COURSE OUTLINE

INTENSIVE BREWING COURSE

Monday

- An overview of brewing from the raw materials to bottling

- Brewing Raw Material and their importance ;
    - Water (pH, hardness, alkalinity, calcium, carbon filtration, salts, acidification or de-acification, etc) ;
    - Barley and malting (barley characteristics, malting process, malt specifications versus brewing process) ;
    - Specialty malts (characteristics related to recipes formulation (suggested addition rates), flavor and foam stability);
    - Brewing adjuncts (wheat, corn, rice, syrups, fruits, honey, spices, etc) ;
    - Hops (growing, characteristics, addition rates) ;

Tuesday

- Theory and practical techniques for the Brewing courses ;
    - Recipe formulation ;
    - BME and yield calculation ;
    - Raw material reception and storage ;
    - Milling (proper grind to obtain proper bed porosity and yield extract) ;
    - Mashing (enzyme activity related to temperature, pH and water to grist ratio, single infusion, step mashing and decoction) ;
    - Lautering (efficiency versus wort clarity and yield, stuck mash and what to do) ;
    - Hop boiling (coagulation, Maillard reaction, evaporation rate, oxidation, hop isomerization, time of addition, etc) and additives (yeast food, zinc sulfate, irish moss, etc).
    - Whirlpool (efficiency of trub separation from the wort, minimization of trub carry over, whirlpool and settling time).

Wednesday

- Theory and practical techniques for the Brewing courses ;
    - Wort cooling ;
    - Aeration (glycogen and lipids)
        - Under and over oxygenation
    - Temperature control.
- Theory and practical techniques of the fermentation ;
    - Yeast ;

- Yeast strains (ale lager and lager properties) ;
  - Attenuation limits (ADF and RDF)
  - Flocculation properties
  - By-products specificity
  - Fermentation temperature
- Yeast pitching (rate, viability, vitality) ;
  - Under and over pitching
  - Proper method
- Yeast storage (temperature, time) ;
  - Vessel specification
  - Handling procedure
- Yeast contamination ;
  - Bacteria (gram + and -)
    - HLP testing
  - Wild yeast
- Yeast washing ;
- Harvesting (proper handling);
  - Centrifuge
  - Small modified keg or Cornelius
- Yeast propagation method ;
- Viability (dead cell count ; methyl blue stain) ;
- Vitality (iodine testing) ;
- Flocculation (properties).
  - Degree of flocculation versus attenuation and diacetyl control

Thursday

- Fermentation ;
  - Yeast sugars intake with other nutrients such as amino acids, minerals and vitamins;
  - Fermentation profile (Temperature controls, Crabtree effect) ;
  - Equipment (fermentor, pumps, hoses, etc) ;
  - Double and triple fermentation (yeast and sugar addition) ;
  - Fermentation by-products ;
    - Fusel alcohols, aldehydes, esters, ketones, organic acids, sulfur compounds.
    - Effects of different conditions on the production of these by-products and what to do to correct a situation.
  - Attenuation (limit attenuation) ;
  - Fermentation problems, reasons and corrections (extended lag phase, incomplete end attenuation (stuck fermentation) and off-flavours)

- Maturation and finishing **;**
  - Vessels configuration ;
  - Beer oxidation and air exclusion techniques ;

- Temperature (chill haze) ;
- Beer stabilization (isinglass, silica gel, biofine and pvpp) ;
- Beer filtration ;
  - DE, pad, lenticular, cross flow filtration
  - Sterile filtration
- Carbonation (natural, forced in line or in tank and re- fermentation in a bottle) ;
- Quality Control parameters.

Friday

- Sensory evaluation ;
  - Taste description of taste buds
  - Beer flavor wheel and how to taste beer
  - Beer defects (6 spike samples) to judge
  - Taste panel room
  - Beer tasting program in a microbrewery
  - Beer defects and attribute

- Beer shrink (how to reduce wort and beer losses) ;

- Brewing equipment cleaning and sanitizing program ;

- Packaging ;
  - Container cleaning
  - Bottling and air exclusion
  - Quality control parameters
  - Pasteurization
  - Labeling

- Quality control program ;
  - Laboratory supplies
  - Test description
  - Brewing and Fermentation log sheets
  - Program

- Brewing Compendium