



# AL138: Modern Chemical Laboratory: *Analytical Instrumentation, Equipment Calibration, Quality & Safety*

### Training Description:

Knowledge of modern analytical instruments and techniques is necessary to solve any laboratory problem. The intensive course provides basic analytical analysis methods and troubleshooting techniques of the most used instruments in an analytical laboratory. In addition, it offers elegant tools for qualitative and quantitative data techniques with practice work on analysis software. The aim is to enrich and advance the skills and knowledge of participants to understand analytical chemistry technology.

### Training Objectives:

By the end of the training, participants will be able to:

- ✓ Impart fundamental techniques of analytical chemistry
- ✓ Identify the application of analytical methods
- ✓ Understand the instruments' techniques
- ✓ Know how to judge the accuracy and precision of experimental data and how these judgments can be sharpened by the application of statistical methods
- ✓ Understand the tools and techniques used to achieve process analysis, qualitative methods, cause and effect diagrams and calibration graphs
- ✓ Familiarize the latest analytical methods

### Training Designed for:

The course is designed for Chemists, Lab Technicians, Chemical Engineers, Instrument Engineers and Lab Supervisors/Managers.

### Training Program:

#### DAY ONE:

- ❖ PRE-TEST
- ❖ Introduction to Analytical Technique
- ❖ Methods of Analysis
- ❖ Basic Laboratory Technique
  - Sample Preparation
  - Analytical Measurement
  - Fundamental Concepts
  - Chemical Equation
  - Acidity of Solution
  - Buffers
- ❖ Gravimetric Methods of Analysis
- ❖ Preparation of Chemicals
- ❖ Acid-Base
- ❖ Titration Methods
- ❖ Complex-Formation Titration Methods
- ❖ Oxidation-Reduction Titration

#### DAY TWO:

- ❖ Precipitation Titration Methods
- ❖ Reference/Indicator Electrodes



- ❖ Potentiostatic Coulometric
- ❖ Potential Selectivity of Electrolytic Methods
- ❖ Manipulation Methods – Solid Phase Extraction and Derivatisation
- ❖ Chromatography Technique
- ❖ Gas Chromatography (Inject System, Column, Detector Types)
- ❖ High Performance Liquid Chromatography
  - Mobile Phase
  - Pumping System
  - Sample Inject System
  - Column
  - Detector Types

#### DAY THREE:

- ❖ Other Chromatography Techniques
- ❖ Data Management Software
- ❖ Analytical Retention Process
- ❖ Spectroscopy Technique and Molecules Identifying
- ❖ Infrared Absorption Spectroscopy
- ❖ Nuclear Magnetic Resonance Spectroscopy – Peak Evaluation
- ❖ Mass spectroscopy
- ❖ UV/IR Absorption Spectroscopy

#### DAY FOUR:

- ❖ Raman Spectroscopy
- ❖ X-Ray Spectroscopy
- ❖ Electron Spectroscopy
- ❖ Atomic Absorption
- ❖ Instruments Troubleshooting
  - Column Contamination
  - Broad in The Peak Bandwidth
  - Ghost Peaks
  - System Peak
  - Contamination in the Inlet Filter
  - Change solvent in mobile phase (HPLC)
  - Interferences in the AAS
  - Detector Contamination

#### DAY FIVE:

- ❖ Safety Operation
- ❖ Quantitative Methods
  - Calibration Methods
  - External and Internal Standards
  - Outliers Test
  - Determination of Analyte Concentration
  - Standard Addition Method
  - Error in Quantitative Analysis



- Confidence Limits
- Detection Limit
- Repeatability, Reproducibility, and Method Validation
- ❖ Course Conclusion
- ❖ POST-TEST and EVALUATION

### Training Requirements:

“Hands-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 01<sup>st</sup> 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

