

Smart Moisture Management

From Water Activity to Drying Process Optimization

Why this workshop

Moisture is one of the most important - and often misunderstood - variables in food engineering. Moisture content alone does not explain how water influences microbial safety, texture, stability, shelf life, packaging performance, or manufacturing efficiency. Those outcomes depend on how water behaves in the product and how it interacts with temperature, humidity, and the drying process.

This interactive workshop gives participants a practical framework for connecting water activity, moisture content, sorption behavior, drying dynamics, air conditions, and microbial stability. Hands-on demonstrations, worksheets, psychrometric analysis, and processing examples translate moisture science into decisions that can improve product development and manufacturing.

Learning outcomes

By the end of the workshop, participants will be able to:

1. Distinguish water activity from moisture content and explain how temperature affects measurement and interpretation.
2. Interpret moisture sorption isotherms to identify critical regions for texture, stability, and moisture uptake or loss.
3. Apply sorption data to shelf-life prediction, packaging selection, coating evaluation, formulation, and production specifications.
4. Use temperature profiles and the delta T approach to evaluate dryer performance, endpoint control, and process variation.
5. Connect psychrometric conditions, product water activity, temperature, and time to drying performance and microbial thermal inactivation.

Target audience

Food engineers, food scientists, academic researchers, postgraduate students, and professionals in R&D, quality, food safety, process development, operations, drying, and packaging. The workshop is especially useful for anyone who needs to convert moisture measurements into better engineering decisions.

Wednesday, November 11, 2026	12:50-2:20 PM
Hilton Waikoloa Village	Waikoloa Village, Hawaii

Prerequisites

No prior knowledge of water activity, moisture sorption isotherms, psychrometrics, or advanced drying control is required. A general interest in food engineering, product stability, food safety, or manufacturing is sufficient.

Workshop format

An in-person, 90-minute session featuring expert instruction, demonstrations, guided worksheets, and discussion.

0:00-0:15	1 Fundamentals of moisture science Presenter: Zachary Cartwright and Mary Galloway Compare water activity and moisture content, examine temperature effects, and use an AQUALAB 5 TE demonstration to show why similar water activity values can correspond to very different moisture contents.
0:15-0:35	2 Moisture sorption isotherms as an R&D tool Presenter: Zachary Cartwright and Mary Galloway Move beyond a single measurement. Participants identify critical moisture zones and explore applications in texture, specifications, shelf life, packaging WVTR, films and coatings, temperature effects, and moisture migration.
0:35-0:55	3 From moisture science to dryer optimization Presenter: Zachary Cartwright Connect product behavior to process performance. Review dryer temperature profiles, the delta T approach, evaporation zones, endpoint control, variation reduction, energy use, and the relationship between in-process measurements and final quality.
0:55-1:00	Transition Presenter: All presenters From product moisture to process and microbial stability.
1:00-1:30	4 Humidity, temperature and microbial thermal inactivation Presenter: Ren Yang Use practical psychrometric examples to connect air temperature, relative humidity, dew point, absolute humidity, and moisture removal with drying performance and microbial resistance, including an apple-drying case study.

Instructors

Dr. Zachary Cartwright, PhD	Principal Food Scientist, AQUALAB by Addium; Adjunct Professor, School of Food Science, Washington State University
Mary Galloway	Lab Director, AQUALAB by Addium
Dr. Ren Yang, PhD	Assistant Professor of Food Engineering, South Dakota State University; Adjunct Faculty, Washington State University

Registration and questions: See the Conference of Food Engineering website for registration, costs, and current conference information: socfoodeng.org/cofe