Chemical Plant Laboratory Operations and Quality Control Training Course



02 - 06 Nov 2026

Cape town

4600 € (Per Person)

Ref: #ACE4340_296386

Course Introduction / Overview:

This course provides a comprehensive framework for mastering laboratory operations and quality control within the demanding environment of chemical plants. It is meticulously designed to bridge the gap between theoretical knowledge and practical application, ensuring that participants can implement robust, efficient, and compliant laboratory practices. The curriculum delves into the core pillars of modern lab management, including Good Laboratory Practice (GLP), the intricacies of ISO/IEC 17025 implementation, and advanced analytical method validation. We will explore concepts championed by experts like Douglas C. Montgomery in his seminal work, "Introduction to Statistical Quality Control," to ground our understanding of statistical process control (SPC) in proven methodologies. Participants will learn to navigate the complexities of regulatory compliance, enhance data integrity through effective Laboratory Information Management Systems (LIMS), and drive continuous improvement. BIG BEN Training Center has developed this program to empower professionals to transform their laboratories into centers of excellence, ensuring product quality, operational safety, and significant contributions to organizational success. This is an A-to-Z guide for achieving operational excellence in chemical laboratory settings.

Target Audience / This training course is suitable for:

- Laboratory Managers and Supervisors.
- Quality Control and Quality Assurance Professionals.
- Chemical Engineers and Process Engineers.
- Laboratory Technicians and Analysts.
- Research and Development Scientists.
- Plant Managers and Operations Managers.
- Regulatory Affairs and Compliance Officers.
- Internal and External Auditors.

Target Sectors and Industries:

- Petrochemical and Refining Industries.
- Specialty and Fine Chemicals Manufacturing.
- Pharmaceutical and Biopharmaceutical Industries.
- Agrochemical and Fertilizer Production.
- Plastics and Polymers Manufacturing.
- Food and Beverage Processing with chemical testing labs.
- Environmental Testing and Analysis Services.
- Governmental regulatory bodies and public testing laboratories.

Target Organizations Departments:

- Quality Control (QC) Department.
- Quality Assurance (QA) Department.
- Research and Development (R&D).
- Production and Operations.
- Health, Safety, and Environment (HSE).
- Regulatory Affairs and Compliance.
- Process Engineering and Technology.
- Plant Management.

Course Offerings:

By the end of this course, the participants will have able to:

- Implement the principles of Good Laboratory Practice (GLP) effectively.
- Develop and manage a Quality Management System (QMS) compliant with ISO/IEC 17025.
- Validate and verify analytical methods for accuracy and reliability.
- Master instrument calibration, maintenance, and troubleshooting protocols.
- Ensure data integrity and effectively utilize Laboratory Information Management Systems (LIMS).
- Apply statistical process control (SPC) techniques to monitor and improve lab performance.
- Conduct thorough risk assessments and implement robust safety procedures in the laboratory.
- Prepare for and successfully manage internal and external laboratory audits.
- Optimize laboratory workflow for increased efficiency and reduced operational costs.
- Develop and implement standard operating procedures (SOPs) for all lab activities.

Course Methodology:

The training methodology at BIG BEN Training Center is designed to be highly interactive, engaging, and practical, ensuring that participants can immediately apply their learning in the workplace. This course moves beyond traditional lectures by incorporating a blended learning approach. We utilize real-world case studies from the chemical industry to analyze complex operational and quality control challenges, allowing participants to develop critical problem-solving skills in a controlled environment. Interactive group discussions and workshops encourage the sharing of experiences and best practices among peers, fostering a collaborative learning atmosphere. Practical exercises will cover key areas such as developing SOPs, conducting risk assessments, and interpreting statistical process control charts. Our expert instructors facilitate sessions that emphasize active participation, providing continuous feedback and guidance. The program is structured to build skills progressively, ensuring a solid understanding of foundational concepts before moving to more advanced topics, making the learning experience both comprehensive and impactful.

Course Agenda (Course Units):

Unit One: Foundations of Chemical Laboratory Management

- Introduction to laboratory roles in chemical plants.
- Principles of Good Laboratory Practice (GLP).
- Understanding the ISO/IEC 17025 standard for laboratory competence.
- Essential health and safety protocols in a chemical laboratory (HSE).
- Navigating the regulatory landscape for chemical plants.
- Fundamentals of chemical inventory and sample management.
- Roles, responsibilities, and ethics for laboratory personnel.

Unit Two: Implementing a Robust Quality Management System (QMS)

- Designing and documenting a laboratory QMS.
- Developing and controlling Standard Operating Procedures (SOPs).
- Managing non-conforming work and implementing corrective actions.
- Conducting effective internal audits and management reviews.
- Supplier and vendor qualification for laboratory materials.
- Root cause analysis techniques for laboratory deviations.
- Preparing for external audits and accreditation processes.

Unit Three: Analytical Instrumentation and Method Validation

- Principles of common analytical techniques (e.g., GC, HPLC, Spectroscopy).
- Instrument qualification (IQ, OQ, PQ) and calibration strategies.
- Routine instrument maintenance and performance verification.
- Comprehensive guide to analytical method validation and verification.
- Calculating measurement uncertainty and establishing traceability.
- Troubleshooting common analytical instrument issues.
- Proficiency testing and inter-laboratory comparisons.

Unit Four: Data Integrity, LIMS, and Statistical Process Control

- Ensuring data integrity and ALCOA+ principles.
- Introduction to Laboratory Information Management Systems (LIMS).
- Effective data recording, analysis, and reporting.
- Fundamentals of Statistical Process Control (SPC) for laboratories.
- Creating and interpreting control charts for quality monitoring.
- Introduction to Design of Experiments (DoE) for process optimization.
- Managing electronic records and signatures in a compliant manner.

Unit Five: Advanced Laboratory Operations and Continuous Improvement

- Optimizing laboratory workflow and improving turnaround time.
- Implementing Lean and Six Sigma principles in the lab.
- Conducting comprehensive laboratory risk assessments.
- Managing laboratory budgets and controlling operational costs.
- Developing effective training programs for laboratory staff.
- Leadership and communication skills for laboratory managers.
- Future trends in laboratory technology and automation.

FAQ:

Qualifications required for registering to this course?

There are no requirements.

How long is each daily session, and what is the total number of training hours for the course?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

Something to think about:

Beyond regulatory compliance, how can a laboratory's quality control function transition from a cost center to a strategic value-driver for a chemical plant?

What unique qualities does this course offer compared to other courses?

This course distinguishes itself by offering a holistic and integrated perspective on chemical plant laboratory management, moving beyond siloed technical training. While other programs may focus narrowly on a single standard like ISO 17025 or a specific analytical technique, this curriculum synthesizes quality control, operational efficiency, safety, and strategic management into a cohesive framework. It emphasizes the laboratory's critical role within the larger context of chemical plant operations, teaching participants not just how to perform a task, but why it is crucial for product quality, plant safety, and business profitability. The content is deeply rooted in practical, real-world applications, using case studies and problem-solving exercises directly relevant to the challenges faced in petrochemical, pharmaceutical, and specialty chemical environments. By integrating management principles like risk assessment and continuous improvement with technical competencies like method validation and statistical process control, the course equips participants with a dual skill set, enabling them to be both proficient scientists and effective leaders who can drive tangible improvements and strategic value.