of Statistical Quality Control Charts (SQC)** (cont'd)
  - Range Charts
  - Interpretation Guidelines
  - Cu sum Chart
- **Interpretation of Inter & Intra Laboratory Data**
  - Data Generation
  - Raw Analytical Data Parameters
  - Signal-to-Noise Ratios
  - Final Data
  - Reporting
  - Common Mistakes Made in Data Interpretation

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- Interpreting Numbers Close to or Below Detection Limits
- Numbers Close to Guideline Values
- Interpretation Using Uncertainty

❖ Course Conclusion
❖ POST-TEST and EVALUATION

Training Requirement:

"**Hand's on practical sessions, equipment** and **software** will be applied during the course if required and as per the client's request".

Please note that the above topics can be amended as per client's learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

As per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:30	Recess (Prayer Break & Lunch)
13:30 - 15:00	Last Session

For training registrations or in-house enquiries, please contact:
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Training & Career Development Department