



**Scandinavian Academy**  
Training and Development AB

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# Course: Statistical Analysis for Quality Control in Mineral and Environmental Testing

Code	City	Hotel	Start	End	Price	Language - Hours
EFS-900	Frankfurt (Germany)	Hotel Meeting	2027-03-01	2027-03-05	5450 €	En - 25

## Programme Summary:

Tailored for data-intensive environments, this course offers an in-depth exploration of statistical tools used to analyze and assure the quality of laboratory and field data. It focuses on extracting meaningful insights from geochemical and environmental test results to support decisions, reduce errors, and ensure compliance.

## General Objective:

To develop participants' skills in applying advanced statistical methods for quality control, method validation, and risk-based decision-making in analytical laboratories.

## Learning Objectives:

- Analyze laboratory and field data using advanced statistical techniques.
- Perform hypothesis testing, regression, and ANOVA in lab result interpretation.
- Validate laboratory methods with statistical tools.
- Create and implement sampling plans based on statistical design.
- Apply risk-based decision-making approaches aligned with international standards.

## Target Audience:

- Laboratory Statisticians
- Quality Data Analysts



- QA/QC Managers
- Geoscientists and Sampling Engineers
- Environmental Monitoring Teams
- Analytical Chemists & Instrumentation Experts

## **Course Outline :**

### **Module 1: Data Distribution and Descriptive Statistics**

- Understanding data types and distributions (normal, skewed, multimodal)
- Measures of central tendency (mean, median, mode)
- Measures of dispersion (range, variance, standard deviation)
- Frequency distributions and histograms
- Assessing normality: graphical and statistical methods

### **Module 2: Statistical Inference and Hypothesis Testing**

- Constructing and interpreting confidence intervals
- Fundamentals of hypothesis testing (null vs alternative hypotheses)
- One-sample and two-sample tests (t-test, z-test)
- Significance levels, p-values, and decision criteria
- Applying tests in method validation and routine lab assessments

### **Module 3: Regression, ANOVA, and Correlation**

- Linear regression for identifying trends in data sets
- Multiple regression for multi-factor analysis
- Pearson and Spearman correlation coefficients
- ANOVA (Analysis of Variance) for comparing group means
- Application of regression and ANOVA in laboratory method comparisons



## **Module 4: Process Capability and Sampling Plans**

- Calculating and interpreting process capability indices ( $C_p$ ,  $C_{pk}$ ,  $P_p$ ,  $P_{pk}$ )
- Determining process suitability and potential improvements
- Designing acceptance sampling plans (single, double, sequential)
- Operating Characteristic (OC) curves for evaluating sampling efficiency
- Detecting outliers and performing root cause analysis for anomalies

## **Module 5: Risk-Based Decision Making and Reporting**

- Visualization of statistical data for quality reporting
- Application of ISO 17025 and ISO 9001 in statistical QC
- Decision-making using risk-based statistical rules
- Creating effective audit and validation reports
- Case scenarios: regulatory compliance, failure analysis, and decision reviews



The Scandinavian Academy for Training and Development adopts the latest scientific and professional methodologies in training and human resource development, aiming to enhance the efficiency of individuals and organizations. Training programs are delivered through a comprehensive approach that includes:

- Theoretical lectures supported by PowerPoint presentations and visual materials (videos and short films).
- Scientific evaluation of participants before and after the program to measure progress and knowledge acquisition.
- Brainstorming sessions and practical role-playing to simulate real-life scenarios.
- Case studies tailored to align with the training content and participants work nature.
- Assessment tests conducted at the end of the program to evaluate the achievement of training objectives.

Each participant receives the training material (both theoretical and practical) in printed form and saved on a CD or flash drive. Detailed reports, including attendance records, final results, and overall program evaluations, are also provided.

Training materials are prepared professionally by a team of experts and specialists in various fields. At the end of the program, participants are awarded a professional attendance certificate, signed and accredited by the Scandinavian Academy for Training and Development.

### **Program Timings:**

- 9:00 AM to 2:00 PM in Arab cities.
- 10:00 AM to 3:00 PM in European and Asian cities.

### **The program includes:**

- A daily Coffee Break provided during the sessions to ensure participants comfort.