

# Scientific Products Lyophilization Training

Industry-leading training programs and packages that include hands-on and remote learning opportunities representing a range of methods, topics, applications, and tools



# Lyophilization Cycle Development & Optimization: A Hands-On Laboratory Based Approach



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Don't miss this unique opportunity to participate in the most comprehensive freeze-drying course in the industry!

This week-long course combines hands-on lab sessions with classroom lectures for an all-encompassing learning and networking experience.

Topics include lyophilization theory, cycle design, formulation basics, pre- and post- analytics from presenters including Biopharma Group, Lighthouse Instruments, Lyophilization Technology, Mettler Toledo, Physical Sciences, Inc., Thermo Fisher Scientific and Temptris.

Completion of this course will provide fundamental understanding of pilot freeze dryers including functions, startup, testing, basic preventative maintenance, and minor troubleshooting.

## **Course Objectives At-A-Glance:**

- Cycle development initial optimization
- Formulation considerations and characterization
- Utilizing differential scanning calorimetry and freeze-drying microscopy in the development of the cycle
- Creating and running the freeze-drying cycle based on data obtained by analysis
- Troubleshooting problematic cycles
- Considerations for transferring freeze-drying cycles from one lyophilizer to another
- Vial headspace analysis

## **Registration**

The registration fee includes course manuals, lodging, and meals. In order to maintain the high quality of our workshops, our seating is limited, so please register early. No registrations will be accepted at the door. Seating is assigned as a first come first served basis.

## **Cancellations**

Refund requests must be in writing. You will receive a full refund or the option to attend the next available course if we are notified of your cancellation up to 2 weeks prior to the start of the training course. If we are notified of your cancellation within 2 weeks of the start date, 50% of the registration fee will be refunded.

# Freeze Dryer Systems Training

**Benefit from lyophilization training at every level from our experts, on-site at our facilities.**

Courses include quizzes, notebook, thumb drive with course materials, and a certificate of completion.

## Workshop Details

Each training is a 3-Day program.

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## Fundamentals I: Basic Freeze Dryer Operation and Maintenance

### Freeze Dryer Overview

- Refrigeration Circuit
- Electrical & Control Systems
- System & Process Integration
- Maintenance
- Safety Highlight

### Freeze Dryer Sub-Systems

- Circulation Vacuum
- Hydraulic Temperature
- Steam

### Compressor Systems

- Dunham/Bush Carlyle
- Mycom
- Copeland

## Fundamentals II: Advanced Freeze Dryer Operation and Maintenance

### Freeze Dryer Overview

- Compressor Use & Types
- Compound Compressors
- Compressor Failures
- Industry Efficiency Standard

### Refrigeration Loops

- Basic Refrigerant Flow
- Proportional Refrigeration Flow
- Cascade Systems
- Auto-Cascade Systems
- Capillary Tube Shelf Control Systems

## Diagnostic Workshop - Understanding Methodology

This is an advanced program developed for individuals with at least 5 years of industry experience.

### Sub-Systems

- Circulation
- Vacuum
- Hydraulic
- Compressors

### Refrigeration Loops

- Refrigeration Control Devices
- Compressor Operation
- Compressor Ratio
- Volumetric Efficiency

## Pilot Freeze Dryer Systems Training

Freeze Dryer models covered include: Advantage, Advantage Pro, General Purpose Freeze Dryer, Freezemobile, Genesis, Ultra and LyoStar.

### Freeze Dryer Overview

- Freeze-Drying Basics
- Freeze Dryer Components

### Sub-Systems

- Refrigeration Systems
- Vacuum Systems
- Heat Transfer Fluid Systems
- Hydraulic Systems
- Control Systems

### Freeze Dryer Processes

- Installation and Start-up
- Hands-on Training

# Remote Lyophilization Training Package

## Benefit from in-depth lyophilization training in small groups via remote learning from our team of experts.

A 7-module training package scheduled in segments at your convenience will enhance your group's expertise while enabling questions to get addressed in a timely, personal manner.

Real life case studies will be utilized to build familiarity with data analysis and problem solving.

Best practices will be introduced and reinforced based on the latest industry knowledge and the principles of good freeze dryer design.

### Theory of Freeze-Drying

- What happens to product and what is the desired outcome of the 4 process steps including pre and post freeze-drying process steps
  - Explains the physics behind each step
  - Describes the attributes of a successfully lyophilized product
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### Principles of Lyophilizer Design

- Refrigeration systems – principles of operation
  - Condenser design – smooth walled, coil type and plates, internal vs external
  - Vacuum pump – discussion of efficiency, care, oil sealed vs dry vacuum pumps
  - Product temp measurement – pros and cons of different sensors
  - Vacuum gauges
  - Shelf Heat Transfer system
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### GLP (Good Laboratory Practice) for Freeze-Drying

- Improving batch uniformity/minimizing edge effects
  - Cycle programming including vacuum setpoint selection
  - Maintaining your freeze dryer – best practices
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### Remote/Hands on Software Training

- Remote access to demo equipment software and live equipment for hands on training
  - Programming cycles utilizing best practices
  - Maintaining and testing your freeze dryer
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### Cycle Optimization Tools

- Thermocouples & RTDs – standard and wireless
  - Pirani/Capacitance Manometer convergence
  - Barometric endpoint determination
  - Smart FD & Auto MTM
  - TDLAS
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### Analyzing Batch Reports / Troubleshooting / Understanding Process Alarms

- Case studies introduced to help develop familiarity
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### Understanding Equipment Capabilities for Your Freeze Dryer

- Testing to determine equipment capabilities
- Choked flow
- Loaded performance vs dry & empty

# Our story

Scientific Products has a distinguished history as a leading global provider of state-of-the-art fill-finish drug manufacturing solutions, research, pilot and production lyophilizers, laboratory equipment and supplies, and specialty glassware. With a journey that began over 100 years ago, our family of brands, including Hull i-Dositecno, VirTis, Genevac, Hotpack, FTS, Bel-Art, and Wilmad, establishes us as a leader in the pharmaceutical and life science markets.

In December 2021, Scientific Products became part of ATS, an industry-leading automation solutions provider. ATS addresses the sophisticated manufacturing automation and service needs of some of the world's most successful businesses. This union creates differentiated value for our customers by partnering Scientific Products' offerings with synergistic capabilities of the ATS Life Sciences portfolio, such as system integration and aseptic processing, under one unified brand.

The 3 parallelograms in our logo reflect our core company values: **People, Process, and Performance**. As part of ATS, Scientific Products leverages the ATS Business Model (ABM) to train, develop, engage, empower, and energize our people to make impactful changes in the organization. This connective thread provides clarity in what we do and why we do it, and leverages a set of tools and resources that allow us to achieve customer-focused business goals through discipline and continuous improvement.



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