



The Science of Beer

Setting the Standard: A Deep Dive into Quality

June 4 – 8, 2018 ■ Fort Collins, Colorado, U.S.A.
Colorado State University ■ CSU Stadium, Room 1204
Preliminary Program, Subject to Change

Monday – June 4

- 8:00 am** **Registration, coffee/tea**
- 9:00 am** **Introduction and Welcome**
Meet and greet for participants and instructors followed by an introduction and expectation discussion
Jeff Callaway, Colorado State University
Rob Christiansen, New Belgium Brewing Company
- 11:00 am** **Lunch Provided**
- 12:00 pm** **Microbiology Day 1 Yeast and More Yeast!**
Rob Christiansen, New Belgium Brewing Company
Kelly Tretter, New Belgium Brewing Company
- Physiology and Metabolism of *Saccharomyces Cerevisiae*
 - Cell Counting Basics
 - Yeast Health (viability and vitality)
 - Lab Exercises
- 4:00 pm** **Day 1 Wrap Up**
- 5:00 pm** **New Belgium Brewing Company Tour and Beers**
Use your Uber credits to get to 500 Linden St., Fort Collins, CO 80524.
- 7:00 pm** **Dinner at Illegal Pete's**
320 Walnut St., Fort Collins, CO 80524. It's a short .5 mile walk from New Belgium Brewing Company. Use your Uber credits to get back to your hotel.

Tuesday – June 5

- 8:00 am** **Microbiology Day 2 Propagation and Pitching, Contamination**
Rob Christiansen, New Belgium Brewing Company
Kelly Tretter, New Belgium Brewing Company
- Analysis of Yeast Stats and what it Means in Your Brewery
 - Yeast Pitching Basics
 - Propagation
 - Cone to Cone Pitching
 - How and When to Harvest Yeast
 - Math lessons
 - Contamination in Beer and Yeast
 - Types of Media and Why/How to Use Them
 - Reading and Identifying Contamination on Plates
 - Identification Techniques (PCR, MALDI-TOF, Sequencing)
 - Lab Exercises
 - Where to Start with a Micro Program
 - Resources for Micro in our Industry
- 12:00 pm** **Lunch Provided**
- 1:00 pm** **Microbiology Day 2 Propagation and Pitching, Contamination continued**
- 4:00 pm** **Day 2 Wrap Up**
- 4:30 pm** **Ramskeller Pub**
Tour, followed by beer and pizza.
Colorado State University, 1101 Center Ave Mall, Fort Collins, CO 80521
Use your Uber credits to get back to your hotel.

Wednesday – June 6

- 8:00 am** **Brewing Chemistry Methods**
Katie Fromuth, Colorado State University
Karl Lakenburg, Anheuser-Busch InBev
Dana Sedin, New Belgium Brewing Company
- Safety
 - Good Laboratory Techniques
 - MOA Overview and Standards Calculation
 - Sampling, Degassing, and Sampling Stability
 - Specific Gravity and Calculated Values
 - Exercise: Pipetting and Building a Calibration Curve
 - pH and Titratable Acidity
 - Spectrophotometer – Wort and Beer Methods
 - Tristimulus

- Exercise: IBUs
- Alcohol
- SO₂
- Gluten
 - Exercise: Anton Paar
- Physical Stability and Turbidity
- Gas Chromatography
- Liquid Chromatography
- VDKs
- IAAs versus IBUs
- DMS
- Fermentation Volatiles
 - Exercise – Chromatography Lab Visit
- Foam
- Metals
- Beer Flavor and Fishbones
- Flavor Stability
- Method Validation, Control Samples, and Proficiency Schemes
- Lab Design, Maintenance, and Outsourcing

12:00 pm Lunch Provided

1:00 pm Brewing Chemistry Methods continued

3:30 pm Day 3 Wrap Up

4:00 pm Bus Departs

Bus departs CSU Gifford Building and will return at approximately 11:00 pm.

5:00 pm ASBC LABS (Local Area Brewing Science) Meeting and Dinner at Avery Brewing Company in Boulder

Bus transportation provided to/from 4910 Nautilus Ct N, Boulder, CO 80301.

11:00 pm Bus Returns to CSU Gifford Building

Use your Uber credits to get back to your hotel.

Thursday – June 7

9:00 am Sensory Program Development

Lindsay Barr, New Belgium Brewing

- Introduction to Sensory Analysis
 - Overview of Flavor and Sensory Evaluation
 - Overview of Sensory Principles
 - Sensory Program Parameters
- Building a Sensory Program
 - Panelist Selection

- Sensory Laboratory Space
- Panelist Training
 - Introduction to Attribute Training
 - Activity – Flavor Training
- Sensory Evaluation in Quality Control
 - Maintenance of Product Quality
 - Measuring Quality
- Sensory Evaluation Throughout the Process
 - Sampling Plans
 - Documentations and Reaction Plans
- Statistical Quality Control
- Sensory Methods
 - Discrimination Testing
 - Threshold Testing
 - Shelf Life Analysis
 - Activity – Case Studies and Method Selection
- Validation
 - Measuring Panelist Acuity
 - Measuring Panel Performance
 - Activity – Validating and Utilizing Panelist Data
- Sensory Evaluation in New Product Development
 - Descriptive Analysis Principles and Practices
 - Activity – Running a Descriptive Analysis Panel
- Conclusion
 - Review of Best Practices

12:00 pm **Lunch Provided**

1:00 pm **Sensory Program Development continued**

4:30 pm **Day 4 Wrap Up**
Open night to explore Fort Collins

Friday – June 8

8:00 am **Raw Materials**
Christian Holbrook, New Belgium Brewing Company

- Hop Quality – Basics for Craft Brewers
- Malt COA Interpretation – Breaking down the Numbers
- Activity – Troubleshooting Potential Contaminants

11:30 am **Lunch provided**

12:30 pm **Packaging Quality: Why Paperboard Matters**
Perry Dickerson, Left Hand Brewing Company

- Packaging Supplier Quality

- Setting Expectations with Suppliers
- Regular Visits
- Quality Expectations
- Using Data to Hold Suppliers Accountable
- Building Partnership to Maximize Supplier Relationships
- In-process Quality
- Critical Parameters to Monitor for Package Ops
 - Total Package Oxygen
 - Fill Volume
 - Can Seams
- Voice of the Customer
 - Using Feedback to Improve Quality of Product
 - Activity – Group problem solving exercises based on customer complaints
 - Review and Discussion of problem solving case studies, “Real” Results

4:30 pm **Day 5 Wrap Up**

5:00 pm **Q&A Session at Ramskeller Pub (optional)**
Colorado State University, 1101 Center Ave Mall, Fort Collins, CO 80521