COURSE OVERVIEW LE0412
Measurement Traceability & Testing & Data Validation

Course Title
Measurement Traceability & Testing & Data Validation

Course Date/Venue
Session 1: April 13-17, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
Session 2: September 15-19, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

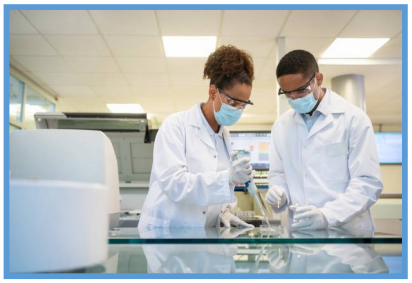
Course Reference
LE0412

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

Course Description

This practical and highly-interactive course includes practical sessions and exercises where participants will visit the laboratory and they will be introduced to various lab instruments and their calibration process. Practical sessions will be performed using one of the lab equipment in order to apply the theory learnt in the class.

This course is designed to provide participants with a detailed and an up-to-date overview of measurement traceability, testing and data validation. It covers the measurement principles and protocols for traceability in chemical analysis; the metrological traceability in laboratory; the traceability and analytical chemistry; the interlaboratory comparisons that can provide traceability; the total allowable error via metrological traceability to uncertainty of measurement of the unbiased result; the traceability in physical measurements and how to achieve international comparability for chemical measurements; and the key elements of traceability in chemical measurement.



Further, the course will also discuss the link to the SI via primary direct methods; the role of reference materials, measurement assurance concept in calibration; the traceability at NBS/NIST and the lifetime of the traceability chain in chemical measurement; the proficiency evaluation as a traceability link in chemical metrology; achieving traceability in chemical measurement; the traceability issues in measurement; and the implementation of traceability.

During this interactive course, participants will learn the improvements in efficiency of production and traceability for certification of reference materials; the traceability of measurement results of the effective acquisition time in gamma ray spectrometry implemented by the pulser method; the benefits of the implementation of a metrological structure for water analyses; the validation steps for traceability of linear calibrated chemical measurements; differentiate the traceability and uncertainty including their role in interlaboratory; the traceable property values, primary reference materials, traceability chain for gas composition, traceability to units and traceability without uncertainty; the role of reference materials in analytical chemistry; the ISO/IEC 17025 traceability requirements; and disseminating traceability in chemical measurement.

Course Objectives

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

- Apply and gain an in-depth knowledge on measurement traceability and testing and data validation
- Discuss the measurement principles and protocols for traceability in chemical analysis including the metrological traceability in laboratory as well as the traceability and analytical chemistry
- Identify interlaboratory comparisons that can provide traceability as well as describe total allowable error via metrological traceability to uncertainty of measurement of the unbiased result and practical considerations on the traceability to conventional scales
- Determine traceability of reference materials, traceability in physical measurements and how to achieve international comparability for chemical measurements
- Identify the key elements of traceability in chemical measurement and practical realization of the traceability of chemical measurements standards
- Review the link to the SI via primary direct methods, the role of reference materials, measurement assurance concept in calibration and traceability at NBS/NIST and the lifetime of the traceability chain in chemical measurement
- Apply proficiency evaluation as a traceability link in chemical metrology and achieve traceability in chemical measurement
- Analyze traceability issues in measurement
- Implement traceability, improve efficiency of production and traceability for certification of reference materials
- Recognize the traceability protocol to the SI by gravimetric analysis
- Identify the traceability in routine chemical measurements and the traceability of measurement results of the effective acquisition time in gamma ray spectrometry implemented by the pulser method
- List the benefits of the implementation of a metrological structure for water analyses
- Employ validation steps for traceability of linear calibrated chemical measurements
- Differentiate traceability and uncertainty including their role in interlaboratory, traceable property values, primary reference materials, traceability chain for gas composition, traceability to units and traceability without uncertainty
- Enumerate the role of reference materials in analytical chemistry as well as review ISO/IEC 17025 traceability requirements and disseminate traceability in chemical measurement

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 measurement traceability and testing and data validation for quality managers, quality professionals, laboratory managers, superintendents, supervisors, chemists, scientists, analysts and other technical staff.

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 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 Certificate(s)

Internationally recognized certificates will be issued to all participants of the course 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 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. Nikolas Karnavos, MSc, BSc, is a **Senior Analytical Chemist** with over **30 years** of extensive experience within the **Oil**, **Gas**, **Refinery** and **Petrochemical** industries. His expertise widely covers **Gas & Liquid Chromatograph Process Analysers**, **Process Analyzer Techniques** (**Online** & **Offline**), Laboratory Information Management System (**LIMS**), **Data & Method Validation in Analytical Laboratories**, Laboratory **Automation Techniques**, **Practical Problem Solving in Chemical Analysis**, **Practical Statistical Analysis of Lab Data**, **Chemical Laboratory**, **Analytical Laboratory & Instrumentation**, Laboratory **Health & Safety**, **GLP**, Laboratory **Quality Management** (**ISO 17025**), **ISO 9001** and Medical Laboratory Quality Management (**ISO 15189**). Further, he is also well-versed in Environmental **Online Analyzers** (**Air** & **Water**), **Gas Chromatography** and various instrumental methods of analysis such as **Water Analysis & Quality Control**, **Water and Wastewater Chemical** Analysis, **Statistical Data and Laboratory Analysis**, **Gas** Analysis, **Qualitative Fuel** Analysis, **Environmental Chemical** Analysis, **Laboratory Environmental** Analysis including Water Quality Testing, Process Water and **Wastewater Effluents**, Oily **Sludge Treatment**, Atomic Absorption and Spectroscopic Methods in Analytical Chemistry, **Analytical Method Development** and **Methods of Environmental Measurements** (**Water**, **Air**, **Liquid** & **Solid Wastes**).

Mr. Karnavos was the **Laboratory Manager** of **Exxon** wherein he was responsible for **ISO 17025 certification**, upgrading laboratory equipment in **refinery**, **petrochemical** and **polypropylene** plants, upgrading and extending LIMS, handling the transition plan process of the existing laboratory to a new as well as formulating and executing the plans for applied research and technology transfer. During his career life, he had occupied several significant positions as the **Laboratory Analyst**, **Laboratory Professor**, **Quality Manager**, **Partner & Managing Director**, **Environmental Engineer**, **Process Engineer**, **Environmental Management Corporate Department Head** and **Quality Control & Plastics Application Head** with different international companies like the **AQUACHEM**, **Hellenic Petroleum** (**EXXON**) and **Technological Institute**.

Mr. Karnavos holds a **Master** degree in **Chemical Engineering** and **Bachelor** degrees in **Mechanical Engineering** and **Petroleum Engineering** from the **Aristotelian University of Thessaloniki**, **Technological Institute** and **KATEE Kavala** respectively. He is an **Accredited Trainer** for the Organization for the Certifications & Vocational Guidance (**EOPPEP**), a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**), a **Certified Instructor/Trainer** and an **Accredited Environmental Auditor** from the **IEMA**. Further, he is the **President** of Greek **Association of Chemical Engineers** and an active member of various professional engineering bodies internationally like the **IEMA**, **Technical Chamber** of Greece and the **CONCAWE**. He also **published numerous books** and **scientific papers** and delivered various trainings and workshops worldwide.

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

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0900	***Measurement Principles for Traceability in Chemical Analysis***
0900 – 0930	***Protocols for Traceability in Chemical Analysis***
0930 – 0945	*Break*
0945 – 1045	***Metrological Traceability in Laboratory***
1045 – 1145	***Traceability & Analytical Chemistry***
1145 – 1245	***Do Interlaboratory Comparisons Provide Traceability?***
1245 – 1300	*Break*
1300 – 1345	***From Total Allowable Error via Metrological Traceability to Uncertainty of Measurement of the Unbiased Result***
1345 – 1420	***Practical Considerations on the Traceability to Conventional Scales***
1420 - 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0830	***Traceability of Reference Materials***
0830 – 0930	***What Can we Learn from Traceability in Physical Measurements?***
0930 – 0945	*Break*
0945 – 1045	***How to Achieve International Comparability for Chemical Measurements***
1045 – 1145	***The Key Elements of Traceability in Chemical Measurement***
1145 – 1245	***The Practical Realization of the Traceability of Chemical Measurements Standards***
1245 – 1300	*Break*
1300 – 1345	***Link to the SI via Primary Direct Methods***
1345 – 1420	***The Role of Reference Materials***
1420 - 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0830	***The Measurement Assurance Concept in Calibration & Traceability at NBS/NIST***
0830 – 0930	***Lifetime of the Traceability Chain in Chemical Measurement***
0930 – 0945	*Break*
0945 – 1045	***Proficiency Evaluation as a Traceability Link in Chemical Metrology***
1045 – 1145	***Achieving Traceability in Chemical Measurement***
1145 – 1245	***Traceability Issues in Measurement***
1245 – 1300	*Break*
1300 – 1345	***Implementation of Traceability***
1345 – 1420	***Improvements in Efficiency of Production & Traceability for Certification of Reference Materials***
1420 - 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0830	***A Traceability Protocol to the SI by Gravimetric Analysis***
0830 – 0930	***Traceability in Routine Chemical Measurements***
0930 – 0945	*Break*
0945 – 1045	***Traceability of Measurement Results of the Effective Acquisition Time in Gamma-Ray Spectrometry Implemented by the Pulser Method***
1045 – 1145	***Benefits of the Implementation of a Metrological Structure for Water Analyses***
1145 – 1245	***Validation Steps for Traceability of Linear Calibrated Chemical Measurements***
1245 – 1300	*Break*
1300 – 1345	***Traceability & Uncertainty***
1345 – 1420	***Traceability & its Role in Interlaboratory Comparisons***
1420 - 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

0730 – 0830	***Traceable Property Values of In-House Reference Materials***
0830 – 0930	***Primary Reference Materials & Traceability Chain for Gas Composition***
0930 – 0945	*Break*
0945 – 1015	***Traceability to Units***
1015 – 1045	***Traceability Without Uncertainty***
1045 – 1130	***The Role of Reference Materials in Analytical Chemistry***
1130 – 1230	***Meeting ISO/IEC 17025 Traceability Requirements***
1230 – 1245	*Break*
1245 – 1345	***Disseminating Traceability in Chemical Measurement***
1345 - 1400	***Course Conclusion***
1400 - 1415	***POST-TEST***
1415 - 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions/Lab Visit

Lab Site visit will be organized during the course for delegates to practice the theory learnt:-

Course Coordinator

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