Training Course on Petroleum Refining Process Optimization

Professional Development Training Course Outline

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

Course Introduction

In today’s rapidly evolving energy sector, petroleum refining process optimization is a critical strategy for improving operational efficiency, reducing costs, and maximizing output quality. With fluctuating global oil prices and increasing environmental regulations, refining facilities must enhance throughput, adopt data-driven techniques, and leverage advanced digital tools to remain competitive. Training Course on Petroleum Refining Process Optimization is designed to equip professionals with the skills and knowledge necessary to understand, evaluate, and implement optimization solutions across all phases of refining processes.

Participants will learn to apply cutting-edge technologies such as AI in process optimization, real-time analytics, catalytic reforming, and energy integration techniques to enhance the performance of key refining units like crude distillation, hydrocracking, and FCC. Through case studies, expert instruction, and interactive learning modules, attendees will gain practical insights into refining economics, troubleshooting techniques, sustainability integration, and digital transformation in refinery operations.

Programme Curriculum

Training Course on Petroleum Refining Process Optimization

Introduction

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Course Objectives

1. Understand the fundamentals of refining process flow optimization.
2. Improve crude oil distillation efficiency using process modeling techniques.
3. Analyze and enhance the performance of hydrocracking and FCC units.
4. Apply energy integration and heat recovery strategies to lower OPEX.
5. Implement AI-driven process control and predictive maintenance solutions.
6. Evaluate refinery margins and economic performance drivers.
7. Enhance product yield optimization and minimize losses.
8. Leverage digital twins and real-time simulation in refining.
9. Master techniques for equipment reliability and downtime reduction.
10. Integrate sustainability practices and emissions control technologies.
11. Improve refinery supply chain and logistics for crude/feedstock planning.
12. Conduct effective root cause analysis and troubleshooting in refining units.
13. Understand global refining trends and benchmarking best practices.

Target Audience

1. Refinery Process Engineers
2. Petroleum Technologists
3. Plant Managers & Operations Heads
4. Mechanical & Instrumentation Engineers
5. Refinery Planning & Scheduling Professionals
6. Environmental and Safety Officers
7. Energy Consultants and Auditors
8. Chemical Engineering Students & Interns

Course Modules

Module 1: Introduction to Petroleum Refining

- Overview of crude oil types
- Refinery configurations (topping, hydroskimming, complex)
- Primary vs secondary processing
- Basic refinery flow diagrams
- Product specifications and market demands
- **Case Study**: Evolution of a complex refinery configuration in the Middle East

Module 2: Crude Distillation Unit (CDU) Optimization

- Pre-heat train analysis
- Column internals and pressure control
- Overflash and reflux ratio tuning
- Heat integration techniques
- Fouling and energy loss reduction
- **Case Study**: CDU throughput improvement in a US Gulf Coast refinery

Module 3: Vacuum Distillation Unit (VDU) Enhancements

- VDU operating parameters
- Managing coke formation
- Ejector and vacuum system optimization
- Distillation curve analysis
- Integration with downstream units
- **Case Study**: VDU reliability improvement at a Southeast Asian plant

Module 4: Fluid Catalytic Cracking (FCC) Optimization

- Catalyst selection and activity monitoring
- Regenerator temperature control
- Feedstock properties and reaction severity
- Fractionator and gas plant optimization
- Emissions and flare minimization
- **Case Study**: FCCU yield improvement through catalyst reformulation

Module 5: Hydrocracking Process Efficiency

- Reactor design and catalyst type
- Hydrogen purity and availability
- Temperature and pressure control
- Product selectivity and conversion
- Equipment fouling management
- **Case Study**: Hydrocracker revamp in a European refinery

Module 6: Reforming and Isomerization Optimization

- Catalytic reforming reaction mechanism
- Platforming technology upgrades
- Octane number improvement strategies
- Feedstock pretreatment
- Catalyst regeneration cycles
- **Case Study**: Isomerization unit profitability enhancement in India

Module 7: Energy Integration in Refineries

- Pinch analysis fundamentals
- Heat exchanger network design
- Utility cost analysis
- Heat recovery optimization
- Steam system efficiency
- **Case Study**: Heat integration project saving $3M annually in Canada

Module 8: Process Safety and Reliability

- HAZOP and LOPA analysis
- Asset integrity management
- Safety Instrumented Systems (SIS)
- Predictive maintenance tools
- Alarm management strategies
- **Case Study**: Turnaround-driven reliability overhaul in Brazil

Module 9: Environmental Compliance and Emission Control

- Sulfur recovery units
- Flaring and VOC control

- CO? capture and reduction technologies
- Water treatment optimization
- Waste heat utilization
- **Case Study**: Emission reduction initiative in a Scandinavian refinery

Module 10: Refining Economics and Margin Management

- Crack spreads and netback calculations
- Product blending economics
- Inventory and working capital optimization
- Linear programming models
- Yield improvement vs cost trade-off
- **Case Study**: Margin optimization strategy in West Africa

Module 11: Advanced Process Control (APC) in Refineries

- APC vs base layer control
- Model predictive control (MPC)
- Soft sensors and inferential controls
- APC implementation lifecycle
- APC ROI assessment
- **Case Study**: FCCU APC deployment for 10% throughput gain

Module 12: Refinery-Wide Digital Transformation

- Role of IIoT in refining
- Building digital twins
- Cloud-based process monitoring
- Data analytics for process optimization
- Cybersecurity in oil and gas
- **Case Study**: Digital twin application in an integrated refinery

Module 13: Root Cause Analysis and Troubleshooting

- Structured problem-solving techniques
- Equipment failure analysis
- Process deviation identification
- Historical data evaluation
- Human factor impact
- **Case Study**: RCA-driven solution to chronic pump failures

Module 14: Supply Chain and Feedstock Planning

- Crude assay and compatibility
- Refinery LP modeling
- Blending and dispatch planning
- Inventory forecasting
- Logistics optimization
- **Case Study**: Crude slate selection enhancing profitability

Module 15: Global Trends and Sustainability in Refining

- Decarbonization and renewable fuels
- ESG frameworks and reporting
- Hydrogen economy impact
- Circular economy applications

- Transition strategies for legacy assets
- **Case Study**: Green refinery conversion project in Europe

Training Methodology

- Interactive lectures using visual process diagrams
- Hands-on simulations with real refinery datasets
- Live case study reviews and group problem-solving
- Quizzes and knowledge checks after each module
- Final project presentation on optimization strategy
- Access to digital course materials and tools

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

Start Date	End Date	Location	Price
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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