# Hydrotreating Technology Training Course

Professional Development Training Course Outline

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| **Category** | Oil and Gas | **Duration** | 5 Days |
| **Base Fee** | $1,500 USD | **Delivery Mode** | Online / On-site Hybrid |

## Course Introduction

Hydrotreating technology plays a critical role in the petroleum refining industry by enhancing product quality, removing impurities, and meeting stringent environmental regulations. Hydrotreating Technology Training Course is designed to provide a deep understanding of hydrotreating processes, reactor design, catalyst performance, operating conditions, feedstock treatment, and process optimization. It focuses on the latest trends in cleaner fuel production, sulfur reduction, and advanced catalytic technology integration to equip participants with real-world skills to improve refinery efficiency.

In an increasingly sustainability-driven and competitive market, knowledge of hydrotreating units is vital for process engineers, technical staff, and refinery managers. This course will address recent innovations such as ultra-low sulfur diesel production, bio-feedstock compatibility, and lifecycle performance assessment. It integrates theoretical concepts with practical case studies and operational troubleshooting techniques. By the end of this course, participants will gain actionable insights into reducing emissions, increasing throughput, enhancing catalyst life, and aligning with global fuel specifications.

## Programme Curriculum

**Hydrotreating Technology Training Course**

**Introduction**

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**Course Objectives**

1. Understand the core principles and mechanisms of hydrotreating reactions.
2. Analyze hydrodesulfurization (HDS) and hydrodenitrogenation (HDN) pathways.
3. Evaluate hydrotreating catalyst types, properties, and selection criteria.
4. Optimize process parameters for improved product yields and performance.
5. Identify and troubleshoot common operational issues in hydrotreaters.
6. Examine the impact of feedstock variability on hydrotreating efficiency.
7. Explore ultra-low sulfur diesel (ULSD) production technologies.
8. Understand reactor design, internals, and catalyst loading strategies.
9. Review process safety considerations and environmental compliance.
10. Study the integration of hydrotreating with other refinery units.
11. Assess life cycle and regeneration of hydrotreating catalysts.
12. Evaluate bio-feedstock processing and renewable fuel trends.
13. Implement digital monitoring tools and predictive maintenance.

**Target Audiences**

1. Process Engineers
2. Refinery Technologists
3. Chemical Engineers
4. Operations Supervisors
5. Catalyst Specialists
6. HSE Professionals in Refining
7. Quality Control Managers
8. Technical Trainers in Refining

**Course Duration:** 5 days

**Course Modules**

**Module 1: Introduction to Hydrotreating Technology**

- Overview of hydrotreating in modern refining
- Key reaction mechanisms (HDS, HDN, HDO, HDA)
- Importance of hydrogen management
- Regulatory drivers for hydrotreating (IMO, EPA, Euro VI)
- Feedstock characteristics and impact on processing
- **Case Study:** Evolution of ULSD hydrotreaters in Europe

**Module 2: Hydrotreating Catalysts and Kinetics**

- Catalyst classification and properties
- Catalyst deactivation and regeneration
- Reaction kinetics and rate-limiting steps
- Catalyst loading strategies and reactor internals
- Catalyst vendors and performance benchmarking

- **Case Study:** Catalyst optimization for Middle East diesel feedstock

**Module 3: Reactor Design and Equipment**

- Reactor types and design principles
- Flow distribution and pressure drop management
- Heat exchangers and temperature control
- Startup and shutdown best practices
- Internals maintenance and reliability issues
- **Case Study:** Revamp of a hydrotreating reactor in Asia-Pacific

**Module 4: Process Optimization and Control**

- Monitoring key process variables (temperature, pressure, LHSV)
- Feed pre-treatment strategies
- Hydrogen consumption control
- Online analyzers and automation systems
- Process debottlenecking and performance improvement
- **Case Study:** Optimization of HDS performance using digital twins

**Module 5: Environmental and Safety Considerations**

- SOx/NOx emissions reduction
- Safety protocols in hydrogen-rich environments
- Waste treatment and water reuse
- Flare minimization and gas recovery systems
- Compliance with international safety standards
- **Case Study:** Incident analysis from a refinery hydrogen fire

**Module 6: Integration with Refinery Units**

- Linking hydrotreating with FCC, reformers, and hydrocrackers
- Blending strategies and product stream management
- Hydrogen plant interaction
- Impact on overall refinery energy balance
- Cross-functional optimization opportunities
- **Case Study:** Multi-unit integration in a US Gulf Coast refinery

**Module 7: Advanced Hydrotreating for Renewables**

- Processing of bio-feedstocks (vegetable oil, used cooking oil)
- Co-processing strategies in existing units
- Challenges in catalyst fouling and compatibility
- Renewable diesel and SAF production
- Technology licensors and global adoption
- **Case Study:** Bio-feedstock retrofitting in a European refinery

**Module 8: Digital Tools and Future Trends**

- Digital twin applications and simulations
- Predictive analytics for catalyst life extension
- AI/ML in process optimization
- Remote diagnostics and smart sensors
- Emerging technologies in hydrotreating
- **Case Study:** AI-driven shutdown avoidance in Southeast Asia

**Training Methodology**

- Instructor-led presentations with visual process simulations
- Group discussions and breakout technical analysis
- Real-life case studies and troubleshooting workshops
- Hands-on exercises with process flow diagrams (PFDs)
- Interactive Q&A and assessments for learning retention
- Post-training access to reading materials and software demos

**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 |

| Start Date | End Date | Location | Price |
|---|---|---|---|
| **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