COURSE OVERVIEW LE0412
Measurement Traceability & Testing & Data Validation

Course Title
Measurement Traceability & Testing & Data Validation

Course Date/Venue
December 09-13, 2024/ 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, sample video clips of the instructor's actual lectures & practical sessions during the course 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.

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.

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 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: -

- 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.

- 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.
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Accommodation

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

Course Instructor

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

Dr. Ian Kaloudis, PhD, MSc, PGrad, BSc, is a **Senior Analytical Chemist** with almost **30 years** of extensive experience. His expertise widely covers in the areas of **Chemical Analysis**, **Chemical Laboratory**, **Laboratory** Management, **Laboratory** Supervision & Management, **Analytical Laboratory** Management, **Modern Analytical Laboratory**: Management, **Laboratory Consumables Management**, **Metrological Traceability**, **Implementation of Traceability**, **Traceability of Units, Laboratory Instrument Calibrations** & Troubleshooting Techniques, Safety and Quality in **Scientific Laboratory**, **Laboratory** Skills, **Pesticides** Application, **PAH**, **VOC**, Advanced Oxidation Processes (**AOP**), **Phenols**, **Cyanotoxins**, Gas Chromatography (**GC**), Mass Spectrometry (**MS**), **GC/MS** Technology & Problem Solving, High Performance Liquid Chromatography (**HPLC**), **HPLC-ICP-MS/ICP-MS**, **Analytical Instrumentation**, Equipment, Safety & Quality (ISO 17025), **Analytical Instrumentation** for Laboratory, **Analytical Chemistry**, **Analytical Laboratory Quality Management System**, **Waste Water Treatment**, **Elucidation** of Mechanisms, **Statistical Analysis of Data**, Statistical Quality Control (**SQC**), Statistics Methods & Measurement Uncertainty, **ISO 17025:2017**, **Food Safety** and **Environmental** Management Systems. He is currently the **Head of Organic Micropollutants Laboratory** of Athens Water Supply and Sewerage Company wherein he is responsible for the development & validation for the determination of organic pollutants in water, research projects related to water quality and development of cyanotoxins analysis laboratory.

All throughout his career life, Dr. Kaloudis had occupied several challenging positions and dedication as **Quality Manager**, **Head of Industrial Waste Water Control Section**, **Consultant**, **Senior Researcher**, **Collaborating Researcher**, **Research Associate**, **Lecturer**, **Trainer** and **Auditor** for various companies such as the KEK DIASTASI - Hellenic Food Authority Training Programs, University of the West of Scotland, Institute of Nanoscience and Nanotechnology (INN), Hellenic Accreditation System (E.SY.D.), Institute of Physical Chemistry, Food Industrial Research and Technological Development Company and Athens Water Supply and Sewerage Company (EYDAP SA).

Dr. Kaloudis has a **PhD** degree in Chemistry (Honors) from the **National and Kapodistrian University of Athens**, a **Master** degree in **Quality Management** from the **University of the West of Scotland**, a **Postgraduate Programme** in **Production Management & Quality Management** from **Technical Educational Institute (TEI) of Piraeus**, a **Bachelor** degree in **Chemistry** (Honors) from **National and Kapodistrian University of Athens**. Further, he is a **Certified Instructor/Trainer**, a **Certified ISO 17025:2017 Auditor**, a **Registered Food Safety and Hygiene Trainer**, a **Certified ISO 9001 Lead Auditor** from International Register of Certificated Auditors (**IRCA**), a **Certified Environmental Management Systems Auditor** from Institute of Environmental Management and Assessment (**IEMA**), a member of the American Chemical Society (**ACS**), a senior member of the American Society for Quality (**ASQ**), a member of the International Water Association (**IWA**), a member of the European Water Platform, a member of the Hellenic Mass Spectrometry Society (**HMSS**), a member of the Italian Society of Toxicology and a member of the Association of Greek Chemists (**AGC**). He has further published numerous journals/books and delivered various trainings, seminars, conferences, workshops and courses globally.

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: ***Monday 09th of December 2024***

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: ***Tuesday 10th of December 2024***

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: ***Wednesday 11th of December 2024***

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: ***Thursday 12th of December 2024***

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: ***Friday 13th of December 2024***

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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