AL025:

Practical Statistical Analysis of Lab Data

Training Description:

The purpose of any analytical measurement is to get consistent, reliable and accurate data. There is no doubt that incorrect measurement results can lead to tremendous costs. In addition, reporting incorrect analytical results at any particular time leads to loss of a laboratory's confidence in the validity of future results. Therefore, any laboratory should do its outmost to ensure measuring and reporting reliable and accurate data within a known level of confidence. Statistics is an integral part of quality assessment of analytical results. The concept of a frequency distribution, which embodies the behaviour of chance/random fluctuations, is essential for the description of many pertinent aspects of measurement. Statistical Inference based on the theory of probability and random variables, allows reliable conclusions to be drawn from data which are subject to error and variability. A quantitative measurement is always an estimate of the real value of the measure and involves some level of uncertainty. The limits of uncertainty must be known within a stated probability; otherwise no use can be made of the measurement. Analysis must be done in such a way that can provide this statistical predictability.

This course is designed for those faced with analyzing data from laboratories in support of R&D programs, pilot plant studies, plant operations, hospitals, medical centres, municipalities, food manufacturers, environmental protection departments and independent laboratories. Its purpose is to provide information concerning contemporary statistical methodology for individuals in the chemical process and allied industries as well as those in the health care and food fields. Emphasis is placed on the practicality and applicability of the techniques presented. You 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. The importance of graphical presentation of statistical results is emphasized. More complex statistical analyses and the statistical design of experiments are also presented. Through a combination of lectures and problem-solving sessions, you will learn new statistical techniques that you can put to immediate use in the workplace.

Training Objective:

By the end of the training, participants will be able to:
- ✓ Apply the correct statistical techniques in analyzing the laboratory data and results
- ✓ Carryout measurements with accuracy and precision as well as recognize the sources of bias and variability
- ✓ Interpret graphical display of data as well as summarise numerical data
- ✓ Measure central tendency and variability as well as interpret their distribution and shapes
- ✓ Explain the confidence intervals for means and standard deviation as well as rates and percentages
- ✓ Carryout hypothesis tests, one-sample, two sample & paired sample tests as well as one-way & two-way ANOVA and multiple comparison testing
- ✓ Discuss experimental design, statistical process control and correlation and regression

Training Designed for:

This course provides an overview of all significant aspects and considerations of practical statistical analysis of lab data for laboratory managers, scientists, engineers, analysts, chemists, laboratory superintendents/supervisors, R&D managers, manufacturing & production managers and those who need to apply the traditional and modern methods of data analysis.

Training Program:

DAY ONE:
- ❖ PRE-TEST
- ❖ Introduction
- ❖ The Importance of Statistics for the Analysis of Lab Data
- ❖ Measurement, Accuracy and Precision
- ❖ Sources of Bias and Variability
- ❖ Random Samples
- ❖ Data
- ❖ Graphical Display of Data

DAY TWO:
- ❖ Numerical Summary of Data
- ❖ Measures of Central Tendency
- ❖ Measures of Variability
- ❖ Distributions and Their Shapes
- ❖ Transformations
- ❖ Outliers

DAY THREE:
- ❖ Statistical Inference
- ❖ Confidence Intervals - General Philosophy
- ❖ Confidence Intervals for Means and Standard Deviations
- ❖ Confidence Intervals for Rates and Percentages
- ❖ Hypothesis Testing

DAY FOUR:
- ❖ One-Sample Tests
- ❖ Two-Sample Tests
- ❖ Paired-Sample Tests
- ❖ One-Way ANOVA
- ❖ Multiple Comparisons Testing
- ❖ Simulator (Hands-on Practical Sessions)

DAY FIVE:
- ❖ Randomized Blocks
- ❖ Two-Way ANOVA
- ❖ Introduction to Experimental Design
- ❖ Statistical Process Control
- ❖ Correlation and Regression
- ❖ 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