Drying and Dehydration Technology and Kinetics Training Course

Professional Development Training Course Outline

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

Course Introduction

Drying and dehydration technology plays a critical role in food processing, pharmaceutical industries, chemical engineering, and advanced material sciences. As global industries adopt innovative solutions for product preservation and shelf-life extension, understanding drying kinetics and modern dehydration techniques becomes a key professional competency. Drying and Dehydration Technology and Kinetics Training Course integrates trending knowledge on drying efficiency, dehydration kinetics, energy optimization, and sustainable process design to equip participants with hands-on expertise.

By combining advanced simulation techniques, pilot-scale demonstrations, and practical case studies, this program offers participants an in-depth understanding of both conventional and emerging drying technologies. The training emphasizes smart manufacturing, green energy adoption, process intensification, and real-world industry applications to ensure participants gain a future-proof skillset that enhances industrial competitiveness.

Programme Curriculum

Drying and Dehydration Technology and Kinetics Training Course

Introduction

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Course Objectives

1. Understand the fundamentals of drying and dehydration kinetics.
2. Analyze moisture transfer mechanisms in drying processes.
3. Evaluate drying rate curves and drying efficiency parameters.
4. Learn thermal drying, freeze drying, and spray drying technologies.
5. Integrate computational models for drying kinetics.
6. Apply energy optimization strategies in drying processes.
7. Explore industrial-scale drying equipment and their applications.
8. Implement sustainable dehydration methods.
9. Assess drying-related product quality parameters.
10. Study industrial case studies on food, pharmaceutical, and chemical drying.
11. Develop troubleshooting techniques for drying systems.
12. Understand advanced dehydration control systems.
13. Apply predictive modeling for drying kinetics in real-time scenarios.

Organizational Benefits

1. Improved product quality and consistency.
2. Enhanced operational efficiency in drying units.
3. Reduced energy consumption in industrial processes.
4. Increased competitiveness through advanced technology adoption.
5. Access to industry-specific drying and dehydration solutions.
6. Strengthened research and development capabilities.
7. Better compliance with safety and sustainability standards.
8. Greater workforce competency in modern drying processes.
9. Improved return on investment through optimized drying systems.
10. Enhanced innovation capacity in product preservation and processing.

Target Audiences

1. Food technologists and process engineers
2. Pharmaceutical manufacturing professionals
3. Chemical engineers and material scientists
4. Agricultural and postharvest specialists
5. R&D researchers in dehydration technologies
6. Quality assurance and control managers
7. Energy efficiency and sustainability officers
8. Academic faculty and postgraduate students

Course Duration: 10 days

Course Modules

Module 1: Fundamentals of Drying and Dehydration

- Principles of heat and mass transfer in drying
- Classification of drying processes
- Role of humidity and temperature in dehydration
- Industrial applications of drying technology
- Moisture sorption isotherms and their significance
- Case Study: Drying of cereal grains

Module 2: Drying Kinetics and Mechanisms

- Moisture transport phenomena in porous materials
- Constant rate and falling rate drying periods
- Drying rate curve analysis
- Role of diffusion and capillary action
- Mathematical modeling of drying kinetics
- Case Study: Kinetics of fruit dehydration

Module 3: Thermal Drying Methods

- Conduction drying technologies
- Convection drying applications
- Radiation drying in industrial processes
- Heat transfer efficiency improvements
- Hybrid thermal drying approaches
- Case Study: Thermal drying of pharmaceuticals

Module 4: Freeze Drying (Lyophilization)

- Principles of sublimation and phase diagrams
- Equipment design and operation for freeze dryers
- Product stability and rehydration properties
- Limitations of freeze drying processes
- Industrial-scale applications in pharmaceuticals and food
- Case Study: Freeze drying of vaccines

Module 5: Spray Drying Technology

- Atomization principles and equipment
- Droplet drying kinetics
- Particle morphology and powder properties
- Energy utilization in spray drying
- Applications in food and bioproducts
- Case Study: Spray drying of milk powder

Module 6: Fluidized Bed and Drum Drying

- Fluidization principles and mechanics
- Heat and mass transfer in fluidized drying
- Drum drying design and applications
- Energy consumption patterns
- Process monitoring and control strategies
- Case Study: Fluidized drying of pharmaceuticals

Module 7: Advanced Drying Equipment

- Rotary dryers and tunnel dryers
- Vacuum dryers and microwave dryers
- Solar drying applications
- Pilot-scale dryers for R&D
- Process intensification in modern dryers
- Case Study: Solar drying of agricultural produce

Module 8: Dehydration Kinetics Modeling

- Empirical modeling techniques
- Semi-theoretical drying models
- Computational fluid dynamics (CFD) in drying
- Artificial intelligence in drying kinetics
- Real-time predictive modeling
- Case Study: CFD analysis of drying herbs

Module 9: Product Quality and Drying Parameters

- Nutritional changes during dehydration
- Physical changes in structure and texture
- Flavor and aroma retention
- Shelf life extension strategies
- Microbiological safety in dried products
- Case Study: Nutrient retention in dehydrated vegetables

Module 10: Energy Efficiency in Drying

- Energy audit in drying systems
- Heat recovery technologies
- Renewable energy integration
- Design of energy-efficient dryers
- Industrial sustainability strategies
- Case Study: Energy optimization in tea drying

Module 11: Industrial Drying in Food Sector

- Drying of fruits and vegetables
- Drying of dairy products
- Drying of meat and fish
- Drying of bakery products
- Challenges in large-scale food drying
- Case Study: Industrial drying of instant coffee

Module 12: Industrial Drying in Pharmaceuticals

- Dehydration of powders and granules
- Drying of tablets and capsules
- Sterility and product safety
- GMP requirements in pharmaceutical drying
- Validation of drying processes

- Case Study: Drying of antibiotics

Module 13: Industrial Drying in Chemicals and Materials

- Drying of polymers and resins
- Drying of inorganic salts and powders
- Impact of drying on material properties
- Drying hazards in chemical industries
- Specialized drying equipment for chemicals
- Case Study: Drying of specialty polymers

Module 14: Troubleshooting Drying Systems

- Common operational problems
- Moisture uniformity issues
- Over-drying and under-drying risks
- Safety concerns in drying plants
- Control strategies for troubleshooting
- Case Study: Troubleshooting in pharmaceutical drying

Module 15: Future Trends in Drying and Dehydration

- Smart drying technologies
- AI and IoT in drying systems
- Sustainable process design
- 3D drying simulation tools
- Integration of Industry 4.0 in dehydration
- Case Study: Digital twin applications in drying kinetics

Training Methodology

- Instructor-led expert presentations
- Interactive case study discussions
- Hands-on simulation exercises
- Industrial visits and pilot plant demonstrations
- Group-based problem-solving sessions
- Knowledge assessment and feedback review

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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