COURSE OVERVIEW LE0030
Practical Statistical Analysis of Lab Data

Course Title
Practical Statistical Analysis of Lab Data

Course Date/Venue
October 19-23, 2025/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai UAE

Course Reference
LE0030

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This course is designed to provide participants with a detailed and up-to-date overview of Practical Statistical Analysis of Lab Data. It covers the quality and process control, process variability and statistical concepts for SPC; the elements of a control system, control charts and steps to implement SPC; the $\bar{X}$ and R Charts (mean and range), $\bar{X}$ and s charts (mean and standard deviation) and individual and moving range (I-MR) charts; the process stability and interpret Cp, Cpk, Pp, Ppk calculations, indices in relation to tolerance, short-term versus long-term capability and capability improvement strategies; the p and np Charts (proportion and count of defectives), c and u Charts (count of defects per unit) and short-run SPC methods; and the measurement system analysis (MSA), using control charts for continuous improvement.

During this interactive course, participants will learn the SPC software tools and automation, set-up real-time dashboards and apply data input automation from sensors/instruments including alerts and notifications for control limit breaches; and the lab-based testing, use of SPC in batch production, managing mixed lab/process SPC systems and cross-functional collaboration; creating effective SPC reports, SPC and lean manufacturing integration and benchmarking and best practices; and the strategic deployment of SPC, sustaining SPC effectiveness, SPC in regulatory and critical applications and troubleshooting common SPC pitfalls.

Course Objectives

Upon the successful completion of this course, each participant will be able to: -

- Apply and gain in-depth knowledge on practical statistical analysis of lab data
- Discuss quality and process control, process variability and statistical concepts for SPC
- Identify the elements of a control system, control charts and steps to implement SPC
- Recognize X and R Charts (mean and range), X and s charts (mean and standard deviation) and individual and moving range (I-MR) charts
- Analyze process stability and interpret Cp, Cpk, Pp, Ppk calculations, indices in relation to tolerance, short-term versus long-term capability and capability improvement strategies
- Discuss p and np Charts (proportion and count of defectives), c and u Charts (count of defects per unit) and short-run SPC methods
- Carryout measurement system analysis (MSA), using control charts for continuous improvement
- Discuss SPC software tools and automation, set-up real-time dashboards and apply data input automation from sensors/instruments including alerts and notifications for control limit breaches
- Carryout lab-based testing, use of SPC in batch production, managing mixed lab/process SPC systems and cross-functional collaboration
- Create effective SPC reports and apply SPC and lean manufacturing integration and benchmarking and best practices
- Employ strategic deployment of SPC, sustaining SPC effectiveness, SPC in regulatory and critical applications and troubleshooting common SPC pitfalls

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

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, lab superintendents/supervisors, R&D managers, manufacturing & production managers and those who need to apply the traditional and modern methods of data analysis.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Course Fee

US$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Mr. Paul Patsi, MSc, BSc, is a **Senior Analytical Chemist** and an **International Expert** in **Water & Waste Water Treatment Technology** with over **25 years** of extensive experience in **Analytical Laboratory** and **Water & Wastewater Treatment Engineering**. His expertise covers **Laboratory Assessment**, **Microbiological Quality Assurance**, **Analytical Chemistry**, **Statistical Analysis**, **Laboratory Safety**, **Equipment & Infrastructure Management**, **Budgeting & Planning of Laboratory Consumables**, **Business Administration**, **Personnel Management**, **Laboratory Management**, **Chemical Analysis**, **Laboratory Auditing**, **Risk Assessment**, **Microbiological Analysis of Water & Waste Water**, **Waste Water Treatment Analysis**, **Water Chemistry**, **HACCP**, **ISO 22000**, **ISO 17025**, **ISO 9001**, Good Manufacturing Practice (**GMP**), Good Hygiene Practice (**GHP**) and Good Laboratory Practice (**GLP**). He is also an expert in microbiological indoor air quality, water biology, food sampling and calibration. He is currently the **Head of Industrial Analytical Laboratory** of PINDOS wherein he is in-charge of the budgeting, auditing, consumables, suppliers, personnel management, equipment and infrastructure management along with waste water treatment and water/environmental legislation.

During his career life, Mr. Paul has held key positions such as the **Head of Microbiology & Chemical Laboratory**, **Head of Quality Control**, **Technical Consultant**, **Research Projects Specialist**, **Scientific Consultant**, **Biologist-Scientific Expert** and **Biologist** for multi-billion companies like the **European Union**, **Help LTD**, **Lake Pamvotis Municipality Company**, **Hellenic Centre for Marine Research**, **Cargill** and **Nestle** just to name a few.

Mr. Paul has a **Master's** degree in **Food Science and Food Technology** from the **University of Ioannina** (**Greece**) and a **Bachelor's** degree in **Biology** from the **Aristotle University of Thessaloniki** (**Greece**). He is a **Certified Instructor/Trainer** and a **Member** of the **Society for Applied Microbiology**, **Society of Biological Scientist** and the **Global Coalition for Sustained Excellence in Food & Health Protection**

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: Sunday, 19th of October 2025

0730 – 0800	*Registration & Coffee*
0745 – 0800	*Welcome & Introduction*
0800 – 0815	***PRE-TEST***
0815 – 0900	***Introduction to Quality & Process Control*** *Evolution of Quality from Inspection to Control • Definitions: Quality Control, Quality Assurance and SPC • Objectives and Benefits of SPC • SPC versus Traditional Quality Control Methods*
0900 – 0945	***Understanding Process Variability*** *Common Cause versus Special Cause Variation • Types of Data: Attribute versus Variable • Sources of Variation in Manufacturing • Effects of Variation on Quality and Cost*
0945 – 1000	*Break*
1000 – 1045	***Basic Statistical Concepts for SPC*** *Mean, Median, Mode • Range, Standard Deviation, Variance • Normal Distribution and Bell Curve • Central Limit Theorem and Sampling*
1045 – 1200	***Elements of a Control System*** *Inputs, Process, Outputs and Feedback • The Voice of the Process versus Voice of the Customer • Process Capability versus Performance • Cost of Poor Quality (COPQ)*
1200 – 1215	*Break*
1215 – 1300	***Control Charts*** *Purpose and Use of Control Charts • Control Limits versus Specification Limits • Understanding UCL, LCL, CL • Shewhart's Contributions to Control Charts*
1300 – 1420	***Steps to Implement SPC*** *Selecting Critical-to-Quality (CTQ) Characteristics • Data Collection Plan • Control Chart Selection • Process Monitoring and Team Roles*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2: Monday, 20th of October 2025

0730 – 0830	***X̄ & R Charts (Mean & Range)*** *When to Use X̄ and R Charts • Construction and Interpretation • Sample Size and Frequency Considerations • Detecting Shifts and Trends*
0830 – 0945	***X̄ & s Charts (Mean & Standard Deviation)*** *Use in High-Precision Processes • Difference from X̄ and R Charts • Standard Deviation Chart Calculation • Interpretation Examples*
0945 – 1000	*Break*
1000 – 1045	***Individual & Moving Range (I-MR) Charts*** *When Data are Collected One Point at a Time • MR Chart Calculation • Dealing with Autocorrelation • Use in Batch and Low-Volume Processes*

1045 – 1200	***Analysis of Process Stability*** *Identifying Control versus Out-of-Control Conditions • Western Electric Rules • Run Tests and Pattern Analysis • Actions for Process Correction*
1200 – 1215	*Break*
1215 – 1330	***Process Capability Studies*** *Cp, Cpk, Pp, Ppk Calculations • Interpreting Indices in Relation to Tolerance • Short-Term versus Long-Term Capability • Capability Improvement Strategies*
1330 – 1420	***Case Study: SPC Implementation in Manufacturing*** *Identifying KPIs and Quality Variables • Building and Analyzing Control Charts • Interpreting Results and Making Decisions • Documenting and Reporting Findings*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3: ***Tuesday, 21st of October 2025***

0730 – 0830	***p & np Charts (Proportion & Count of Defectives)*** *Use for Pass/Fail or Yes/No Data • Calculating p and np Charts • Variable Sample Size Adjustment • Interpretation and Corrective Action*
0830 – 0945	***c & u Charts (Count of Defects per Unit)*** *Use for Defect Count Rather Than Defective Items • Adjusting for Varying Inspection Areas • Understanding c-Bar and u-Bar • Interpreting Patterns and Spikes*
0945 – 1000	*Break*
1000 – 1100	***Short-Run SPC Methods*** *Challenges in Short Production Runs • Z-Bar and Moving Z Charts • Nominal Plotting and Transformation • Real-World Examples in Custom Manufacturing*
1100 – 1200	***Measurement System Analysis (MSA)*** *Gage Repeatability and Reproducibility (Gage R&R) • Stability, Linearity, and Bias • Impact of Poor Measurement Systems on SPC • MSA Case Study and Interpretation*
1200 – 1215	*Break*
1215 – 1330	***Analyzing Special Causes & Assignable Variation*** *Identifying Root Causes of Variation • Fault Tree Analysis and 5 Whys • Linking SPC Alerts to Troubleshooting • Corrective/Preventive Action Planning*
1330 - 1420	***Using Control Charts for Continuous Improvement*** *Monitoring Improvements Over Time • SPC in DMAIC and Six Sigma • Integrating SPC with Kaizen • Success Metrics and KPI Tracking*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4: Wednesday, 22nd of October 2025

0730 – 0830	***SPC Software Tools & Automation*** *Overview of Common SPC Tools (Minitab, JMP, Excel, etc.) • Setting Up Real-Time Dashboards • Data Input Automation from Sensors/Instruments • Alerts and Notifications for Control Limit Breaches*
0830 – 0945	***SPC in Laboratory & Process Settings*** *Lab-Based Testing (Cement, Chemicals, Food, etc.) • Use of SPC in Batch Production • Managing Mixed Lab/Process SPC Systems • Cross-Functional Collaboration*
0945 – 1000	*Break*
1000 – 1045	***Creating Effective SPC Reports*** *Structuring SPC Reports for Management and Operations • Visualizing Trends, Charts, and Outliers • Summary Tables, Capability Analysis Reports • Recommendations and Follow-Up Plans*
1045 - 1200	***SPC & Lean Manufacturing Integration*** *Eliminating Waste through Data-Driven Control • Real-Time Defect Detection and Response • Cycle Time and Takt Time Monitoring • Linking SPC to OEE (Overall Equipment Effectiveness)*
1200 – 1215	*Break*
1215 – 1300	***SPC & Quality Audits*** *Role of SPC Evidence in Internal/External Audits • Using SPC Charts in ISO 9001, IATF 16949 Audits • Document Retention and Traceability • Audit Nonconformity Prevention through SPC*
1300 – 1420	***Benchmarking & Best Practices*** *Comparing SPC Maturity across Industries • Developing SPC KPIs • Operator Engagement and Training • Real-Life Examples of World-Class SPC Systems*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

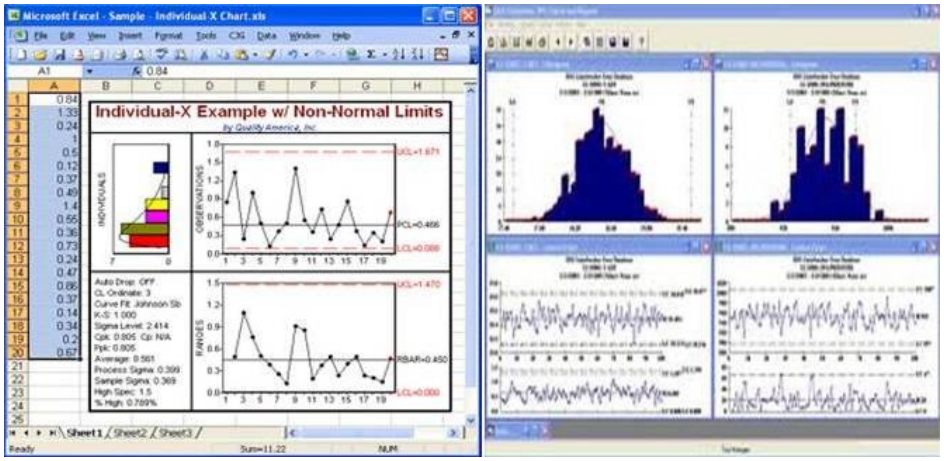
Day 5: Thursday, 23rd of October 2025

0730 – 0945	***Strategic Deployment of SPC*** *Embedding SPC in Company-Wide Quality Culture • Linking SPC to Business Objectives • Cross-Departmental SPC Deployment Roadmap • Prioritizing Areas for SPC Roll-Out*
0945 – 1000	*Break*
1000 – 1100	***Sustaining SPC Effectiveness*** *Preventing Control Chart Fatigue • Maintaining Operator Interest and Ownership • Periodic Review of Limits and Control Plans • Continuous Training and Coaching*
1100 – 1200	***SPC in Regulatory & Critical Applications*** *SPC in Pharmaceutical and Medical Industries (GMP, FDA) • Application in Automotive and Aerospace (PPAP, APQP) • Recordkeeping and Compliance Requirements • Real-Time SPC in Safety-Critical Environments*
1200 – 1215	*Break*
1215 - 1315	***Hands-On Workshop: SPC Implementation*** *Group Selection of Real-World Variables • Data Collection and Chart Development • Process Capability Analysis and Recommendations • Report-Out and Critique Session*

1315 – 1345	***Troubleshooting Common SPC Pitfalls*** *Overreaction to Noise and False Alarms • Misuse of Control Charts for Specification Control • Inconsistent Sampling Methods • Inadequate Training or Buy-In*
1345 - 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulator (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art simulator "SPC for Excel Software".



SPC for EXCEL SOFTWARE

Course Coordinator

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