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
  - 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
  - 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

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

- Sanitation Performance
  - ATP checks
  - Residual chemicals & pH testing
  - Water
  - Pectinatus and biofilm
- Brewhouse Performance
  - 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
  - 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, CO_2, 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
  - Eosin Y stain
- Station 3 - Brewhouse performance
  - Wort gravity via hydrometer, densitometer and refractometer
    - Test wort (n = 3) with all three methods
    - Note variation between results
  - pH

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

- Data analysis and interpretation