Catalyst Selection and Performance Evaluation 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

The modern chemical and petrochemical industry demands high-efficiency processes, sustainable operations, and cost-effective production. Catalyst selection and performance evaluation play a pivotal role in optimizing reaction efficiency, maximizing yield, and reducing operational costs. Catalyst Selection and Performance Evaluation Training Course equips professionals with hands-on knowledge and practical insights into catalyst types, selection criteria, reaction kinetics, and performance monitoring, empowering them to make data-driven decisions for process optimization.

Through this comprehensive course, participants will gain expertise in catalyst characterization, deactivation analysis, reaction mechanism understanding, and process integration. Leveraging real-world case studies and industry benchmarks, the program ensures that participants can identify, evaluate, and implement catalysts effectively to drive innovation, sustainability, and profitability in their chemical processes.

Programme Curriculum

Catalyst Selection and Performance Evaluation Training Course

Introduction

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Course Objectives

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

1. Understand advanced catalyst selection criteria for diverse chemical processes.
2. Evaluate catalyst activity, selectivity, and stability in industrial reactions.
3. Analyze catalyst deactivation mechanisms and regeneration strategies.
4. Apply kinetic modeling for reaction and catalyst performance optimization.
5. Implement process simulation tools for catalyst evaluation.
6. Conduct characterization techniques including BET, XRD, TEM, and FTIR.
7. Optimize heterogeneous and homogeneous catalysts for efficiency.
8. Integrate green chemistry principles in catalyst selection.
9. Design and interpret pilot-scale experiments for catalyst screening.
10. Utilize data analytics and AI-based tools for performance prediction.
11. Benchmark catalysts against industry standards and best practices.
12. Troubleshoot operational issues using real-world case studies.
13. Enhance process profitability through strategic catalyst management.

Target Audience

- Chemical Engineers
- Process Engineers
- Research & Development Scientists
- Production Managers
- Catalysis Specialists
- Industrial Chemists
- Quality Control & Assurance Professionals
- Graduate Students in Chemical Engineering or Industrial Chemistry

Course Modules

Module 1: Introduction to Catalysis

- Fundamentals of catalysis and reaction mechanisms
- Classification of catalysts: homogeneous vs. heterogeneous
- Role of catalysts in process efficiency and sustainability
- Case study: Selection of catalysts in petrochemical reforming
- Industry trends in catalyst innovation

Module 2: Catalyst Selection Criteria

- Physical and chemical properties impacting performance
- Activity, selectivity, and stability considerations

- Economic and environmental factors in selection
- Case study: Choosing catalysts for ammonia synthesis
- Decision-making frameworks for catalyst selection

Module 3: Catalyst Characterization Techniques

- BET surface area analysis
- X-ray diffraction (XRD) and electron microscopy
- Spectroscopic methods-FTIR, NMR, UV-Vis
- Thermal analysis-TGA, DSC
- Case study: Characterization of supported metal catalysts

Module 4: Catalyst Deactivation and Regeneration

- Causes of deactivation: fouling, poisoning, sintering
- Methods for monitoring catalyst lifespan
- Regeneration strategies for industrial catalysts
- Case study: Regeneration of fluidized-bed catalysts
- Predictive maintenance for catalyst performance

Module 5: Reaction Kinetics and Modeling

- Fundamentals of reaction kinetics
- Rate laws and mechanistic modeling
- Computational tools for kinetic analysis
- Case study: Kinetic modeling in biodiesel production
- Optimization of reaction conditions

Module 6: Pilot-Scale Evaluation and Screening

- Laboratory vs. pilot-scale performance evaluation
- Screening techniques for catalyst efficiency
- Scale-up challenges and solutions
- Case study: Pilot testing of hydrocracking catalysts
- Data analysis and interpretation

Module 7: Process Integration and Optimization

- Integration of catalysts in continuous processes
- Process simulation and design tools
- Energy and cost optimization strategies
- Case study: Catalytic cracking process optimization
- Lean and green process integration

Module 8: Industry Case Studies and Emerging Trends

- Case studies from petrochemicals, pharmaceuticals, and fine chemicals
- AI and machine learning in catalyst performance prediction
- Sustainable and green catalysts
- Recent innovations in nanocatalysts
- Future trends and research directions

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

Start Date	End Date	Location	Price
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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