Analytical Chemistry for Process Industries Training Course

Professional Development Training Course Outline

Category	General Training	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

In today's highly regulated and technology-driven manufacturing environment, Analytical Chemistry plays a critical role in ensuring process optimization, product quality assurance, regulatory compliance, sustainability, and operational excellence. Process industries including petrochemicals, pharmaceuticals, food processing, specialty chemicals, oil & gas, water treatment, mining, and advanced materials rely on modern analytical techniques to monitor raw materials, control production processes, minimize waste, and enhance product consistency. The integration of Industry 4.0, Process Analytical Technology (PAT), Digital Transformation, Artificial Intelligence (AI), Smart Manufacturing, and Real-Time Process Monitoring has significantly increased the importance of analytical chemistry professionals in industrial operations.

Analytical Chemistry for Process Industries Training Course equips participants with advanced knowledge of instrumental analysis, quality control systems, process analytical technologies, laboratory data management, risk-based decision making, environmental monitoring, predictive analytics, and sustainability-driven chemical analysis. Through practical case studies, industry applications, and best-practice methodologies, participants will learn how to leverage analytical chemistry to improve productivity, reduce operational costs, ensure regulatory compliance, enhance process reliability, and support continuous improvement initiatives across modern process industries

Programme Curriculum

Analytical Chemistry for Process Industries Training Course

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Course Duration

5 days

Course Objectives

Upon completion of this course, participants will be able to:

1. Understand advanced principles of Industrial Analytical Chemistry and process control.
2. Apply Process Analytical Technology (PAT) for real-time manufacturing monitoring.
3. Utilize AI-driven analytical solutions for process optimization.
4. Implement effective Quality Assurance (QA) and Quality Control (QC) systems.
5. Interpret analytical data using Data Analytics and Statistical Process Control (SPC).
6. Optimize laboratory operations through Digital Laboratory Transformation.
7. Apply spectroscopy techniques for industrial troubleshooting.
8. Utilize chromatography methods for complex process analysis.
9. Ensure compliance with ISO, GMP, GLP, FDA, EPA, and ESG requirements.
10. Conduct root cause analysis using analytical investigations.
11. Monitor environmental performance and sustainability indicators.
12. Integrate Industry 4.0 Smart Sensors and IoT-based Monitoring Systems.
13. Develop continuous improvement strategies through analytical intelligence.

Target Audience

1. Process Engineers
2. Analytical Chemists
3. Quality Assurance Professionals
4. Quality Control Engineers
5. Laboratory Managers
6. Production Supervisors
7. Environmental Compliance Specialists
8. Operations and Plant Managers

Course Modules

Module 1: Fundamentals of Analytical Chemistry for Process Industries

- Role of analytical chemistry in industrial operations

- Chemical measurement principles
- Sampling strategies and sample integrity
- Sources of analytical errors and uncertainty
- Industrial quality requirements
- **Case Study:** Improving product consistency in a petrochemical manufacturing facility through optimized sampling protocols.

Module 2: Process Analytical Technology (PAT)

- PAT framework and implementation
- Real-time process monitoring
- In-line and on-line analytical systems
- Process optimization methodologies
- Regulatory expectations for PAT
- **Case Study:** Deployment of PAT systems in pharmaceutical manufacturing to reduce batch failures.

Module 3: Spectroscopic Techniques in Industrial Analysis

- UV-Visible spectroscopy applications
- Infrared (FTIR) spectroscopy
- Atomic Absorption Spectroscopy (AAS)
- ICP-OES and ICP-MS techniques
- Raman spectroscopy for process control
- **Case Study:** Using FTIR monitoring to improve polymer production efficiency.

Module 4: Chromatographic Techniques for Process Industries

- Gas Chromatography (GC)
- High Performance Liquid Chromatography (HPLC)
- Ion Chromatography
- Method development and validation
- Troubleshooting chromatographic systems
- **Case Study:** Reducing product contamination in specialty chemical production using advanced chromatography.

Module 5: Quality Control and Regulatory Compliance

- QA/QC frameworks
- ISO 17025 laboratory requirements
- GMP and GLP compliance
- Data integrity and traceability
- Audit readiness strategies
- **Case Study:** Achieving regulatory compliance in a food processing laboratory.

Module 6: Data Analytics and Digital Laboratory Systems

- Laboratory Information Management Systems (LIMS)
- Statistical Process Control (SPC)
- Big Data applications in analytical chemistry
- AI and Machine Learning for predictive quality
- Digital transformation strategies

- **Case Study:** Implementing predictive analytics to reduce process variability in chemical manufacturing.

Module 7: Environmental and Sustainability Analytics

- Water quality monitoring
- Air emissions analysis
- Waste characterization
- ESG reporting requirements
- Sustainable manufacturing metrics
- **Case Study:** Environmental monitoring program for a large industrial processing facility.

Module 8: Advanced Troubleshooting and Process Optimization

- Root Cause Analysis (RCA)
- Failure investigation methodologies
- Process deviation management
- Continuous improvement tools
- Risk-based decision making
- **Case Study:** Analytical investigation of production losses resulting in significant cost reduction and process efficiency gains.

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

Register Online Now

Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com