Pharmaceutical Utilities Engineering Training Course

Professional Development Training Course Outline

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

Course Introduction

The pharmaceutical industry operates within highly regulated environments where Pharmaceutical Utilities Engineering plays a critical role in ensuring product quality, regulatory compliance, operational efficiency, and contamination control. Modern pharmaceutical facilities rely on sophisticated utility systems including Water for Injection (WFI), Purified Water (PW), Clean Steam, HVAC systems, compressed gases, vacuum systems, chilled water, and building management systems (BMS) to support manufacturing operations. With increasing emphasis on digital transformation, Industry 4.0, sustainability engineering, data integrity, energy optimization, and GMP compliance, organizations require highly skilled professionals capable of designing, operating, validating, and maintaining critical utility infrastructure.

Pharmaceutical Utilities Engineering Training Course provides participants with advanced knowledge of pharmaceutical utility systems, engineering design principles, qualification strategies, risk management methodologies, and regulatory requirements. The program integrates global standards, real-world industrial applications, engineering best practices, and case studies from leading pharmaceutical facilities. Participants will gain practical insights into utility lifecycle management, utility validation, predictive maintenance, contamination prevention, and sustainable engineering solutions that enhance operational reliability and regulatory readiness.

Programme Curriculum

Pharmaceutical Utilities Engineering Training Course

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Course Objectives

Upon completion of this course, participants will be able to:

1. Understand critical pharmaceutical utility systems and GMP requirements.
2. Apply Quality Risk Management (QRM) principles to utility engineering.
3. Design compliant Purified Water and WFI systems.
4. Optimize HVAC and cleanroom engineering performance.
5. Implement utility qualification and validation programs.
6. Improve utility reliability using Predictive Maintenance Technologies.
7. Apply Industry 4.0 and Smart Utility Monitoring solutions.
8. Develop contamination control strategies for utility systems.
9. Interpret international regulatory expectations and engineering standards.
10. Perform utility system troubleshooting and root cause analysis.
11. Enhance energy efficiency and sustainability performance.
12. Utilize digital monitoring, SCADA, and Building Management Systems.
13. Manage utility lifecycle engineering and continuous improvement initiatives.

Target Audience

1. Pharmaceutical Engineers
2. Utility Engineers
3. Maintenance Engineers
4. Validation Specialists
5. Facility Managers
6. Manufacturing Managers
7. Quality Assurance Professionals
8. Technical Services and Engineering Consultants

Course Modules

Module 1: Fundamentals of Pharmaceutical Utilities

- Overview of pharmaceutical utility systems

- Utility classifications and applications
- GMP requirements for utilities
- Critical versus non-critical utilities
- Utility lifecycle management
- **Case Study:** Utility assessment of a sterile manufacturing facility.

Module 2: Pharmaceutical Water Systems Engineering

- Purified Water (PW) fundamentals
- Water for Injection (WFI) generation
- Storage and distribution systems
- Biofilm prevention strategies
- Water system monitoring
- **Case Study:** Investigation of microbial excursions in PW systems.

Module 3: Clean Steam Systems

- Clean steam generation principles
- Steam quality requirements
- Distribution network design
- Condensate management
- Steam validation practices
- **Case Study:** Clean steam contamination event analysis.

Module 4: HVAC Systems for Pharmaceutical Facilities

- HVAC design fundamentals
- Air handling units (AHUs)
- Pressure differentials
- Airflow visualization techniques
- HVAC performance qualification
- **Case Study:** HVAC redesign for contamination control improvement.

Module 5: Cleanroom Engineering

- ISO cleanroom classifications
- Environmental control strategies
- Particle management
- Cleanroom airflow design
- Monitoring systems
- **Case Study:** Cleanroom compliance improvement project.

Module 6: Compressed Air and Gas Systems

- Pharmaceutical compressed air requirements
- Gas purity standards
- Filtration technologies
- Distribution system design
- Monitoring and testing
- **Case Study:** Compressed air contamination investigation.

Module 7: Chilled Water and Cooling Systems

- Chilled water system design
- Cooling load calculations
- Utility integration
- Performance optimization
- Reliability engineering
- **Case Study:** Energy optimization of cooling utilities.

Module 8: Utility Qualification and Validation

- Design Qualification (DQ)
- Installation Qualification (IQ)
- Operational Qualification (OQ)
- Performance Qualification (PQ)
- Continued process verification
- **Case Study:** Qualification of a new WFI generation plant.

Module 9: Building Management Systems (BMS) and SCADA

- BMS architecture
- SCADA integration
- Alarm management
- Data acquisition systems
- Utility automation
- **Case Study:** Smart utility monitoring implementation.

Module 10: Utility Risk Management

- Risk assessment methodologies
- Failure Mode and Effects Analysis (FMEA)
- Hazard identification
- Risk mitigation planning
- Continuous risk review
- **Case Study:** Risk assessment for critical utilities.

Module 11: Maintenance and Reliability Engineering

- Preventive maintenance programs
- Predictive maintenance technologies
- Reliability-centered maintenance (RCM)
- Asset management
- Failure analysis
- **Case Study:** Reducing utility downtime through predictive analytics.

Module 12: Energy Efficiency and Sustainability

- Energy auditing techniques
- Utility optimization programs
- Carbon footprint reduction
- Sustainable facility design
- Green engineering initiatives
- **Case Study:** Utility sustainability transformation project.

Module 13: Regulatory Compliance and GMP Requirements

- GMP utility requirements
- Regulatory inspection readiness
- Documentation practices
- Data integrity requirements
- Compliance management systems
- **Case Study:** Regulatory observations related to utilities.

Module 14: Troubleshooting and Root Cause Analysis

- Utility failure investigations
- Root cause methodologies
- Corrective and Preventive Actions (CAPA)
- Performance monitoring
- Continuous improvement
- **Case Study:** WFI distribution system failure investigation.

Module 15: Future Trends in Pharmaceutical Utilities

- Industry 4.0 applications
- Digital twins
- Artificial Intelligence in utilities
- IoT-enabled utility monitoring
- Smart pharmaceutical facilities
- **Case Study:** Digital utility transformation in a modern pharmaceutical plant.

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
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

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