





# COURSE SCHEDULE

## DAY ONE

### Course Overview

This course provides a comprehensive insight into a wide range of elements in freeze drying, including details on the concepts and practical aspects of each step of the process, principles and methodologies for formulation development and characterization.

Additionally, it covers approaches to cycle development and scale-up including Quality by Design, fundamental equipment features of refrigeration, vacuum and control systems i.e. PAT tools, and aspects of troubleshooting, maintenance and qualification.

### + Day One

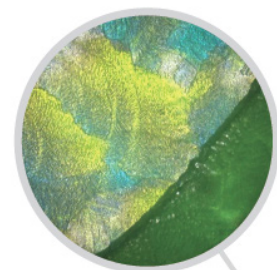
- Welcome & Course Opening
- Introduction to Freeze Drying Technology
- Characterisation methods & stages of Freeze Drying
- Break
- Characterisation Techniques
- DTA/ Impedance Analysis
- Freeze Dryer Design (2)
- Lunch (included)
- Primary & Secondary Drying
- Freeze Dryer Systems
- Break
- General Concepts of Formulation
- Refrigeration Systems (1)

### + Day Two

- Formulation Characterization
- Vacuum Systems
- Break
- Temperature Measurement & Calibration
- Refrigeration Systems (2)
- Lunch (included)
- Cycle Development & Scale-Up
- Validation & Qualification Systems
- Break
- SMART & ControlLyo Technology
- Workshop

### + Day Three

- Maintenance Strategy for Freeze Dryers
- QbD in Freeze Drying
- Break
- Sterilization Systems
- Containers, Stoppers & Barrier Technology
- Lunch
- Freeze Dried Product Analysis
- CIP Systems
- Workshop 2 (Introduction)
- Refreshments
- Workshop 2 (Conclusion)
- Course Ends





## IS THIS COURSE RIGHT FOR YOU?

*IF YOU'RE INTERESTED IN:*

- 1) Biotechnology
- 2) Pharmaceuticals
- 3) Freeze and Cycle Development
- 4) Diagnostic industries

## MEET THE EXPERTS



### **+ Dr. Kevin Ward**

Kevin was awarded his PhD for studies in pharmaceutical freeze drying, focusing on the use of protective agents in formulations of proteins and liposomes for drug and vaccine delivery. He is R&D Director at BTL and regularly lectures on the freeze drying process.



### **+ Kevin Smith**

With over 20 years of industry experience, Kevin is the Technical & Service Director. He has carried out installations, qualifications and re-location of a variety of freeze drying machines and is responsible for overseeing the day to day runnings of the engineering team.

