Instructor
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Office Hours: By appointment (PTSC 115)

Rationale
The class is designed to give an overview of the biological and chemical processes involved in brewing beer and an appreciation for beer styles and flavors. Perspectives of brewing from the homebrewer to the industrial brewer will be discussed.

General Course Objectives
Have an appreciation for beer’s role in society including history, distribution and economic importance
Have an understanding of the raw materials used in brewing
Have an understanding of the biological and chemical processes involved in brewing
Have an appreciation of the different styles, flavors, and quality characteristics of beer

Materials of Instruction
No textbook will be required but books listed in the reference section can provide in-depth information. On-line articles will also be used to provide additional information.

Instructional Modes to be used
Lectures will be used to present information that will be used for evaluation (quizzes and tests). Field trips and hands-on exercises will also be utilized.

Academic integrity
As a core part of its mission, the University of Arkansas provides students with the opportunity to further their educational goals through programs of study and research in an environment that promotes freedom of inquiry and academic responsibility. Accomplishing this mission is only possible when intellectual honesty and individual integrity prevail.

Each University of Arkansas student is required to be familiar with and abide by the University’s 'Academic Integrity Policy' at honesty.uark.edu/policy. Students with questions about how these policies apply to a particular course or assignment should immediately contact their instructor.

Attendance
Attendance is expected during all class periods. Excused absences include personal illness (with a doctor’s note), illness or death of a family member, and participation in official university events (must be notified in advance).
Student Evaluation
Mid-term exams (2@100 pts)
Brewery tours (2@35 pts)
Comprehensive Final exam (150 pts)
Homework (30 pt)
TOTAL 450 PTS

The semester grade will be determined by dividing the total points accumulated by the total possible to obtaining a percentage. The following percentages will be used to determine letter grades:
A    90-100%
B+   85-89%
B    80-84%
C+   75-79%
C    70-74%
D+   65-69%
D    60-64%
F    <60%

Instructor consent and additional assignments are required for graduate credit.
Course Outline

1. Background
   - What is beer – water, malt, hops, and yeast
   - Cereals as staples -reason for, civilizations and their staple
   - Bread and beer
     - Cereal seed structure and growth–embryo, scutellum, aleurone, endosperm, hulls
     - Seed composition– starch (2 types,) protein, oil, and husks
   - Historical look at beer
     - Worldwide
     - United States
     - Current production and consumption

2. Brewing process overview
   - Malting
   - Milling
   - Mashing – gelatinization, liquefaction, and saccharification
   - Wort separation -sparging and lauterung
   - Boiling and bittering
   - Fermentation
   - Aging and packaging

3. Malting process and types of malt
   - Process – cleaning, steeping, germination, kilning
   - Base malts vs specialty malts – diastatic power, color, flavor, dextrins
   - Malting grains – barley, wheat, rye (others)
   - Other malts and adjuncts – non-barley malt, cereal adjuncts, sugars, malt extracts

4. Wort production
   - Milling malt
   - Mashing grist –gelatinization, liquefaction, and saccharification
   - Wort separation - sparging and lauterung
   - Boiling – sterilization, isomerization, hot break, Malliard reaction, sulfur compounds
   - Wort strength – influencing factors, measurement

5. Hops
   - History of bittering ingredients - gruit, hops & others
   - Classification, growth habit, production
   - Alpha acids and bitterness
     - Isomerization
     - IBU calculation
     - Balance GU and BU
   - Beta acids and essential oils
   - Antimicrobial properties
     - Hop forms – wet hops, whole hops, pellets, extracts
     - Protection from blue light
6. Yeast
   Evolution of brewing yeast
   Preparation - wort cooling and oxygenation
   Fermentation – overview, fermentation of sugars, other yeast products
   Types of brewing yeast - ale, lager, wine, strains within species
   Factors affecting yeast performance – pitching rate, oxygen, temperature
   Other organisms used in beer brewing *Brettanomyces*, *Lactobacillus*, wild yeasts
   Contaminant types
   Yeast as a waste byproduct

7. Water profiles
   Brewery needs
   General fitness - pH and hardness, minerals

8. Packaging and distribution
   Maturation – aging, secondary fermentation, lagering
   Stabilization
   Clarification – centrifugation, cold conditioning, fining agents, filtration
   Microorganism removal - pasteurization, sterile filtration
   Gas control – CO₂, nitrogen
   Packaging - Bottles, cans, kegs
   Quality control
   Distribution

9. Beer styles
   General Characteristics – gravity, strength, attenuation, color, bitterness, clarity, carbonation
   Recipe formulation
   BJCP guidelines
   Lagers
   Pale lager
   Amber lager
   Dark lager
   Munich/Dunkle
   Bock
   Ales
   Light colored ales - wheat, whit, Saison
   Hoppy – bitters, pale ales, IPAs
   The dark side – porters, stouts, and brown ales
   Kitchen sink – spiced, vegetable, smoked
   Pucker up- sour, gose, Lambics
   Are you kidding – light, non-alcoholic, gluten-free

10. Beer and Food
    Flavor components
    Quality - flaws, freshness/aging
    Serving – temperature, presentation
    Pairing beer and food
    Cooking with beer
REFERENCES

General Brewing


History


Ingredients


**Styles and Food Pairing**  

