

**BREW 100 Course Outline as of Fall 2022****CATALOG INFORMATION**

Dept and Nbr: BREW 100 Title: FUND FERM SCIENCE

Full Title: Fundamentals of Fermentation Science

Last Reviewed: 5/23/2016

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	3.00	Lab Scheduled	0	8	Lab Scheduled	0
		Contact DHR	0		Contact DHR	0
		Contact Total	3.00		Contact Total	52.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00

Total Student Learning Hours: 157.50

Title 5 Category: AA Degree Applicable

Grading: Grade or P/NP

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly:

**Catalog Description:**

Overview of beer brewing including history, malting, brewing, fermentation, finishing, and packaging, with a focus on ingredients and their effect on color, aroma, and flavor.

**Prerequisites/Corequisites:**

Concurrent Enrollment in BREW 112

**Recommended Preparation:**

Eligibility for ENGL 100 or ESL 100

**Limits on Enrollment:**

Must be age 18 or older

**Schedule of Classes Information:**

Description: Overview of beer brewing including history, malting, brewing, fermentation, finishing, and packaging, with a focus on ingredients and their effect on color, aroma, and flavor. (Grade or P/NP)

Prerequisites/Corequisites: Concurrent Enrollment in BREW 112

Recommended: Eligibility for ENGL 100 or ESL 100

Limits on Enrollment: Must be age 18 or older

Transfer Credit:

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

<b>AS Degree:</b>	<b>Area</b>	<b>Effective:</b>	<b>Inactive:</b>
<b>CSU GE:</b>	<b>Transfer Area</b>	<b>Effective:</b>	<b>Inactive:</b>
<b>IGETC:</b>	<b>Transfer Area</b>	<b>Effective:</b>	<b>Inactive:</b>
<b>CSU Transfer:</b>		<b>Effective:</b>	<b>Inactive:</b>
<b>UC Transfer:</b>		<b>Effective:</b>	<b>Inactive:</b>

**CID:**

**Certificate/Major Applicable:**

Certificate Applicable Course

## **COURSE CONTENT**

### **Student Learning Outcomes:**

At the conclusion of this course, the student should be able to:

1. Describe the raw materials used in brewing and their sources.
2. Demonstrate the impact of various ingredients on finished beer through creation of beer recipes.

### **Objectives:**

Upon completion of this course, students will be able to:

1. Identify different microbes encountered in beer production and their influence on the final product.
2. Describe the chemical pathways in fermentation and how they are impacted by their environment.
3. Describe the impact of brewing water composition on final product.
4. Identify options for carbohydrate sources in brewing and their impact on final product.
5. Describe the cultivation and processing of hops and how they influence beer.
6. Describe the stages of the brewing process.
7. Create recipes for beer to show knowledge of ingredients.
8. Troubleshoot problems in brewing, fermentation, finishing, and packaging.

### **Topics and Scope:**

- I. History of fermented foods
- II. Regulatory agencies - licensing and reporting
- III. Yeast and bacteria
  - A. Beneficial microbes
  - B. Favorable conditions
  - C. Problem microbes and their control
  - D. Sources of microbes
  - E. Microbes and beer style
- IV. Biochemical pathways in fermentation
  - A. Glycolysis

- B. Products and byproducts
- C. Precursors
- D. Required nutrients
- E. Environmental impacts (temperature, pH, clarity)
- F. Post fermentation changes
- V. Brewing ingredients
  - A. Water
    - 1. History vs. current practices
    - 2. Composition and influence on beer style
  - B. Carbohydrate sources
    - 1. History
    - 2. Types of barley
    - 3. Favorable growing conditions
    - 4. Stages of malting
    - 5. Chemical changes during malting
      - a. Enzyme induced
      - b. Heat induced
  - C. Other grains and adjuncts
- VI. Hops
  - A. History and current trends
  - B. Types of hops
  - C. Favorable growing conditions
  - D. Aroma and flavor influence
  - E. Hop products (green, dried, whole, pellets)
- VII. Stages of Brewing (wort production)
  - A. Milling
  - B. Mashing
  - C. Lautering
  - D. Boiling
  - E. Cooling
- VIII. Fermentation
  - A. Fermenter design
  - B. Optimal conditions
  - C. Changes
  - D. Temperature control
  - E. Flocculation/clarifying
- IX. Maturation
  - A. Optimal conditions
  - B. Changes
- X. Finishing
  - A. Beer clarification
  - B. Filtration
  - C. Carbonation
- XI. Packaging
  - A. Container types
  - B. Effects on finished beer
- XII. Bottling and Kegging
  - A. Filling methods
  - B. Optimal storage conditions

**Assignment:**

1. Reading in required text, 20 - 40 pages per week
2. Research and report on a creative new ingredient or procedure being used in the brewing industry (5-10 pages)
3. Problem solving simulation exercise
4. Quizzes, midterm and final exam

### Methods of Evaluation/Basis of Grade:

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Research report; simulation exercise

Writing  
20 - 40%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Problem solving simulation exercise

Problem solving  
20 - 40%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

None

Skill Demonstrations  
0 - 0%

**Exams:** All forms of formal testing, other than skill performance exams.

Quizzes, midterm and final: multiple choice, true/false, completion

Exams  
20 - 40%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

None

Other Category  
0 - 0%

### Representative Textbooks and Materials:

Beer and Ingredients, The Ultimate Beer Ingredient Guide, What does What. Take your homebrew to the next level, homebrew's ingredient guide. By Patrick Klungle 2nd Edition (2012)

Water: A Comprehensive Guide for Brewers (Brewing Elements), by John Palmer and Colin Kaminski 1st Edition (2013)

Instructor prepared materials