Advanced Process Engineering and Optimization Training Course

Professional Development Training Course Outline

Category	General Training	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

In today's highly competitive industrial environment, organizations are increasingly focused on digital transformation, operational excellence, process optimization, sustainability, energy efficiency, Industry 4.0 integration, predictive analytics, and intelligent manufacturing systems. Advanced Process Engineering and Optimization equips professionals with the knowledge and practical tools required to enhance productivity, reduce operational costs, improve product quality, and achieve world-class manufacturing performance. Advanced Process Engineering and Optimization Training Course provides comprehensive insights into modern process engineering methodologies, advanced modeling techniques, process simulation, optimization algorithms, and performance improvement strategies applicable across various industrial sectors.

This intensive training program integrates Artificial Intelligence (AI), Machine Learning (ML), Digital Twins, Process Analytical Technology (PAT), Big Data Analytics, Lean Manufacturing, Six Sigma, Smart Manufacturing, Industrial Internet of Things (IIoT), and Advanced Process Control (APC) to address contemporary industry challenges. Participants will learn how to identify bottlenecks, optimize production systems, maximize asset utilization, improve process reliability, and implement sustainable engineering solutions through practical exercises, industry case studies, and real-world applications.

Programme Curriculum

Advanced Process Engineering and Optimization Training Course

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Course Objectives

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

1. Apply advanced Process Engineering Optimization Techniques to improve operational performance.
2. Utilize Digital Twin Technology for process modeling and simulation.
3. Implement Industry 4.0 Solutions for smart manufacturing environments.
4. Leverage Artificial Intelligence and Machine Learning for predictive process optimization.
5. Conduct advanced Process Simulation and Dynamic Modeling studies.
6. Optimize energy consumption using Energy Management Systems.
7. Apply Advanced Process Control (APC) methodologies.
8. Integrate Industrial IoT (IIoT) technologies for real-time monitoring.
9. Perform Root Cause Analysis and Reliability Engineering assessments.
10. Implement Lean Six Sigma Optimization Strategies.
11. Utilize Big Data Analytics and Predictive Maintenance tools.
12. Enhance process sustainability through Green Manufacturing Practices.
13. Develop continuous improvement frameworks for Operational Excellence and Business Transformation.

Target Audience

This course is designed for:

1. Process Engineers
2. Production Engineers
3. Chemical Engineers
4. Mechanical Engineers
5. Operations Managers
6. Plant Managers and Supervisors
7. Reliability and Maintenance Engineers
8. Manufacturing and Industrial Engineering Professionals

Course Modules

Module 1: Fundamentals of Advanced Process Engineering

- Process engineering principles
- Process lifecycle management
- System thinking methodologies
- Process performance indicators
- Case Study: World-class manufacturing transformation
- **Case Study:** Optimization of a chemical production facility through process redesign and performance benchmarking.

Module 2: Process Modeling and Simulation

- Steady-state modeling
- Dynamic process simulation
- Model validation techniques
- Process sensitivity analysis
- Simulation software applications
- **Case Study:** Simulation-driven optimization of refinery operations.

Module 3: Process Data Analytics

- Data acquisition systems
- Statistical process analysis
- Data visualization techniques
- Process performance dashboards
- Data-driven decision making
- **Case Study:** Using production data analytics to reduce manufacturing losses.

Module 4: Advanced Process Control (APC)

- Control loop optimization
- Multivariable control systems
- Model predictive control
- Real-time optimization
- Controller performance monitoring
- **Case Study:** APC implementation in petrochemical operations.

Module 5: Artificial Intelligence and Machine Learning Applications

- AI fundamentals for industry
- Machine learning algorithms
- Predictive process models
- Intelligent automation
- Process anomaly detection
- **Case Study:** AI-powered optimization in pharmaceutical manufacturing.

Module 6: Digital Twin Technology

- Digital twin architecture
- Virtual process environments
- Asset performance monitoring
- Predictive simulation
- Lifecycle optimization

- **Case Study:** Digital twin deployment in power generation facilities.

Module 7: Industrial Internet of Things (IIoT)

- Smart sensors and instrumentation
- Connectivity protocols
- Real-time monitoring systems
- Edge computing applications
- Cybersecurity fundamentals
- **Case Study:** IIoT-enabled smart manufacturing plant.

Module 8: Lean Manufacturing and Six Sigma

- Lean principles
- Waste elimination techniques
- Six Sigma methodologies
- DMAIC framework
- Continuous improvement tools
- **Case Study:** Lean transformation in automotive manufacturing.

Module 9: Energy Optimization and Sustainability

- Energy efficiency assessment
- Carbon footprint reduction
- Utility optimization
- Sustainable operations
- Green manufacturing initiatives
- **Case Study:** Energy optimization project reducing plant costs by 20%.

Module 10: Reliability and Asset Performance Management

- Reliability engineering principles
- Failure mode analysis
- Asset health monitoring
- Predictive maintenance
- Risk-based inspection
- **Case Study:** Reliability improvement in offshore production facilities.

Module 11: Process Safety and Risk Management

- Hazard identification
- HAZOP methodologies
- Risk assessment frameworks
- Safety integrity systems
- Emergency response planning
- **Case Study:** Process safety enhancement in a chemical processing plant.

Module 12: Bottleneck Analysis and Capacity Optimization

- Constraint identification
- Throughput analysis
- Production balancing

- Capacity planning
- Workflow optimization
- **Case Study:** Capacity expansion without capital investment.

Module 13: Supply Chain and Production Optimization

- Integrated planning systems
- Inventory optimization
- Demand forecasting
- Production scheduling
- Supply chain resilience
- **Case Study:** Supply chain optimization in consumer goods manufacturing.

Module 14: Operational Excellence Frameworks

- Performance management systems
- KPI development
- Benchmarking strategies
- Business process improvement
- Change management
- **Case Study:** Operational excellence journey in a global manufacturing company.

Module 15: Future Trends in Process Engineering

- Smart factories
- Autonomous operations
- AI-driven optimization
- Sustainable industrial transformation
- Emerging technologies
- **Case Study:** Next-generation intelligent manufacturing ecosystem.

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	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

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

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