Smart Manufacturing in Chemical 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

Smart Manufacturing in Chemical Industries is transforming traditional chemical production into a highly intelligent, data-driven, automated, and connected ecosystem. By integrating Industry 4.0 technologies, Industrial IoT (IIoT), Artificial Intelligence (AI), Machine Learning (ML), and Digital Twins, chemical plants are achieving unprecedented levels of efficiency, safety, sustainability, and operational excellence. Smart Manufacturing in Chemical Industries Training Course is designed to equip professionals with cutting-edge skills to understand, design, and implement smart manufacturing systems tailored for chemical process industries.

The chemical industry is rapidly evolving toward predictive maintenance, real-time process optimization, cloud-based manufacturing execution systems (MES), and autonomous operations. With increasing global demand for safer, greener, and more efficient production systems, smart manufacturing is no longer optional it is a strategic necessity. This program empowers learners with hands-on knowledge of data analytics, automation systems, cybersecurity in industrial networks, and AI-driven process control, enabling organizations to reduce downtime, improve yield, and enhance regulatory compliance while embracing sustainable manufacturing practices.

Programme Curriculum

Smart Manufacturing in Chemical Industries Training Course

Introduction

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Course Duration

5 days

Course Objectives

1. Understand Industry 4.0 framework in chemical manufacturing ecosystems
2. Apply Industrial IoT (IIoT) architectures for real-time plant monitoring
3. Implement AI-powered predictive maintenance strategies
4. Design and simulate Digital Twin models for chemical processes
5. Optimize production using Big Data analytics and process mining
6. Enhance safety using smart sensors and automated hazard detection systems
7. Develop expertise in Advanced Process Control (APC) systems
8. Integrate Cloud Manufacturing Execution Systems (MES)
9. Improve asset reliability using predictive analytics and machine learning models
10. Strengthen cybersecurity using Industrial Cybersecurity frameworks (ICS Security)
11. Enable real-time supply chain visibility and smart logistics
12. Reduce carbon footprint using green manufacturing and sustainability analytics
13. Build competency in robotics and automation in chemical plants

Target Audience

1. Chemical Process Engineers
2. Plant Operations Managers
3. Automation & Control Engineers
4. Data Scientists in Manufacturing
5. Industrial IoT Developers
6. Maintenance & Reliability Engineers
7. Production Supervisors in Chemical Plants
8. Sustainability & Process Optimization Specialists

Course Modules

Module 1: Foundations of Smart Manufacturing & Industry 4.0

- Evolution from traditional to smart chemical plants
- Core principles of Industry 4.0
- Smart factory architecture
- Cyber-physical systems overview

- Data-driven manufacturing ecosystem
- **Case Study:** BASF smart production transformation using digital integration

Module 2: Industrial IoT (IIoT) in Chemical Plants

- Sensor networks and smart instrumentation
- Edge computing in chemical environments
- Real-time data acquisition systems
- IIoT communication protocols
- Asset connectivity and monitoring
- **Case Study:** Dow Chemical IIoT-enabled predictive monitoring system

Module 3: Artificial Intelligence & Machine Learning Applications

- AI models for process optimization
- Machine learning in quality prediction
- Anomaly detection systems
- Neural networks for chemical process control
- Data preprocessing and feature engineering
- **Case Study:** Siemens AI-based production optimization in chemical reactors

Module 4: Digital Twin Technology for Chemical Processes

- Concept of digital replication of plants
- Simulation and modeling tools
- Real-time synchronization with physical assets
- Scenario testing and optimization
- Lifecycle management using digital twins
- **Case Study:** Shell digital twin deployment for refinery optimization

Module 5: Advanced Process Control (APC) Systems

- Multivariable control systems
- Model Predictive Control (MPC)
- Process stability enhancement
- Automation hierarchy in plants
- Control loop optimization
- **Case Study:** ExxonMobil APC implementation for yield improvement

Module 6: Smart Maintenance & Predictive Analytics

- Predictive vs preventive maintenance
- Vibration and thermal analysis
- Machine learning-based failure prediction
- Asset health dashboards
- Maintenance optimization strategies
- **Case Study:** Chevron predictive maintenance reducing downtime by 30%

Module 7: Industrial Cybersecurity in Chemical Manufacturing

- ICS/SCADA security frameworks
- Threat detection in industrial networks

- Risk mitigation strategies
- Secure communication protocols
- Compliance and regulatory standards
- **Case Study:** Stuxnet lessons and modern chemical plant defense systems

Module 8: Sustainable & Autonomous Chemical Manufacturing

- Green manufacturing strategies
- Energy optimization systems
- Autonomous production systems
- Waste reduction using analytics
- ESG compliance and reporting
- **Case Study:** Unilever sustainable smart factory initiative

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:

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