

Basics of Brewing Quality

A Hands-On Workshop

Tentative agenda:

8:00 – 8:15 – Welcome, Orientation and Safety

8:15 – 9:30 – Lecture: Brewing Microbiology Basics

- Yeast
 - Saccharomyces vs non-Saccharomyces
 - Lager vs ale
 - "Culture" yeast vs "wild" yeast and consequences of contamination
- Bacteria
 - Types aerobic/anaerobic/facultative
 - Consequences of contamination
 - Staining tests (Gram stain), catalase tests

9:30 - 10:30 - Lecture: Microscopy Basics

- The Microscope
 - o Basics of microscope set-up
 - Wet mounting/dry mounting/oil immersion
 - Yeast counting with a hemocytometer
 - Staining: methylene blue & Gram stain
- Plating and Media
 - Aseptic techniques
 - o Differential media, selective media, non-selective media
 - Isolating and streaking pure cultures
- Other Micro
 - Forced fermentations for estimating attenuation
 - Yeast propagation
 - Sediment analysis
 - PCR basics
 - Catalase tests

10:30 - 12:30 - Microbiology Laboratory Practical

- Station 1: The Microscope
 - Microscope set-up
 - Pipetting, dilutions and staining live samples
 - Counting yeast on the hemocytometer
- Station 2: Plating
 - Perform Aseptic technique
 - Conduct pour plate, streak plating and isolation streaking
 - Conduct pipetting 1 ml into HLP
 - Reviewing differential media and selective media
 - Look at results from sample plates
 - Document total count, and make observations on selective/differential media.
- Station 3: Gram Stain and Catalase Test

12:30 - 1:30 - LUNCH

1:30 - 3:00 pm - Lecture: Brewing Chemistry

- Sanitation Performance
 - ATP checks
 - Residual chemicals & pH testing
 - o Water
 - Pectinatus and biofilm
- Brewhouse Performance
 - o Wort gravity via hydrometer, densitometer, refractometer and direct weight
 - Spectrophotometry tests, beer color, IBUs in beer
 - Wort fermentability
- Fermentation Performance
 - Calculations extract of original wort, real degree of fermentation, real extract and ethanol
 - Diacetyl measurement quick/simple vs complex
 - o Other checks oxygen pickup, temperature controls, pH, titratable acidity
- Finishing and Packaging Performance
 - Dissolved oxygen in beer
 - Beer stability and clarity
 - Methods for alcohol measurement distillation, GC, NIR
 - Spectroscopy
 - Beer pH degassing, probe calibration and buffers
 - Checking filtration performance
 - Package gases (TPO, CO₂, headspace air)
 - Packaging material quality (crowns, glass)
- Food Safety Hazards
 - Glass, chemicals, etc.

3:00 - 4:30 - Quality Control Lab Practical

- Station 1 Finishing and Packaging Performance
 - Cold-side Dissolved oxygen in beer
 - Zahm Nagel Piercer demonstration
 - Cold-side Beer stability/clarity
 - Sediment under 3 microscopes
 - Discussion of how to perform sediment test (Decant, spin, wetmount, stain)
- Station 2 Beer Stability and Clarity
 - Microscopy of common sediments
 - o Eosin Y stain
- Station 3 Brewhouse performance
 - o Wort gravity via hydrometer, densitometer and refractometer
 - Test wort (n = 3) with all three methods
 - Note variation between results
 - o pH

4:30 - 5:00 - Wrap-up: Putting it all together

Data analysis and interpretation

