



# Remote Lyophilization Training Package

## Theory of Freeze-Drying – 2 hours

- 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

## Principles of Lyophilizer Design – 90 minutes

- 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

## GLP (Good Laboratory Practice) for Freeze-Drying – 1 hour

- Improving batch uniformity/minimizing edge effects
- Cycle programming including vacuum setpoint selection
- Maintaining your freeze dryer – best practices

## Remote/Hands on Software Training – 90 minutes

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

## Cycle Optimization Tools – 1 hour

- Thermocouples & RTDs – standard and wireless
- Pirani/Capacitance Manometer convergence
- Barometric endpoint determination
- Smart FD & Auto MTM
- TDLAS

## Analyzing Batch Reports / Troubleshooting / Understanding Process Alarms – 90 minutes

- Case studies introduced to help develop familiarity

## Understanding Equipment Capabilities for Your Freeze Dryer – 1 hour

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

**Benefit from  
in-depth  
lyophilization  
training in small  
groups via  
remote learning  
from the experts  
at SP.**

A seven-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.

Training Package Cost \$3175

For more information, contact:  
Leslie Mather  
Director of Training  
[leslie.mather@spscientific.com](mailto:leslie.mather@spscientific.com)