Catalyst Management in Refineries 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

Catalyst management is a critical pillar in modern refinery operations, directly influencing hydrocarbon conversion efficiency, process optimization, emissions control, and operational profitability. As refineries evolve toward digital transformation, energy transition, and sustainability-driven operations, effective catalyst selection, handling, regeneration, and lifecycle optimization have become essential competencies. Poor catalyst management can lead to reduced throughput, increased downtime, higher energy consumption, and suboptimal product yields making this training vital for refinery engineers and operational leaders.

Catalyst Management in Refineries Training Course is designed to equip professionals with advanced knowledge of refinery catalysts, deactivation mechanisms, regeneration strategies, performance monitoring, and troubleshooting techniques. It integrates real-world refinery scenarios, industry best practices, and case-driven learning to enhance decision-making in FCC, hydrocracking, hydrotreating, reforming, and petrochemical integration units. Participants will gain the capability to optimize catalyst life cycle performance while aligning with asset integrity, process safety, and sustainability goals.

Programme Curriculum

Catalyst Management in Refineries Training Course

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Course Duration

5 days

Course Objectives

1. Understand fundamentals of refinery catalysts and reaction engineering
2. Analyze catalyst deactivation mechanisms
3. Optimize catalyst life cycle management strategies
4. Improve FCC, hydrocracking, and hydrotreating performance
5. Apply best practices in catalyst handling, loading, and unloading
6. Enhance process efficiency through catalyst optimization
7. Implement advanced catalyst regeneration techniques
8. Monitor catalyst performance using KPI and digital analytics tools
9. Reduce operational costs through predictive catalyst management
10. Strengthen process safety in catalyst operations
11. Identify and troubleshoot catalyst-related process failures
12. Align catalyst management with decarbonization and ESG goals
13. Integrate AI and data-driven refinery optimization techniques

Target Audience

- Refinery Process Engineers
- Chemical Engineers in Petrochemical Plants
- Operations and Production Supervisors
- Maintenance and Reliability Engineers
- FCC / Hydroprocessing Unit Operators
- Plant Managers and Technical Superintendents
- HSE and Process Safety Professionals
- Energy and Sustainability Analysts

Course Modules

Module 1: Refinery Catalysts Fundamentals

- Types of refinery catalysts
- Catalyst role in hydrocarbon processing
- Reaction kinetics and selectivity principles
- Catalyst support structures and formulation
- Industry catalyst innovations overview
- **Case Study:** FCC catalyst performance improvement in a Middle East refinery

Module 2: Catalyst Deactivation Mechanisms

- Coke formation and fouling impacts

- Poisoning by sulfur, nitrogen, metals
- Thermal degradation and sintering effects
- Feedstock-related catalyst stress factors
- Detection and diagnosis techniques
- **Case Study:** Hydrotreating catalyst poisoning in sour crude processing unit

Module 3: Catalyst Selection and Optimization

- Feedstock-catalyst compatibility analysis
- Activity vs selectivity trade-offs
- Vendor selection and benchmarking
- Catalyst grading and performance specs
- Optimization under refinery constraints
- **Case Study:** Catalyst selection optimization in hydrocracking unit

Module 4: Catalyst Loading, Unloading & Handling

- Safe handling and inerting procedures
- Reactor loading patterns and distribution
- Dust control and exposure risks
- Catalyst storage and transportation standards
- Shutdown and turnaround best practices
- **Case Study:** Catalyst loading failure prevention during FCC turnaround

Module 5: Catalyst Regeneration Technologies

- In-situ and ex-situ regeneration methods
- Burn-off techniques and oxidation control
- Regeneration efficiency monitoring
- Environmental compliance in regeneration
- Catalyst reuse and recycling strategies
- **Case Study:** FCC regenerator optimization improving yield recovery

Module 6: Catalyst Performance Monitoring

- Key performance indicators (KPI) tracking
- Pressure drop and conversion efficiency analysis
- Advanced process control systems
- Digital twins and predictive analytics
- Real-time monitoring tools
- **Case Study:** AI-based catalyst performance monitoring in refinery operations

Module 7: Troubleshooting Catalyst Failures

- Identifying early warning signals
- Root cause analysis (RCA) methods
- Process upset correlation
- Mitigation strategies and corrective actions
- Incident documentation and learning systems
- **Case Study:** Rapid catalyst deactivation in hydrotreater due to feed contamination

Module 8: Sustainable Catalyst Management & Digital Refining

- ESG integration in catalyst lifecycle
- Low-emission catalyst technologies
- Waste minimization and recycling
- AI and machine learning in catalyst optimization
- Future trends in refinery catalysis
- **Case Study:** Digital refinery transformation using predictive catalyst lifecycle modeling

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