Process Hazard Analysis (PHA) Techniques 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

Process Hazard Analysis (PHA) Techniques Training Course is a highly specialized industrial safety, risk assessment, and process safety management (PSM) program designed to equip professionals with advanced skills to identify, evaluate, and control hazards in high-risk process industries. This course focuses on globally recognized methodologies such as HAZOP (Hazard and Operability Study), What-If Analysis, FMEA (Failure Modes and Effects Analysis), Bowtie Risk Analysis, and LOPA (Layers of Protection Analysis) to ensure robust hazard identification and mitigation strategies. It is aligned with modern OSHA, EPA, IEC 61511, and API standards, making it essential for oil & gas, petrochemical, chemical, manufacturing, and energy sectors.

In today’s fast-evolving industrial environment, organizations are prioritizing process safety excellence, operational risk management, and predictive hazard control systems to prevent catastrophic incidents. This training provides deep insights into risk-based decision-making, safety lifecycle management, barrier integrity, and incident prevention frameworks. Participants will learn how to conduct structured hazard reviews, develop risk control measures, and strengthen safety culture using advanced engineering safety analysis tools and digital PHA software applications, ensuring compliance, resilience, and operational excellence.

Programme Curriculum

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5 days

Course Objectives

1. Master Process Hazard Analysis (PHA) methodologies for industrial safety
2. Apply HAZOP study techniques for systematic hazard identification
3. Perform What-If risk assessments for process deviation analysis
4. Execute FMEA for equipment failure prediction and prevention
5. Implement Bowtie analysis for barrier-based risk visualization
6. Understand LOPA for independent protection layer evaluation
7. Strengthen Process Safety Management (PSM) compliance systems
8. Identify operational hazards in chemical and industrial processes
9. Develop risk mitigation and control strategies using engineering tools
10. Enhance incident investigation and root cause analysis skills
11. Apply quantitative and qualitative risk assessment techniques
12. Improve safety integrity level (SIL) understanding and application
13. Build competency in digital PHA tools and safety lifecycle management

Target Audience

1. Process Engineers
2. Safety Engineers & HSE Professionals
3. Chemical Engineers
4. Oil & Gas Industry Technicians
5. Plant Managers & Operations Supervisors
6. Risk & Reliability Engineers
7. Maintenance Engineers
8. Compliance & Regulatory Officers

Course Modules

Module 1: Introduction to Process Safety & PHA Framework

- Fundamentals of Process Safety Management (PSM)
- Overview of PHA lifecycle and safety systems
- Regulatory compliance
- Hazard identification principles in industries

- Safety culture and organizational risk mindset
- **Case Study:** BP Texas City Refinery Explosion analysis using PHA failures

Module 2: HAZOP Study Techniques

- Guide words methodology
- Node-based process analysis
- Deviation identification techniques
- Risk ranking and prioritization
- HAZOP team structuring and facilitation
- **Case Study:** LNG plant HAZOP study for leak prevention

Module 3: What-If Analysis & Checklist Method

- Structured brainstorming techniques
- Scenario-based hazard identification
- Checklist development for process safety
- Simple vs complex system analysis
- Risk ranking and mitigation planning
- **Case Study:** Chemical storage facility spill prevention review

Module 4: FMEA (Failure Modes and Effects Analysis)

- Failure mode identification techniques
- Severity, occurrence, detection scoring
- Risk Priority Number (RPN) calculation
- Equipment reliability improvement strategies
- Maintenance optimization through FMEA
- **Case Study:** Pump failure analysis in petrochemical plant

Module 5: Bowtie Risk Analysis

- Threats, top events, and consequences mapping
- Barrier identification and classification
- Preventive vs mitigative controls
- Visualization of complex risk pathways
- Barrier effectiveness evaluation
- **Case Study:** Gas pipeline rupture scenario modeling

Module 6: LOPA (Layers of Protection Analysis)

- Independent protection layers (IPL) concept
- Risk tolerance and frequency estimation
- SIL determination basics
- Scenario-based risk reduction
- Validation of safety systems
- **Case Study:** Reactor overpressure protection system

Module 7: Quantitative Risk Assessment (QRA)

- Frequency and consequence modeling
- Risk matrices and heat maps

- Explosion, fire, and toxic release modeling
- Individual & societal risk concepts
- Decision-making using risk thresholds
- **Case Study:** Offshore drilling platform risk modeling

Module 8: Incident Investigation & Root Cause Analysis

- RCA methodologies
- Incident data interpretation
- Barrier failure analysis
- Corrective and preventive actions (CAPA)
- Learning from major industrial accidents
- **Case Study:** Fukushima nuclear disaster root cause breakdown

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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